International Trade

Numerical and Geometric Problems

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ESZTER SZABÓ-BAKOS

INTERNATIONAL TRADE

Numerical and geometric problems

Corvinus University of Budapest
School of Economics
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PREFACE

Only a few students start their international trade studies because they desperately want to set up Lagrange functions, intend to solve a system of eight equations for eight unknown variables or desire to shift the budget constraint to the left or right. The desire for acquisition of knowledge is always led by relevant economic questions

- Why do countries trade at all? Why don't they produce all goods by themselves?
- Is free trade really beneficial?
- Why do French farmers drop imported Spanish apples on French highways?
- Why does Germany support Hungarian growth and development via the EU's budget, why don't they directly give us the founds?
- Why do economists consider that barriers to trade have an adverse effect on the economy while didn't even blink their eyes when South Korea introduced a severe quota on American TV series in the '90s.

To answer these -- and several similar -- questions we need two things: concepts and artificial economies (macroeconomic models).

Without knowing the concepts we would not know why "comparative advantage" is identified as the driving force of international trade, or we could not understand why "specific factor owners in the import competing industries are considered to be losers of free trade".

Without models we wouldn't be able to clearly and logically explain what we think about the functioning of the economy, and why we think that. It is easier to answer the "but why" question that occurs during the analysis of the expected effect of an economic event or a policy intervention by showing: under given behavioral patterns and assumptions, the increase in variable X that appears in equation eight really modifies the variable Z in equation two.

to answer relevant economic questions we need some expertise on using specific concepts accurately and on building, solving and analysing formal macroeconomic models. This problem set was written to develop this expertise.

1. RICARDIAN MODEL
AUTARKY

1.

The Representative Consumer's Problem

1. Problem

The representative consumer of an economy purchases only wallet and painting. She derives utility from consuming these goods. The following function represents the consumer's utility: $U = 2.30 D_{\text{wallet}}^{0.25} D_{\text{painting}}^{0.75}$. The total income of the consumer is 412 units, the price of a wallet is 6.05, and she has to buy painting at a price of 3.53.

1.

Calculate the optimal amount of D_{wallet}.

Solution In optimum $D_{\text{wallet}} = 17.0248$.

2. Problem

The representative consumer of an economy purchases only fruit cake and lemonade. She derives utility from consuming these goods. The following function represents the consumer's utility: $U = 1.35 D_{\text{fruit cake}}^{0.64} D_{\text{lemonade}}^{0.36}$. The total income of the consumer is 287 units, the price of a fruit cake is 12.55, and she has to buy lemonade at a price of 12.07.

Calculate the optimal amount of $D_{\text{fruit cake}}$.

Solution In optimum $D_{\text{fruit cake}} = 14.6359$.

3. Problem

In a closed economy the behavior of the representative consumer is driven by the following factors:

$$\begin{aligned} U &= 0.36 \ln D_{\text{pistachio}} + 0.93 \ln D_{\text{chicken burger}} \\ \text{income} &= 235 \\ p_{\text{pistachio}} &= 6.19 \\ p_{\text{chicken burger}} &= 12.08 \end{aligned}$$

What is the amount of chicken burger bought by the consumer in optimum?

Solution The optimal amount of chicken burger is 14.0247.

4. Problem

In an economy there are just two goods napkin and milkshake. The representative consumer chooses the amount of napkin and milkshake that – at given prices and income – maximize the following utility $U = 2.04 \ln D_{\text{napkin}} + 0.50 \ln D_{\text{milkshake}}$. The price of napkin is 7.01 and it takes 3.86 units of money to buy a unit of milkshake. The consumer's income is 115.

Find the optimal amount of napkin bought by the consumer!

1.

Solution Under the given assumptions the optimal amount of napkin is 13.1758.

5. Problem

The representative consumer of an economy purchases only soup and tea. She derives utility from consuming these goods. The following function represents the consumer's utility: $U = 1.46 D_{\text{soup}}^{0.30} D_{\text{tea}}^{0.70}$. The total income of the consumer is 342 units, the price of a soup is 9.45, and she has to buy tea at a price of 8.70.

Calculate the optimal amount of D_{soup}.

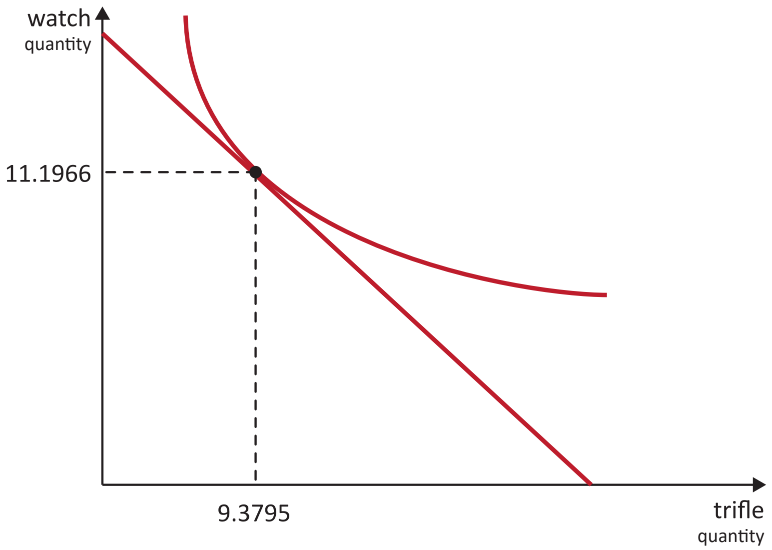
Solution In optimum $D_{\text{soup}} = 10.8571$.

6. Problem

In a closed economy the representative consumer spends her 195 units of income on buying trifle and watch. The prices of the goods are $p_{\text{trifle}} = 5.94$ and $p_{\text{watch}} = 12.44$ respectively. The objective function of the economic agents can be formalized as $U = 0.16 \ln D_{\text{trifle}} + 0.40 \ln D_{\text{watch}}$. Illustrate on the following graph the budget constraint, the indifference curve that contains the optimal bundle of goods and label the optimal choice. How many trifles and how many watchs are in the optimal bundle of goods?

Solution In optimum the consumes buys 9.3795 units of trifle and 11.1966 units of watch. The budget constraint intersects the trifle axis at 32.8283 and the watch axis at 15.6752. The correct graph looks like the following

1.



7. Problem

In an economy there are just two goods teacup and jigsaw. The representative consumer chooses the amount of teacup and jigsaw that – at given prices and income – maximize the following utility $U = 0.51 \ln D_{\text{teacup}} + 1.05 \ln D_{\text{jigsaw}}$. The price of teacup is 5.63 and it takes 3.39 units of money to buy a unit of jigsaw. The consumer's income is 631.

Find the optimal amount of teacup bought by the consumer!

Solution Under the given assumptions the optimal amount of teacup is 36.6409.

8. Problem

In an economy there are just two goods plate and bookshelf. The representative consumer chooses the amount of plate and bookshelf that – at given prices and income – maximize the following utility $U = 1.39 \ln D_{\text{plate}} + 0.95 \ln D_{\text{bookshelf}}$. The price of plate is 4.94 and it takes 3.43 units of money to buy a unit of bookshelf. The consumer's income is 116.

Find the optimal amount of plate bought by the consumer!

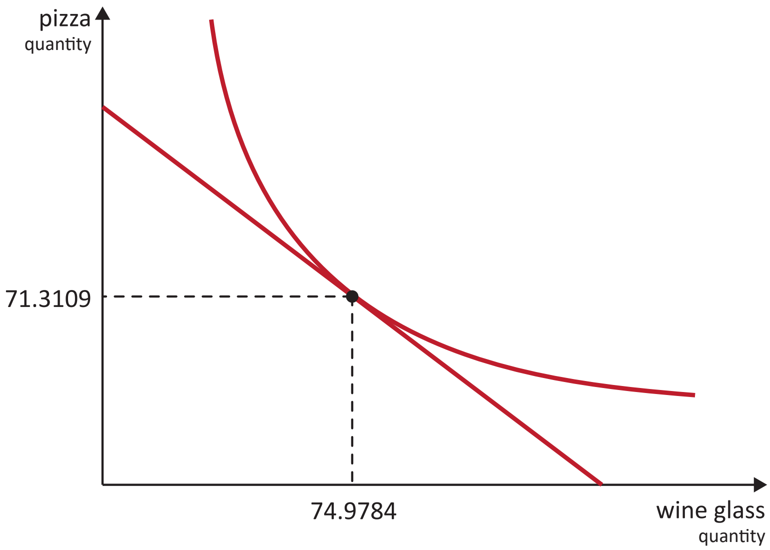
Solution Under the given assumptions the optimal amount of plate is 13.9486.

9. Problem

In a closed economy the representative consumer spends her 433 units of income on buying wine glass and pizza. The prices of the goods are $p_{\text{wine glass}} = 3.15$ and $p_{\text{pizza}} = 2.76$ respectively. The objective function of the economic agents can be formalized as $U = 1.44 \ln D_{\text{wine glass}} + 1.20 \ln D_{\text{pizza}}$. Illustrate on the following graph the budget constraint, the indifference curve that contains the optimal bundle of goods and label the optimal choice. How many wine glasss and how many pizzas are in the optimal bundle of goods?

1.

Solution In optimum the consumes buys 74.9784 units of wine glass and 71.3109 units of pizza. The budget constraint intersects the wine glass axis at 137.4603 and the pizza axis at 156.8841. The correct graph looks like the following



10. Problem

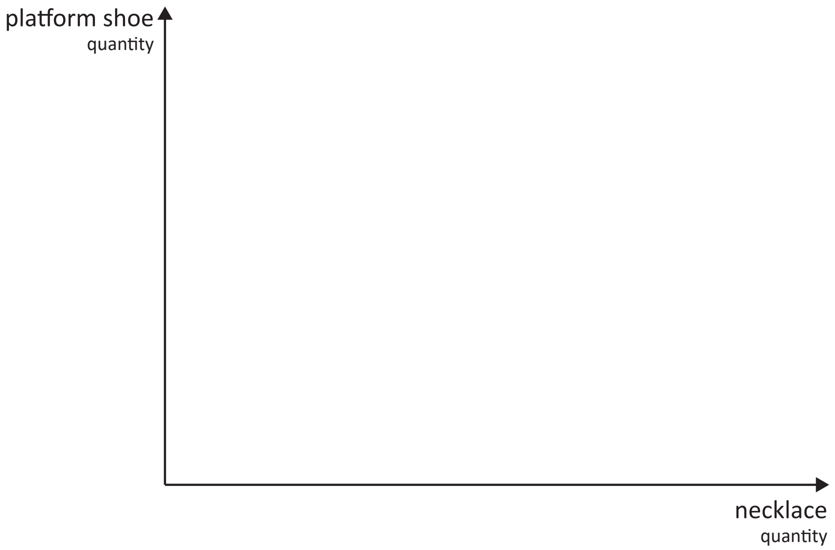
In a closed economy, economic agents consume only two goods: porridge and scarf. It takes 8.59 units of money to buy a unit of porridge and the price of scarf is $p_{\text{scarf}} = 8.04$. The total income of the economic agents is 69 units.

Write down the budget constraint of the agents of this closed economy.

Solution The budget constraint of the economic agents is: $69 = 8.59 \cdot D_{\text{porridge}} + 8.04 \cdot D_{\text{scarf}}$.

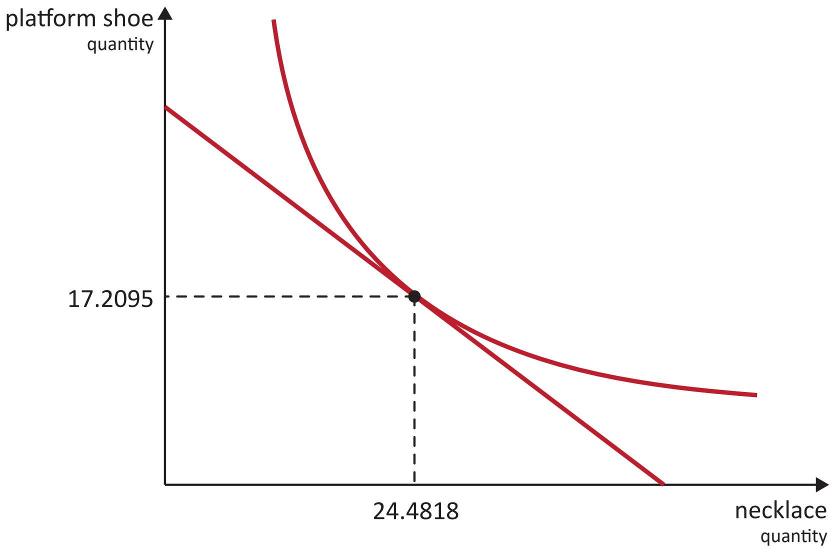
11. Problem

In a closed economy the representative consumer spends her 439 units of income on buying necklace and platform shoe. The prices of the goods are $p_{\text{necklace}} = 10.15$ and $p_{\text{platform shoe}} = 11.07$ respectively. The objective function of the economic agents can be formalized as $U = 1.80 \ln D_{\text{necklace}} + 1.38 \ln D_{\text{platform shoe}}$. Illustrate on the following graph the budget constraint, the indifference curve that contains the optimal bundle of goods and label the optimal choice. How many necklaces and how many platform shoes are in the optimal bundle of goods?



1.

Solution In optimum the consumes buys 24.4818 units of necklace and 17.2095 units of platform shoe. The budget constraint intersects the necklace axis at 43.2512 and the platform shoe axis at 39.6567. The correct graph looks like the following



1.

12. Problem

The goal and constraint of a representative consumer can be characterized by the following formulas:

$$U = 2.08 D_{\text{orange}}^{0.40} D_{\text{watermelon}}^{0.60}$$
$$57 = 2.46 \cdot D_{\text{orange}} + 2.55 \cdot D_{\text{watermelon}}$$

Determine the optimal amount of watermelon purchased by the consumer.

Solution In optimum, the consumer purchases 13.4118 units of watermelon.

13. Problem

In a closed economy the behavior of the representative consumer is driven by the following factors:

$$U = 0.71 \ln D_{\text{aubergine}} + 1.98 \ln D_{\text{wine glass}}$$
$$\text{income} = 260$$
$$p_{\text{aubergine}} = 3.20$$

$$p_{\text{wine glass}} = 11.05$$

What is the amount of wine glass bought by the consumer in optimum?

Solution The optimal amount of wine glass is 17.3190.

14. Problem

The goal and constraint of a representative consumer can be characterized by the following formulas:

$$U = 2.41 D_{\text{mint tea}}^{0.39} D_{\text{cappuccino}}^{0.61}$$
$$495 = 10.29 \cdot D_{\text{mint tea}} + 10.68 \cdot D_{\text{cappuccino}}$$

Determine the optimal amount of cappuccino purchased by the consumer.

Solution In optimum, the consumer purchases 28.2725 units of cappuccino.

15. Problem

The representative consumer of an economy purchases only sweetcorn and pastry. She derives utility from consuming these goods. The following function represents the consumer's utility: $U = 1.71 D_{\text{sweetcorn}}^{0.59} D_{\text{pastry}}^{0.41}$. The total income of the consumer is 408 units, the price of a sweetcorn is 7.54, and she has to buy pastry at a price of 13.93.

Calculate the optimal amount of $D_{\text{sweetcorn}}$.

Solution In optimum $D_{\text{sweetcorn}} = 31.9257$.

16. Problem

In a closed economy the behavior of the representative consumer is driven by the following factors:

$$U = 2.06 \ln D_{\text{yoghurt}} + 0.78 \ln D_{\text{onion}}$$
$$\text{income} = 360$$
$$p_{\text{yoghurt}} = 12.61$$
$$p_{\text{onion}} = 13.63$$

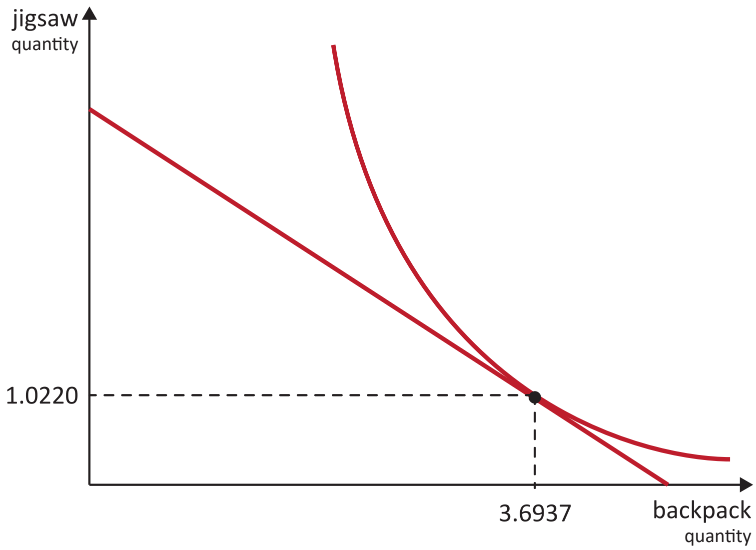
What is the amount of onion bought by the consumer in optimum?

Solution The optimal amount of onion is 7.2541.

17. Problem

In a closed economy the representative consumer spends her 46 units of income on buying backpack and jigsaw. The prices of the goods are $p_{\text{backpack}} = 9.72$ and $p_{\text{jigsaw}} = 9.88$ respectively. The objective function of the economic agents can be formalized as $U = 0.64 \ln D_{\text{backpack}} + 0.18 \ln D_{\text{jigsaw}}$. Illustrate on the following graph the budget constraint, the indifference curve that contains the optimal bundle of goods and label the optimal choice. How many backpacks and how many jigsaws are in the optimal bundle of goods?

Solution In optimum the consumes buys 3.6937 units of backpack and 1.0220 units of jigsaw. The budget constraint intersects the backpack axis at 4.7325 and the jigsaw axis at 4.6559. The correct graph looks like the following



18. Problem

The goal and constraint of a representative consumer can be characterized by the following formulas:

$$U = 0.77 D_{\text{hot chocolate}}^{0.45} D_{\text{pie}}^{0.55}$$
$$568 = 3.51 \cdot D_{\text{hot chocolate}} + 3.34 \cdot D_{\text{pie}}$$

Determine the optimal amount of pie purchased by the consumer.

Solution In optimum, the consumer purchases 93.5329 units of pie.

19. Problem

The goal and constraint of a representative consumer can be characterized by the following formulas:

$$U = 0.20 D_{\text{bagel}}^{0.72} D_{\text{teacup}}^{0.28}$$
$$358 = 10.60 \cdot D_{\text{bagel}} + 10.88 \cdot D_{\text{teacup}}$$

Determine the optimal amount of teacup purchased by the consumer.

Solution In optimum, the consumer purchases 9.2132 units of teacup.

20. Problem

In a closed economy the behavior of the representative consumer is driven by the following factors:

$$\begin{aligned} U &= 1.82 \ln D_{\text{aubergine}} + 0.79 \ln D_{\text{fruit cake}} \\ \text{income} &= 303 \\ p_{\text{aubergine}} &= 2.00 \\ p_{\text{fruit cake}} &= 12.75 \end{aligned}$$

What is the amount of fruit cake bought by the consumer in optimum?

Solution The optimal amount of fruit cake is 7.1931.

21. Problem

In a closed economy the behavior of the representative consumer is driven by the following factors:

$$\begin{aligned} U &= 0.46 \ln D_{\text{pizza}} + 0.99 \ln D_{\text{sweetcorn}} \\ \text{income} &= 202 \\ p_{\text{pizza}} &= 7.56 \\ p_{\text{sweetcorn}} &= 2.86 \end{aligned}$$

What is the amount of sweetcorn bought by the consumer in optimum?

Solution The optimal amount of sweetcorn is 48.2228.

22. Problem

The goal and constraint of a representative consumer can be characterized by the following formulas:

$$\begin{aligned} U &= 0.29 D_{\text{backpack}}^{0.25} D_{\text{spring onion}}^{0.75} \\ 362 &= 2.93 \cdot D_{\text{backpack}} + 11.05 \cdot D_{\text{spring onion}} \end{aligned}$$

1.

Determine the optimal amount of spring onion purchased by the consumer.

Solution In optimum, the consumer purchases 24.5701 units of spring onion.

23. Problem

In a closed economy, economic agents consume only two goods: tea and lemonade. It takes 13.60 units of money to buy a unit of tea and the price of lemonade is $p_{\text{lemonade}} = 6.71$. The total income of the economic agents is 611 units.

Write down the budget constraint of the agents of this closed economy.

Solution The budget constraint of the economic agents is: $611 = 13.60 \cdot D_{\text{tea}} + 6.71 \cdot D_{\text{lemonade}}$.

24. Problem

In a closed economy, economic agents consume only two goods: cauliflower and brioche. It takes 12.49 units of money to buy a unit of cauliflower and the price of brioche is $p_{\text{brioche}} = 9.08$. The total income of the economic agents is 641 units.

Write down the budget constraint of the agents of this closed economy.

Solution The budget constraint of the economic agents is: $641 = 12.49 \cdot D_{\text{cauliflower}} + 9.08 \cdot D_{\text{brioche}}$.

25. Problem

In a closed economy, economic agents consume only two goods: trifle and lime. It takes 6.58 units of money to buy a unit of trifle and the price of lime is $p_{\text{lime}} = 2.52$. The total income of the economic agents is 225 units.

Write down the budget constraint of the agents of this closed economy.

Solution The budget constraint of the economic agents is: $225 = 6.58 \cdot D_{\text{trifle}} + 2.52 \cdot D_{\text{lime}}$.

26. Problem

In a closed economy, economic agents consume only two goods: banana and pastry. It takes 8.97 units of money to buy a unit of banana and the price of pastry is $p_{\text{pastry}} = 8.82$. The total income of the economic agents is 513 units.

Write down the budget constraint of the agents of this closed economy.

Solution The budget constraint of the economic agents is: $513 = 8.97 \cdot D_{\text{banana}} + 8.82 \cdot D_{\text{pastry}}$.

1.

27. Problem

In an economy there are just two goods pistachio and naan bread. The representative consumer chooses the amount of pistachio and naan bread that – at given prices and income – maximize the following utility $U = 0.86 \ln D_{\text{pistachio}} + 1.58 \ln D_{\text{naan bread}}$. The price of pistachio is 7.51 and it takes 13.22 units of money to buy a unit of naan bread. The consumer's income is 71.

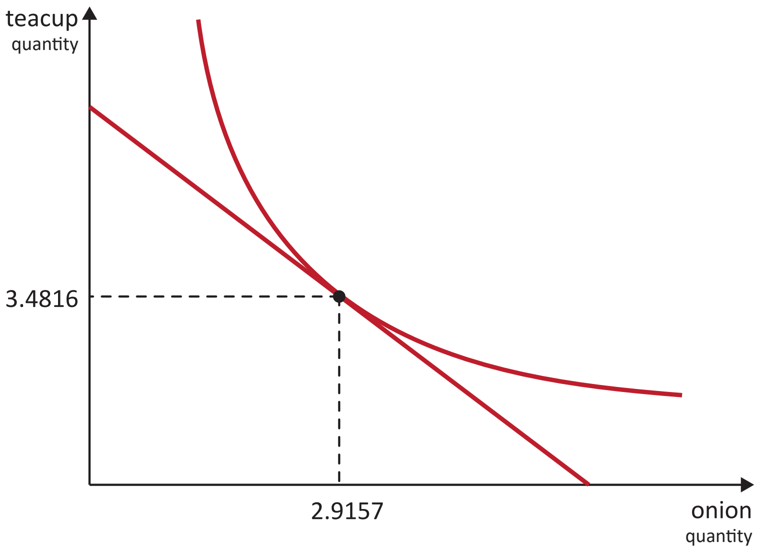
Find the optimal amount of pistachio bought by the consumer!

Solution Under the given assumptions the optimal amount of pistachio is 3.3322.

28. Problem

In a closed economy the representative consumer spends her 81 units of income on buying onion and teacup. The prices of the goods are $p_{\text{onion}} = 12.58$ and $p_{\text{teacup}} = 12.73$ respectively. The objective function of the economic agents can be formalized as $U = 1.44 \ln D_{\text{onion}} + 1.74 \ln D_{\text{teacup}}$. Illustrate on the following graph the budget constraint, the indifference curve that contains the optimal bundle of goods and label the optimal choice. How many onions and how many teacups are in the optimal bundle of goods?

Solution In optimum the consumes buys 2.9157 units of onion and 3.4816 units of teacup. The budget constraint intersects the onion axis at 6.4388 and the teacup axis at 6.3629. The correct graph looks like the following



29. Problem

In an economy there are just two goods pistachio and shampoo. The representative consumer chooses the amount of pistachio and shampoo that – at given prices and income – maximize the following utility $U = 1.15 \ln D_{\text{pistachio}} + 2.35 \ln D_{\text{shampoo}}$. The price of pistachio is 11.24 and it takes 8.60 units of money to buy a unit of shampoo. The consumer's income is 432.

Find the optimal amount of pistachio bought by the consumer!

Solution Under the given assumptions the optimal amount of pistachio is 12.6284.

30. Problem

The representative consumer of an economy purchases only hot chocolate and salad. She derives utility from consuming these goods. The following function represents the consumer's utility: $U = 2.10 D_{\text{hot chocolate}}^{0.58} D_{\text{salad}}^{0.42}$. The total income of the consumer is 382 units, the price of a hot chocolate is 8.59, and she has to buy salad at a price of 1.76.

Calculate the optimal amount of $D_{\text{hot chocolate}}$.

Solution In optimum $D_{\text{hot chocolate}} = 25.7928$.

1.

Producers' Problem

1. Problem

1.

In a given economy it takes 0.54 units of labor to produce one unit of lime. The production function of the representative firm is linear.

Write down the production function.

Solution: The production function takes the following form $Q_{\text{lime}} = \frac{1}{0.54} L_{\text{lime}}$.

2. Problem

The following table shows the unit labor requirement parameters for the two sectors of a closed economy

	mint tea	aubergine
unit labor requirement	0.14	1.37

The production functions are linear and depend only on one input: labor. The labor supply in the economy is constant, 470 units.

Write down the production possibilities frontier function.

Solution: Equilibrium occures in the labor market if $470 = L_{\text{mint tea}} + L_{\text{aubergine}}$. It takes 0.14 unist of labor to produce one mint tea, thus $L_{\text{mint tea}} = 0.14 \cdot Q_{\text{mint tea}}$, and it takes 1.37 units of labor to produce one aubergine, so $L_{\text{aubergine}} = 1.37 \cdot Q_{\text{aubergine}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$470 = 0.14 \cdot Q_{\text{mint tea}} + 1.37 \cdot Q_{\text{aubergine}}$$

3. Problem

The representative firm of the paper clip industry uses only labor to produce its output. The production process can be characterized by a linear function, where the unit labor requirement is 1.31.

Write down the behavioral equations of the profit-maximizing firm.

Solution: The behavior of the profit-maximizing firm can be represented by two equations: the production function and the demand for labor function. To formulate the production function we must use the following pieces of information:

1. the firm uses only labor as input,
2. the production function is linear,
3. the unit labor requirement is given.

And to find the demand for labor function we must use the following reasoning: the profit-maximizing firm uses labor up to the point, where the marginal revenue of employing and additional worker equals its marginal cost. The behavioral equations are:

$$Q_{\text{paper clip}} = \frac{1}{1.31} L_{\text{paper clip}}$$
$$P_{\text{paper clip}} \frac{1}{1.31} = W_{\text{paper clip}}$$

1.

4. Problem

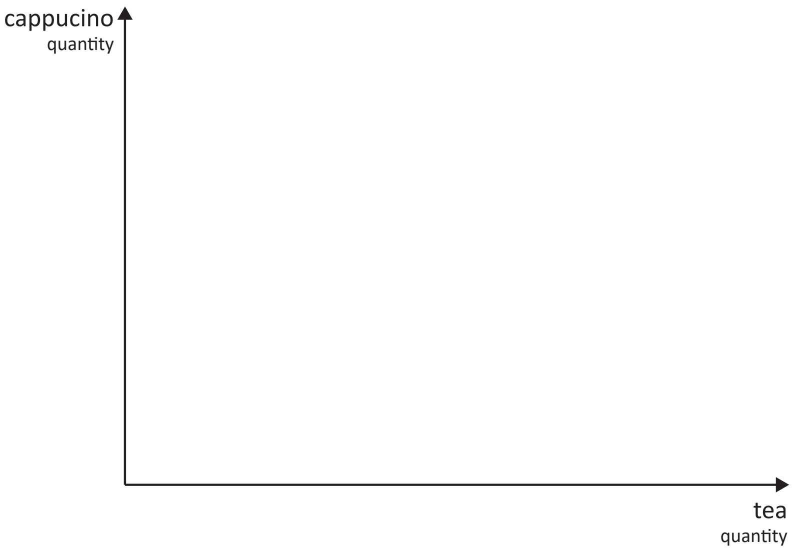
The representative firm produces wallet. The production process is characterized by the production function of $Q_{\text{wallet}} = 0.609756 L_{\text{wallet}}$.

Find the unit labor requirement for this industry.

Solution The unit labor requirement for the wallet industry is 1.64 (it takes 1.64 units of labor to produce one unit of wallet).

5. Problem

The unit labor requirement in the tea industry is 1.74, and in the cappuccino industry is 1.58. The economy produces only two goods and the production functions are linear. The amount of labor available to production is 246 units. Illustrate the production possibilities frontier on the following graph.



1.

Solution: Equilibrium occures in the labor market if $246 = L_{\text{tea}} + L_{\text{cappuccino}}$. It takes 1.74 unist of labor to produce one tea, thus $L_{\text{tea}} = 1.74 \cdot Q_{\text{tea}}$, and it takes 1.58 units of labor to produce one cappuccino, so $L_{\text{cappuccino}} = 1.58 \cdot Q_{\text{cappuccino}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$246 = 1.74 \cdot Q_{\text{tea}} + 1.58 \cdot Q_{\text{cappuccino}}$$

This function intersects the tea axis at 141.379310, and the cappuccino axis at 155.696203, thus the correct graph looks like this:

6. Problem

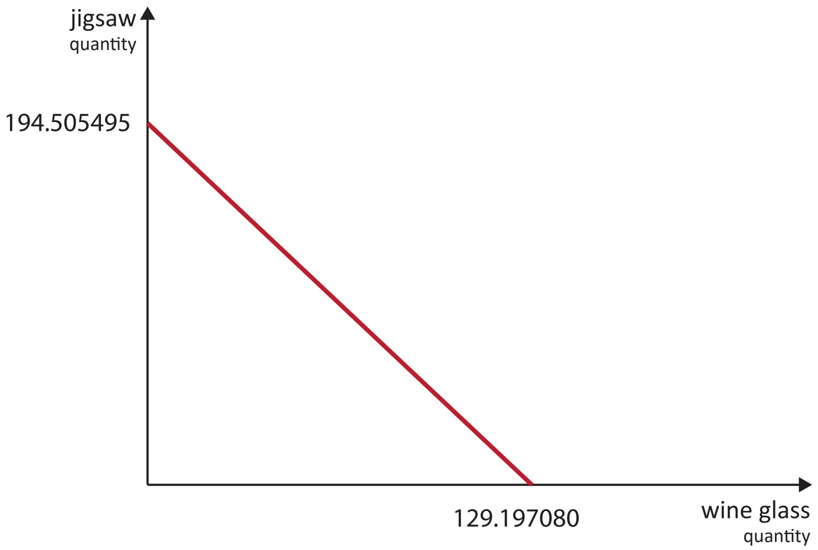
The unit labor requirement in the wine glass industry is 1.37, and in the jigsaw industry is 0.91. The economy produces only two goods and the production functions are linear. The amount of labor available to production is 177 units. Illustrate the production possibilities frontier on the following graph.

1.

Solution: Equilibrium occures in the labor market if $177 = L_{\text{wine glass}} + L_{\text{jigsaw}}$. It takes 1.37 unist of labor to produce one wine glass, thus $L_{\text{wine glass}} = 1.37 \cdot Q_{\text{wine glass}}$, and it takes 0.91 units of labor to produce one jigsaw, so $L_{\text{jigsaw}} = 0.91 \cdot Q_{\text{jigsaw}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$177 = 1.37 \cdot Q_{\text{wine glass}} + 0.91 \cdot Q_{\text{jigsaw}}$$

This function intersects the wine glass axis at 129.197080, and the jigsaw axis at 194.505495, thus the correct graph looks like this:



1.

7. Problem

The representative firm of the tea industry uses only labor to produce its output. The production process can be characterized by a linear function, where the unit labor requirement is 2.26.

Write down the behavioral equations of the profit-maximizing firm.

Solution: The behavior of the profit-maximizing firm can be represented by two equations: the production function and the demand for labor function. To formulate the production function we must use the following pieces of information:

1. the firm uses only labor as input,
2. the production function is linear,
3. the unit labor requirement is given.

And to find the demand for labor function we must use the following reasoning: the profit-maximizing firm uses labor up to the point, where the marginal revenue of employing and additional worker equals its marginal cost. The behavioral equations are:

$$Q_{\text{tea}} = \frac{1}{2.26} L_{\text{tea}}$$

$$P_{\text{tea}}\frac{1}{2.26}=W_{\text{tea}}$$

8. Problem

The production function in the strawberry industry is $Q_{\text{strawberry}}=2.26L_{\text{strawberry}}$. The representative firm of the industry sells its product at the price of 11.63.

Calculate the nominal wage, that the profit-maximizing firm offers to the workers.

Solution: The profit-maximizing firm uses labor up to the point where the marginal revenue of using an addition worker equals its marginal cost, thus

$$\begin{aligned}P_{\text{strawberry}}\cdot MPL_{\text{strawberry}}&=W_{\text{strawberry}}\\ 11.63\cdot 2.26&=W_{\text{strawberry}}\\ W_{\text{strawberry}}&=26.28\end{aligned}$$

9. Problem

The production function in the wooden spoon industry is $Q_{\text{wooden spoon}}=1.84L_{\text{wooden spoon}}$. The representative firm of the industry sells its product at the price of 4.74.

Calculate the nominal wage, that the profit-maximizing firm offers to the workers.

Solution: The profit-maximizing firm uses labor up to the point where the marginal revenue of using an addition worker equals its marginal cost, thus

$$\begin{aligned}P_{\text{wooden spoon}}\cdot MPL_{\text{wooden spoon}}&=W_{\text{wooden spoon}}\\ 4.74\cdot 1.84&=W_{\text{wooden spoon}}\\ W_{\text{wooden spoon}}&=8.72\end{aligned}$$

10. Problem

In a closed economy there are just two firms: firm A that produces spring onions, and firm B that produces cabbages. Both firms use technology that depends only on one factor: labor, and the production functions are linear. The unit labor requirements are $a_{\text{spring onion}} = 2.32$ and $a_{\text{cabbage}} = 1.60$ in the spring onion and cabbage industry respectively. Suppose that the economy has 255 units of labor.

Derive the production possibilities frontier!

Solution: Equilibrium occures in the labor market if $255 = L_{\text{spring onion}} + L_{\text{cabbage}}$. It takes 2.32 unist of labor to produce one spring onion, thus $L_{\text{spring onion}} = 2.32 \cdot Q_{\text{spring onion}}$, and it takes 1.60 units of labor to produce one cabbage, so $L_{\text{cabbage}} = 1.60 \cdot Q_{\text{cabbage}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$255 = 2.32 \cdot Q_{\text{spring onion}} + 1.60 \cdot Q_{\text{cabbage}}$$

1.

11. Problem

The behavior of firms in an economy, that produces only two goods, can be described by the following functions:

$$Q_{\text{bagel}} = 1.68 \cdot L_{\text{bagel}}$$
$$Q_{\text{chicken burger}} = 0.61 \cdot L_{\text{chicken burger}}$$

The labor supply is constant, 255 units.

Set up the production possibilities frontier for this economy.

Solution: Equilibrium occures in the labor market if $255 = L_{\text{bagel}} + L_{\text{chicken burger}}$. We can express L_{bagel} and $L_{\text{chicken burger}}$ from the production functions as $L_{\text{bagel}} = \frac{Q_{\text{bagel}}}{1.68}$ and $L_{\text{chicken burger}} = \frac{Q_{\text{chicken burger}}}{0.61}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function as

$$255 = \frac{Q_{\text{bagel}}}{1.68} + \frac{Q_{\text{chicken burger}}}{0.61}$$

12. Problem

In a closed economy there are just two firms: firm A that produces paper clips, and firm B that produces hairdryers. Both firms use technology that depends only on one factor: labor, and the production functions are linear. The unit labor requirements are $a_{\text{paper clip}} = 1.51$ and $a_{\text{hairdryer}} = 1.37$ in the paper clip and hairdryer industry respectively. Suppose that the economy has 431 units of labor.

Derive the production possibilities frontier!

Solution: Equilibrium occures in the labor market if $431 = L_{\text{paper clip}} + L_{\text{hairdryer}}$. It takes 1.51 unist of labor to produce one paper clip, thus $L_{\text{paper clip}} = 1.51 \cdot Q_{\text{paper clip}}$, and it takes 1.37 units of labor to produce one hairdryer, so $L_{\text{hairdryer}} = 1.37 \cdot Q_{\text{hairdryer}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$431 = 1.51 \cdot Q_{\text{paper clip}} + 1.37 \cdot Q_{\text{hairdryer}}$$

13. Problem

The following table shows the unit labor requirement parameters for the two sectors of a closed economy

	scarf	broccoli
unit labor requirement	2.38	0.28

The production functions are linear and depend only on one input: labor. The labor supply in the economy is constant, 502 units.

Write down the production possibilities frontier function.

Solution: Equilibrium occures in the labor market if $502 = L_{\text{scarf}} + L_{\text{broccoli}}$. It takes 2.38 unist of labor to produce one scarf, thus $L_{\text{scarf}} = 2.38 \cdot Q_{\text{scarf}}$, and it takes 0.28 units of labor to produce one broccoli, so $L_{\text{broccoli}} = 0.28 \cdot Q_{\text{broccoli}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$502 = 2.38 \cdot Q_{\text{scarf}} + 0.28 \cdot Q_{\text{broccoli}}$$

14. Problem

In a closed economy there are just two firms: firm A that produces soups, and firm B that produces hairdryers. Both firms use technology that depends only on one factor: labor, and the production functions are linear. The unit labor requirements are $a_{\text{soup}} = 1.07$ and $a_{\text{hairdryer}} = 0.27$ in the soup and hairdryer industry respectively. Suppose that the economy has 190 units of labor.

Derive the production possibilities frontier!

Solution: Equilibrium occures in the labor market if $190 = L_{\text{soup}} + L_{\text{hairdryer}}$. It takes 1.07 unist of labor to produce one soup, thus $L_{\text{soup}} = 1.07 \cdot Q_{\text{soup}}$, and it takes 0.27 units of labor to produce one hairdryer, so $L_{\text{hairdryer}} = 0.27 \cdot Q_{\text{hairdryer}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$190 = 1.07 \cdot Q_{\text{soup}} + 0.27 \cdot Q_{\text{hairdryer}}$$

15. Problem

The following table shows the unit labor requirement parameters for the two sectors of a closed economy

	strawberry	cauliflower
unit labor requirement	1.82	0.91

The production functions are linear and depend only on one input: labor. The labor supply in the economy is constant, 110 units.

Write down the production possibilities frontier function.

Solution: Equilibrium occures in the labor market if $110 = L_{\text{strawberry}} + L_{\text{cauliflower}}$. It takes 1.82 unist of labor to produce one strawberry, thus $L_{\text{strawberry}} = 1.82 \cdot Q_{\text{strawberry}}$, and it takes 0.91 units of labor to produce one cauliflower, so $L_{\text{cauliflower}} = 0.91 \cdot Q_{\text{cauliflower}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$110 = 1.82 \cdot Q_{\text{strawberry}} + 0.91 \cdot Q_{\text{cauliflower}}$$

16. Problem

The representative firm produces spring onion. The production process is characterized by the production function of $Q_{\text{spring onion}} = 0.483092 L_{\text{spring onion}}$.

Find the unit labor requirement for this industry.

Solution The unit labor requirement for the spring onion industry is 2.07 (it takes 2.07 units of labor to produce one unit of spring onion).

17. Problem

The representative firm of the pushchair industry uses only labor to produce its output. The production process can be characterized by a linear function, where the unit labor requirement is 0.50.

Write down the behavioral equations of the profit-maximizing firm.

Solution: The behavior of the profit-maximizing firm can be represented by two equations: the production function and the demand for labor function. To formulate the production function we must use the following pieces of information:

1.

1. the firm uses only labor as input,
2. the production function is linear,
3. the unit labor requirement is given.

And to find the demand for labor function we must use the following reasoning: the profit-maximizing firm uses labor up to the point, where the marginal revenue of employing and additional worker equals its marginal cost. The behavioral equations are:

$$Q_{\text{pushchair}} = \frac{1}{0.50} L_{\text{pushchair}}$$
$$P_{\text{pushchair}} \frac{1}{0.50} = W_{\text{pushchair}}$$

18. Problem

In a closed economy there are just two firms: firm A that produces almonds, and firm B that produces colas. Both firms use technology that depends only on one factor: labor, and the production functions are linear. The unit labor requirements are $a_{\text{almond}} = 1.97$ and $a_{\text{cola}} = 0.74$ in the almond and cola industry respectively. Suppose that the economy has 333 units of labor.

Derive the production possibilities frontier!

Solution: Equilibrium occures in the labor market if $333 = L_{\text{almond}} + L_{\text{cola}}$. It takes 1.97 unist of labor to produce one almond, thus $L_{\text{almond}} = 1.97 \cdot Q_{\text{almond}}$, and it takes 0.74 units of labor to produce one cola, so $L_{\text{cola}} = 0.74 \cdot Q_{\text{cola}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$333 = 1.97 \cdot Q_{\text{almond}} + 0.74 \cdot Q_{\text{cola}}$$

19. Problem

The behavior of firms in an economy, that produces only two goods, can be described by the following functions:

$$Q_{\text{lemonade}} = 0.40 \cdot L_{\text{lemonade}}$$
$$Q_{\text{hot dog}} = 1.14 \cdot L_{\text{hot dog}}$$

The labor supply is constant, 600 units.

Set up the production possibilities frontier for this economy.

Solution: Equilibrium occures in the labor market if $600 = L_{\text{lemonade}} + L_{\text{hot dog}}$. We can express L_{lemonade} and $L_{\text{hot dog}}$ from the production functions as $L_{\text{lemonade}} = \frac{Q_{\text{lemonade}}}{0.40}$ and $L_{\text{hot dog}} = \frac{Q_{\text{hot dog}}}{1.14}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function as

$$600 = \frac{Q_{\text{lemonade}}}{0.40} + \frac{Q_{\text{hot dog}}}{1.14}$$

20. Problem

The production function in the teapot industry is $Q_{\text{teapot}} = 1.38L_{\text{teapot}}$. The representative firm of the industry sells its product at the price of 8.74.

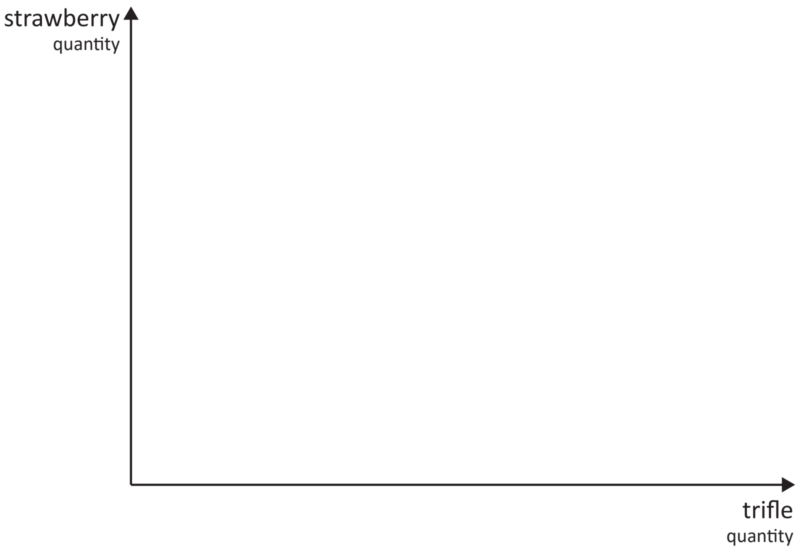
Calculate the nominal wage, that the profit-maximizing firm offers to the workers.

Solution: The profit-maximizing firm uses labor up to the point where the marginal revenue of using an addition worker equals its marginal cost, thus

$$P_{\text{teapot}} \cdot MPL_{\text{teapot}} = W_{\text{teapot}}$$
$$8.74 \cdot 1.38 = W_{\text{teapot}}$$
$$W_{\text{teapot}} = 12.06$$

21. Problem

The unit labor requirement in the trifle industry is 0.41, and in the strawberry industry is 2.30. The economy produces only two goods and the production functions are linear. The amount of labor available to production is 193 units. Illustrate the production possibilities frontier on the following graph.

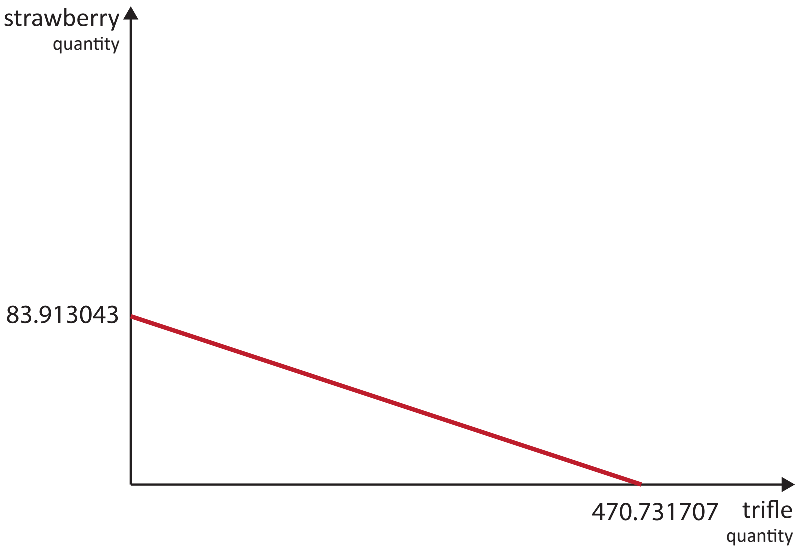


1.

Solution: Equilibrium occures in the labor market if $193 = L_{\text{trifle}} + L_{\text{strawberry}}$. It takes 0.41 unist of labor to produce one trifle, thus $L_{\text{trifle}} = 0.41 \cdot Q_{\text{trifle}}$, and it takes 2.30 units of labor to produce one strawberry, so $L_{\text{strawberry}} = 2.30 \cdot Q_{\text{strawberry}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$193 = 0.41 \cdot Q_{\text{trifle}} + 2.30 \cdot Q_{\text{strawberry}}$$

This function intersects the trifle axis at 470.731707, and the strawberry axis at 83.913043, thus the correct graph looks like this:



22. Problem

In a given economy it takes 1.17 units of labor to produce one unit of wallet. The production function of the representative firm is linear.

Write down the production function.

Solution: The production function takes the following form $Q_{\text{wallet}} = \frac{1}{1.17} L_{\text{wallet}}$.

23. Problem

The representative firm produces trifle. The production process is characterized by the production function of $Q_{\text{trifle}} = 0.641026 L_{\text{trifle}}$.

Find the unit labor requirement for this industry.

Solution The unit labor requirement for the trifle industry is 1.56 (it takes 1.56 units of labor to produce one unit of trifle).

24. Problem

In a given economy it takes 1.47 units of labor to produce one unit of cabbage. The production function of the representative firm is linear.

Write down the production function.

Solution: The production function takes the following form $Q_{\text{cabbage}} = \frac{1}{1.47} L_{\text{cabbage}}$.

1.

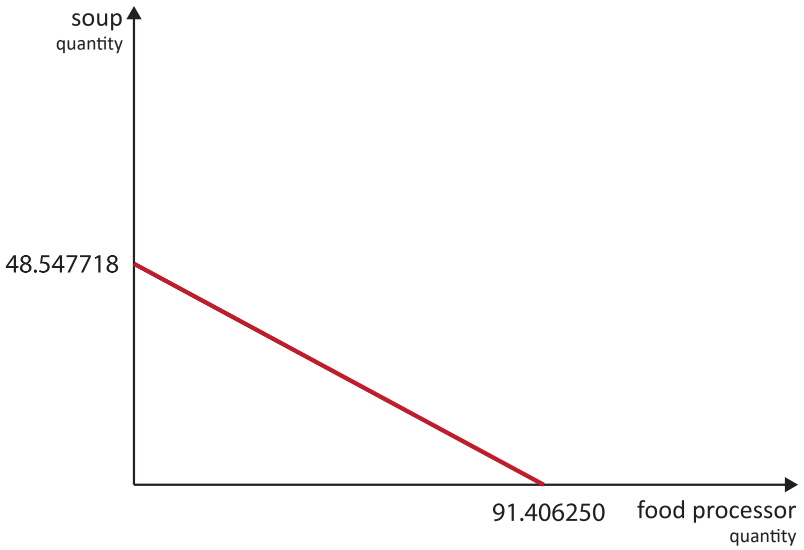
25. Problem

The unit labor requirement in the food processor industry is 1.28, and in the soup industry is 2.41. The economy produces only two goods and the production functions are linear. The amount of labor available to production is 117 units. Illustrate the production possibilities frontier on the following graph.

Solution: Equilibrium occures in the labor market if $117 = L_{\text{food processor}} + L_{\text{soup}}$. It takes 1.28 unist of labor to produce one food processor, thus $L_{\text{food processor}} = 1.28 \cdot Q_{\text{food processor}}$, and it takes 2.41 units of labor to produce one soup, so $L_{\text{soup}} = 2.41 \cdot Q_{\text{soup}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$117 = 1.28 \cdot Q_{\text{food processor}} + 2.41 \cdot Q_{\text{soup}}$$

This function intersects the food processor axis at 91.406250, and the soup axis at 48.547718, thus the correct graph looks like this:



26. Problem

The following table shows the unit labor requirement parameters for the two sectors of a closed economy

	sweetcorn	teacup
unit labor requirement	0.50	1.37

The production functions are linear and depend only on one input: labor. The labor supply in the economy is constant, 141 units.

Write down the production possibilities frontier function.

Solution: Equilibrium occures in the labor market if $141 = L_{\text{sweetcorn}} + L_{\text{teacup}}$. It takes 0.50 unist of labor to produce one sweetcorn, thus $L_{\text{sweetcorn}} = 0.50 \cdot Q_{\text{sweetcorn}}$, and it takes 1.37 units of labor to produce one teacup, so $L_{\text{teacup}} = 1.37 \cdot Q_{\text{teacup}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$141 = 0.50 \cdot Q_{\text{sweetcorn}} + 1.37 \cdot Q_{\text{teacup}}$$

27. Problem

The representative firm of the pastry industry uses only labor to produce its output. The production process can be characterized by a linear function, where the unit labor requirement is 1.36.

Write down the behavioral equations of the profit-maximizing firm.

Solution: The behavior of the profit-maximizing firm can be represented by two equations: the production function and the demand for labor function. To formulate the production function we must use the following pieces of information:

1. the firm uses only labor as input,
2. the production function is linear,
3. the unit labor requirement is given.

And to find the demand for labor function we must use the following reasoning: the profit-maximizing firm uses labor up to the point, where the marginal revenue of employing and additional worker equals its marginal cost. The behavioral equations are:

$$Q_{\text{pastry}} = \frac{1}{1.36} L_{\text{pastry}}$$
$$P_{\text{pastry}} \frac{1}{1.36} = W_{\text{pastry}}$$

28. Problem

In a given economy it takes 2.00 units of labor to produce one unit of wine glass. The production function of the representative firm is linear.

Write down the production function.

Solution: The production function takes the following form $Q_{\text{wine glass}} = \frac{1}{2.00} L_{\text{wine glass}}$.

29. Problem

In a given economy it takes 0.32 units of labor to produce one unit of hot dog. The production function of the representative firm is linear.

Write down the production function.

Solution: The production function takes the following form $Q_{\text{hot dog}} = \frac{1}{0.32} L_{\text{hot dog}}$.

30. Problem

The representative firm of the sweetcorn industry uses only labor to produce its output. The production process can be characterized by a linear function, where the unit labor requirement is 1.80.

Write down the behavioral equations of the profit-maximizing firm.

Solution: The behavior of the profit-maximizing firm can be represented by two equations: the production function and the demand for labor function. To formulate the production function we must use the following pieces of information:

1. the firm uses only labor as input,
2. the production function is linear,
3. the unit labor requirement is given.

And to find the demand for labor function we must use the following reasoning: the profit-maximizing firm uses labor up to the point, where the marginal revenue of employing and additional worker equals its marginal cost. The behavioral equations are:

$$Q_{\text{sweetcorn}} = \frac{1}{1.80} L_{\text{sweetcorn}}$$

$$P_{\text{sweetcorn}} \frac{1}{1.80} = W_{\text{sweetcorn}}$$

31. Problem

The behavior of firms in an economy, that produces only two goods, can be described by the following functions:

$$Q_{\text{strawberry}} = 0.67 \cdot L_{\text{strawberry}}$$

$$Q_{\text{necklace}} = 0.28 \cdot L_{\text{necklace}}$$

The labor supply is constant, 455 units.

Set up the production possibilities frontier for this economy.

Solution: Equilibrium occures in the labor market if $455 = L_{\text{strawberry}} + L_{\text{necklace}}$. We can express $L_{\text{strawberry}}$ and L_{necklace} from the production functions as $L_{\text{strawberry}} = \frac{Q_{\text{strawberry}}}{0.67}$ and $L_{\text{necklace}} = \frac{Q_{\text{necklace}}}{0.28}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function as

$$455 = \frac{Q_{\text{strawberry}}}{0.67} + \frac{Q_{\text{necklace}}}{0.28}$$

1.

32. Problem

The production function in the plate industry is $Q_{\text{plate}} = 1.72L_{\text{plate}}$. The representative firm of the industry sells its product at the price of 10.85.

Calculate the nominal wage, that the profit-maximizing firm offers to the workers.

Solution: The profit-maximizing firm uses labor up to the point where the marginal revenue of using an addition worker equals its marginal cost, thus

$$\begin{aligned} P_{\text{plate}} \cdot MPL_{\text{plate}} &= W_{\text{plate}} \\ 10.85 \cdot 1.72 &= W_{\text{plate}} \\ W_{\text{plate}} &= 18.66 \end{aligned}$$

33. Problem

The representative firm produces plate. The production process is characterized by the production function of $Q_{\text{plate}} = 0.680272L_{\text{plate}}$.

Find the unit labor requirement for this industry.

Solution The unit labor requirement for the plate industry is 1.47 (it takes 1.47 units of labor to produce one unit of plate).

34. Problem

The production function in the tea industry is $Q_{\text{tea}} = 0.53L_{\text{tea}}$. The representative firm of the industry sells its product at the price of 8.85.

Calculate the nominal wage, that the profit-maximizing firm offers to the workers.

Solution: The profit-maximizing firm uses labor up to the point where the marginal revenue of using an addition worker equals its marginal cost, thus

$$\begin{aligned} P_{\text{tea}} \cdot MPL_{\text{tea}} &= W_{\text{tea}} \\ 8.85 \cdot 0.53 &= W_{\text{tea}} \\ W_{\text{tea}} &= 4.69 \end{aligned}$$

1.

35. Problem

The behavior of firms in an economy, that produces only two goods, can be described by the following functions:

$$\begin{aligned} Q_{\text{cappuccino}} &= 1.41 \cdot L_{\text{cappuccino}} \\ Q_{\text{pushchair}} &= 0.55 \cdot L_{\text{pushchair}} \end{aligned}$$

The labor supply is constant, 341 units.

Set up the production possibilities frontier for this economy.

Solution: Equilibrium occures in the labor market if $341 = L_{\text{cappuccino}} + L_{\text{pushchair}}$. We can express $L_{\text{cappuccino}}$ and $L_{\text{pushchair}}$ from the production functions as $L_{\text{cappuccino}} = \frac{Q_{\text{cappuccino}}}{1.41}$ and $L_{\text{pushchair}} = \frac{Q_{\text{pushchair}}}{0.55}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function as

$$341 = \frac{Q_{\text{cappuccino}}}{1.41} + \frac{Q_{\text{pushchair}}}{0.55}$$

36. Problem

The representative firm produces pie. The production process is characterized by the production function of $Q_{\text{pie}} = 0.833333L_{\text{pie}}$.

Find the unit labor requirement for this industry.

Solution The unit labor requirement for the pie industry is 1.20 (it takes 1.20 units of labor to produce one unit of pie).

37. Problem

The following table shows the unit labor requirement parameters for the two sectors of a closed economy

	paper clip	strawberry
unit labor requirement	1.63	2.33

The production functions are linear and depend only on one input: labor. The labor supply in the economy is constant, 269 units.

Write down the production possibilities frontier function.

Solution: Equilibrium occures in the labor market if $269 = L_{\text{paper clip}} + L_{\text{strawberry}}$. It takes 1.63 unist of labor to produce one paper clip, thus $L_{\text{paper clip}} = 1.63 \cdot Q_{\text{paper clip}}$, and it takes 2.33 units of labor to produce one strawberry, so $L_{\text{strawberry}} = 2.33 \cdot Q_{\text{strawberry}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$269 = 1.63 \cdot Q_{\text{paper clip}} + 2.33 \cdot Q_{\text{strawberry}}$$

38. Problem

In a closed economy there are just two firms: firm A that produces watermelons, and firm B that produces sweetcorns. Both firms use technology that depends only on one factor: labor, and the production functions are linear. The unit labor requirements are $a_{\text{watermelon}} = 2.04$ and $a_{\text{sweetcorn}} = 1.72$ in the watermelon and sweetcorn industry respectively. Suppose that the economy has 162 units of labor.

Derive the production possibilities frontier!

Solution: Equilibrium occures in the labor market if $162 = L_{\text{watermelon}} + L_{\text{sweetcorn}}$. It takes 2.04 unist of labor to produce one watermelon, thus $L_{\text{watermelon}} = 2.04 \cdot Q_{\text{watermelon}}$, and it takes 1.72 units of labor to produce one sweetcorn, so $L_{\text{sweetcorn}} = 1.72 \cdot Q_{\text{sweetcorn}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$162 = 2.04 \cdot Q_{\text{watermelon}} + 1.72 \cdot Q_{\text{sweetcorn}}$$

39. Problem

The behavior of firms in an economy, that produces only two goods, can be described by the following functions:

$$Q_{\text{pushchair}} = 1.06 \cdot L_{\text{pushchair}}$$
$$Q_{\text{lemonade}} = 0.79 \cdot L_{\text{lemonade}}$$

The labor supply is constant, 356 units.

Set up the production possibilities frontier for this economy.

Solution: Equilibrium occures in the labor market if $356 = L_{\text{pushchair}} + L_{\text{lemonade}}$. We can express $L_{\text{pushchair}}$ and L_{lemonade} from the production functions as $L_{\text{pushchair}} = \frac{Q_{\text{pushchair}}}{1.06}$ and $L_{\text{lemonade}} = \frac{Q_{\text{lemonade}}}{0.79}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function as

$$356 = \frac{Q_{\text{pushchair}}}{1.06} + \frac{Q_{\text{lemonade}}}{0.79}$$

40. Problem

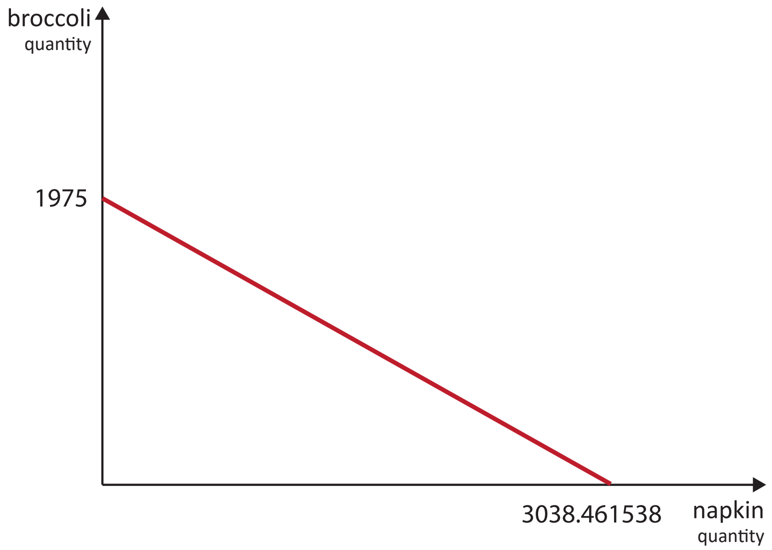
The unit labor requirement in the napkin industry is 0.13, and in the broccoli industry is 0.20. The economy produces only two goods and the production functions are linear. The amount of labor available to production is 395 units. Illustrate the production possibilities frontier on the following graph.

1.

Solution: Equilibrium occures in the labor market if $395 = L_{\text{napkin}} + L_{\text{broccoli}}$. It takes 0.13 unist of labor to produce one napkin, thus $L_{\text{napkin}} = 0.13 \cdot Q_{\text{napkin}}$, and it takes 0.20 units of labor to produce one broccoli, so $L_{\text{broccoli}} = 0.20 \cdot Q_{\text{broccoli}}$. By plugging these two formulas into the labor market clearing condition we obtain the production possibilities function

$$395 = 0.13 \cdot Q_{\text{napkin}} + 0.20 \cdot Q_{\text{broccoli}}$$

This function intersects the napkin axis at 3038.461538, and the broccoli axis at 1975.000000, thus the correct graph looks like this:


broccoli
quantity
1975
3038.461538
napkin
quantity

1. Problem

The objectives and constraints of economic agents in a closed economy that produces only two goods can be written as

$$Q_{\text{naan bread}} = \frac{1}{1.80} L_{\text{naan bread}}$$
$$Q_{\text{teapot}} = \frac{1}{0.74} L_{\text{teapot}}$$
$$U = 0.21 \cdot \ln D_{\text{naan bread}} + 0.74 \cdot \ln D_{\text{teapot}}$$

Find the relative price of naan bread in terms of teapot in this economy.

Solution: The representative firm of naan bread industry hires labor up to the point where the marginal revenue of an additional worker is equal the marginal cost of it:

$$P_{\text{naan bread}} \frac{1}{1.80} = W_{\text{naan bread}}$$

The same applies to the profit-maximizing firm of teapot industry:

$$P_{\text{teapot}} \frac{1}{0.74} = W_{\text{teapot}}$$

Equilibrium occurs in the labor market, thus no industry is able to pay higher wage than the other one. By rearranging the equation we obtain the relative price as the ratio of unit labor requirements:

$$W_{\text{naan bread}} = W_{\text{teapot}}$$
$$\frac{P_{\text{naan bread}}}{1.80} = \frac{P_{\text{teapot}}}{0.74}$$
$$\frac{P_{\text{naan bread}}}{P_{\text{teapot}}} = \frac{1.80}{0.74} = 2.432432$$

2. Problem

The economy is functioning under the following conditions:

$$Q_{\text{aubergine}} = \frac{1}{0.21} L_{\text{aubergine}}$$

$$Q_{\text{ice cream}} = \frac{1}{1.95} L_{\text{ice cream}}$$
$$U = 0.69 \cdot D_{\text{aubergine}}^{0.76} D_{\text{ice cream}}^{0.24}$$
$$L = 590$$

Find the optimal amount of ice cream produced by the representative producer.

Solution: In optimum the representative consumer maximizes her utility, the firms maximize their profits, and equilibrium occurs in all three markets of the economy. Formally:

$$\frac{MU_{D_{\text{aubergine}}}}{MU_{D_{\text{ice cream}}}} = \frac{P_{\text{aubergine}}}{P_{\text{ice cream}}}$$
$$P_{\text{aubergine}} \cdot Q_{\text{aubergine}} + P_{\text{ice cream}} \cdot Q_{\text{ice cream}} = P_{\text{aubergine}} \cdot D_{\text{aubergine}} + P_{\text{ice cream}} \cdot D_{\text{ice cream}}$$
$$Q_{\text{aubergine}} = \frac{1}{0.21} L_{\text{aubergine}}$$
$$Q_{\text{ice cream}} = \frac{1}{1.95} L_{\text{ice cream}}$$
$$590 = L_{\text{aubergine}} + L_{\text{ice cream}}$$
$$P_{\text{aubergine}} MPL_{\text{aubergine}} = P_{\text{ice cream}} MPL_{\text{ice cream}}$$
$$Q_{\text{aubergine}} = D_{\text{aubergine}}$$
$$Q_{\text{ice cream}} = D_{\text{ice cream}}$$

Solving these equations for $Q_{\text{ice cream}}$ yields that $Q_{\text{ice cream}} = 72.615385$

3. Problem

A firms in a closed economy produce only two goods, soup and aubergine. They use a production process that employs only labor as input, and the whole process can be characterized by linear production function. The unit labor requirement in the soup industry is 1.75, and it is 0.46 in the aubergine industry. The following utility function describes the representative consumers preferences over the two goods: $U = 1.09 \cdot \ln D_{\text{soup}} + 1.31 \cdot \ln D_{\text{aubergine}}$. The labor supply in this economy is 267 units.

What are the behavioral equations and the market clearing conditions of this economy?

Solution: The firm, that produces soup can be characterized by two equations, the production function and the demand for labor function:

$$Q_{\text{soup}} = \frac{1}{1.75} L_{\text{soup}}$$
$$P_{\text{soup}} = 1.75 \cdot W_{\text{soup}}$$

The behavior of representative firm of the aubergine industry is described by the following set of functions:

$$Q_{\text{aubergine}} = \frac{1}{0.46} L_{\text{aubergine}}$$

$$P_{\text{aubergine}} = 0.46 \cdot W_{\text{aubergine}}$$

The behavior of the representative consumer is characterized by a budget constraint, and an equation that states that in optimum the marginal rate of substitution between the two goods equals the relative price.

$$P_{\text{soup}} \cdot Q_{\text{soup}} + P_{\text{aubergine}} \cdot Q_{\text{aubergine}} = P_{\text{soup}} \cdot D_{\text{soup}} + P_{\text{aubergine}} \cdot D_{\text{aubergine}}$$
$$\frac{1.09}{1.31} \frac{D_{\text{aubergine}}}{D_{\text{soup}}} = \frac{P_{\text{soup}}}{P_{\text{aubergine}}}$$

The economy has three markets. In the market for soup the supply equals demand. The same formula applies to the aubergine market. And the supply of labor equals the total demand for labor (in labor market equilibrium an industry cannot pay greater nominal wage to workers than the other industry, thus the nominal wage in soup industry equals the nominal wage in aubergine industry). The market clearing conditions are:

$$Q_{\text{soup}} = D_{\text{soup}}$$
$$Q_{\text{aubergine}} = D_{\text{aubergine}}$$
$$267 = L_{\text{soup}} + L_{\text{aubergine}}$$
$$W_{\text{soup}} = W_{\text{aubergine}}$$

The model – artificial economy – consists of behavioral equations and market clearing conditions. The behavioral equations are:

$$Q_{\text{soup}} = \frac{1}{1.75} L_{\text{soup}}$$
$$P_{\text{soup}} = 1.75 \cdot W_{\text{soup}}$$
$$Q_{\text{aubergine}} = \frac{1}{0.46} L_{\text{aubergine}}$$
$$P_{\text{aubergine}} = 0.46 \cdot W_{\text{aubergine}}$$
$$P_{\text{soup}} \cdot Q_{\text{soup}} + P_{\text{aubergine}} \cdot Q_{\text{aubergine}} = P_{\text{soup}} \cdot D_{\text{soup}} + P_{\text{aubergine}} \cdot D_{\text{aubergine}}$$
$$\frac{1.09}{1.31} \frac{D_{\text{aubergine}}}{D_{\text{soup}}} = \frac{P_{\text{soup}}}{P_{\text{aubergine}}}$$

and the market clearing conditions are the following:

$$Q_{\text{soup}} = D_{\text{soup}}$$
$$Q_{\text{aubergine}} = D_{\text{aubergine}}$$
$$267 = L_{\text{soup}} + L_{\text{aubergine}}$$
$$W_{\text{soup}} = W_{\text{aubergine}}$$

4. Problem

The utility function of a representative consumer in a two-good-economy is $U = 1.27 \cdot \ln D_{\text{cappuccino}} + 1.06 \cdot \ln D_{\text{milkshake}}$. The producers use only one input – labor – to produce their output, and the production functions are linear. The unit labor requirement in the cappuccino sector is 0.42, and the same parameter in the milkshake sector is 2.39. The labor supply in this economy is 605, and the labor moves freely from one industry to the other industry.

Calculate the optimal amount of cappuccino purchased by the representative consumer.

Solution: In optimum (i.) the marginal rate of substitution equals the relative price, (ii.) the optimal bundle of goods is on the budget constraint and in a closed economy this budget constraint is equivalent to the production possibilities function, and (iii.) if labor moves freely from on industry to the other industry, no industry can pay higher wage than the other industry, which yields that the relative price equals the ratio of the two unit labor requirements:

$$\frac{MU_{D_{\text{cappuccino}}}}{MU_{D_{\text{milkshake}}}} = \frac{P_{\text{cappuccino}}}{P_{\text{milkshake}}}$$
$$605 = 2.39 \cdot Q_{\text{cappuccino}} + 2.39 \cdot Q_{\text{milkshake}}$$
$$\frac{P_{\text{cappuccino}}}{P_{\text{milkshake}}} = \frac{a_{\text{cappuccino}}}{a_{\text{milkshake}}} = 0.175732$$

From these three equations and by using the fact, that in a closed economy $Q_{\text{cappuccino}} = D_{\text{cappuccino}}$ and $Q_{\text{milkshake}} = D_{\text{milkshake}}$, after some rearrangements and substitutions we obtain that in optimum the representative consumer buys 785.152258 units of cappuccino.

5. Problem

A firms in a closed economy produce only two goods, pie and cola. They use a production process that employs only labor as input, and the whole process can be characterized by linear production function. The unit labor requirement in the pie industry is 0.84, and it is 1.93 in the cola industry. The following utility function describes the representative consumers preferences over the two goods: $U = 1.19 \cdot \ln D_{\text{pie}} + 2.15 \cdot \ln D_{\text{cola}}$. The labor supply in this economy is 159 units.

What are the behavioral equations and the market clearing conditions of this economy?

Solution: The firm, that produces pie can be characterized by two equations, the production function and the demand for labor function:

$$Q_{\text{pie}} = \frac{1}{0.84} L_{\text{pie}}$$
$$P_{\text{pie}} = 0.84 \cdot W_{\text{pie}}$$

The behavior of representative firm of the cola industry is described by the following set of functions:

$$Q_{\text{cola}} = \frac{1}{1.93} L_{\text{cola}}$$
$$P_{\text{cola}} = 1.93 \cdot W_{\text{cola}}$$

The behavior of the representative consumer is characterized by a budget constraint, and an equation that states that in optimum the marginal rate of substitution between the two goods equals the relative price.

$$P_{\text{pie}} \cdot Q_{\text{pie}} + P_{\text{cola}} \cdot Q_{\text{cola}} = P_{\text{pie}} \cdot D_{\text{pie}} + P_{\text{cola}} \cdot D_{\text{cola}}$$

$$\frac{1.19}{2.15}\frac{D_{\text{cola}}}{D_{\text{pie}}}=\frac{P_{\text{pie}}}{P_{\text{cola}}}$$

The economy has three markets. In the market for pie the supply equals demand. The same formula applies to the cola market. And the supply of labor equals the total demand for labor (in labor market equilibrium an industry cannot pay greater nominal wage to workers than the other industry, thus the nominal wage in pie industry equals the nominal wage in cola industry). The market clearing conditions are:

$$\begin{aligned}
Q_{\text{pie}} &= D_{\text{pie}}\\
Q_{\text{cola}} &= D_{\text{cola}}\\
159 &= L_{\text{pie}}+L_{\text{cola}}\\
W_{\text{pie}} &= W_{\text{cola}}
\end{aligned}$$

1.

The model – artificial economy – consists of behavioral equations and market clearing conditions. The behavioral equations are:

$$\begin{aligned}
Q_{\text{pie}} &= \frac{1}{0.84}L_{\text{pie}}\\
P_{\text{pie}} &= 0.84\cdot W_{\text{pie}}\\
Q_{\text{cola}} &= \frac{1}{1.93}L_{\text{cola}}\\
P_{\text{cola}} &= 1.93\cdot W_{\text{cola}}\\
P_{\text{pie}}\cdot Q_{\text{pie}}+P_{\text{cola}}\cdot Q_{\text{cola}} &= P_{\text{pie}}\cdot D_{\text{pie}}+P_{\text{cola}}\cdot D_{\text{cola}}\\
\frac{1.19}{2.15}\frac{D_{\text{cola}}}{D_{\text{pie}}} &= \frac{P_{\text{pie}}}{P_{\text{cola}}}
\end{aligned}$$

and the market clearing conditions are the following:

$$\begin{aligned}
Q_{\text{pie}} &= D_{\text{pie}}\\
Q_{\text{cola}} &= D_{\text{cola}}\\
159 &= L_{\text{pie}}+L_{\text{cola}}\\
W_{\text{pie}} &= W_{\text{cola}}
\end{aligned}$$

6. Problem

The utility function of a representative consumer in a two-good-economy is $U=0.94\cdot\ln D_{\text{paper clip}}+1.06\cdot\ln D_{\text{platform shoe}}$. The producers use only one input – labor – to produce their output, and the production functions are linear. The unit labor requirement in the paper clip sector is 0.42, and the same parameter in the platform shoe sector is 1.49. The labor supply in this economy is 66, and the labor moves freely from one industry to the other industry.

Calculate the optimal amount of paper clip purchased by the representative consumer.

Solution: In optimum (i.) the marginal rate of substitution equals the relative price, (ii.) the optimal bundle of goods is on the budget constraint and in a closed economy this budget constraint is equivalent to the production possibilities function, and (iii.) if labor moves freely from on industry to the other industry, no industry can pay higher wage than the other industry, which yields that the relative price equals the ratio of the two unit labor requirements:

$$\frac{MU_{D_{\text{paper clip}}}}{MU_{D_{\text{platform shoe}}}} = \frac{P_{\text{paper clip}}}{P_{\text{platform shoe}}}$$
$$66 = 1.49 \cdot Q_{\text{paper clip}} + 1.49 \cdot Q_{\text{platform shoe}}$$
$$\frac{P_{\text{paper clip}}}{P_{\text{platform shoe}}} = \frac{a_{\text{paper clip}}}{a_{\text{platform shoe}}} = 0.281879$$

From these three equations and by using the fact, that in a closed economy $Q_{\text{paper clip}} = D_{\text{paper clip}}$ and $Q_{\text{platform shoe}} = D_{\text{platform shoe}}$, after some rearrangements and substitutions we obtain that in optimum the representative consumer buys 73.857143 units of paper clip.

7. Problem

A firms in a closed economy produce only two goods, sweetcorn and coffee. They use a production process that employs only labor as input, and the whole process can be characterized by linear production function. The unit labor requirement in the sweetcorn industry is 0.36, and it is 2.37 in the coffee industry. The following utility function describes the representative consumers preferences over the two goods: $U = 1.79 \cdot \ln D_{\text{sweetcorn}} + 0.20 \cdot \ln D_{\text{coffee}}$. The labor supply in this economy is 584 units.

What are the behavioral equations and the market clearing conditions of this economy?

Solution: The firm, that produces sweetcorn can be characterized by two equations, the production function and the demand for labor function:

$$Q_{\text{sweetcorn}} = \frac{1}{0.36} L_{\text{sweetcorn}}$$
$$P_{\text{sweetcorn}} = 0.36 \cdot W_{\text{sweetcorn}}$$

The behavior of representative firm of the coffee industry is described by the following set of functions:

$$Q_{\text{coffee}} = \frac{1}{2.37} L_{\text{coffee}}$$
$$P_{\text{coffee}} = 2.37 \cdot W_{\text{coffee}}$$

The behavior of the representative consumer is characterized by a budget constraint, and an equation that states that in optimum the marginal rate of substitution between the two goods equals the relative price.

$$P_{\text{sweetcorn}} \cdot Q_{\text{sweetcorn}} + P_{\text{coffee}} \cdot Q_{\text{coffee}} = P_{\text{sweetcorn}} \cdot D_{\text{sweetcorn}} + P_{\text{coffee}} \cdot D_{\text{coffee}}$$
$$\frac{1.79}{0.20} \frac{D_{\text{coffee}}}{D_{\text{sweetcorn}}} = \frac{P_{\text{sweetcorn}}}{P_{\text{coffee}}}$$

The economy has three markets. In the market for sweetcorn the supply equals demand. The same formula applies to the coffee market. And the supply of labor equals the total demand for labor (in labor market equilibrium an industry cannot pay greater nominal wage to workers than the other industry, thus the nominal wage in sweetcorn industry equals the nominal wage in coffee industry). The market clearing conditions are:

$$\begin{aligned} Q_{\text{sweetcorn}} &= D_{\text{sweetcorn}} \\ Q_{\text{coffee}} &= D_{\text{coffee}} \\ 584 &= L_{\text{sweetcorn}} + L_{\text{coffee}} \\ W_{\text{sweetcorn}} &= W_{\text{coffee}} \end{aligned}$$

The model – artificial economy – consists of behavioral equations and market clearing conditions. The behavioral equations are:

$$\begin{aligned} Q_{\text{sweetcorn}} &= \frac{1}{0.36} L_{\text{sweetcorn}} \\ P_{\text{sweetcorn}} &= 0.36 \cdot W_{\text{sweetcorn}} \\ Q_{\text{coffee}} &= \frac{1}{2.37} L_{\text{coffee}} \\ P_{\text{coffee}} &= 2.37 \cdot W_{\text{coffee}} \\ P_{\text{sweetcorn}} \cdot Q_{\text{sweetcorn}} + P_{\text{coffee}} \cdot Q_{\text{coffee}} &= P_{\text{sweetcorn}} \cdot D_{\text{sweetcorn}} + P_{\text{coffee}} \cdot D_{\text{coffee}} \\ \frac{1.79}{0.20} \frac{D_{\text{coffee}}}{D_{\text{sweetcorn}}} &= \frac{P_{\text{sweetcorn}}}{P_{\text{coffee}}} \end{aligned}$$

and the market clearing conditions are the following:

$$\begin{aligned} Q_{\text{sweetcorn}} &= D_{\text{sweetcorn}} \\ Q_{\text{coffee}} &= D_{\text{coffee}} \\ 584 &= L_{\text{sweetcorn}} + L_{\text{coffee}} \\ W_{\text{sweetcorn}} &= W_{\text{coffee}} \end{aligned}$$

8. Problem

The utility function of a representative consumer in a two-good-economy is $U = 2.07 \cdot \ln D_{\text{jigsaw}} + 0.93 \cdot \ln D_{\text{food processor}}$. The producers use only one input – labor – to produce their output, and the production functions are linear. The unit labor requirement in the jigsaw sector is 1.73, and the same parameter in the food processor sector is 1.68. The labor supply in this economy is 410, and the labor moves freely from one industry to the other industry.

Calculate the optimal amount of jigsaw purchased by the representative consumer.

Solution: In optimum (i.) the marginal rate of substitution equals the relative price, (ii.) the optimal bundle of goods is on the budget constraint and in a closed economy this budget constraint is equivalent to the production possibilities function, and (iii.) if labor moves freely from on industry to the other industry, no industry can pay higher wage than the other industry, which yields that the relative price equals the ratio of the two unit labor requirements:

$$\frac{MU_{D_{\text{jigsaw}}}}{MU_{D_{\text{food processor}}}} = \frac{P_{\text{jigsaw}}}{P_{\text{food processor}}}$$
$$410 = 1.68 \cdot Q_{\text{jigsaw}} + 1.68 \cdot Q_{\text{food processor}}$$
$$\frac{P_{\text{jigsaw}}}{P_{\text{food processor}}} = \frac{a_{\text{jigsaw}}}{a_{\text{food processor}}} = 1.029762$$

From these three equations and by using the fact, that in a closed economy $Q_{\text{jigsaw}} = D_{\text{jigsaw}}$ and $Q_{\text{food processor}} = D_{\text{food processor}}$, after some rearrangements and substitutions we obtain that in optimum the representative consumer buys 163.526012 units of jigsaw.

1.

9. Problem

A firms in a closed economy produce only two goods, tomato and bookshelf. They use a production process that employs only labor as input, and the whole process can be characterized by linear production function. The unit labor requirement in the tomato industry is 2.11, and it is 1.44 in the bookshelf industry. The following utility function describes the representative consumers preferences over the two goods: $U = 0.82 \cdot \ln D_{\text{tomato}} + 1.90 \cdot \ln D_{\text{bookshelf}}$. The labor supply in this economy is 556 units.

What are the behavioral equations and the market clearing conditions of this economy?

Solution: The firm, that produces tomato can be characterized by two equations, the production function and the demand for labor function:

$$Q_{\text{tomato}} = \frac{1}{2.11} L_{\text{tomato}}$$
$$P_{\text{tomato}} = 2.11 \cdot W_{\text{tomato}}$$

The behavior of representative firm of the bookshelf industry is described by the following set of functions:

$$Q_{\text{bookshelf}} = \frac{1}{1.44} L_{\text{bookshelf}}$$
$$P_{\text{bookshelf}} = 1.44 \cdot W_{\text{bookshelf}}$$

The behavior of the representative consumer is characterized by a budget constraint, and an equation that states that in optimum the marginal rate of substitution between the two goods equals the relative price.

$$P_{\text{tomato}} \cdot Q_{\text{tomato}} + P_{\text{bookshelf}} \cdot Q_{\text{bookshelf}} = P_{\text{tomato}} \cdot D_{\text{tomato}} + P_{\text{bookshelf}} \cdot D_{\text{bookshelf}}$$
$$\frac{0.82}{1.90} \frac{D_{\text{bookshelf}}}{D_{\text{tomato}}} = \frac{P_{\text{tomato}}}{P_{\text{bookshelf}}}$$

The economy has three markets. In the market for tomato the supply equals demand. The same formula applies to the bookshelf market. And the supply of labor equals the total demand for labor (in labor market equilibrium an industry cannot pay greater nominal wage to workers than the other industry, thus the nominal wage in tomato industry equals the nominal wage in bookshelf industry). The market clearing conditions are:

$$\begin{aligned} Q_{\text{tomato}} &= D_{\text{tomato}} \\ Q_{\text{bookshelf}} &= D_{\text{bookshelf}} \\ 556 &= L_{\text{tomato}} + L_{\text{bookshelf}} \\ W_{\text{tomato}} &= W_{\text{bookshelf}} \end{aligned}$$

The model – artificial economy – consists of behavioral equations and market clearing conditions. The behavioral equations are:

1.

$$\begin{aligned} Q_{\text{tomato}} &= \frac{1}{2.11} L_{\text{tomato}} \\ P_{\text{tomato}} &= 2.11 \cdot W_{\text{tomato}} \\ Q_{\text{bookshelf}} &= \frac{1}{1.44} L_{\text{bookshelf}} \\ P_{\text{bookshelf}} &= 1.44 \cdot W_{\text{bookshelf}} \\ P_{\text{tomato}} \cdot Q_{\text{tomato}} + P_{\text{bookshelf}} \cdot Q_{\text{bookshelf}} &= P_{\text{tomato}} \cdot D_{\text{tomato}} + P_{\text{bookshelf}} \cdot D_{\text{bookshelf}} \\ \frac{0.82}{1.90} \frac{D_{\text{bookshelf}}}{D_{\text{tomato}}} &= \frac{P_{\text{tomato}}}{P_{\text{bookshelf}}} \end{aligned}$$

and the market clearing conditions are the following:

$$\begin{aligned} Q_{\text{tomato}} &= D_{\text{tomato}} \\ Q_{\text{bookshelf}} &= D_{\text{bookshelf}} \\ 556 &= L_{\text{tomato}} + L_{\text{bookshelf}} \\ W_{\text{tomato}} &= W_{\text{bookshelf}} \end{aligned}$$

10. Problem

The objectives and constraints of economic agents in a closed economy that produces only two goods can be written as

$$\begin{aligned} Q_{\text{sweetcorn}} &= \frac{1}{0.88} L_{\text{sweetcorn}} \\ Q_{\text{platform shoe}} &= \frac{1}{1.85} L_{\text{platform shoe}} \\ U &= 1.17 \cdot \ln D_{\text{sweetcorn}} + 0.92 \cdot \ln D_{\text{platform shoe}} \end{aligned}$$

Find the relative price of sweetcorn in terms of platform shoe in this economy.

Solution: The representative firm of sweetcorn industry hires labor up to the point where the marginal revenue of an additional worker is equal the marginal cost of it:

$$P_{\text{sweetcorn}} \frac{1}{0.88} = W_{\text{sweetcorn}}$$

The same applies to the profit-maximizing firm of platform shoe industry:

$$P_{\text{platform shoe}} \frac{1}{1.85} = W_{\text{platform shoe}}$$

Equilibrium occurs in the labor market, thus no industry is able to pay higher wage than the other one. By rearranging the equation we obtain the relative price as the ratio of unit labor requirements:

$$\begin{aligned} W_{\text{sweetcorn}} &= W_{\text{platform shoe}} \\ \frac{P_{\text{sweetcorn}}}{0.88} &= \frac{P_{\text{platform shoe}}}{1.85} \\ \frac{P_{\text{sweetcorn}}}{P_{\text{platform shoe}}} &= \frac{0.88}{1.85} = 0.475676 \end{aligned}$$

11. Problem

The economy is functioning under the following conditions:

$$\begin{aligned} Q_{\text{muffin}} &= \frac{1}{1.40} L_{\text{muffin}} \\ Q_{\text{wooden spoon}} &= \frac{1}{1.78} L_{\text{wooden spoon}} \\ U &= 1.59 \cdot D_{\text{muffin}}^{0.13} D_{\text{wooden spoon}}^{0.87} \\ L &= 132 \end{aligned}$$

Find the optimal amount of wooden spoon produced by the representative producer.

Solution: In optimum the representative consumer maximizes her utility, the firms maximize their profits, and equilibrium occurs in all three markets of the economy. Formally:

$$\begin{aligned} \frac{MU_{D_{\text{muffin}}}}{MU_{D_{\text{wooden spoon}}}} &= \frac{P_{\text{muffin}}}{P_{\text{wooden spoon}}} \\ P_{\text{muffin}} \cdot Q_{\text{muffin}} + P_{\text{wooden spoon}} \cdot Q_{\text{wooden spoon}} &= P_{\text{muffin}} \cdot D_{\text{muffin}} + P_{\text{wooden spoon}} \cdot D_{\text{wooden spoon}} \\ Q_{\text{muffin}} &= \frac{1}{1.40} L_{\text{muffin}} \\ Q_{\text{wooden spoon}} &= \frac{1}{1.78} L_{\text{wooden spoon}} \\ 132 &= L_{\text{muffin}} + L_{\text{wooden spoon}} \end{aligned}$$

$$P_{\text{muffin}} MPL_{\text{muffin}} = P_{\text{wooden spoon}} MPL_{\text{wooden spoon}}$$
$$Q_{\text{muffin}} = D_{\text{muffin}}$$
$$Q_{\text{wooden spoon}} = D_{\text{wooden spoon}}$$

Solving these equations for $Q_{\text{wooden spoon}}$ yields that $Q_{\text{wooden spoon}} = 64.516854$

12. Problem

The economy is functioning under the following conditions:

$$Q_{\text{orange}} = \frac{1}{1.29} L_{\text{orange}}$$
$$Q_{\text{lemon}} = \frac{1}{1.20} L_{\text{lemon}}$$
$$U = 0.27 \cdot D_{\text{orange}}^{0.28} D_{\text{lemon}}^{0.72}$$
$$L = 544$$

Find the optimal amount of lemon produced by the representative producer.

Solution: In optimum the representative consumer maximizes her utility, the firms maximize their profits, and equilibrium occurs in all three markets of the economy. Formally:

$$\frac{MU_{D_{\text{orange}}}}{MU_{D_{\text{lemon}}}} = \frac{P_{\text{orange}}}{P_{\text{lemon}}}$$
$$P_{\text{orange}} \cdot Q_{\text{orange}} + P_{\text{lemon}} \cdot Q_{\text{lemon}} = P_{\text{orange}} \cdot D_{\text{orange}} + P_{\text{lemon}} \cdot D_{\text{lemon}}$$
$$Q_{\text{orange}} = \frac{1}{1.29} L_{\text{orange}}$$
$$Q_{\text{lemon}} = \frac{1}{1.20} L_{\text{lemon}}$$
$$544 = L_{\text{orange}} + L_{\text{lemon}}$$
$$P_{\text{orange}} MPL_{\text{orange}} = P_{\text{lemon}} MPL_{\text{lemon}}$$
$$Q_{\text{orange}} = D_{\text{orange}}$$
$$Q_{\text{lemon}} = D_{\text{lemon}}$$

Solving these equations for Q_{lemon} yields that $Q_{\text{lemon}} = 326.400000$

13. Problem

The objectives and constraints of economic agents in a closed economy that produces only two goods can be written as

$$Q_{\text{trifle}} = \frac{1}{2.25} L_{\text{trifle}}$$

$$Q_{\text{spring onion}} = \frac{1}{1.16} L_{\text{spring onion}}$$
$$U = 1.85 \cdot \ln D_{\text{trifle}} + 1.63 \cdot \ln D_{\text{spring onion}}$$

Find the relative price of trifle in terms of spring onion in this economy.

Solution: The representative firm of trifle industry hires labor up to the point where the marginal revenue of an additional worker is equal the marginal cost of it:

$$P_{\text{trifle}} \frac{1}{2.25} = W_{\text{trifle}}$$

The same applies to the profit-maximizing firm of spring onion industry:

$$P_{\text{spring onion}} \frac{1}{1.16} = W_{\text{spring onion}}$$

Equilibrium occurs in the labor market, thus no industry is able to pay higher wage than the other one. By rearranging the equation we obtain the relative price as the ratio of unit labor requirements:

$$W_{\text{trifle}} = W_{\text{spring onion}}$$
$$\frac{P_{\text{trifle}}}{2.25} = \frac{P_{\text{spring onion}}}{1.16}$$
$$\frac{P_{\text{trifle}}}{P_{\text{spring onion}}} = \frac{2.25}{1.16} = 1.939655$$

14. Problem

The utility function of a representative consumer in a two-good-economy is $U = 2.27 \cdot \ln D_{\text{necklace}} + 0.27 \cdot \ln D_{\text{pizza}}$. The producers use only one input – labor – to produce their output, and the production functions are linear. The unit labor requirement in the necklace sector is 1.02, and the same parameter in the pizza sector is 1.04. The labor supply in this economy is 547, and the labor moves freely from one industry to the other industry.

Calculate the optimal amount of necklace purchased by the representative consumer.

Solution: In optimum (i.) the marginal rate of substitution equals the relative price, (ii.) the optimal bundle of goods is on the budget constraint and in a closed economy this budget constraint is equivalent to the production possibilities function, and (iii.) if labor moves freely from on industry to the other industry, no industry can pay higher wage than the other industry, which yields that the relative price equals the ratio of the two unit labor requirements:

$$\frac{MU_{D_{\text{necklace}}}}{MU_{D_{\text{pizza}}}} = \frac{P_{\text{necklace}}}{P_{\text{pizza}}}$$
$$547 = 1.04 \cdot Q_{\text{necklace}} + 1.04 \cdot Q_{\text{pizza}}$$

1.

$$\frac{P_{\text{necklace}}}{P_{\text{pizza}}} = \frac{a_{\text{necklace}}}{a_{\text{pizza}}} = 0.980769$$

From these three equations and by using the fact, that in a closed economy $Q_{\text{necklace}} = D_{\text{necklace}}$ and $Q_{\text{pizza}} = D_{\text{pizza}}$, after some rearrangements and substitutions we obtain that in optimum the representative consumer buys 479.268952 units of necklace.

15. Problem

The economy is functioning under the following conditions:

$$Q_{\text{lemon}} = \frac{1}{0.36} L_{\text{lemon}}$$
$$Q_{\text{napkin}} = \frac{1}{2.42} L_{\text{napkin}}$$
$$U = 1.55 \cdot D_{\text{lemon}}^{0.38} D_{\text{napkin}}^{0.62}$$
$$L = 444$$

Find the optimal amount of napkin produced by the representative producer.

Solution: In optimum the representative consumer maximizes her utility, the firms maximize their profits, and equilibrium occurs in all three markets of the economy. Formally:

$$\frac{MU_{D_{\text{lemon}}}}{MU_{D_{\text{napkin}}}} = \frac{P_{\text{lemon}}}{P_{\text{napkin}}}$$
$$P_{\text{lemon}} \cdot Q_{\text{lemon}} + P_{\text{napkin}} \cdot Q_{\text{napkin}} = P_{\text{lemon}} \cdot D_{\text{lemon}} + P_{\text{napkin}} \cdot D_{\text{napkin}}$$
$$Q_{\text{lemon}} = \frac{1}{0.36} L_{\text{lemon}}$$
$$Q_{\text{napkin}} = \frac{1}{2.42} L_{\text{napkin}}$$
$$444 = L_{\text{lemon}} + L_{\text{napkin}}$$
$$P_{\text{lemon}} MPL_{\text{lemon}} = P_{\text{napkin}} MPL_{\text{napkin}}$$
$$Q_{\text{lemon}} = D_{\text{lemon}}$$
$$Q_{\text{napkin}} = D_{\text{napkin}}$$

Solving these equations for Q_{napkin} yields that $Q_{\text{napkin}} = 113.752066$

16. Problem

The objectives and constraints of economic agents in a closed economy that produces only two goods can be written as

$$Q_{\text{painting}} = \frac{1}{0.25} L_{\text{painting}}$$

$$Q_{\text{cauliflower}} = \frac{1}{0.33} L_{\text{cauliflower}}$$
$$U = 2.18 \cdot \ln D_{\text{painting}} + 0.60 \cdot \ln D_{\text{cauliflower}}$$

Find the relative price of painting in terms of cauliflower in this economy.

Solution: The representative firm of painting industry hires labor up to the point where the marginal revenue of an additional worker is equal the marginal cost of it:

$$P_{\text{painting}} \frac{1}{0.25} = W_{\text{painting}}$$

The same applies to the profit-maximizing firm of cauliflower industry:

$$P_{\text{cauliflower}} \frac{1}{0.33} = W_{\text{cauliflower}}$$

Equilibrium occurs in the labor market, thus no industry is able to pay higher wage than the other one. By rearranging the equation we obtain the relative price as the ratio of unit labor requirements:

$$W_{\text{painting}} = W_{\text{cauliflower}}$$
$$\frac{P_{\text{painting}}}{0.25} = \frac{P_{\text{cauliflower}}}{0.33}$$
$$\frac{P_{\text{painting}}}{P_{\text{cauliflower}}} = \frac{0.25}{0.33} = 0.757576$$

17. Problem

The economy is functioning under the following conditions:

$$Q_{\text{cauliflower}} = \frac{1}{0.41} L_{\text{cauliflower}}$$
$$Q_{\text{salad}} = \frac{1}{2.27} L_{\text{salad}}$$
$$U = 1.45 \cdot D_{\text{cauliflower}}^{0.26} D_{\text{salad}}^{0.74}$$
$$L = 84$$

Find the optimal amount of salad produced by the representative producer.

Solution: In optimum the representative consumer maximizes her utility, the firms maximize their profits, and equilibrium occurs in all three markets of the economy. Formally:

$$\frac{MU_{D_{\text{cauliflower}}}}{MU_{D_{\text{salad}}}} = \frac{P_{\text{cauliflower}}}{P_{\text{salad}}}$$

$$
\begin{aligned}
P_{\text{cauliflower}} \cdot Q_{\text{cauliflower}} + P_{\text{salad}} \cdot Q_{\text{salad}} &= P_{\text{cauliflower}} \cdot D_{\text{cauliflower}} + P_{\text{salad}} \cdot D_{\text{salad}} \\
Q_{\text{cauliflower}} &= \frac{1}{0.41} L_{\text{cauliflower}} \\
Q_{\text{salad}} &= \frac{1}{2.27} L_{\text{salad}} \\
84 &= L_{\text{cauliflower}} + L_{\text{salad}} \\
P_{\text{cauliflower}} MPL_{\text{cauliflower}} &= P_{\text{salad}} MPL_{\text{salad}} \\
Q_{\text{cauliflower}} &= D_{\text{cauliflower}} \\
Q_{\text{salad}} &= D_{\text{salad}}
\end{aligned}
$$

Solving these equations for Q_{salad} yields that $Q_{\text{salad}} = 27.383260$

18. Problem

The objectives and constraints of economic agents in a closed economy that produces only two goods can be written as

$$
\begin{aligned}
Q_{\text{fruit cake}} &= \frac{1}{0.37} L_{\text{fruit cake}} \\
Q_{\text{hairspray}} &= \frac{1}{1.84} L_{\text{hairspray}} \\
U &= 1.71 \cdot \ln D_{\text{fruit cake}} + 0.94 \cdot \ln D_{\text{hairspray}}
\end{aligned}
$$

Find the relative price of fruit cake in terms of hairspray in this economy.

Solution: The representative firm of fruit cake industry hires labor up to the point where the marginal revenue of an additional worker is equal the marginal cost of it:

$$P_{\text{fruit cake}} \frac{1}{0.37} = W_{\text{fruit cake}}$$

The same applies to the profit-maximizing firm of hairspray industry:

$$P_{\text{hairspray}} \frac{1}{1.84} = W_{\text{hairspray}}$$

Equilibrium occurs in the labor market, thus no industry is able to pay higher wage than the other one. By rearranging the equation we obtain the relative price as the ratio of unit labor requirements:

$$
\begin{aligned}
W_{\text{fruit cake}} &= W_{\text{hairspray}} \\
\frac{P_{\text{fruit cake}}}{0.37} &= \frac{P_{\text{hairspray}}}{1.84} \\
\frac{P_{\text{fruit cake}}}{P_{\text{hairspray}}} &= \frac{0.37}{1.84} = 0.201087
\end{aligned}
$$

19. Problem

The utility function of a representative consumer in a two-good-economy is $U = 2.21 \cdot \ln D_{\text{paper clip}} + 1.37 \cdot \ln D_{\text{coffee cup}}$. The producers use only one input – labor – to produce their output, and the production functions are linear. The unit labor requirement in the paper clip sector is 1.42, and the same parameter in the coffee cup sector is 2.25. The labor supply in this economy is 361, and the labor moves freely from one industry to the other industry.

Calculate the optimal amount of paper clip purchased by the representative consumer.

Solution: In optimum (i.) the marginal rate of substitution equals the relative price, (ii.) the optimal bundle of goods is on the budget constraint and in a closed economy this budget constraint is equivalent to the production possibilities function, and (iii.) if labor moves freely from on industry to the other industry, no industry can pay higher wage than the other industry, which yields that the relative price equals the ratio of the two unit labor requirements:

$$\frac{MU_{D_{\text{paper clip}}}}{MU_{D_{\text{coffee cup}}}} = \frac{P_{\text{paper clip}}}{P_{\text{coffee cup}}}$$
$$361 = 2.25 \cdot Q_{\text{paper clip}} + 2.25 \cdot Q_{\text{coffee cup}}$$
$$\frac{P_{\text{paper clip}}}{P_{\text{coffee cup}}} = \frac{a_{\text{paper clip}}}{a_{\text{coffee cup}}} = 0.631111$$

From these three equations and by using the fact, that in a closed economy $Q_{\text{paper clip}} = D_{\text{paper clip}}$ and $Q_{\text{coffee cup}} = D_{\text{coffee cup}}$, after some rearrangements and substitutions we obtain that in optimum the representative consumer buys 156.937997 units of paper clip.

20. Problem

A firms in a closed economy produce only two goods, cola and blackcurrant. They use a production process that employs only labor as input, and the whole process can be characterized by linear production function. The unit labor requirement in the cola industry is 1.91, and it is 2.24 in the blackcurrant industry. The following utility function describes the representative consumers preferences over the two goods: $U = 1.27 \cdot \ln D_{\text{cola}} + 1.01 \cdot \ln D_{\text{blackcurrant}}$. The labor supply in this economy is 103 units.

What are the behavioral equations and the market clearing conditions of this economy?

Solution: The firm, that produces cola can be characterized by two equations, the production function and the demand for labor function:

$$Q_{\text{cola}} = \frac{1}{1.91} L_{\text{cola}}$$
$$P_{\text{cola}} = 1.91 \cdot W_{\text{cola}}$$

The behavior of representative firm of the blackcurrant industry is described by the following set of functions:

$$\begin{aligned} Q_{\text{blackcurrant}} &= \frac{1}{2.24} L_{\text{blackcurrant}} \\ P_{\text{blackcurrant}} &= 2.24 \cdot W_{\text{blackcurrant}} \end{aligned}$$

The behavior of the representative consumer is characterized by a budget constraint, and an equation that states that in optimum the marginal rate of substitution between the two goods equals the relative price.

$$\begin{gathered} P_{\text{cola}} \cdot Q_{\text{cola}} + P_{\text{blackcurrant}} \cdot Q_{\text{blackcurrant}} = P_{\text{cola}} \cdot D_{\text{cola}} + P_{\text{blackcurrant}} \cdot D_{\text{blackcurrant}} \\ \frac{1.27}{1.01} \frac{D_{\text{blackcurrant}}}{D_{\text{cola}}} = \frac{P_{\text{cola}}}{P_{\text{blackcurrant}}} \end{gathered}$$

1.

The economy has three markets. In the market for cola the supply equals demand. The same formula applies to the blackcurrant market. And the supply of labor equals the total demand for labor (in labor market equilibrium an industry cannot pay greater nominal wage to workers than the other industry, thus the nominal wage in cola industry equals the nominal wage in blackcurrant industry). The market clearing conditions are:

$$\begin{aligned} Q_{\text{cola}} &= D_{\text{cola}} \\ Q_{\text{blackcurrant}} &= D_{\text{blackcurrant}} \\ 103 &= L_{\text{cola}} + L_{\text{blackcurrant}} \\ W_{\text{cola}} &= W_{\text{blackcurrant}} \end{aligned}$$

The model – artificial economy – consists of behavioral equations and market clearing conditions. The behavioral equations are:

$$\begin{aligned} Q_{\text{cola}} &= \frac{1}{1.91} L_{\text{cola}} \\ P_{\text{cola}} &= 1.91 \cdot W_{\text{cola}} \\ Q_{\text{blackcurrant}} &= \frac{1}{2.24} L_{\text{blackcurrant}} \\ P_{\text{blackcurrant}} &= 2.24 \cdot W_{\text{blackcurrant}} \\ P_{\text{cola}} \cdot Q_{\text{cola}} + P_{\text{blackcurrant}} \cdot Q_{\text{blackcurrant}} &= P_{\text{cola}} \cdot D_{\text{cola}} + P_{\text{blackcurrant}} \cdot D_{\text{blackcurrant}} \\ \frac{1.27}{1.01} \frac{D_{\text{blackcurrant}}}{D_{\text{cola}}} &= \frac{P_{\text{cola}}}{P_{\text{blackcurrant}}} \end{aligned}$$

and the market clearing conditions are the following:

$$\begin{aligned} Q_{\text{cola}} &= D_{\text{cola}} \\ Q_{\text{blackcurrant}} &= D_{\text{blackcurrant}} \\ 103 &= L_{\text{cola}} + L_{\text{blackcurrant}} \\ W_{\text{cola}} &= W_{\text{blackcurrant}} \end{aligned}$$

1.

2. RICARDIAN MODEL FREE TRADE

2.

Absolute Advantage, Opportunity Cost

1. Problem

Firms is Home produce peach and napkin by using a technology that can be characterized by the following production functions:

$$Q_{\text{peach}} = 11.61 \cdot L_{\text{peach}}$$
$$Q_{\text{napkin}} = 7.92 \cdot L_{\text{napkin}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{peach}} = 1.81 \cdot L^{\text{world}}_{\text{peach}}$$
$$Q^{\text{world}}_{\text{napkin}} = 6.30 \cdot L^{\text{world}}_{\text{napkin}}$$

Which economy has absolute advantage in producing peach?

Solution: Home has absolute advantage in producing peach.

2. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
teapot	7.74	7.60
milkshake	1.18	7.25

What is the opportunity cost of producing teapot in terms of milkshake in the open economy?

Solution: The opportunity cost of teapot in terms of milkshake in the open economy is 1.0184.

3. Problem

In an open economy firms use the only available input – labor – to produce two goods: soup and bagel. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{bagel}} = 729.69 - 0.99 \cdot Q_{\text{soup}}$$

The rest of the world produces soup and bagel. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{bagel}} = 537.21 - 17.00 \cdot Q^{\text{world}}_{\text{soup}}$$

2.

Find the opportunity cost of producing soup in terms of bagel in the open economy.

Solution: The opportunity cost of soup in terms of bagel in the open economy is 0.99.

4. Problem

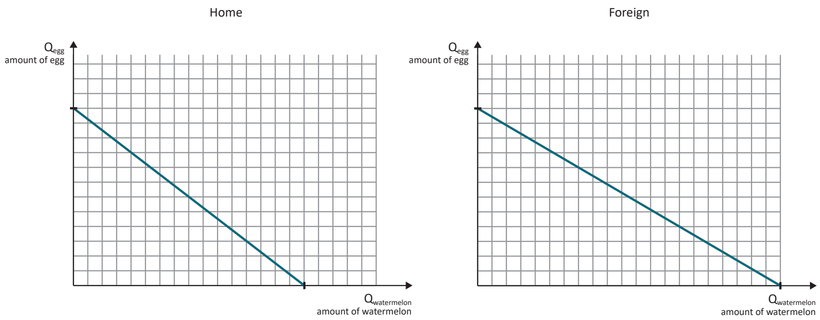
In an open economy the production possibilities frontier function intersects the tea axis at 75.00 and the intersection point with the lime axis is 69.22. The firms of this economy are able to use 1305 units of labor. In the rest of the world the production possibilities frontier intersects the tea and lime axes at 59.04 and 20.41 respectively and the labor supply in this region is 1005 units.

Find the opportunity cost of producing tea in terms of lime in the open economy.

Solution: The opportunity cost of tea in terms of lime in the open economy is 0.9229.

5. Problem

Suppose that Home and Foreign use the same amount of labor to produce egg and watermelon. The following graphs illustrate the production possibilities frontier in the two economies



Which economy has absolute advantage in producing watermelon?

Solution: Foreign has absolute advantage in producing watermelon.

6. Problem

An open economy has 337 units labor to produce two goods hairdryer and coffee, while the labor supply in the rest of the world is 1132 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{coffee}} = 244.71 - 6.42 \cdot Q_{\text{hairdryer}}$$
$$Q^{\text{world}}_{\text{coffee}} = 584.28 - 2.74 \cdot Q^{\text{world}}_{\text{hairdryer}}$$

Which economy has absolute advantage in producing coffee?

Solution: The open economy has absolute advantage in producing coffee.

7. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
pushchair	7.09	4.52
chicken burger	5.23	2.42

What is the opportunity cost of producing chicken burger in terms of pushchair in the rest of the world?

Solution: The opportunity cost of chicken burger in terms of pushchair in the rest of the world is 0.4627.

8. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
fruit cake	0.39	1.84
spring onion	11.38	6.10

What is the opportunity cost of producing fruit cake in terms of spring onion in economy A?

Solution: The opportunity cost of fruit cake in terms of spring onion in economy A is 4.7179.

9. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
wooden spoon	9.94	4.98
mint tea	0.93	0.91

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing mint tea?

Solution: The rest of the world has absolute advantage in producing mint tea.

10. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
platform shoe	11.68	3.33
jigsaw	3.26	7.49

What is the opportunity cost of producing platform shoe in terms of jigsaw in the rest of the world?

Solution: The opportunity cost of platform shoe in terms of jigsaw in the rest of the world is 0.4352.

11. Problem

In an open economy firms use the only available input – labor – to produce two goods: wine glass and lemonade. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{lemonade}} = 589.18 - 8.52 \cdot Q_{\text{wine glass}}$$

The rest of the world produces wine glass and lemonade. There the production possibilities frontier function takes the form of

$$Q_{\text{lemonade}}^{\text{world}} = 366.78 - 3.86 \cdot Q_{\text{wine glass}}^{\text{world}}$$

Calculate the opportunity cost of producing wine glass in terms of lemonade in the rest of the world.

Solution: The opportunity cost of wine glass in terms of lemonade in the rest of the world is 3.86.

12. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
handbag	1.61	3.67
ice cream	4.07	9.10

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing ice cream?

Solution: Economy B has absolute advantage in producing ice cream.

13. Problem

Firms is Home produce plate and lemon by using a technology that can be characterized by the following production functions:

$$Q_{\text{plate}} = 1.25 \cdot L_{\text{plate}}$$
$$Q_{\text{lemon}} = 7.00 \cdot L_{\text{lemon}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{plate}}^{\text{world}} = 1.58 \cdot L_{\text{plate}}^{\text{world}}$$
$$Q_{\text{lemon}}^{\text{world}} = 4.01 \cdot L_{\text{lemon}}^{\text{world}}$$

What is the opportunity cost of producing lemon in terms of plate in Home?

Solution: The opportunity cost of lemon in terms of plate in Home is 0.1786.

2.

14. Problem

In an open economy firms use the only available input – labor – to produce two goods: platform shoe and scarf. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{scarf}} = 453.52 - 10.18 \cdot Q_{\text{platform shoe}}$$

The rest of the world produces platform shoe and scarf. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{scarf}} = 676.00 - 10.09 \cdot Q^{\text{world}}_{\text{platform shoe}}$$

Find the opportunity cost of producing platform shoe in terms of scarf in the open economy.

Solution: The opportunity cost of platform shoe in terms of scarf in the open economy is 10.18.

15. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
sweetcorn	6.98	4.61
teacup	0.91	9.90

What is the opportunity cost of producing sweetcorn in terms of teacup in economy A?

Solution: The opportunity cost of sweetcorn in terms of teacup in economy A is 0.6605.

16. Problem

Firms is Home produce brioche and peach by using a technology that can be characterized by the following production functions:

$$Q_{\text{brioche}} = 6.54 \cdot L_{\text{brioche}}$$
$$Q_{\text{peach}} = 2.27 \cdot L_{\text{peach}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{brioche}} = 6.93 \cdot L^{\text{world}}_{\text{brioche}}$$
$$Q^{\text{world}}_{\text{peach}} = 2.94 \cdot L^{\text{world}}_{\text{peach}}$$

Which economy has absolute advantage in producing brioche?

Solution: The rest of the world has absolute advantage in producing brioche.

17. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
scarf	1.55	10.48
hairspray	11.17	6.73

What is the opportunity cost of producing hairspray in terms of scarf in the rest of the world?

Solution: The opportunity cost of hairspray in terms of scarf in the rest of the world is 0.6025.

18. Problem

In an open economy firms produce only jigsaw and spring onion. The production process can be described by a linear production function. The unit labor requirement in jigsaw industry is 5.52, and in spring onion industry it is 3.01. In the rest of the world $a^{\text{world}}_{\text{jigsaw}} = 2.48$ and $a^{\text{world}}_{\text{spring onion}} = 8.36$.

Which economy has absolute advantage in producing spring onion?

Solution: The open economy has absolute advantage in producing spring onion.

19. Problem

In an open economy the production possibilities frontier function intersects the cabbage axis at 87.44 and the intersection point with the necklace axis is 61.14. The firms of this economy are able to use 663 units of labor. In the rest of the world the production possibilities frontier intersects the cabbage and necklace axes at 93.62 and 19.38 respectively and the labor supply in this region is 494 units.

Find the opportunity cost of producing cabbage in terms of necklace in the open economy.

Solution: The opportunity cost of cabbage in terms of necklace in the open economy is 0.6992.

20. Problem

In an open economy the production possibilities frontier function intersects the watermelon axis at 90.25 and the intersection point with the tea axis is 20.61. The firms of this economy are able to use 293 units of labor. In the rest of the world the production possibilities frontier intersects the watermelon and tea axes at 12.17 and 24.84 respectively and the labor supply in this region is 880 units.

Calculate the opportunity cost of producing watermelon in terms of tea in the rest of the world.

Solution: The opportunity cost of watermelon in terms of tea in the rest of the world is 2.0411.

21. Problem

In an open economy firms produce only muffin and almond. The production process can be described by a linear production function. The unit labor requirement in muffin industry is 3.99, and in almond industry it is 1.68. In the rest of the world $a^{\text{world}}_{\text{muffin}} = 8.67$ and $a^{\text{world}}_{\text{almond}} = 8.39$.

What is the opportunity cost of producing muffin in terms of almond in the open economy?

Solution: The opportunity cost of muffin in terms of almond in the open economy is 2.3750.

22. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
watch	5.67	4.83
hot chocolate	5.51	6.70

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing hot chocolate?

Solution: The open economy has absolute advantage in producing hot chocolate.

23. Problem

Firms is Home produce watermelon and platform shoe by using a technology that can be characterized by the following production functions:

$$Q_{\text{watermelon}} = 11.19 \cdot L_{\text{watermelon}}$$
$$Q_{\text{platform shoe}} = 7.32 \cdot L_{\text{platform shoe}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{watermelon}} = 3.42 \cdot L^{\text{world}}_{\text{watermelon}}$$
$$Q^{\text{world}}_{\text{platform shoe}} = 5.52 \cdot L^{\text{world}}_{\text{platform shoe}}$$

Calculate the opportunity cost of producing watermelon in terms of platform shoe in the rest of the world.

Solution: The opportunity cost of watermelon in terms of platform shoe in the rest of the world is 1.6140.

24. Problem

In an open economy the production possibilities frontier function intersects the scarf axis at 75.35 and the intersection point with the banana axis is 47.24. The firms of this economy are able to use 814 units of labor. In the rest of the world the production possibilities frontier intersects the scarf and banana axes at 90.53 and 56.03 respectively and the labor supply in this region is 536 units.

What is the opportunity cost of producing banana in terms of scarf in the open economy?

Solution: The opportunity cost of banana in terms of scarf in the open economy is 1.5950.

25. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
sweetcorn	10.36	9.83
teacup	9.20	6.18

What is the opportunity cost of producing sweetcorn in terms of teacup in the rest of the world?

Solution: The opportunity cost of sweetcorn in terms of teacup in the rest of the world is 1.4887.

26. Problem

In an open economy firms produce only platform shoe and pushchair. The production process can be described by a linear production function. The unit labor requirement in platform shoe industry is 6.08, and in pushchair industry it is 9.77. In the rest of the world $a^{\text{world}}_{\text{platform shoe}} = 2.01$ and $a^{\text{world}}_{\text{pushchair}} = 0.88$.

Which economy has absolute advantage in producing platform shoe?

Solution: The rest of the world has absolute advantage in producing platform shoe.

27. Problem

Firms is Home produce soup and cabbage by using a technology that can be characterized by the following production functions:

$$Q_{\text{soup}} = 9.91 \cdot L_{\text{soup}}$$
$$Q_{\text{cabbage}} = 5.18 \cdot L_{\text{cabbage}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{soup}} = 10.19 \cdot L^{\text{world}}_{\text{soup}}$$
$$Q^{\text{world}}_{\text{cabbage}} = 9.58 \cdot L^{\text{world}}_{\text{cabbage}}$$

Calculate the opportunity cost of producing soup in terms of cabbage in the rest of the world.

Solution: The opportunity cost of soup in terms of cabbage in the rest of the world is 0.9401.

28. Problem

An open economy has 1171 units labor to produce two goods hot chocolate and handbag, while the labor supply in the rest of the world is 588 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{handbag}} = 515.07 - 9.60 \cdot Q_{\text{hot chocolate}}$$
$$Q^{\text{world}}_{\text{handbag}} = 651.74 - 6.94 \cdot Q^{\text{world}}_{\text{hot chocolate}}$$

Which economy displays absolute advantage in producing hot chocolate?

Solution: The rest of the world has absolute advantage in producing hot chocolate.

29. Problem

Firms is Home produce hot chocolate and sweetcorn by using a technology that can be characterized by the following production functions:

$$Q_{\text{hot chocolate}} = 4.63 \cdot L_{\text{hot chocolate}}$$
$$Q_{\text{sweetcorn}} = 0.98 \cdot L_{\text{sweetcorn}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{hot chocolate}} = 9.53 \cdot L^{\text{world}}_{\text{hot chocolate}}$$

$$Q^{\text{world}}_{\text{sweetcorn}} = 10.24 \cdot L^{\text{world}}_{\text{sweetcorn}}$$

What is the opportunity cost of producing sweetcorn in terms of hot chocolate in Home?

Solution: The opportunity cost of sweetcorn in terms of hot chocolate in Home is 4.7245.

30. Problem

Firms is Home produce hot chocolate and necklace by using a technology that can be characterized by the following production functions:

$$Q_{\text{hot chocolate}} = 1.08 \cdot L_{\text{hot chocolate}}$$
$$Q_{\text{necklace}} = 5.55 \cdot L_{\text{necklace}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{hot chocolate}} = 4.98 \cdot L^{\text{world}}_{\text{hot chocolate}}$$
$$Q^{\text{world}}_{\text{necklace}} = 8.20 \cdot L^{\text{world}}_{\text{necklace}}$$

Find the opportunity cost of producing hot chocolate in terms of necklace in Home.

Solution: The opportunity cost of hot chocolate in terms of necklace in Home is 5.1389.

31. Problem

In an open economy the production possibilities frontier function intersects the hairspray axis at 93.27 and the intersection point with the blackcurrant axis is 46.34. The firms of this economy are able to use 346 units of labor. In the rest of the world the production possibilities frontier intersects the hairspray and blackcurrant axes at 47.86 and 27.09 respectively and the labor supply in this region is 966 units.

What is the opportunity cost of producing blackcurrant in terms of hairspray in the open economy?

Solution: The opportunity cost of blackcurrant in terms of hairspray in the open economy is 2.0127.

32. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
salad	5.64	3.91
soup	5.03	11.71

What is the opportunity cost of producing salad in terms of soup in the rest of the world?

Solution: The opportunity cost of salad in terms of soup in the rest of the world is 0.4295.

2.

33. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
shampoo	7.94	1.34
pistachio	3.85	4.03

What is the opportunity cost of producing pistachio in terms of shampoo in the open economy?

Solution: The opportunity cost of pistachio in terms of shampoo in the open economy is 0.1688.

34. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
spring onion	3.31	5.13
muffin	5.57	6.71

What is the opportunity cost of producing muffin in terms of spring onion in the open economy?

Solution: The opportunity cost of muffin in terms of spring onion in the open economy is 1.5498.

2.

35. Problem

In an open economy firms produce only watch and necklace. The production process can be described by a linear production function. The unit labor requirement in watch industry is 8.43, and in necklace industry it is 1.94. In the rest of the world $a^{\text{world}}_{\text{watch}} = 1.72$ and $a^{\text{world}}_{\text{necklace}} = 9.60$.

Which economy has absolute advantage in producing necklace?

Solution: The open economy has absolute advantage in producing necklace.

36. Problem

In an open economy firms use the only available input – labor – to produce two goods: brioche and coffee. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{coffee}} = 623.40 - 8.21 \cdot Q_{\text{brioche}}$$

The rest of the world produces brioche and coffee. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{coffee}} = 751.44 - 20.59 \cdot Q^{\text{world}}_{\text{brioche}}$$

Calculate the opportunity cost of producing brioche in terms of coffee in the rest of the world.

Solution: The opportunity cost of brioche in terms of coffee in the rest of the world is 20.59.

37. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
spring onion	4.70	5.91
handbag	10.66	4.15

What is the opportunity cost of producing spring onion in terms of handbag in economy B?

Solution: The opportunity cost of spring onion in terms of handbag in economy B is 0.3893.

38. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
pie	7.72	5.78
rug	0.77	6.57

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing pie?

Solution: The rest of the world has absolute advantage in producing pie.

2.

39. Problem

In an open economy firms use the only available input – labor – to produce two goods: lemonade and necklace. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{necklace}} = 162.19 - 16.76 \cdot Q_{\text{lemonade}}$$

The rest of the world produces lemonade and necklace. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{necklace}} = 533.94 - 20.86 \cdot Q^{\text{world}}_{\text{lemonade}}$$

Calculate the opportunity cost of producing lemonade in terms of necklace in the rest of the world.

Solution: The opportunity cost of lemonade in terms of necklace in the rest of the world is 20.86.

40. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
pushchair	2.43	8.42
coffee cup	7.65	1.54

What is the opportunity cost of producing coffee cup in terms of pushchair in economy A?

Solution: The opportunity cost of coffee cup in terms of pushchair in economy A is 0.2886.

41. Problem

In an open economy firms produce only soup and cauliflower. The production process can be described by a linear production function. The unit labor requirement in soup industry is 5.69, and in cauliflower industry it is 1.43. In the rest of the world $a_{\text{soup}}^{\text{world}} = 3.43$ and $a_{\text{cauliflower}}^{\text{world}} = 4.57$.

Which economy has absolute advantage in producing soup?

Solution: The rest of the world has absolute advantage in producing soup.

42. Problem

2.

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
shampoo	11.01	6.30
pizza	5.65	10.14

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing shampoo?

Solution: Economy A has absolute advantage in producing shampoo.

43. Problem

Firms is Home produce blackcurrant and wallet by using a technology that can be characterized by the following production functions:

$$Q_{\text{blackcurrant}} = 2.88 \cdot L_{\text{blackcurrant}}$$
$$Q_{\text{wallet}} = 10.18 \cdot L_{\text{wallet}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{blackcurrant}}^{\text{world}} = 0.69 \cdot L_{\text{blackcurrant}}^{\text{world}}$$
$$Q_{\text{wallet}}^{\text{world}} = 3.84 \cdot L_{\text{wallet}}^{\text{world}}$$

Which economy has absolute advantage in producing wallet?

Solution: Home has absolute advantage in producing wallet.

44. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
trifle	8.43	10.90
banana	1.37	9.61

What is the opportunity cost of producing trifle in terms of banana in the open economy?

Solution: The opportunity cost of trifle in terms of banana in the open economy is 0.7734.

45. Problem

An open economy has 422 units labor to produce two goods porridge and onion, while the labor supply in the rest of the world is 410 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{onion}} = 405.19 - 17.43 \cdot Q_{\text{porridge}}$$
$$Q^{\text{world}}_{\text{onion}} = 258.54 - 10.60 \cdot Q^{\text{world}}_{\text{porridge}}$$

Which economy displays absolute advantage in producing porridge?

Solution: The rest of the world has absolute advantage in producing porridge.

2.

46. Problem

Firms is Home produce cauliflower and wine glass by using a technology that can be characterized by the following production functions:

$$Q_{\text{cauliflower}} = 10.37 \cdot L_{\text{cauliflower}}$$
$$Q_{\text{wine glass}} = 4.30 \cdot L_{\text{wine glass}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{cauliflower}} = 4.46 \cdot L^{\text{world}}_{\text{cauliflower}}$$
$$Q^{\text{world}}_{\text{wine glass}} = 6.54 \cdot L^{\text{world}}_{\text{wine glass}}$$

2.

Calculate the opportunity cost of producing cauliflower in terms of wine glass in the rest of the world.

Solution: The opportunity cost of cauliflower in terms of wine glass in the rest of the world is 1.4664.

47. Problem

Firms is Home produce orange and hairdryer by using a technology that can be characterized by the following production functions:

$$Q_{\text{orange}} = 7.93 \cdot L_{\text{orange}}$$
$$Q_{\text{hairdryer}} = 9.06 \cdot L_{\text{hairdryer}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{orange}} = 2.10 \cdot L^{\text{world}}_{\text{orange}}$$
$$Q^{\text{world}}_{\text{hairdryer}} = 6.84 \cdot L^{\text{world}}_{\text{hairdryer}}$$

Determine the opportunity cost of producing hairdryer in terms of orange in the rest of the world.

Solution: The opportunity cost of hairdryer in terms of orange in the rest of the world is 0.3070.

48. Problem

In an open economy firms use the only available input – labor – to produce two goods: cauliflower and lemonade. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{lemonade}} = 298.75 - 2.61 \cdot Q_{\text{cauliflower}}$$

The rest of the world produces cauliflower and lemonade. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{lemonade}} = 395.77 - 4.18 \cdot Q^{\text{world}}_{\text{cauliflower}}$$

Determine the opportunity cost of producing lemonade in terms of cauliflower in the rest of the world.

Solution: The opportunity cost of lemonade in terms of cauliflower in the rest of the world is 0.2392.

49. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
hairspray	2.41	6.45
pie	1.30	6.46

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing pie?

Solution: Economy B has absolute advantage in producing pie.

50. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
jigsaw	6.65	5.64
shampoo	10.22	11.49

What is the opportunity cost of producing shampoo in terms of jigsaw in the rest of the world?

Solution: The opportunity cost of shampoo in terms of jigsaw in the rest of the world is 1.1243.

51. Problem

In an open economy firms produce only peach and brioche. The production process can be described by a linear production function. The unit labor requirement in peach industry is 0.89, and in brioche industry it is 8.85. In the rest of the world $a_{\text{peach}}^{\text{world}} = 11.53$ and $a_{\text{brioche}}^{\text{world}} = 3.73$.

Find the opportunity cost of producing brioche in terms of peach in the rest of the world.

Solution: The opportunity cost of brioche in terms of peach in the rest of the world is 0.3235.

52. Problem

In an open economy firms produce only bagel and muffin. The production process can be described by a linear production function. The unit labor requirement in bagel industry is 9.29, and in muffin industry it is 8.52. In the rest of the world $a_{\text{bagel}}^{\text{world}} = 2.11$ and $a_{\text{muffin}}^{\text{world}} = 5.73$.

Determine the opportunity cost of producing bagel in terms of muffin in the rest of the world.

Solution: The opportunity cost of bagel in terms of muffin in the rest of the world is 0.3682.

53. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
rug	7.03	10.61
food processor	11.70	1.37

What is the opportunity cost of producing food processor in terms of rug in the open economy?

Solution: The opportunity cost of food processor in terms of rug in the open economy is 1.5092.

54. Problem

In an open economy firms produce only spring onion and trifle. The production process can be described by a linear production function. The unit labor requirement in spring onion industry is 10.55, and in trifle industry it is 5.08. In the rest of the world $a^{\text{world}}_{\text{spring onion}} = 11.51$ and $a^{\text{world}}_{\text{trifle}} = 3.13$.

Calculate the opportunity cost of producing trifle in terms of spring onion in the open economy.

Solution: The opportunity cost of trifle in terms of spring onion in the open economy is 0.4815.

55. Problem

In an open economy firms produce only almond and pizza. The production process can be described by a linear production function. The unit labor requirement in almond industry is 11.10, and in pizza industry it is 9.39. In the rest of the world $a^{\text{world}}_{\text{almond}} = 4.78$ and $a^{\text{world}}_{\text{pizza}} = 6.95$.

Determine the opportunity cost of producing almond in terms of pizza in the rest of the world.

Solution: The opportunity cost of almond in terms of pizza in the rest of the world is 0.6878.

56. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
cauliflower	10.73	1.53
lime	10.55	6.72

What is the opportunity cost of producing lime in terms of cauliflower in the open economy?

Solution: The opportunity cost of lime in terms of cauliflower in the open economy is 0.1426.

2.

57. Problem

In an open economy firms use the only available input – labor – to produce two goods: onion and lime. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{lime}} = 211.51 - 4.88 \cdot Q_{\text{onion}}$$

The rest of the world produces onion and lime. There the production possibilities frontier function takes the form of

$$Q_{\text{lime}}^{\text{world}} = 671.00 - 4.43 \cdot Q_{\text{onion}}^{\text{world}}$$

Determine the opportunity cost of producing lime in terms of onion in the rest of the world.

Solution: The opportunity cost of lime in terms of onion in the rest of the world is 0.2257.

58. Problem

In an open economy the production possibilities frontier function intersects the naan bread axis at 47.65 and the intersection point with the orange axis is 14.86. The firms of this economy are able to use 1156 units of labor. In the rest of the world the production possibilities frontier intersects the naan bread and orange axes at 21.42 and 66.15 respectively and the labor supply in this region is 575 units.

Which economy displays absolute advantage in producing naan bread?

Solution: The open economy has absolute advantage in producing naan bread.

59. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
mint tea	4.90	2.48
painting	6.88	8.27

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing mint tea?

Solution: The open economy has absolute advantage in producing mint tea.

60. Problem

In an open economy firms produce only strawberry and fruit cake. The production process can be described by a linear production function. The unit labor requirement in strawberry industry is 8.85, and in fruit cake industry it is 6.34. In the rest of the world $a^{\text{world}}_{\text{strawberry}} = 2.91$ and $a^{\text{world}}_{\text{fruit cake}} = 5.96$.

Which economy has absolute advantage in producing fruit cake?

Solution: The rest of the world has absolute advantage in producing fruit cake.

61. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

2.

	total factor productivity	
	Economy A	Economy B
handbag	7.37	9.03
pistachio	8.31	6.59

What is the opportunity cost of producing pistachio in terms of handbag in economy A?

Solution: The opportunity cost of pistachio in terms of handbag in economy A is 0.8162.

2.

62. Problem

In an open economy firms produce only jigsaw and wine glass. The production process can be described by a linear production function. The unit labor requirement in jigsaw industry is 2.29, and in wine glass industry it is 3.03. In the rest of the world $a^{\text{world}}_{\text{jigsaw}} = 1.77$ and $a^{\text{world}}_{\text{wine glass}} = 1.84$.

Determine the opportunity cost of producing jigsaw in terms of wine glass in the rest of the world.

Solution: The opportunity cost of jigsaw in terms of wine glass in the rest of the world is 0.9620.

63. Problem

Firms is Home produce bookshelf and rug by using a technology that can be characterized by the following production functions:

$$Q_{\text{bookshelf}} = 2.46 \cdot L_{\text{bookshelf}}$$
$$Q_{\text{rug}} = 5.36 \cdot L_{\text{rug}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{bookshelf}} = 2.57 \cdot L^{\text{world}}_{\text{bookshelf}}$$
$$Q^{\text{world}}_{\text{rug}} = 2.25 \cdot L^{\text{world}}_{\text{rug}}$$

What is the opportunity cost of producing rug in terms of bookshelf in Home?

Solution: The opportunity cost of rug in terms of bookshelf in Home is 0.4590.

64. Problem

Firms is Home produce blackcurrant and bookshelf by using a technology that can be characterized by the following production functions:

$$Q_{\text{blackcurrant}} = 0.86 \cdot L_{\text{blackcurrant}}$$
$$Q_{\text{bookshelf}} = 10.52 \cdot L_{\text{bookshelf}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{blackcurrant}} = 2.69 \cdot L^{\text{world}}_{\text{blackcurrant}}$$
$$Q^{\text{world}}_{\text{bookshelf}} = 3.30 \cdot L^{\text{world}}_{\text{bookshelf}}$$

Calculate the opportunity cost of producing blackcurrant in terms of bookshelf in the rest of the world.

Solution: The opportunity cost of blackcurrant in terms of bookshelf in the rest of the world is 1.2268.

65. Problem

Firms is Home produce coffee cup and watermelon by using a technology that can be characterized by the following production functions:

$$Q_{\text{coffee cup}} = 0.20 \cdot L_{\text{coffee cup}}$$
$$Q_{\text{watermelon}} = 8.57 \cdot L_{\text{watermelon}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{coffee cup}} = 4.76 \cdot L^{\text{world}}_{\text{coffee cup}}$$
$$Q^{\text{world}}_{\text{watermelon}} = 7.28 \cdot L^{\text{world}}_{\text{watermelon}}$$

Which economy has absolute advantage in producing watermelon?

Solution: Home has absolute advantage in producing watermelon.

66. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
rug	8.00	3.23
bookshelf	4.87	7.50

What is the opportunity cost of producing rug in terms of bookshelf in economy A?

Solution: The opportunity cost of rug in terms of bookshelf in economy A is 0.4037.

2.

67. Problem

In an open economy firms produce only hairspray and lemon. The production process can be described by a linear production function. The unit labor requirement in hairspray industry is 6.71, and in lemon industry it is 11.45. In the rest of the world $a_{\text{hairspray}}^{\text{world}} = 5.41$ and $a_{\text{lemon}}^{\text{world}} = 2.51$.

Which economy has absolute advantage in producing lemon?

Solution: The rest of the world has absolute advantage in producing lemon.

68. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
rug	8.15	4.47
blackcurrant	4.57	9.19

What is the opportunity cost of producing rug in terms of blackcurrant in economy B?

Solution: The opportunity cost of rug in terms of blackcurrant in economy B is 2.0109.

69. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
pastry	10.45	9.06
muffin	0.26	1.57

What is the opportunity cost of producing pastry in terms of muffin in economy A?

Solution: The opportunity cost of pastry in terms of muffin in economy A is 0.8670.

70. Problem

In an open economy the production possibilities frontier function intersects the scarf axis at 78.73 and the intersection point with the spring onion axis is 22.02. The firms of this economy are able to use 671 units of labor. In the rest of the world the production possibilities frontier intersects the scarf and spring onion axes at 62.51 and 69.07 respectively and the labor supply in this region is 351 units.

Which economy displays absolute advantage in producing scarf?

Solution: The rest of the world has absolute advantage in producing scarf.

2.

71. Problem

Firms is Home produce hot chocolate and lime by using a technology that can be characterized by the following production functions:

$$Q_{\text{hot chocolate}} = 6.28 \cdot L_{\text{hot chocolate}}$$
$$Q_{\text{lime}} = 4.06 \cdot L_{\text{lime}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{hot chocolate}} = 8.96 \cdot L^{\text{world}}_{\text{hot chocolate}}$$
$$Q^{\text{world}}_{\text{lime}} = 11.58 \cdot L^{\text{world}}_{\text{lime}}$$

Which economy has absolute advantage in producing hot chocolate?

Solution: The rest of the world has absolute advantage in producing hot chocolate.

72. Problem

An open economy has 706 units labor to produce two goods spring onion and teacup, while the labor supply in the rest of the world is 448 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{teacup}} = 510.07 - 3.20 \cdot Q_{\text{spring onion}}$$
$$Q^{\text{world}}_{\text{teacup}} = 697.00 - 10.35 \cdot Q^{\text{world}}_{\text{spring onion}}$$

Which economy has absolute advantage in producing teacup?

Solution: The rest of the world has absolute advantage in producing teacup.

73. Problem

Firms is Home produce aubergine and painting by using a technology that can be characterized by the following production functions:

$$Q_{\text{aubergine}} = 3.46 \cdot L_{\text{aubergine}}$$
$$Q_{\text{painting}} = 10.36 \cdot L_{\text{painting}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{aubergine}} = 11.11 \cdot L^{\text{world}}_{\text{aubergine}}$$

$$Q_{\text{painting}}^{\text{world}} = 0.88 \cdot L_{\text{painting}}^{\text{world}}$$

What is the opportunity cost of producing painting in terms of aubergine in Home?

Solution: The opportunity cost of painting in terms of aubergine in Home is 0.3340.

74. Problem

In an open economy the production possibilities frontier function intersects the pie axis at 37.69 and the intersection point with the salad axis is 14.86. The firms of this economy are able to use 341 units of labor. In the rest of the world the production possibilities frontier intersects the pie and salad axes at 93.53 and 53.43 respectively and the labor supply in this region is 745 units.

Find the opportunity cost of producing pie in terms of salad in the open economy.

Solution: The opportunity cost of pie in terms of salad in the open economy is 0.3943.

75. Problem

In an open economy the production possibilities frontier function intersects the sweetcorn axis at 77.77 and the intersection point with the cola axis is 46.27. The firms of this economy are able to use 1056 units of labor. In the rest of the world the production possibilities frontier intersects the sweetcorn and cola axes at 18.38 and 90.13 respectively and the labor supply in this region is 921 units.

Determine the opportunity cost of producing cola in terms of sweetcorn in the rest of the world.

Solution: The opportunity cost of cola in terms of sweetcorn in the rest of the world is 0.2039.

76. Problem

In an open economy firms produce only pizza and hot chocolate. The production process can be described by a linear production function. The unit labor requirement in pizza industry is 0.61, and in hot chocolate industry it is 11.65. In the rest of the world $a_{\text{pizza}}^{\text{world}} = 1.93$ and $a_{\text{hot chocolate}}^{\text{world}} = 11.60$.

What is the opportunity cost of producing pizza in terms of hot chocolate in the open economy?

Solution: The opportunity cost of pizza in terms of hot chocolate in the open economy is 0.0524.

77. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
onion	4.40	5.32
cabbage	3.77	2.27

What is the opportunity cost of producing onion in terms of cabbage in economy B?

Solution: The opportunity cost of onion in terms of cabbage in economy B is 0.6021.

78. Problem

An open economy has 1134 units labor to produce two goods lemonade and strawberry, while the labor supply in the rest of the world is 533 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{strawberry}} = 655.31 - 6.88 \cdot Q_{\text{lemonade}}$$
$$Q^{\text{world}}_{\text{strawberry}} = 473.20 - 11.36 \cdot Q^{\text{world}}_{\text{lemonade}}$$

Which economy displays absolute advantage in producing lemonade?

Solution: The open economy has absolute advantage in producing lemonade.

79. Problem

In an open economy the production possibilities frontier function intersects the bagel axis at 20.92 and the intersection point with the pushchair axis is 67.04. The firms of this economy are able to use 468 units of labor. In the rest of the world the production possibilities frontier intersects the bagel and pushchair axes at 29.37 and 50.48 respectively and the labor supply in this region is 733 units.

What is the opportunity cost of producing pushchair in terms of bagel in the open economy?

Solution: The opportunity cost of pushchair in terms of bagel in the open economy is 0.3121.

80. Problem

In an open economy firms produce only blackcurrant and fruit cake. The production process can be described by a linear production function. The unit labor requirement in blackcurrant industry is 9.20, and in fruit cake industry it is 6.56. In the rest of the world $a_{\text{blackcurrant}}^{\text{world}} = 10.96$ and $a_{\text{fruit cake}}^{\text{world}} = 10.13$.

What is the opportunity cost of producing blackcurrant in terms of fruit cake in the open economy?

Solution: The opportunity cost of blackcurrant in terms of fruit cake in the open economy is 1.4024.

81. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
mint tea	9.91	7.84
tomato	10.13	2.07

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing mint tea?

Solution: Economy B has absolute advantage in producing mint tea.

82. Problem

In an open economy firms produce only onion and painting. The production process can be described by a linear production function. The unit labor requirement in onion industry is 6.29, and in painting industry it is 5.81. In the rest of the world $a_{\text{onion}}^{\text{world}} = 6.14$ and $a_{\text{painting}}^{\text{world}} = 9.62$.

Find the opportunity cost of producing painting in terms of onion in the rest of the world.

Solution: The opportunity cost of painting in terms of onion in the rest of the world is 1.5668.

2.

83. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
broccoli	2.43	6.40
wine glass	10.61	6.54

What is the opportunity cost of producing wine glass in terms of broccoli in the open economy?

Solution: The opportunity cost of wine glass in terms of broccoli in the open economy is 2.6337.

84. Problem

In an open economy firms use the only available input – labor – to produce two goods: hot dog and peach. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{peach}} = 619.59 - 10.42 \cdot Q_{\text{hot dog}}$$

The rest of the world produces hot dog and peach. There the production possibilities frontier function takes the form of

$$Q_{\text{peach}}^{\text{world}} = 272.64 - 8.62 \cdot Q_{\text{hot dog}}^{\text{world}}$$

Calculate the opportunity cost of producing hot dog in terms of peach in the rest of the world.

Solution: The opportunity cost of hot dog in terms of peach in the rest of the world is 8.62.

85. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
cola	4.83	8.41
pistachio	8.06	3.31

What is the opportunity cost of producing pistachio in terms of cola in economy A?

Solution: The opportunity cost of pistachio in terms of cola in economy A is 0.5743.

86. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
handbag	6.26	11.04
muffin	7.35	8.67

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing handbag?

Solution: The open economy has absolute advantage in producing handbag.

87. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
hot dog	0.70	7.84
lemon	1.26	8.39

What is the opportunity cost of producing lemon in terms of hot dog in the rest of the world?

Solution: The opportunity cost of lemon in terms of hot dog in the rest of the world is 6.6587.

88. Problem

Firms is Home produce plate and brioche by using a technology that can be characterized by the following production functions:

$$Q_{\text{plate}} = 10.00 \cdot L_{\text{plate}}$$
$$Q_{\text{brioche}} = 8.70 \cdot L_{\text{brioche}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{plate}} = 7.62 \cdot L^{\text{world}}_{\text{plate}}$$
$$Q^{\text{world}}_{\text{brioche}} = 2.09 \cdot L^{\text{world}}_{\text{brioche}}$$

Find the opportunity cost of producing plate in terms of brioche in Home.

Solution: The opportunity cost of plate in terms of brioche in Home is 0.8700.

89. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
wallet	6.28	9.07
rug	5.94	6.70

What is the opportunity cost of producing rug in terms of wallet in economy A?

Solution: The opportunity cost of rug in terms of wallet in economy A is 0.6924.

90. Problem

In an open economy the production possibilities frontier function intersects the lemon axis at 16.93 and the intersection point with the brioche axis is 61.68. The firms of this economy are able to use 1237 units of labor. In the rest of the world the production possibilities frontier intersects the lemon and brioche axes at 91.86 and 38.49 respectively and the labor supply in this region is 534 units.

Determine the opportunity cost of producing brioche in terms of lemon in the rest of the world.

Solution: The opportunity cost of brioche in terms of lemon in the rest of the world is 2.3866.

91. Problem

In an open economy firms use the only available input – labor – to produce two goods: pistachio and lime. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{lime}} = 149.45 - 20.68 \cdot Q_{\text{pistachio}}$$

The rest of the world produces pistachio and lime. There the production possibilities frontier function takes the form of

$$Q_{\text{lime}}^{\text{world}} = 603.65 - 13.96 \cdot Q_{\text{pistachio}}^{\text{world}}$$

What is the opportunity cost of producing lime in terms of pistachio in the open economy?

Solution: The opportunity cost of lime in terms of pistachio in the open economy is 0.0484.

92. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
coffee	1.50	3.74
watch	8.12	7.11

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing coffee?

Solution: Economy B has absolute advantage in producing coffee.

93. Problem

Firms is Home produce scarf and orange by using a technology that can be characterized by the following production functions:

$$Q_{\text{scarf}} = 6.75 \cdot L_{\text{scarf}}$$
$$Q_{\text{orange}} = 6.25 \cdot L_{\text{orange}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{scarf}}^{\text{world}} = 7.86 \cdot L_{\text{scarf}}^{\text{world}}$$

$$Q_{\text{orange}}^{\text{world}} = 1.05 \cdot L_{\text{orange}}^{\text{world}}$$

Which economy has absolute advantage in producing scarf?

Solution: The rest of the world has absolute advantage in producing scarf.

94. Problem

Firms is Home produce banana and chicken burger by using a technology that can be characterized by the following production functions:

$$Q_{\text{banana}} = 5.27 \cdot L_{\text{banana}}$$
$$Q_{\text{chicken burger}} = 2.83 \cdot L_{\text{chicken burger}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{banana}}^{\text{world}} = 9.49 \cdot L_{\text{banana}}^{\text{world}}$$
$$Q_{\text{chicken burger}}^{\text{world}} = 4.44 \cdot L_{\text{chicken burger}}^{\text{world}}$$

Find the opportunity cost of producing banana in terms of chicken burger in Home.

Solution: The opportunity cost of banana in terms of chicken burger in Home is 0.5370.

95. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
cabbage	2.94	7.15
bagel	7.87	9.19

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing bagel?

Solution: Economy B has absolute advantage in producing bagel.

96. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
chicken burger	2.93	4.70
tea	0.93	5.29

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing tea?

Solution: Economy B has absolute advantage in producing tea.

97. Problem

In an open economy firms produce only orange and wine glass. The production process can be described by a linear production function. The unit labor requirement in orange industry is 5.85, and in wine glass industry it is 10.76. In the rest of the world $a^{\text{world}}_{\text{orange}} = 1.90$ and $a^{\text{world}}_{\text{wine glass}} = 10.01$.

Which economy has absolute advantage in producing orange?

Solution: The rest of the world has absolute advantage in producing orange.

98. Problem

In an open economy the production possibilities frontier function intersects the onion axis at 60.93 and the intersection point with the porridge axis is 73.96. The firms of this economy are able to use 1067 units of labor. In the rest of the world the production possibilities frontier intersects the onion and porridge axes at 67.08 and 68.74 respectively and the labor supply in this region is 369 units.

Find the opportunity cost of producing onion in terms of porridge in the open economy.

Solution: The opportunity cost of onion in terms of porridge in the open economy is 1.2139.

2.

99. Problem

In an open economy firms produce only trifle and spring onion. The production process can be described by a linear production function. The unit labor requirement in trifle industry is 2.60, and in spring onion industry it is 3.92. In the rest of the world $a_{\text{trifle}}^{\text{world}} = 0.27$ and $a_{\text{spring onion}}^{\text{world}} = 6.05$.

Calculate the opportunity cost of producing spring onion in terms of trifle in the open economy.

Solution: The opportunity cost of spring onion in terms of trifle in the open economy is 1.5077.

100. Problem

An open economy has 1252 units labor to produce two goods shampoo and ice cream, while the labor supply in the rest of the world is 1176 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{ice cream}} = 441.36 - 15.74 \cdot Q_{\text{shampoo}}$$
$$Q_{\text{ice cream}}^{\text{world}} = 280.35 - 12.47 \cdot Q_{\text{shampoo}}^{\text{world}}$$

Which economy displays absolute advantage in producing shampoo?

Solution: The open economy has absolute advantage in producing shampoo.

101. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
mint tea	8.28	11.24
milkshake	1.06	7.72

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing mint tea?

2.

Solution: The rest of the world has absolute advantage in producing mint tea.

102. Problem

In an open economy firms use the only available input – labor – to produce two goods: trifle and necklace. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{necklace}} = 570.31 - 8.19 \cdot Q_{\text{trifle}}$$

The rest of the world produces trifle and necklace. There the production possibilities frontier function takes the form of

$$Q_{\text{necklace}}^{\text{world}} = 485.09 - 2.90 \cdot Q_{\text{trifle}}^{\text{world}}$$

Determine the opportunity cost of producing necklace in terms of trifle in the rest of the world.

Solution: The opportunity cost of necklace in terms of trifle in the rest of the world is 0.3448.

103. Problem

Firms is Home produce handbag and lime by using a technology that can be characterized by the following production functions:

$$Q_{\text{handbag}} = 8.86 \cdot L_{\text{handbag}}$$
$$Q_{\text{lime}} = 3.34 \cdot L_{\text{lime}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{handbag}}^{\text{world}} = 8.63 \cdot L_{\text{handbag}}^{\text{world}}$$

$$Q^{\text{world}}_{\text{lime}} = 8.53 \cdot L^{\text{world}}_{\text{lime}}$$

Calculate the opportunity cost of producing handbag in terms of lime in the rest of the world.

Solution: The opportunity cost of handbag in terms of lime in the rest of the world is 0.9884.

104. Problem

In an open economy firms produce only mint tea and bookshelf. The production process can be described by a linear production function. The unit labor requirement in mint tea industry is 0.66, and in bookshelf industry it is 10.30. In the rest of the world $a^{\text{world}}_{\text{mint tea}} = 7.24$ and $a^{\text{world}}_{\text{bookshelf}} = 9.22$.

Find the opportunity cost of producing bookshelf in terms of mint tea in the rest of the world.

Solution: The opportunity cost of bookshelf in terms of mint tea in the rest of the world is 1.2735.

105. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
watch	2.58	7.17
fruit cake	10.26	6.88

What is the opportunity cost of producing watch in terms of fruit cake in the rest of the world?

Solution: The opportunity cost of watch in terms of fruit cake in the rest of the world is 1.4913.

106. Problem

In an open economy the production possibilities frontier function intersects the watch axis at 86.74 and the intersection point with the cauliflower axis is 27.84. The firms of this economy are able to use 575 units of labor. In the rest of the world the production possibilities frontier intersects the watch and cauliflower axes at 47.95 and 12.70 respectively and the labor supply in this region is 768 units.

Calculate the opportunity cost of producing watch in terms of cauliflower in the rest of the world.

Solution: The opportunity cost of watch in terms of cauliflower in the rest of the world is 0.2649.

2.

107. Problem

Firms is Home produce hairspray and fruit cake by using a technology that can be characterized by the following production functions:

$$Q_{\text{hairspray}} = 8.01 \cdot L_{\text{hairspray}}$$
$$Q_{\text{fruit cake}} = 4.75 \cdot L_{\text{fruit cake}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{hairspray}}^{\text{world}} = 5.60 \cdot L_{\text{hairspray}}^{\text{world}}$$
$$Q_{\text{fruit cake}}^{\text{world}} = 2.24 \cdot L_{\text{fruit cake}}^{\text{world}}$$

What is the opportunity cost of producing fruit cake in terms of hairspray in Home?

Solution: The opportunity cost of fruit cake in terms of hairspray in Home is 1.6863.

108. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
hot dog	6.95	8.11
trifle	1.52	0.75

What is the opportunity cost of producing trifle in terms of hot dog in economy A?

Solution: The opportunity cost of trifle in terms of hot dog in economy A is 0.8570.

109. Problem

An open economy has 697 units labor to produce two goods cola and salad, while the labor supply in the rest of the world is 575 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{salad}} = 433.03 - 16.71 \cdot Q_{\text{cola}}$$
$$Q^{\text{world}}_{\text{salad}} = 765.14 - 18.41 \cdot Q^{\text{world}}_{\text{cola}}$$

Which economy has absolute advantage in producing salad?

Solution: The rest of the world has absolute advantage in producing salad.

110. Problem

In an open economy the production possibilities frontier function intersects the hairdryer axis at 92.73 and the intersection point with the necklace axis is 74.03. The firms of this economy are able to use 1182 units of labor. In the rest of the world the production possibilities frontier intersects the hairdryer and necklace axes at 38.16 and 71.79 respectively and the labor supply in this region is 1108 units.

Which economy has absolute advantage in producing necklace?

Solution: The rest of the world has absolute advantage in producing necklace.

111. Problem

In an open economy the production possibilities frontier function intersects the paper clip axis at 59.46 and the intersection point with the backpack axis is 72.75. The firms of this economy are able to use 757 units of labor. In the rest of the world the production possibilities frontier intersects the paper clip and backpack axes at 57.81 and 47.58 respectively and the labor supply in this region is 1190 units.

What is the opportunity cost of producing backpack in terms of paper clip in the open economy?

Solution: The opportunity cost of backpack in terms of paper clip in the open economy is 0.8173.

112. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

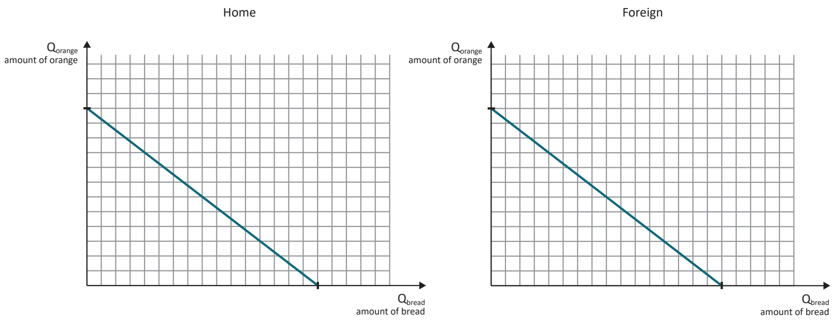
	total factor productivity	
	Economy A	Economy B
watch	0.79	1.85
painting	6.72	6.56

What is the opportunity cost of producing watch in terms of painting in economy B?

Solution: The opportunity cost of watch in terms of painting in economy B is 0.9762.

113. Problem

Suppose that Home uses 3.54 times the labor used in Foreign to produce orange and bread. The following graphs illustrate the production possibilities frontier in the two economies



Which economy has absolute advantage in producing orange?

Solution: Foreign has absolute advantage in producing orange.

114. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
backpack	3.62	5.47
hot chocolate	6.79	9.15

What is the opportunity cost of producing backpack in terms of hot chocolate in the open economy?

Solution: The opportunity cost of backpack in terms of hot chocolate in the open economy is 0.6618.

115. Problem

In an open economy firms produce only bookshelf and hairspray. The production process can be described by a linear production function. The unit labor requirement in bookshelf industry is 6.02, and in hairspray industry it is 0.24. In the rest of the world $a^{\text{world}}_{\text{bookshelf}} = 3.72$ and $a^{\text{world}}_{\text{hairspray}} = 6.34$.

What is the opportunity cost of producing bookshelf in terms of hairspray in the open economy?

Solution: The opportunity cost of bookshelf in terms of hairspray in the open economy is 25.0833.

116. Problem

In an open economy the production possibilities frontier function intersects the strawberry axis at 80.00 and the intersection point with the orange axis is 82.05. The firms of this economy are able to use 544 units of labor. In the rest of the world the production possibilities frontier intersects the strawberry and orange axes at 35.61 and 19.36 respectively and the labor supply in this region is 1226 units.

Determine the opportunity cost of producing orange in terms of strawberry in the rest of the world.

Solution: The opportunity cost of orange in terms of strawberry in the rest of the world is 1.8394.

117. Problem

In an open economy firms use the only available input – labor – to produce two goods: yoghurt and tomato. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{tomato}} = 467.24 - 15.89 \cdot Q_{\text{yoghurt}}$$

The rest of the world produces yoghurt and tomato. There the production possibilities frontier function takes the form of

$$Q_{\text{tomato}}^{\text{world}} = 472.21 - 11.52 \cdot Q_{\text{yoghurt}}^{\text{world}}$$

What is the opportunity cost of producing tomato in terms of yoghurt in the open economy?

Solution: The opportunity cost of tomato in terms of yoghurt in the open economy is 0.0629.

118. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
broccoli	7.40	9.33
lime	9.52	3.00

What is the opportunity cost of producing broccoli in terms of lime in economy B?

Solution: The opportunity cost of broccoli in terms of lime in economy B is 0.3151.

119. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
food processor	10.72	7.26
yoghurt	5.51	10.23

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing yoghurt?

Solution: The open economy has absolute advantage in producing yoghurt.

120. Problem

In an open economy firms use the only available input – labor – to produce two goods: teacup and backpack. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{backpack}} = 686.93 - 15.26 \cdot Q_{\text{teacup}}$$

The rest of the world produces teacup and backpack. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{backpack}} = 354.86 - 1.71 \cdot Q^{\text{world}}_{\text{teacup}}$$

What is the opportunity cost of producing backpack in terms of teacup in the open economy?

Solution: The opportunity cost of backpack in terms of teacup in the open economy is 0.0655.

2.

121. Problem

In an open economy firms produce only rug and strawberry. The production process can be described by a linear production function. The unit labor requirement in rug industry is 11.18, and in strawberry industry it is 10.93. In the rest of the world $a^{\text{world}}_{\text{rug}} = 10.13$ and $a^{\text{world}}_{\text{strawberry}} = 0.81$.

Which economy has absolute advantage in producing strawberry?

Solution: The rest of the world has absolute advantage in producing strawberry.

122. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
hot dog	6.66	11.54
watch	11.75	8.71

What is the opportunity cost of producing hot dog in terms of watch in economy A?

Solution: The opportunity cost of hot dog in terms of watch in economy A is 1.7327.

123. Problem

In an open economy the production possibilities frontier function intersects the hot chocolate axis at 23.74 and the intersection point with the painting axis is 43.53. The firms of this economy are able to use 1160 units of labor. In the rest of the world the production possibilities frontier intersects the hot chocolate and painting axes at 66.28 and 43.88 respectively and the labor supply in this region is 857 units.

Determine the opportunity cost of producing painting in terms of hot chocolate in the rest of the world.

Solution: The opportunity cost of painting in terms of hot chocolate in the rest of the world is 1.5105.

124. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
painting	6.27	4.93
teapot	6.19	7.38

What is the opportunity cost of producing painting in terms of teapot in the open economy?

Solution: The opportunity cost of painting in terms of teapot in the open economy is 1.2718.

125. Problem

In an open economy the production possibilities frontier function intersects the jigsaw axis at 58.05 and the intersection point with the hot chocolate axis is 14.22. The firms of this economy are able to use 463 units of labor. In the rest of the world the production possibilities frontier intersects the jigsaw and hot chocolate axes at 14.38 and 57.40 respectively and the labor supply in this region is 1255 units.

Which economy displays absolute advantage in producing jigsaw?

Solution: The open economy has absolute advantage in producing jigsaw.

126. Problem

In an open economy the production possibilities frontier function intersects the mint tea axis at 77.44 and the intersection point with the spring onion axis is 27.25. The firms of this economy are able to use 503 units of labor. In the rest of the world the production possibilities frontier intersects the mint tea and spring onion axes at 20.02 and 32.70 respectively and the labor supply in this region is 945 units.

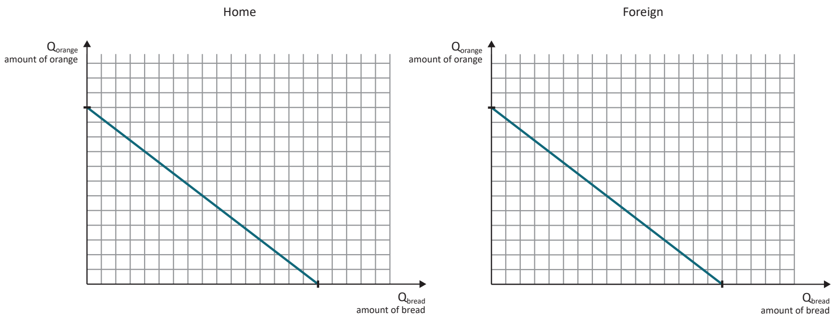
Calculate the opportunity cost of producing mint tea in terms of spring onion in the rest of the world.

Solution: The opportunity cost of mint tea in terms of spring onion in the rest of the world is 1.6334.

2.

127. Problem

Suppose that Home uses 0.73 times the labor used in Foreign to produce orange and bread. The following graphs illustrate the production possibilities frontier in the two economies



Which economy has absolute advantage in producing bread?

Solution: Home has absolute advantage in producing bread.

128. Problem

In an open economy firms produce only teapot and watermelon. The production process can be described by a linear production function. The unit labor requirement in teapot industry is 2.13, and in watermelon industry it is 0.58. In the rest of the world $a^{\text{world}}_{\text{teapot}} = 1.99$ and $a^{\text{world}}_{\text{watermelon}} = 0.28$.

Calculate the opportunity cost of producing watermelon in terms of teapot in the open economy.

Solution: The opportunity cost of watermelon in terms of teapot in the open economy is 0.2723.

129. Problem

In an open economy firms produce only paper clip and pistachio. The production process can be described by a linear production function. The unit labor requirement in paper clip industry is 11.12, and in pistachio industry it is 11.12. In the rest of the world $a^{\text{world}}_{\text{paper clip}} = 6.45$ and $a^{\text{world}}_{\text{pistachio}} = 5.76$.

Calculate the opportunity cost of producing pistachio in terms of paper clip in the open economy.

Solution: The opportunity cost of pistachio in terms of paper clip in the open economy is 1.0000.

130. Problem

In an open economy firms produce only naan bread and pie. The production process can be described by a linear production function. The unit labor requirement in naan bread industry is 11.61, and in pie industry it is 11.69. In the rest of the world $a^{\text{world}}_{\text{naan bread}} = 5.37$ and $a^{\text{world}}_{\text{pie}} = 3.47$.

Calculate the opportunity cost of producing pie in terms of naan bread in the open economy.

Solution: The opportunity cost of pie in terms of naan bread in the open economy is 1.0069.

131. Problem

In an open economy the production possibilities frontier function intersects the painting axis at 88.03 and the intersection point with the peach axis is 58.13. The firms of this economy are able to use 717 units of labor. In the rest of the world the production possibilities frontier intersects the painting and peach axes at 86.41 and 89.18 respectively and the labor supply in this region is 1265 units.

Which economy has absolute advantage in producing peach?

Solution: The open economy has absolute advantage in producing peach.

132. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
teacup	3.24	4.49
hot dog	5.86	7.45

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing hot dog?

Solution: The open economy has absolute advantage in producing hot dog.

133. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
soup	9.11	9.70
sweetcorn	9.16	8.07

What is the opportunity cost of producing sweetcorn in terms of soup in economy B?

Solution: The opportunity cost of sweetcorn in terms of soup in economy B is 1.1351.

134. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
cabbage	4.05	8.28
strawberry	9.82	2.49

What is the opportunity cost of producing strawberry in terms of cabbage in economy B?

Solution: The opportunity cost of strawberry in terms of cabbage in economy B is 3.9438.

135. Problem

In an open economy firms produce only strawberry and hairdryer. The production process can be described by a linear production function. The unit labor requirement in strawberry industry is 1.38, and in hairdryer industry it is 4.79. In the rest of the world $a^{\text{world}}_{\text{strawberry}} = 6.39$ and $a^{\text{world}}_{\text{hairdryer}} = 3.28$.

Find the opportunity cost of producing hairdryer in terms of strawberry in the rest of the world.

Solution: The opportunity cost of hairdryer in terms of strawberry in the rest of the world is 0.5133.

136. Problem

In an open economy firms use the only available input – labor – to produce two goods: broccoli and chicken burger. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{chicken burger}} = 676.18 - 8.71 \cdot Q_{\text{broccoli}}$$

2.

The rest of the world produces broccoli and chicken burger. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{chicken burger}} = 261.40 - 17.20 \cdot Q^{\text{world}}_{\text{broccoli}}$$

Determine the opportunity cost of producing chicken burger in terms of broccoli in the rest of the world.

Solution: The opportunity cost of chicken burger in terms of broccoli in the rest of the world is 0.0581.

137. Problem

In an open economy firms produce only ice cream and spring onion. The production process can be described by a linear production function. The unit labor requirement in ice cream industry is 9.77, and in spring onion industry it is 9.82. In the rest of the world $a^{\text{world}}_{\text{ice cream}} = 2.85$ and $a^{\text{world}}_{\text{spring onion}} = 3.08$.

Find the opportunity cost of producing spring onion in terms of ice cream in the rest of the world.

Solution: The opportunity cost of spring onion in terms of ice cream in the rest of the world is 1.0807.

138. Problem

In an open economy the production possibilities frontier function intersects the coffee cup axis at 93.11 and the intersection point with the wooden spoon axis is 55.01. The firms of this economy are able to use 899 units of labor. In the rest of the world the production possibilities frontier intersects the coffee cup and wooden spoon axes at 72.13 and 33.64 respectively and the labor supply in this region is 1294 units.

Calculate the opportunity cost of producing coffee cup in terms of wooden spoon in the rest of the world.

Solution: The opportunity cost of coffee cup in terms of wooden spoon in the rest of the world is 0.4664.

139. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
shampoo	5.78	1.80
salad	10.43	4.31

What is the opportunity cost of producing shampoo in terms of salad in the rest of the world?

Solution: The opportunity cost of shampoo in terms of salad in the rest of the world is 2.4200.

140. Problem

In an open economy the production possibilities frontier function intersects the cappuccino axis at 73.87 and the intersection point with the sweetcorn axis is 21.40. The firms of this economy are able to use 661 units of labor. In the rest of the world the production possibilities frontier intersects the cappuccino and sweetcorn axes at 14.38 and 22.64 respectively and the labor supply in this region is 1123 units.

Which economy has absolute advantage in producing sweetcorn?

Solution: The open economy has absolute advantage in producing sweetcorn.

141. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

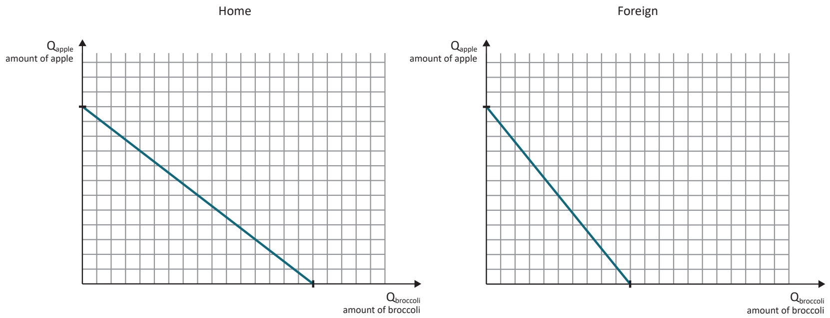
	unit labor requirements	
	Open economy	Rest of the World
sweetcorn	10.21	5.14
hairspray	1.27	5.54

What is the opportunity cost of producing sweetcorn in terms of hairspray in the open economy?

Solution: The opportunity cost of sweetcorn in terms of hairspray in the open economy is 1.9864.

142. Problem

Suppose that Home and Foreign use the same amount of labor to produce apple and broccoli. The following graphs illustrate the production possibilities frontier in the two economies

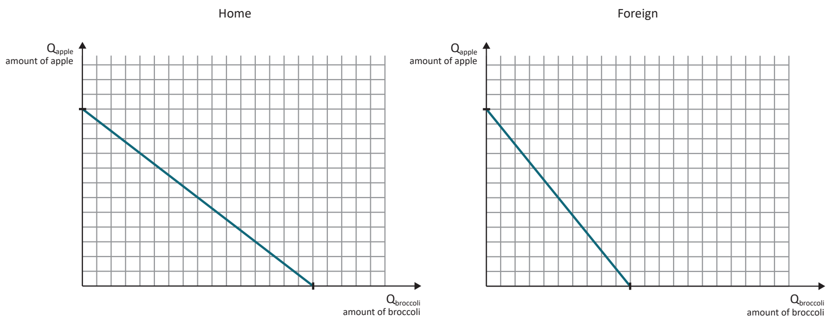


Which economy has absolute advantage in producing broccoli?

Solution: Home has absolute advantage in producing broccoli.

143. Problem

Suppose that Home uses 0.17 times the labor used in Foreign to produce apple and broccoli. The following graphs illustrate the production possibilities frontier in the two economies



Which economy has absolute advantage in producing apple?

Solution: Home has absolute advantage in producing apple.

144. Problem

In an open economy the production possibilities frontier function intersects the spring onion axis at 13.20 and the intersection point with the sweetcorn axis is 81.71. The firms of this economy are able to use 282 units of labor. In the rest of the world the production possibilities frontier intersects the spring onion and sweetcorn axes at 91.02 and 46.25 respectively and the labor supply in this region is 962 units.

What is the opportunity cost of producing sweetcorn in terms of spring onion in the open economy?

Solution: The opportunity cost of sweetcorn in terms of spring onion in the open economy is 0.1615.

145. Problem

An open economy has 434 units labor to produce two goods coffee and almond, while the labor supply in the rest of the world is 310 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{almond}} = 334.19 - 7.29 \cdot Q_{\text{coffee}}$$
$$Q^{\text{world}}_{\text{almond}} = 348.49 - 17.89 \cdot Q^{\text{world}}_{\text{coffee}}$$

Which economy displays absolute advantage in producing coffee?

Solution: The open economy has absolute advantage in producing coffee.

146. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
tea	4.98	2.87
painting	9.09	0.54

What is the opportunity cost of producing painting in terms of tea in the rest of the world?

Solution: The opportunity cost of painting in terms of tea in the rest of the world is 0.0594.

2.

147. Problem

In an open economy the production possibilities frontier function intersects the handbag axis at 42.52 and the intersection point with the lemon axis is 77.12. The firms of this economy are able to use 835 units of labor. In the rest of the world the production possibilities frontier intersects the handbag and lemon axes at 16.22 and 53.88 respectively and the labor supply in this region is 298 units.

Which economy has absolute advantage in producing lemon?

Solution: The rest of the world has absolute advantage in producing lemon.

148. Problem

Firms is Home produce teacup and pushchair by using a technology that can be characterized by the following production functions:

$$Q_{\text{teacup}} = 2.45 \cdot L_{\text{teacup}}$$
$$Q_{\text{pushchair}} = 9.03 \cdot L_{\text{pushchair}}$$

The production functions in the rest of the world take the following form:

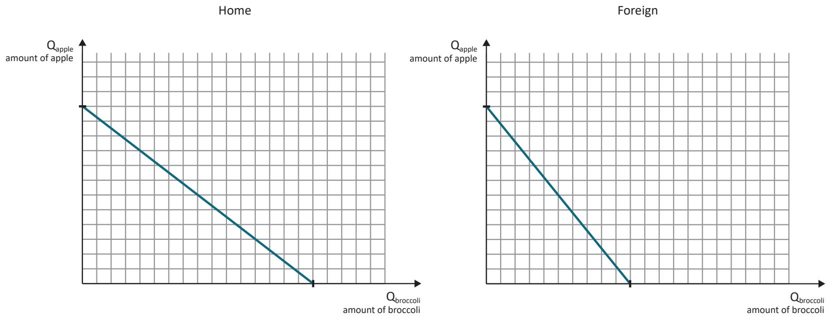
$$Q^{\text{world}}_{\text{teacup}} = 10.43 \cdot L^{\text{world}}_{\text{teacup}}$$
$$Q^{\text{world}}_{\text{pushchair}} = 6.87 \cdot L^{\text{world}}_{\text{pushchair}}$$

Determine the opportunity cost of producing pushchair in terms of teacup in the rest of the world.

Solution: The opportunity cost of pushchair in terms of teacup in the rest of the world is 1.5182.

149. Problem

Suppose that Home uses 3.54 times the labor used in Foreign to produce apple and broccoli. The following graphs illustrate the production possibilities frontier in the two economies



Which economy has absolute advantage in producing apple?

Solution: Foreign has absolute advantage in producing apple.

150. Problem

In an open economy the production possibilities frontier function intersects the trifle axis at 41.22 and the intersection point with the lemonade axis is 70.22. The firms of this economy are able to use 829 units of labor. In the rest of the world the production possibilities frontier intersects the trifle and lemonade axes at 51.66 and 27.51 respectively and the labor supply in this region is 660 units.

Which economy displays absolute advantage in producing trifle?

Solution: The rest of the world has absolute advantage in producing trifle.

151. Problem

Firms is Home produce cauliflower and chicken burger by using a technology that can be characterized by the following production functions:

$$Q_{\text{cauliflower}} = 0.27 \cdot L_{\text{cauliflower}}$$
$$Q_{\text{chicken burger}} = 1.95 \cdot L_{\text{chicken burger}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{cauliflower}} = 5.49 \cdot L^{\text{world}}_{\text{cauliflower}}$$
$$Q^{\text{world}}_{\text{chicken burger}} = 7.77 \cdot L^{\text{world}}_{\text{chicken burger}}$$

Find the opportunity cost of producing cauliflower in terms of chicken burger in Home.

Solution: The opportunity cost of cauliflower in terms of chicken burger in Home is 7.2222.

152. Problem

Firms is Home produce teacup and almond by using a technology that can be characterized by the following production functions:

$$Q_{\text{teacup}} = 4.55 \cdot L_{\text{teacup}}$$
$$Q_{\text{almond}} = 5.14 \cdot L_{\text{almond}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{teacup}} = 10.40 \cdot L^{\text{world}}_{\text{teacup}}$$
$$Q^{\text{world}}_{\text{almond}} = 8.13 \cdot L^{\text{world}}_{\text{almond}}$$

Which economy has absolute advantage in producing almond?

Solution: The rest of the world has absolute advantage in producing almond.

153. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
tea	6.65	5.95
mint tea	3.00	9.77

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing mint tea?

Solution: The open economy has absolute advantage in producing mint tea.

154. Problem

In an open economy firms use the only available input – labor – to produce two goods: porridge and cabbage. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{cabbage}} = 707.32 - 19.75 \cdot Q_{\text{porridge}}$$

The rest of the world produces porridge and cabbage. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{cabbage}} = 470.44 - 16.60 \cdot Q^{\text{world}}_{\text{porridge}}$$

Find the opportunity cost of producing porridge in terms of cabbage in the open economy.

Solution: The opportunity cost of porridge in terms of cabbage in the open economy is 19.75.

155. Problem

In an open economy firms use the only available input – labor – to produce two goods: hot chocolate and wine glass. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{wine glass}} = 664.79 - 11.72 \cdot Q_{\text{hot chocolate}}$$

The rest of the world produces hot chocolate and wine glass. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{wine glass}} = 234.04 - 5.20 \cdot Q^{\text{world}}_{\text{hot chocolate}}$$

Determine the opportunity cost of producing wine glass in terms of hot chocolate in the rest of the world.

Solution: The opportunity cost of wine glass in terms of hot chocolate in the rest of the world is 0.1923.

156. Problem

Firms is Home produce cola and banana by using a technology that can be characterized by the following production functions:

$$Q_{\text{cola}} = 6.68 \cdot L_{\text{cola}}$$
$$Q_{\text{banana}} = 0.90 \cdot L_{\text{banana}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{cola}}^{\text{world}} = 9.34 \cdot L_{\text{cola}}^{\text{world}}$$
$$Q_{\text{banana}}^{\text{world}} = 9.44 \cdot L_{\text{banana}}^{\text{world}}$$

2.

Determine the opportunity cost of producing banana in terms of cola in the rest of the world.

Solution: The opportunity cost of banana in terms of cola in the rest of the world is 0.9894.

157. Problem

An open economy has 746 units labor to produce two goods muffin and cappuccino, while the labor supply in the rest of the world is 999 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{cappuccino}} = 731.07 - 13.30 \cdot Q_{\text{muffin}}$$
$$Q_{\text{cappuccino}}^{\text{world}} = 444.70 - 14.13 \cdot Q_{\text{muffin}}^{\text{world}}$$

Which economy has absolute advantage in producing cappuccino?

Solution: The open economy has absolute advantage in producing cappuccino.

158. Problem

In an open economy the production possibilities frontier function intersects the watch axis at 87.88 and the intersection point with the teacup axis is 17.12. The firms of this economy are able to use 452 units of labor. In the rest of the world the production possibilities frontier intersects the watch and teacup axes at 62.64 and 32.64 respectively and the labor supply in this region is 582 units.

Find the opportunity cost of producing watch in terms of teacup in the open economy.

Solution: The opportunity cost of watch in terms of teacup in the open economy is 0.1948.

159. Problem

In an open economy firms use the only available input – labor – to produce two goods: brioche and pie. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{pie}} = 593.00 - 20.69 \cdot Q_{\text{brioche}}$$

The rest of the world produces brioche and pie. There the production possibilities frontier function takes the form of

$$Q_{\text{pie}}^{\text{world}} = 437.25 - 9.46 \cdot Q_{\text{brioche}}^{\text{world}}$$

Find the opportunity cost of producing brioche in terms of pie in the open economy.

Solution: The opportunity cost of brioche in terms of pie in the open economy is 20.69.

160. Problem

In an open economy the production possibilities frontier function intersects the jigsaw axis at 62.86 and the intersection point with the aubergine axis is 83.82. The firms of this economy are able to use 963 units of labor. In the rest of the world the production possibilities frontier intersects the jigsaw and aubergine axes at 16.81 and 54.83 respectively and the labor supply in this region is 999 units.

Which economy has absolute advantage in producing aubergine?

Solution: The open economy has absolute advantage in producing aubergine.

161. Problem

In an open economy the production possibilities frontier function intersects the banana axis at 23.32 and the intersection point with the tea axis is 22.96. The firms of this economy are able to use 673 units of labor. In the rest of the world the production possibilities frontier intersects the banana and tea axes at 28.86 and 19.84 respectively and the labor supply in this region is 330 units.

Which economy displays absolute advantage in producing banana?

Solution: The rest of the world has absolute advantage in producing banana.

162. Problem

Firms is Home produce blackcurrant and pastry by using a technology that can be characterized by the following production functions:

$$Q_{\text{blackcurrant}} = 1.00 \cdot L_{\text{blackcurrant}}$$
$$Q_{\text{pastry}} = 0.33 \cdot L_{\text{pastry}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{blackcurrant}} = 4.71 \cdot L^{\text{world}}_{\text{blackcurrant}}$$
$$Q^{\text{world}}_{\text{pastry}} = 2.66 \cdot L^{\text{world}}_{\text{pastry}}$$

2.

Determine the opportunity cost of producing pastry in terms of blackcurrant in the rest of the world.

Solution: The opportunity cost of pastry in terms of blackcurrant in the rest of the world is 1.7707.

163. Problem

Firms is Home produce bagel and tea by using a technology that can be characterized by the following production functions:

$$Q_{\text{bagel}} = 7.65 \cdot L_{\text{bagel}}$$
$$Q_{\text{tea}} = 5.73 \cdot L_{\text{tea}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{bagel}} = 0.74 \cdot L^{\text{world}}_{\text{bagel}}$$
$$Q^{\text{world}}_{\text{tea}} = 2.00 \cdot L^{\text{world}}_{\text{tea}}$$

Which economy has absolute advantage in producing tea?

Solution: Home has absolute advantage in producing tea.

164. Problem

In an open economy the production possibilities frontier function intersects the mint tea axis at 61.86 and the intersection point with the naan bread axis is 85.48. The firms of this economy are able to use 1023 units of labor. In the rest of the world the production possibilities frontier intersects the mint tea and naan bread axes at 53.36 and 85.27 respectively and the labor supply in this region is 900 units.

Calculate the opportunity cost of producing mint tea in terms of naan bread in the rest of the world.

Solution: The opportunity cost of mint tea in terms of naan bread in the rest of the world is 1.5980.

165. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
cappuccino	1.21	9.85
wooden spoon	4.35	3.02

What is the opportunity cost of producing wooden spoon in terms of cappuccino in economy B?

Solution: The opportunity cost of wooden spoon in terms of cappuccino in economy B is 1.4404.

166. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
blackcurrant	8.16	8.82
lime	3.05	11.25

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing blackcurrant?

Solution: Economy A has absolute advantage in producing blackcurrant.

167. Problem

In an open economy firms produce only pushchair and brioche. The production process can be described by a linear production function. The unit labor requirement in pushchair industry is 0.70, and in brioche industry it is 8.99. In the rest of the world $a^{\text{world}}_{\text{pushchair}} = 6.03$ and $a^{\text{world}}_{\text{brioche}} = 7.55$.

What is the opportunity cost of producing pushchair in terms of brioche in the open economy?

Solution: The opportunity cost of pushchair in terms of brioche in the open economy is 0.0779.

168. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirements	
	Open economy	Rest of the World
mint tea	11.56	8.36
watermelon	7.79	8.02

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing mint tea?

Solution: The rest of the world has absolute advantage in producing mint tea.

169. Problem

In an open economy firms produce only wallet and pistachio. The production process can be described by a linear production function. The unit labor requirement in wallet industry is 4.25, and in pistachio industry it is 10.48. In the rest of the world $a_{\text{wallet}}^{\text{world}} = 8.75$ and $a_{\text{pistachio}}^{\text{world}} = 5.22$.

Determine the opportunity cost of producing wallet in terms of pistachio in the rest of the world.

Solution: The opportunity cost of wallet in terms of pistachio in the rest of the world is 1.6762.

170. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
painting	1.26	1.26
spring onion	5.44	7.16

What is the opportunity cost of producing spring onion in terms of painting in economy B?

Solution: The opportunity cost of spring onion in terms of painting in economy B is 0.7598.

171. Problem

In an open economy the production possibilities frontier function intersects the plate axis at 94.30 and the intersection point with the hot dog axis is 19.53. The firms of this economy are able to use 302 units of labor. In the rest of the world the production possibilities frontier intersects the plate and hot dog axes at 36.47 and 84.56 respectively and the labor supply in this region is 921 units.

Determine the opportunity cost of producing hot dog in terms of plate in the rest of the world.

Solution: The opportunity cost of hot dog in terms of plate in the rest of the world is 0.4313.

172. Problem

In an open economy firms produce only sweetcorn and cappuccino. The production process can be described by a linear production function. The unit labor requirement in sweetcorn industry is 6.68, and in cappuccino industry it is 7.08. In the rest of the world $a_{\text{sweetcorn}}^{\text{world}} = 8.27$ and $a_{\text{cappuccino}}^{\text{world}} = 1.35$.

Which economy has absolute advantage in producing sweetcorn?

Solution: The open economy has absolute advantage in producing sweetcorn.

173. Problem

Firms is Home produce food processor and rug by using a technology that can be characterized by the following production functions:

$$Q_{\text{food processor}} = 3.24 \cdot L_{\text{food processor}}$$
$$Q_{\text{rug}} = 0.22 \cdot L_{\text{rug}}$$

The production functions in the rest of the world take the following form:

$$Q_{\text{food processor}}^{\text{world}} = 3.23 \cdot L_{\text{food processor}}^{\text{world}}$$
$$Q_{\text{rug}}^{\text{world}} = 0.17 \cdot L_{\text{rug}}^{\text{world}}$$

Which economy has absolute advantage in producing rug?

Solution: Home has absolute advantage in producing rug.

174. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
almond	1.10	10.47
lemon	6.73	2.22

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing lemon?

Solution: Economy A has absolute advantage in producing lemon.

175. Problem

In an open economy firms produce only lime and trifle. The production process can be described by a linear production function. The unit labor requirement in lime industry is 0.53, and in trifle industry it is 4.28. In the rest of the world $a^{\text{world}}_{\text{lime}} = 6.48$ and $a^{\text{world}}_{\text{trifle}} = 8.49$.

Determine the opportunity cost of producing lime in terms of trifle in the rest of the world.

Solution: The opportunity cost of lime in terms of trifle in the rest of the world is 0.7633.

176. Problem

In an open economy firms produce only backpack and cabbage. The production process can be described by a linear production function. The unit labor requirement in backpack industry is 4.97, and in cabbage industry it is 9.92. In the rest of the world $a^{\text{world}}_{\text{backpack}} = 11.71$ and $a^{\text{world}}_{\text{cabbage}} = 6.22$.

Which economy has absolute advantage in producing backpack?

Solution: The open economy has absolute advantage in producing backpack.

177. Problem

Firms is Home produce cauliflower and watermelon by using a technology that can be characterized by the following production functions:

$$Q_{\text{cauliflower}} = 6.00 \cdot L_{\text{cauliflower}}$$
$$Q_{\text{watermelon}} = 6.94 \cdot L_{\text{watermelon}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{cauliflower}} = 4.87 \cdot L^{\text{world}}_{\text{cauliflower}}$$
$$Q^{\text{world}}_{\text{watermelon}} = 2.88 \cdot L^{\text{world}}_{\text{watermelon}}$$

Which economy has absolute advantage in producing cauliflower?

Solution: Home has absolute advantage in producing cauliflower.

178. Problem

Firms is Home produce hot dog and spring onion by using a technology that can be characterized by the following production functions:

$$Q_{\text{hot dog}} = 10.25 \cdot L_{\text{hot dog}}$$
$$Q_{\text{spring onion}} = 4.53 \cdot L_{\text{spring onion}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{hot dog}} = 10.96 \cdot L^{\text{world}}_{\text{hot dog}}$$
$$Q^{\text{world}}_{\text{spring onion}} = 10.69 \cdot L^{\text{world}}_{\text{spring onion}}$$

Determine the opportunity cost of producing spring onion in terms of hot dog in the rest of the world.

Solution: The opportunity cost of spring onion in terms of hot dog in the rest of the world is 1.0253.

179. Problem

Firms is Home produce necklace and cabbage by using a technology that can be characterized by the following production functions:

$$Q_{\text{necklace}} = 10.20 \cdot L_{\text{necklace}}$$

$$Q_{\text{cabbage}} = 3.70 \cdot L_{\text{cabbage}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{necklace}} = 2.49 \cdot L^{\text{world}}_{\text{necklace}}$$
$$Q^{\text{world}}_{\text{cabbage}} = 4.28 \cdot L^{\text{world}}_{\text{cabbage}}$$

Find the opportunity cost of producing necklace in terms of cabbage in Home.

Solution: The opportunity cost of necklace in terms of cabbage in Home is 0.3627.

180. Problem

An open economy has 382 units labor to produce two goods pistachio and lime, while the labor supply in the rest of the world is 974 units. The production possibilities frontier in the two regions can be written as:

$$Q_{\text{lime}} = 457.31 - 14.83 \cdot Q_{\text{pistachio}}$$
$$Q^{\text{world}}_{\text{lime}} = 650.23 - 4.69 \cdot Q^{\text{world}}_{\text{pistachio}}$$

Which economy has absolute advantage in producing lime?

Solution: The open economy has absolute advantage in producing lime.

181. Problem

In an open economy firms use the only available input – labor – to produce two goods: cabbage and pushchair. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{pushchair}} = 399.83 - 17.02 \cdot Q_{\text{cabbage}}$$

The rest of the world produces cabbage and pushchair. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{pushchair}} = 337.86 - 21.44 \cdot Q^{\text{world}}_{\text{cabbage}}$$

Calculate the opportunity cost of producing cabbage in terms of pushchair in the rest of the world.

Solution: The opportunity cost of cabbage in terms of pushchair in the rest of the world is 21.44.

182. Problem

In an open economy firms use the only available input – labor – to produce two goods: hot dog and cauliflower. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{cauliflower}} = 594.22 - 3.74 \cdot Q_{\text{hot dog}}$$

The rest of the world produces hot dog and cauliflower. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{cauliflower}} = 300.93 - 12.68 \cdot Q^{\text{world}}_{\text{hot dog}}$$

2.

What is the opportunity cost of producing cauliflower in terms of hot dog in the open economy?

Solution: The opportunity cost of cauliflower in terms of hot dog in the open economy is 0.2674.

183. Problem

In an open economy firms use the only available input – labor – to produce two goods: naan bread and salad. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{salad}} = 398.78 - 16.38 \cdot Q_{\text{naan bread}}$$

The rest of the world produces naan bread and salad. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{salad}} = 163.92 - 5.81 \cdot Q^{\text{world}}_{\text{naan bread}}$$

Find the opportunity cost of producing naan bread in terms of salad in the open economy.

Solution: The opportunity cost of naan bread in terms of salad in the open economy is 16.38.

184. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
muffin	8.80	0.83
fruit cake	3.53	1.71

What is the opportunity cost of producing fruit cake in terms of muffin in economy B?

Solution: The opportunity cost of fruit cake in terms of muffin in economy B is 2.0643.

185. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total factor productivity).

	total factor productivity	
	Economy A	Economy B
teapot	10.24	0.62
shampoo	4.53	3.62

Based on the pieces of data displayed in the table, which economy has absolute advantage in producing teapot?

Solution: Economy A has absolute advantage in producing teapot.

186. Problem

In an open economy firms use the only available input – labor – to produce two goods: bagel and napkin. The production process and the state of the labor market can be described by the following production possibilities frontier function:

$$Q_{\text{napkin}} = 352.40 - 9.35 \cdot Q_{\text{bagel}}$$

The rest of the world produces bagel and napkin. There the production possibilities frontier function takes the form of

$$Q^{\text{world}}_{\text{napkin}} = 177.38 - 1.87 \cdot Q^{\text{world}}_{\text{bagel}}$$

What is the opportunity cost of producing napkin in terms of bagel in the open economy?

Solution: The opportunity cost of napkin in terms of bagel in the open economy is 0.1070.

2.

Comparative Advantage

1. Problem

Firms in Home produce rug and banana by using a technology that can be characterized by the following production functions:

$$Q_{\text{rug}} = 10.02 \cdot L_{\text{rug}}$$
$$Q_{\text{banana}} = 6.26 \cdot L_{\text{banana}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{rug}} = 2.31 \cdot L^{\text{world}}_{\text{rug}}$$
$$Q^{\text{world}}_{\text{banana}} = 6.44 \cdot L^{\text{world}}_{\text{banana}}$$

Which economy has comparative advantage in producing banana?

Solution: The rest of the world has comparative advantage in producing banana.

2. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
hot dog	11.38	11.60
blackcurrant	1.39	5.97

Which economy has comparative advantage in producing hot dog?

Solution: Economy A has comparative advantage in producing hot dog.

3. Problem

Firms in Home produce pushchair and mint tea by using a technology that can be characterized by the following production functions:

$$Q_{\text{pushchair}} = 0.90 \cdot L_{\text{pushchair}}$$
$$Q_{\text{mint tea}} = 10.63 \cdot L_{\text{mint tea}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{pushchair}} = 2.93 \cdot L^{\text{world}}_{\text{pushchair}}$$
$$Q^{\text{world}}_{\text{mint tea}} = 0.49 \cdot L^{\text{world}}_{\text{mint tea}}$$

Which economy has comparative advantage in producing mint tea?

Solution: Home has comparative advantage in producing mint tea.

4. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
coffee cup	1.71	5.48
painting	8.24	4.70

Which economy has comparative advantage in producing coffee cup?

Solution: The open economy has comparative advantage in producing coffee cup.

5. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{chicken burger}} = 8.06 \cdot L_{\text{chicken burger}}$$
$$Q_{\text{peach}} = 10.66 \cdot L_{\text{peach}}$$

In the rest of the world the relative price of chicken burger in terms of peach is 21.22.

Which economy has comparative advantage in producing peach?

Solution: The rest of the world has comparative advantage in producing peach.

6. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
bagel	5.89	5.18
lemon	7.35	7.03

Which economy has comparative advantage in producing bagel?

Solution: The rest of the world has comparative advantage in producing bagel.

7. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
porridge	11.64	10.16
lime	4.68	8.93

Which economy has comparative advantage in producing porridge?

Solution: Economy A has comparative advantage in producing porridge.

2.

8. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{salad}} = 205.65 - 12.36 \cdot Q_{\text{chicken burger}}$$

In the rest of the world the relative price of chicken burger in terms of salad is 32.69.

Which economy has comparative advantage in producing salad?

Solution: The rest of the world has comparative advantage in producing salad.

9. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
fruit cake	6.90	0.86
handbag	5.49	10.73

Which economy has comparative advantage in producing handbag?

Solution: The open economy has comparative advantage in producing handbag.

10. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{cabbage}} = 105.29 - 27.67 \cdot Q^A_{\text{ice cream}}$$
$$Q^B_{\text{cabbage}} = 391.08 - 35.23 \cdot Q^B_{\text{ice cream}}$$

Identify the good in which country A has a comparative advantage.

Solution: A has comparative advantage in producing ice cream.

11. Problem

In a small open economy the opportunity cost of producing pie in terms of almond is 33.17. In the rest of the world the relative price of pie in terms of almond is $\frac{P^{\text{world}}_{\text{pie}}}{P^{\text{world}}_{\text{almond}}} = 38.45$.

In producing which good has the rest of the world comparative advantage?

Solution: The rest of the world has comparative advantage in producing almond.

12. Problem

Firms in Home produce jigsaw and trifle by using a technology that can be characterized by the following production functions:

$$Q_{\text{jigsaw}} = 2.23 \cdot L_{\text{jigsaw}}$$
$$Q_{\text{trifle}} = 11.17 \cdot L_{\text{trifle}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{jigsaw}} = 7.12 \cdot L^{\text{world}}_{\text{jigsaw}}$$
$$Q^{\text{world}}_{\text{trifle}} = 3.59 \cdot L^{\text{world}}_{\text{trifle}}$$

Which economy has comparative advantage in producing trifle?

Solution: Home has comparative advantage in producing trifle.

13. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
teacup	2.09	4.12
sweetcorn	1.32	7.08

Which economy has comparative advantage in producing sweetcorn?

Solution: Economy B has comparative advantage in producing sweetcorn.

14. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
jigsaw	1.58	8.92
shampoo	6.68	11.60

Which economy has comparative advantage in producing shampoo?

Solution: Economy A has comparative advantage in producing shampoo.

15. Problem

In a small open economy the opportunity cost of producing bookshelf in terms of painting is 36.93. In the rest of the world the relative price of bookshelf in terms of painting is $\frac{P^{\text{world}}_{\text{bookshelf}}}{P^{\text{world}}_{\text{painting}}} = 27.67$.

Identify the good in which the small open economy has comparative advantage over the rest of the world.

Solution: The small open economy has comparative advantage in producing painting.

16. Problem

In economy A the production possibilities frontier function intersects the chicken burger axis at 10.49 and the aubergine axis at 2.56.In country B the relative price of chicken burger in terms of aubergine is $\frac{P^{B}_{\text{chicken burger}}}{P^{B}_{\text{chicken burger}}} = 8.38$.

In producing which good has country A comparative advantage?

Solution: A has comparative advantage in producing chicken burger.

17. Problem

In Home it takes 0.19 units of labor to produce one unit of backpack and the unit labor requirement parameter in the hairdryer sector is $a_{\text{hairdryer}} = 9.90$. In Foreign the relative price of backpack in terms of hairdryer is $\frac{P^{\text{Foreign}}_{\text{backpack}}}{P^{\text{Foreign}}_{\text{hairdryer}}} = 6.57$.

In producing which good has Foreign comparative advantage?

Solution: Foreign has comparative advantage in producing hairdryer.

18. Problem

In economy A the production possibilities frontier function intersects the platform shoe axis at 32.10 and the tea axis at 33.93.In country B the relative price of platform shoe in terms of tea is $\frac{P^{B}_{\text{platform shoe}}}{P^{B}_{\text{platform shoe}}} = 6.13$.

In producing which good has country A comparative advantage?

Solution: A has comparative advantage in producing platform shoe.

19. Problem

In a small open economy the opportunity cost of producing pastry in terms of rug is 22.24. In the rest of the world the relative price of pastry in terms of rug is $\frac{P^{\text{world}}_{\text{pastry}}}{P^{\text{world}}_{\text{rug}}} = 35.23$.

Identify the good in which the small open economy has comparative advantage over the rest of the world.

Solution: The small open economy has comparative advantage in producing pastry.

20. Problem

In economy A the production possibilities frontier function intersects the cauliflower axis at 6.91 and the onion axis at 3.92.In country B the relative price of cauliflower in terms of onion is $\frac{P^{B}_{\text{cauliflower}}}{P^{B}_{\text{cauliflower}}} = 2.68$.

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing onion.

21. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^{A}_{\text{onion}} = 244.08 - 2.66 \cdot Q^{A}_{\text{paper clip}}$$
$$Q^{B}_{\text{onion}} = 333.35 - 21.24 \cdot Q^{B}_{\text{paper clip}}$$

Identify the good in which country A has a comparative advantage.

Solution: A has comparative advantage in producing paper clip.

22. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
tea	6.04	9.88
bookshelf	8.34	5.14

Which economy has comparative advantage in producing bookshelf?

Solution: Economy A has comparative advantage in producing bookshelf.

23. Problem

In Home it takes 3.05 units of labor to produce one unit of salad and the unit labor requirement parameter in the handbag sector is $a_{\text{handbag}} = 5.55$. In Foreign the relative price of salad in terms of handbag is $\frac{P^{\text{Foreign}}_{\text{salad}}}{P^{\text{Foreign}}_{\text{handbag}}} = 33.42$.

In producing which good has Foreign comparative advantage?

Solution: Foreign has comparative advantage in producing handbag.

24. Problem

In Home it takes 7.61 units of labor to produce one unit of lemon and the unit labor requirement parameter in the chicken burger sector is $a_{\text{chicken burger}} = 3.66$. In Foreign the relative price of lemon in terms of chicken burger is $\frac{P^{\text{Foreign}}_{\text{lemon}}}{P^{\text{Foreign}}_{\text{chicken burger}}} = 36.80$.

In producing which good has Foreign comparative advantage?

Solution: Foreign has comparative advantage in producing chicken burger.

25. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
almond	0.30	10.06
platform shoe	5.98	11.53

Which economy has comparative advantage in producing platform shoe?

Solution: Economy A has comparative advantage in producing platform shoe.

26. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{blackcurrant}} = 301.04 - 38.66 \cdot Q^A_{\text{almond}}$$
$$Q^B_{\text{blackcurrant}} = 255.10 - 20.55 \cdot Q^B_{\text{almond}}$$

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing almond.

27. Problem

Firms in Home produce porridge and spring onion by using a technology that can be characterized by the following production functions:

$$Q_{\text{porridge}} = 8.60 \cdot L_{\text{porridge}}$$
$$Q_{\text{spring onion}} = 3.78 \cdot L_{\text{spring onion}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{porridge}} = 2.02 \cdot L^{\text{world}}_{\text{porridge}}$$
$$Q^{\text{world}}_{\text{spring onion}} = 10.70 \cdot L^{\text{world}}_{\text{spring onion}}$$

Which economy has comparative advantage in producing porridge?

Solution: Home has comparative advantage in producing porridge.

28. Problem

2.

Firms in Home produce hot chocolate and painting by using a technology that can be characterized by the following production functions:

$$Q_{\text{hot chocolate}} = 5.25 \cdot L_{\text{hot chocolate}}$$
$$Q_{\text{painting}} = 5.95 \cdot L_{\text{painting}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{hot chocolate}} = 9.62 \cdot L^{\text{world}}_{\text{hot chocolate}}$$
$$Q^{\text{world}}_{\text{painting}} = 4.62 \cdot L^{\text{world}}_{\text{painting}}$$

Which economy has comparative advantage in producing hot chocolate?

Solution: The rest of the world has comparative advantage in producing hot chocolate.

29. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{watch}} = 3.72 \cdot L_{\text{watch}}$$
$$Q_{\text{pizza}} = 7.22 \cdot L_{\text{pizza}}$$

In the rest of the world the relative price of watch in terms of pizza is 9.85.

Which economy has comparative advantage in producing watch?

Solution: The small open economy has comparative advantage in producing watch.

30. Problem

In an economy the relative price of lime in terms of hairspray would have been 0.82 in autarky. The same relative price in the rest of the world is 37.35.

Which economy has comparative advantage in producing hairspray?

Solution: The rest of the world has comparative advantage in producing hairspray.

2.

31. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{hairspray}} = 157.58 - 33.53 \cdot Q_{\text{hairdryer}}$$

In the rest of the world the relative price of hairdryer in terms of hairspray is 29.49.

Which economy has comparative advantage in producing hairdryer?

Solution: The rest of the world has comparative advantage in producing hairdryer.

32. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{teacup}} = 6.93 \cdot L_{\text{teacup}}$$
$$Q_{\text{porridge}} = 2.97 \cdot L_{\text{porridge}}$$

In the rest of the world the relative price of teacup in terms of porridge is 1.60.

Which economy has comparative advantage in producing teacup?

Solution: The small open economy has comparative advantage in producing teacup.

33. Problem

In economy A the production possibilities frontier function intersects the watermelon axis at 11.93 and the teacup axis at 14.97.In country B the relative price of watermelon in terms of teacup is $\frac{P^B_{\text{watermelon}}}{P^B_{\text{watermelon}}} = 10.17$.

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing teacup.

34. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{tea}} = 282.57 - 5.50 \cdot Q^A_{\text{cauliflower}}$$
$$Q^B_{\text{tea}} = 299.00 - 24.92 \cdot Q^B_{\text{cauliflower}}$$

Identify the good in which country A has a comparative advantage.

Solution: A has comparative advantage in producing cauliflower.

35. Problem

Firms in Home produce onion and watch by using a technology that can be characterized by the following production functions:

$$Q_{\text{onion}} = 4.72 \cdot L_{\text{onion}}$$
$$Q_{\text{watch}} = 11.31 \cdot L_{\text{watch}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{onion}} = 0.43 \cdot L^{\text{world}}_{\text{onion}}$$
$$Q^{\text{world}}_{\text{watch}} = 6.69 \cdot L^{\text{world}}_{\text{watch}}$$

Which economy has comparative advantage in producing onion?

Solution: Home has comparative advantage in producing onion.

36. Problem

In an economy the relative price of salad in terms of mint tea would have been 24.07 in autarky. The same relative price in the rest of the world is 25.28.

Which economy has comparative advantage in producing mint tea?

Solution: The rest of the world has comparative advantage in producing mint tea.

37. Problem

In Home it takes 10.95 units of labor to produce one unit of cola and the unit labor requirement parameter in the soup sector is $a_{\text{soup}} = 2.28$. In Foreign the relative price of cola in terms of soup is $\frac{P^{\text{Foreign}}_{\text{cola}}}{P^{\text{Foreign}}_{\text{soup}}} = 4.98$.

In producing which good has Foreign comparative advantage?

Solution: Foreign has comparative advantage in producing soup.

38. Problem

In economy A the production possibilities frontier function intersects the bagel axis at 23.43 and the coffee cup axis at 4.65.In country B the relative price of bagel in terms of coffee cup is $\frac{P^{B}_{\text{bagel}}}{P^{B}_{\text{bagel}}} = 13.63$.

In producing which good has country A comparative advantage?

Solution: A has comparative advantage in producing bagel.

39. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
pistachio	5.18	3.79
watermelon	0.96	9.73

Which economy has comparative advantage in producing watermelon?

Solution: The open economy has comparative advantage in producing watermelon.

40. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{sweetcorn}} = 291.86 - 12.66 \cdot Q_{\text{tea}}$$

In the rest of the world the relative price of tea in terms of sweetcorn is 19.79.

Which economy has comparative advantage in producing sweetcorn?

Solution: The rest of the world has comparative advantage in producing sweetcorn.

41. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{shampoo}} = 254.23 - 28.54 \cdot Q_{\text{spring onion}}$$

In the rest of the world the relative price of spring onion in terms of shampoo is 8.67.

Which economy has comparative advantage in producing spring onion?

Solution: The rest of the world has comparative advantage in producing spring onion.

42. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{spring onion}} = 280.71 - 22.76 \cdot Q_{\text{hot chocolate}}$$

In the rest of the world the relative price of hot chocolate in terms of spring onion is 35.99.

Which economy has comparative advantage in producing hot chocolate?

Solution: The small open economy has comparative advantage in producing hot chocolate.

43. Problem

In economy A the production possibilities frontier function intersects the bagel axis at 6.79 and the watermelon axis at 32.14.In country B the relative price of bagel in terms of watermelon is $\frac{P^B_{\text{bagel}}}{P^B_{\text{bagel}}} = 3.28.$

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing bagel.

2.

44. Problem

In a small open economy the opportunity cost of producing aubergine in terms of backpack is 0.37. In the rest of the world the relative price of aubergine in terms of backpack is $\frac{P^{\text{world}}_{\text{aubergine}}}{P^{\text{world}}_{\text{backpack}}} = 32.66.$

In producing which good has the rest of the world comparative advantage?

Solution: The rest of the world has comparative advantage in producing backpack.

45. Problem

In economy A the production possibilities frontier function intersects the backpack axis at 35.94 and the chicken burger axis at 28.30.In country B the relative price of backpack in terms of chicken burger is $\frac{P^B_{\text{backpack}}}{P^B_{\text{backpack}}} = 6.26.$

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing chicken burger.

46. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
scarf	3.47	2.88
tomato	9.79	4.50

Which economy has comparative advantage in producing tomato?

Solution: The rest of the world has comparative advantage in producing tomato.

2.

47. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{orange}} = 299.16 - 23.05 \cdot Q^A_{\text{food processor}}$$
$$Q^B_{\text{orange}} = 369.46 - 24.75 \cdot Q^B_{\text{food processor}}$$

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing orange.

48. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
pistachio	5.28	4.33
spring onion	1.40	7.49

Which economy has comparative advantage in producing pistachio?

Solution: Economy A has comparative advantage in producing pistachio.

49. Problem

In economy A the production possibilities frontier function intersects the milkshake axis at 18.76 and the scarf axis at 1.14.In country B the relative price of milkshake in terms of scarf is $\frac{P^B_{\text{milkshake}}}{P^B_{\text{milkshake}}} = 10.51$.

In producing which good has country A comparative advantage?

Solution: A has comparative advantage in producing milkshake.

50. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
brioche	6.91	4.36
hot chocolate	3.41	8.71

Which economy has comparative advantage in producing hot chocolate?

Solution: Economy B has comparative advantage in producing hot chocolate.

51. Problem

In an economy the relative price of brioche in terms of wallet would have been 3.32 in autarky. The same relative price in the rest of the world is 22.16.

Which economy has comparative advantage in producing brioche?

Solution: The observed economy has comparative advantage in producing brioche.

52. Problem

In an economy the relative price of tea in terms of wooden spoon would have been 30.88 in autarky. The same relative price in the rest of the world is 28.04.

Which economy has comparative advantage in producing tea?

Solution: The rest of the world has comparative advantage in producing tea.

53. Problem

In a small open economy the opportunity cost of producing shampoo in terms of teapot is 9.13. In the rest of the world the relative price of shampoo in terms of teapot is $\frac{P^{\text{world}}_{\text{shampoo}}}{P^{\text{world}}_{\text{teapot}}} = 7.57$.

In producing which good has the rest of the world comparative advantage?

Solution: The rest of the world has comparative advantage in producing shampoo.

54. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{orange}} = 339.43 - 31.04 \cdot Q^A_{\text{brioche}}$$
$$Q^B_{\text{orange}} = 140.72 - 8.41 \cdot Q^B_{\text{brioche}}$$

Identify the good in which country A has a comparative advantage.

Solution: A has comparative advantage in producing orange.

55. Problem

In a small open economy the opportunity cost of producing aubergine in terms of bagel is 26.72. In the rest of the world the relative price of aubergine in terms of bagel is $\frac{P^{\text{world}}_{\text{aubergine}}}{P^{\text{world}}_{\text{bagel}}} = 12.25$.

Identify the good in which the small open economy has comparative advantage over the rest of the world.

Solution: The small open economy has comparative advantage in producing bagel.

2.

56. Problem

In Home it takes 1.80 units of labor to produce one unit of mint tea and the unit labor requirement parameter in the cola sector is $a_{\text{cola}} = 7.77$. In Foreign the relative price of mint tea in terms of cola is $\frac{P^{\text{Foreign}}_{\text{mint tea}}}{P^{\text{Foreign}}_{\text{cola}}} = 15.07$.

What is the good in which Home has comparative advantage over Foreign?

Solution: Home has comparative advantage in producing mint tea.

57. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{paper clip}} = 128.67 - 4.34 \cdot Q^A_{\text{rug}}$$
$$Q^B_{\text{paper clip}} = 395.41 - 17.94 \cdot Q^B_{\text{rug}}$$

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing paper clip.

58. Problem

Firms in Home produce paper clip and lime by using a technology that can be characterized by the following production functions:

$$Q_{\text{paper clip}} = 7.36 \cdot L_{\text{paper clip}}$$

$$Q_{\text{lime}} = 7.63 \cdot L_{\text{lime}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{paper clip}} = 2.93 \cdot L^{\text{world}}_{\text{paper clip}}$$
$$Q^{\text{world}}_{\text{lime}} = 2.60 \cdot L^{\text{world}}_{\text{lime}}$$

Which economy has comparative advantage in producing lime?

Solution: Home has comparative advantage in producing lime.

59. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{watermelon}} = 10.25 \cdot L_{\text{watermelon}}$$
$$Q_{\text{brioche}} = 2.48 \cdot L_{\text{brioche}}$$

In the rest of the world the relative price of watermelon in terms of brioche is 25.79.

Which economy has comparative advantage in producing watermelon?

Solution: The small open economy has comparative advantage in producing watermelon.

60. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{cauliflower}} = 256.68 - 12.53 \cdot Q_{\text{hairspray}}$$

In the rest of the world the relative price of hairspray in terms of cauliflower is 3.69.

Which economy has comparative advantage in producing cauliflower?

Solution: The small open economy has comparative advantage in producing cauliflower.

61. Problem

In Home it takes 7.30 units of labor to produce one unit of onion and the unit labor requirement parameter in the hot dog sector is $a_{\text{hot dog}} = 4.45$. In Foreign the relative price of onion in terms of hot dog is

$\frac{P^{\text{Foreign}}_{\text{onion}}}{P^{\text{Foreign}}_{\text{hot dog}}} = 10.57.$

What is the good in which Home has comparative advantage over Foreign?

Solution: Home has comparative advantage in producing onion.

62. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
food processor	10.27	3.46
brioche	1.11	9.23

Which economy has comparative advantage in producing brioche?

Solution: The open economy has comparative advantage in producing brioche.

63. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{chicken burger}} = 188.40 - 6.29 \cdot Q_{\text{ice cream}}$$

In the rest of the world the relative price of ice cream in terms of chicken burger is 36.15.

Which economy has comparative advantage in producing ice cream?

Solution: The small open economy has comparative advantage in producing ice cream.

64. Problem

In a small open economy the opportunity cost of producing shampoo in terms of sweetcorn is 0.38. In the rest of the world the relative price of shampoo in terms of sweetcorn is $\frac{P^{\text{world}}_{\text{shampoo}}}{P^{\text{world}}_{\text{sweetcorn}}} = 15.29$.

In producing which good has the rest of the world comparative advantage?

Solution: The rest of the world has comparative advantage in producing sweetcorn.

65. Problem

In economy A the production possibilities frontier function intersects the pastry axis at 7.83 and the coffee cup axis at 11.11.In country B the relative price of pastry in terms of coffee cup is $\frac{P^{B}_{\text{pastry}}}{P^{B}_{\text{pastry}}} = 2.49$.

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing coffee cup.

66. Problem

Firms in Home produce handbag and wine glass by using a technology that can be characterized by the following production functions:

$$Q_{\text{handbag}} = 5.24 \cdot L_{\text{handbag}}$$
$$Q_{\text{wine glass}} = 4.01 \cdot L_{\text{wine glass}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{handbag}} = 1.95 \cdot L^{\text{world}}_{\text{handbag}}$$
$$Q^{\text{world}}_{\text{wine glass}} = 8.20 \cdot L^{\text{world}}_{\text{wine glass}}$$

Which economy has comparative advantage in producing handbag?

Solution: Home has comparative advantage in producing handbag.

67. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{shampoo}} = 300.68 - 25.23 \cdot Q_{\text{peach}}$$

In the rest of the world the relative price of peach in terms of shampoo is 14.46.

Which economy has comparative advantage in producing shampoo?

Solution: The small open economy has comparative advantage in producing shampoo.

68. Problem

In Home it takes 2.54 units of labor to produce one unit of lemonade and the unit labor requirement parameter in the cabbage sector is $a_{\text{cabbage}} = 7.18$. In Foreign the relative price of lemonade in terms of cabbage is $\frac{P^{\text{Foreign}}_{\text{lemonade}}}{P^{\text{Foreign}}_{\text{cabbage}}} = 31.69$.

What is the good in which Home has comparative advantage over Foreign?

Solution: Home has comparative advantage in producing lemonade.

69. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^{A}_{\text{food processor}} = 357.72 - 22.86 \cdot Q^{A}_{\text{milkshake}}$$
$$Q^{B}_{\text{food processor}} = 248.65 - 33.84 \cdot Q^{B}_{\text{milkshake}}$$

Identify the good in which country A has a comparative advantage.

Solution: A has comparative advantage in producing milkshake.

70. Problem

In an economy the relative price of strawberry in terms of cabbage would have been 38.63 in autarky. The same relative price in the rest of the world is 9.85.

Which economy has comparative advantage in producing cabbage?

Solution: The observed economy has comparative advantage in producing cabbage.

71. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
pastry	4.50	6.22
lime	3.49	7.00

Which economy has comparative advantage in producing pastry?

Solution: Economy A has comparative advantage in producing pastry.

72. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{trifle}} = 222.07 - 28.76 \cdot Q^A_{\text{porridge}}$$
$$Q^B_{\text{trifle}} = 94.77 - 37.50 \cdot Q^B_{\text{porridge}}$$

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing trifle.

2.

73. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
broccoli	1.26	4.23
lemon	9.31	9.67

Which economy has comparative advantage in producing broccoli?

Solution: The open economy has comparative advantage in producing broccoli.

74. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{scarf}} = 1.57 \cdot L_{\text{scarf}}$$
$$Q_{\text{bookshelf}} = 10.25 \cdot L_{\text{bookshelf}}$$

In the rest of the world the relative price of scarf in terms of bookshelf is 35.14.

Which economy has comparative advantage in producing bookshelf?

Solution: The rest of the world has comparative advantage in producing bookshelf.

75. Problem

In Home it takes 5.83 units of labor to produce one unit of bookshelf and the unit labor requirement parameter in the peach sector is $a_{\text{peach}} = 2.53$. In Foreign the relative price of bookshelf in terms of peach is $\frac{P^{\text{Foreign}}_{\text{bookshelf}}}{P^{\text{Foreign}}_{\text{peach}}} = 35.78$.

In producing which good has Foreign comparative advantage?

Solution: Foreign has comparative advantage in producing peach.

76. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
rug	1.29	9.74
peach	9.18	4.43

Which economy has comparative advantage in producing rug?

Solution: The open economy has comparative advantage in producing rug.

77. Problem

In an economy the relative price of tomato in terms of food processor would have been 15.87 in autarky. The same relative price in the rest of the world is 29.83.

Which economy has comparative advantage in producing tomato?

Solution: The observed economy has comparative advantage in producing tomato.

78. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{food processor}} = 0.80 \cdot L_{\text{food processor}}$$
$$Q_{\text{wooden spoon}} = 9.20 \cdot L_{\text{wooden spoon}}$$

In the rest of the world the relative price of food processor in terms of wooden spoon is 18.21.

Which economy has comparative advantage in producing wooden spoon?

Solution: The rest of the world has comparative advantage in producing wooden spoon.

79. Problem

In an economy the relative price of hairdryer in terms of banana would have been 14.23 in autarky. The same relative price in the rest of the world is 17.27.

Which economy has comparative advantage in producing hairdryer?

Solution: The observed economy has comparative advantage in producing hairdryer.

80. Problem

In an economy the relative price of trifle in terms of banana would have been 30.35 in autarky. The same relative price in the rest of the world is 19.64.

Which economy has comparative advantage in producing trifle?

Solution: The rest of the world has comparative advantage in producing trifle.

81. Problem

The world consists of two economies A and B. Both economies produce only two goods and they use a technology in all of the sectors that can be characterized by a linear production function. The following table displays the parameters that show the amount of output that can be produced by using just one unit of labor (total productivity).

	Total productivity	
	Economy A	Economy B
tomato	10.68	1.69
orange	3.62	10.51

Which economy has comparative advantage in producing tomato?

Solution: Economy A has comparative advantage in producing tomato.

82. Problem

The production possibilities frontier in country A and country B take the following form:

$$Q^A_{\text{shampoo}} = 299.82 - 26.01 \cdot Q^A_{\text{onion}}$$
$$Q^B_{\text{shampoo}} = 200.43 - 31.40 \cdot Q^B_{\text{onion}}$$

In producing which good has country B comparative advantage?

Solution: B has comparative advantage in producing shampoo.

83. Problem

In a small open economy the opportunity cost of producing teacup in terms of pastry is 39.13. In the rest of the world the relative price of teacup in terms of pastry is $\frac{P^{\text{world}}_{\text{teacup}}}{P^{\text{world}}_{\text{pastry}}} = 6.04$.

Identify the good in which the small open economy has comparative advantage over the rest of the world.

Solution: The small open economy has comparative advantage in producing pastry.

84. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{plate}} = 4.89 \cdot L_{\text{plate}}$$
$$Q_{\text{pizza}} = 3.94 \cdot L_{\text{pizza}}$$

In the rest of the world the relative price of plate in terms of pizza is 1.78.

Which economy has comparative advantage in producing pizza?

Solution: The rest of the world has comparative advantage in producing pizza.

2.

85. Problem

Firms in Home produce wallet and handbag by using a technology that can be characterized by the following production functions:

$$Q_{\text{wallet}} = 8.33 \cdot L_{\text{wallet}}$$
$$Q_{\text{handbag}} = 10.42 \cdot L_{\text{handbag}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{wallet}} = 1.33 \cdot L^{\text{world}}_{\text{wallet}}$$
$$Q^{\text{world}}_{\text{handbag}} = 7.84 \cdot L^{\text{world}}_{\text{handbag}}$$

Which economy has comparative advantage in producing wallet?

Solution: Home has comparative advantage in producing wallet.

86. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{bagel}} = 100.08 - 10.32 \cdot Q_{\text{handbag}}$$

In the rest of the world the relative price of handbag in terms of bagel is 33.46.

Which economy has comparative advantage in producing bagel?

Solution: The rest of the world has comparative advantage in producing bagel.

87. Problem

In a small open economy the opportunity cost of producing orange in terms of pie is 33.55. In the rest of the world the relative price of orange in terms of pie is $\frac{P^{\text{world}}_{\text{orange}}}{P^{\text{world}}_{\text{pie}}} = 24.11$.

In producing which good has the rest of the world comparative advantage?

Solution: The rest of the world has comparative advantage in producing orange.

88. Problem

In a small open economy the opportunity cost of producing blackcurrant in terms of bagel is 1.04. In the rest of the world the relative price of blackcurrant in terms of bagel is $\frac{P^{\text{world}}_{\text{blackcurrant}}}{P^{\text{world}}_{\text{bagel}}} = 19.63$.

Identify the good in which the small open economy has comparative advantage over the rest of the world.

Solution: The small open economy has comparative advantage in producing blackcurrant.

89. Problem

In an economy the relative price of sweetcorn in terms of hairspray would have been 25.88 in autarky. The same relative price in the rest of the world is 34.88.

Which economy has comparative advantage in producing hairspray?

Solution: The rest of the world has comparative advantage in producing hairspray.

90. Problem

In economy A the production possibilities frontier function intersects the sweetcorn axis at 40.85 and the wine glass axis at 2.74.In country B the relative price of sweetcorn in terms of wine glass is $\frac{P^{B}_{\text{sweetcorn}}}{P^{B}_{\text{sweetcorn}}} = 11.51$.

In producing which good has country A comparative advantage?

Solution: A has comparative advantage in producing sweetcorn.

91. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
ice cream	5.61	3.23
hot dog	7.45	6.63

2.

Which economy has comparative advantage in producing hot dog?

Solution: The open economy has comparative advantage in producing hot dog.

92. Problem

In Home it takes 9.66 units of labor to produce one unit of pushchair and the unit labor requirement parameter in the hairspray sector is $a_{\text{hairspray}} = 7.64$. In Foreign the relative price of pushchair in terms of hairspray is $\frac{P^{\text{Foreign}}_{\text{pushchair}}}{P^{\text{Foreign}}_{\text{hairspray}}} = 22.57$.

What is the good in which Home has comparative advantage over Foreign?

Solution: Home has comparative advantage in producing pushchair.

93. Problem

The production possibilities frontier function in a small open economy is given by

$$Q_{\text{cauliflower}} = 339.83 - 35.73 \cdot Q_{\text{teacup}}$$

In the rest of the world the relative price of teacup in terms of cauliflower is 14.15.

Which economy has comparative advantage in producing teacup?

Solution: The rest of the world has comparative advantage in producing teacup.

94. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{aubergine}} = 4.00 \cdot L_{\text{aubergine}}$$
$$Q_{\text{strawberry}} = 9.99 \cdot L_{\text{strawberry}}$$

In the rest of the world the relative price of aubergine in terms of strawberry is 38.47.

Which economy has comparative advantage in producing strawberry?

Solution: The rest of the world has comparative advantage in producing strawberry.

95. Problem

The following table shows the unit labor requirement parameters in an open economy and in the rest of the world. Both regions produce only two goods and use technology that requires only input as a factor.

	unit labor requirement	
	Open economy	Rest of the World
necklace	8.79	4.25
backpack	2.84	7.08

Which economy has comparative advantage in producing necklace?

Solution: The rest of the world has comparative advantage in producing necklace.

96. Problem

Firms in Home produce wallet and cappuccino by using a technology that can be characterized by the following production functions:

$$Q_{\text{wallet}} = 10.77 \cdot L_{\text{wallet}}$$
$$Q_{\text{cappuccino}} = 8.92 \cdot L_{\text{cappuccino}}$$

The production functions in the rest of the world take the following form:

$$Q^{\text{world}}_{\text{wallet}} = 10.43 \cdot L^{\text{world}}_{\text{wallet}}$$
$$Q^{\text{world}}_{\text{cappuccino}} = 0.25 \cdot L^{\text{world}}_{\text{cappuccino}}$$

Which economy has comparative advantage in producing cappuccino?

Solution: Home has comparative advantage in producing cappuccino.

97. Problem

In Home it takes 6.53 units of labor to produce one unit of jigsaw and the unit labor requirement parameter in the platform shoe sector is $a_{\text{platform shoe}} = 2.41$. In Foreign the relative price of jigsaw in terms of platform shoe is $\frac{P^{\text{Foreign}}_{\text{jigsaw}}}{P^{\text{Foreign}}_{\text{platform shoe}}} = 27.04$.

What is the good in which Home has comparative advantage over Foreign?

Solution: Home has comparative advantage in producing jigsaw.

98. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{yoghurt}} = 6.37 \cdot L_{\text{yoghurt}}$$
$$Q_{\text{jigsaw}} = 0.48 \cdot L_{\text{jigsaw}}$$

In the rest of the world the relative price of yoghurt in terms of jigsaw is 41.48.

Which economy has comparative advantage in producing yoghurt?

Solution: The small open economy has comparative advantage in producing yoghurt.

99. Problem

In an economy the relative price of strawberry in terms of hairdryer would have been 6.89 in autarky. The same relative price in the rest of the world is 34.47.

Which economy has comparative advantage in producing hairdryer?

Solution: The rest of the world has comparative advantage in producing hairdryer.

100. Problem

A small open economy produces its goods by using a technology that can be described by the following production functions

$$Q_{\text{lemonade}} = 8.83 \cdot L_{\text{lemonade}}$$
$$Q_{\text{almond}} = 6.06 \cdot L_{\text{almond}}$$

In the rest of the world the relative price of lemonade in terms of almond is 31.12.

Which economy has comparative advantage in producing lemonade?

Solution: The small open economy has comparative advantage in producing lemonade.

Ricardian Model
Small Open Economy

1. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 1277 units. The unit labor requirement parameters in the sweetcorn and shampoo sector are $a_{\text{sweetcorn}} = 10.49$ and $a_{\text{shampoo}} = 9.25$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P_{\text{sweetcorn}}^{0.65} P_{\text{sweetcorn}}^{0.35}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P_{\text{sweetcorn}}^{\text{world}}}{P_{\text{shampoo}}^{\text{world}}} = 14.21$ as relative price.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.2413 units.

2. Problem

In a small open economy there are just two firms: the firm that produces hairspray and the firm that produces watch. The following functions characterize the production process:

$$Q_{\text{hairspray}} = 5.22 \cdot L_{\text{hairspray}}$$
$$Q_{\text{watch}} = 13.71 \cdot L_{\text{watch}}$$

The utility function of the consumer is given by $U = 2.24 \cdot \ln D_{\text{hairspray}} + 2.85 \cdot \ln D_{\text{watch}}$, and the labor supply is fixed at 1225.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{hairspray}}^{\text{világ}} = 15.31 \cdot L_{\text{hairspray}}^{\text{világ}}$$
$$Q_{\text{watch}}^{\text{világ}} = 2.39 \cdot L_{\text{watch}}^{\text{világ}}$$

What amount of hairsprays are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 47345.7575 units of hairspray.

3. Problem

The functioning of a small open economy can be described by the following set of equations:

$$U = 1.09 \cdot \ln D_{\text{soup}} + 5.34 \cdot \ln D_{\text{coffee cup}}$$
$$0.52 \cdot Q_{\text{soup}} = L_{\text{soup}}$$
$$14.08 \cdot Q_{\text{coffee cup}} = L_{\text{coffee cup}}$$
$$L = 923$$
$$\frac{P^{\text{world}}_{\text{soup}}}{P^{\text{world}}_{\text{coffee cup}}} = 14.08$$

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports soup and the amount of export is $EX = 1474.1058$ units.

4. Problem

In a small open economy – that has comparative advantage in producing plate – the maximum amount of labor provided is 822 units. The unit labor requirement parameters are:

$$a_{\text{broccoli}} = 7.14$$
$$a_{\text{plate}} = 6.05$$

The statistical office uses the formula of $P = P^{0.56}_{\text{broccoli}} P^{0.44}_{\text{plate}}$ to calculate the price level. Under these circumstances the small open economy achieves 344.361370 units of real GDP.

What is the real wage in this small open economy?

Solution: The real wage is 0.4189 units.

5. Problem

The functioning of a small open economy can be described by the following set of equations:

$$U = 3.72 \cdot \ln D_{\text{hairdryer}} + 1.85 \cdot \ln D_{\text{cola}}$$

2.

$$
\begin{aligned}
2.30 \cdot Q_{\text{hairdryer}} &= L_{\text{hairdryer}} \\
10.60 \cdot Q_{\text{cola}} &= L_{\text{cola}} \\
L &= 602 \\
\frac{P^{\text{world}}_{\text{hairdryer}}}{P^{\text{world}}_{\text{cola}}} &= 10.60
\end{aligned}
$$

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports cola and the amount of import is $IM = 1468.3001$ units.

6. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: food processor and cola. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{food processor}} = 1.66$ and $a_{\text{cola}} = 6.60$. The labor supply is constant, $L = 914$.

The utility function of the representative consumer takes the following form:

$$U = 2.68 \cdot \ln D^{0.57}_{\text{food processor}} \cdot \ln D^{0.43}_{\text{cola}}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P^{\text{world}}_{\text{food processor}}}{P^{\text{world}}_{\text{cola}}} = 17.45$.

Find the amount of cola consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 4131.4452 units of cola.

7. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$
\begin{aligned}
a_{\text{rug}} &= 7.54 \\
a_{\text{pushchair}} &= 0.55
\end{aligned}
$$

In this economy the labor supply is constant: 182.

The utility function of the representative consumer is written as $U = 3.95 \cdot D^{0.73}_{\text{rug}} D^{0.27}_{\text{pushchair}}$.

The relative world price is 23.50 (price of rug in terms of pushchair).

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports pushchair and the amount of import is $IM = 153.1552$ units.

8. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 5.60 \cdot \ln D_{\text{cola}} + 3.80 \cdot \ln D_{\text{pizza}}$$

2.

Firms in the cola sector uses only labor to produce their output, the unit labor requirement is 11.50 units. The same parameter in the pizza sector is $a_{\text{pizza}} = 12.51$. The labor supply is fixed at $L = 658$ units.

The small open economy trades actively with the rest of the world, where the price of cola in terms of pizza is $\frac{P^{\text{world}}_{\text{cola}}}{P^{\text{world}}_{\text{pizza}}} = 13.28$.

What is the amount of pizza produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of pizza.

9. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 448 units. The unit labor requirement parameters in the backpack and cabbage sector are $a_{\text{backpack}} = 7.57$ and $a_{\text{cabbage}} = 8.09$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.38}_{\text{backpack}} P^{0.62}_{\text{backpack}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{backpack}}}{P^{\text{world}}_{\text{cabbage}}} = 1.08$ as relative price.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.1386 units.

10. Problem

In a small open economy there are just two firms: the firm that produces watermelon and the firm that produces napkin. The following functions characterize the production process:

$$Q_{\text{watermelon}} = 1.54 \cdot L_{\text{watermelon}}$$
$$Q_{\text{napkin}} = 5.54 \cdot L_{\text{napkin}}$$

The utility function of the representative consumer is given by $U = 2.42 \cdot \ln D_{\text{watermelon}} + 0.74 \cdot \ln D_{\text{napkin}}$, and the labor supply is fixed at 1341 units. The statistical office uses the formula of $P = P_{\text{watermelon}}^{0.36} P_{\text{napkin}}^{0.64}$ to calculate the price level.

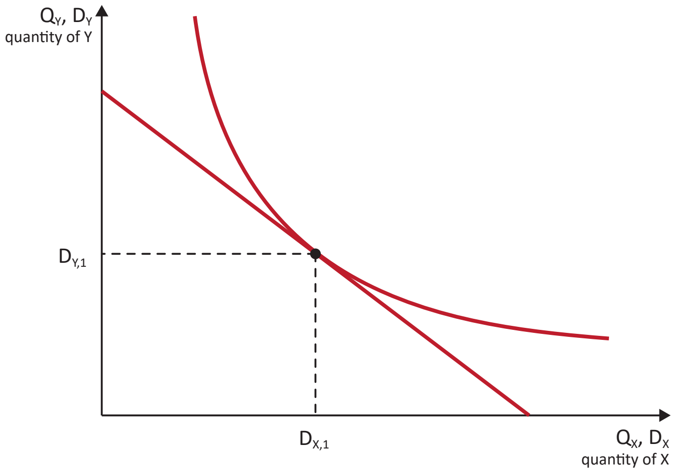
The relative world price is 5.02 units (price of watermelon in terms of napkin).

By what percentage does free trade modify the real wage of the economic agents relative to the real wage in autarky?

Solution: Free trade increases real wage by 23.7706 percent.

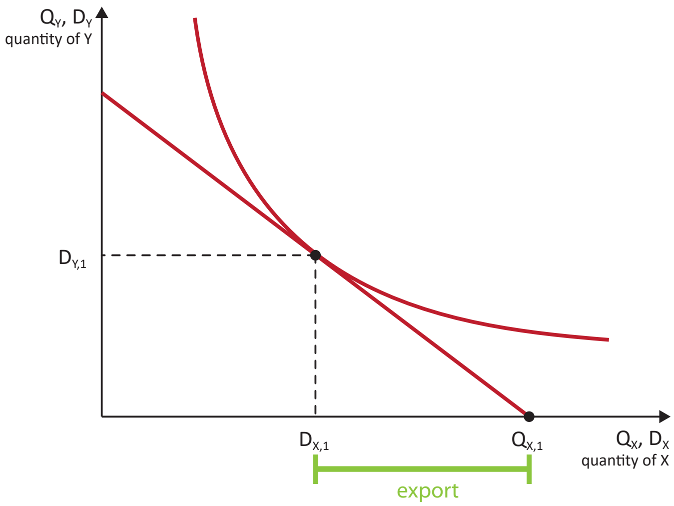
11. Problem

The following graph shows the budget constraint and the indifference curve that designates the optimal consumption bundle in a Ricardian small open economy under free trade.



The small open economy has comparative advantage in producing X. Identify the amount of export.

Solution: The correct graph is the following:



12. Problem

In a Ricardian small open economy the unit labor requirement in the rug sector is 4.38 and the unit labor requirement in the food processor sector is 6.70. The labor supply is 989. The behavior of the representative consumer can be described by the following utility function $U = 5.11 \cdot \ln D_{\text{rug}} + 1.26 \cdot \ln D_{\text{food processor}}$.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{rug}}^{0.41} P_{\text{food processor}}^{0.59}$.

The relative world price of rug in terms of food processor is 1.78.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.3208 units.

13. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 2.39 \cdot \ln D_{\text{lemonade}} + 2.10 \cdot \ln D_{\text{almond}}$$

Firms in the lemonade sector uses only labor to produce their output, the unit labor requirement is 15.10 units. The same parameter in the almond sector is $a_{\text{almond}} = 6.79$. The labor supply is fixed at $L = 1306$ units.

The small open economy trades actively with the rest of the world, where the price of lemonade in terms of almond is $\frac{P^{\text{world}}_{\text{lemonade}}}{P^{\text{world}}_{\text{almond}}} = 2.61$.

Calculate the amount of lemonade consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 46.0381 units of lemonade.

14. Problem

2.

In a small open economy there are just two firms: the firm that produces platform shoe and the firm that produces painting. The following functions characterize the production process:

$$Q_{\text{platform shoe}} = 5.60 \cdot L_{\text{platform shoe}}$$
$$Q_{\text{painting}} = 2.20 \cdot L_{\text{painting}}$$

The utility function of the consumer is given by $U = 3.47 \cdot \ln D_{\text{platform shoe}} + 1.33 \cdot \ln D_{\text{painting}}$, and the labor supply is fixed at 954.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{platform shoe}} = 1.05 \cdot L^{\text{világ}}_{\text{platform shoe}}$$
$$Q^{\text{világ}}_{\text{painting}} = 10.62 \cdot L^{\text{világ}}_{\text{painting}}$$

How many platform shoes does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 5342.4000 units of platform shoe.

15. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{yoghurt}} = 9.44$$
$$a_{\text{spring onion}} = 4.84$$

In this economy the labor supply is constant: 881.

The utility function of the representative consumer is written as $U = 2.85 \cdot D_{\text{yoghurt}}^{0.49} D_{\text{spring onion}}^{0.51}$.

The relative world price is 3.65 (price of yoghurt in terms of spring onion).

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports spring onion and the amount of import is $IM = 173.7269$ units.

16. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{wooden spoon}} = 14.93$$
$$a_{\text{chicken burger}} = 6.78$$

In this economy the labor supply is constant: 739.

The utility function of the representative consumer is written as $U = 3.56 \cdot D_{\text{wooden spoon}}^{0.45} D_{\text{chicken burger}}^{0.55}$.

The relative world price is 10.68 (price of wooden spoon in terms of chicken burger).

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports wooden spoon and the amount of export is $EX = 27.2237$ units.

17. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 1306 units. The unit labor requirement parameters in the necklace and painting sector are $a_{\text{necklace}} = 15.49$ and $a_{\text{painting}} = 12.42$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P_{\text{necklace}}^{0.66} P_{\text{necklace}}^{0.34}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P_{\text{necklace}}^{\text{world}}}{P_{\text{painting}}^{\text{world}}} = 5.12$ as relative price.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 146.9074 units.

18. Problem

In a small open economy – that has comparative advantage in producing blackcurrant – the maximum amount of labor provided is 482 units. The unit labor requirement parameters are:

$$a_{\text{chicken burger}} = 2.41$$
$$a_{\text{blackcurrant}} = 2.88$$

The statistical office uses the formula of $P = P_{\text{chicken burger}}^{0.64} P_{\text{blackcurrant}}^{0.36}$ to calculate the price level. Under these circumstances the small open economy achieves 501.510635 units of real GDP.

What is the relative world price (price of chicken burger in terms of blackcurrant)?

Solution: The relative world price is 0.18 units.

19. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{coffee}} = 4.94$$
$$a_{\text{cola}} = 9.26$$

In this economy the labor supply is constant: 216.

The utility function of the representative consumer is written as $U = 0.68 \cdot D_{\text{coffee}}^{0.22} D_{\text{cola}}^{0.78}$.

The relative world price is 11.03 (price of coffee in terms of cola).

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports coffee and the amount of export is $EX = 34.1053$ units.

20. Problem

A small open economy, that can be described by the following set of formulas:

$$U = 1.54 \cdot \ln D_{\text{hot dog}} + 2.94 \cdot \ln D_{\text{cauliflower}}$$

$$
\begin{aligned}
6.45 \cdot Q_{\text{hot dog}} &= L_{\text{hot dog}} \\
10.95 \cdot Q_{\text{cauliflower}} &= L_{\text{cauliflower}} \\
L &= 655
\end{aligned}
$$

exports 66.642442 units of hot dog and imports 243.911337 units of cauliflower.

What is the relative world price (price of X in terms of Y) the economy faces while trading with the rest of the world?

Solution: The relative world price is 3.66 units.

2.

21. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 972 units of labor to produce two goods: watch and wooden spoon. The production possibilities frontier in this economy can be written as:

$$Q_{\text{wooden spoon}} = 512.81 - 12.39 \cdot Q_{\text{watch}}$$

In this economy $U = 1.44 \cdot \ln D_{\text{watch}} + 3.70 \cdot \ln D_{\text{wooden spoon}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of watch in terms of wooden spoon is $\frac{P^{\text{world}}_{\text{watch}}}{P^{\text{world}}_{\text{wooden spoon}}} = 24.04$.

Calculate the amount of watch consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 11.5954 units of watch.

22. Problem

A small open economy, that can be described by the following set of formulas:

$$
\begin{aligned}
U &= 1.12 \cdot \ln D_{\text{watch}} + 1.15 \cdot \ln D_{\text{orange}} \\
a_{\text{orange}} &= 14.33 \\
L &= 682 \\
\frac{P^{\text{world}}_{\text{watch}}}{P^{\text{world}}_{\text{orange}}} &= 19.62
\end{aligned}
$$

exports 23.345041 units of watch and imports 458.103667 units of orange.

Determine the unit labor requirement parameter for the X sector.

Solution: The unit labor requirement parameter in the watch sector is 14.80 units.

23. Problem

In a small open economy there are just two firms: the firm that produces soup and the firm that produces lime. The following functions characterize the production process:

$$Q_{\text{soup}} = 12.44 \cdot L_{\text{soup}}$$
$$Q_{\text{lime}} = 7.53 \cdot L_{\text{lime}}$$

The utility function of the consumer is given by $U = 5.15 \cdot \ln D_{\text{soup}} + 1.33 \cdot \ln D_{\text{lime}}$, and the labor supply is fixed at 1292.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{soup}} = 0.78 \cdot L^{\text{világ}}_{\text{soup}}$$
$$Q^{\text{világ}}_{\text{lime}} = 5.37 \cdot L^{\text{világ}}_{\text{lime}}$$

What amount of soups are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 12773.6531 units of soup.

24. Problem

In a small open economy there are just two firms: the firm that produces blackcurrant and the firm that produces hot dog. The following functions characterize the production process:

$$Q_{\text{blackcurrant}} = 7.62 \cdot L_{\text{blackcurrant}}$$
$$Q_{\text{hot dog}} = 15.40 \cdot L_{\text{hot dog}}$$

The utility function of the representative consumer is given by $U = 4.52 \cdot \ln D_{\text{blackcurrant}} + 1.11 \cdot \ln D_{\text{hot dog}}$, and the labor supply is fixed at 706 units. The statistical office uses the formula of $P = P^{0.18}_{\text{blackcurrant}} P^{0.82}_{\text{hot dog}}$ to calculate the price level.

The relative world price is 21.01 units (price of blackcurrant in terms of hot dog).

By what percentage does free trade modify the real wage of the economic agents relative to the real wage in autarky?

Solution: Free trade increases real wage by 582.0645 percent.

25. Problem

In a small open economy – that has comparative advantage in producing food processor – the maximum amount of labor provided is 569 units. The unit labor requirement parameters are:

$$a_{\text{orange}} = 15.03$$
$$a_{\text{food processor}} = 8.24$$

The statistical office uses the formula of $P = P_{\text{orange}}^{0.45} P_{\text{food processor}}^{0.55}$ to calculate the price level. Under these circumstances the small open economy achieves 104.293696 units of real GDP.

What is the real wage in this small open economy?

2.

Solution: The real wage is 0.1833 units.

26. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: platform shoe and teapot. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{platform shoe}} = 10.18$ and $a_{\text{teapot}} = 9.46$. The labor supply is constant, $L = 1184$.

The utility function of the representative consumer takes the following form:

$$U = 5.44 \cdot \ln D_{\text{platform shoe}}^{0.50} \cdot \ln D_{\text{teapot}}^{0.50}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{platform shoe}}^{\text{world}}}{P_{\text{teapot}}^{\text{world}}} = 20.67$.

What is the amount of teapot produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of teapot.

27. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1031 units of labor to produce two goods: spring onion and lime. The production possibilities frontier in this economy can be written as:

$$Q_{\text{lime}} = 218.98 - 10.75 \cdot Q_{\text{spring onion}}$$

In this economy $U = 4.65 \cdot \ln D_{\text{spring onion}} + 0.20 \cdot \ln D_{\text{lime}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of spring onion in terms of lime is $\frac{P^{\text{world}}_{\text{spring onion}}}{P^{\text{world}}_{\text{lime}}} = 19.54$.

Determine the amount of spring onion produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 20.3702 units of spring onion.

28. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$\begin{aligned} U &= 0.53 \cdot D_{\text{bagel}}^{0.21} D_{\text{fruit cake}}^{0.79} \\ 0.26 \cdot Q_{\text{bagel}} &= L_{\text{bagel}} \\ 8.90 \cdot Q_{\text{fruit cake}} &= L_{\text{fruit cake}} \\ L &= 700 \\ P &= P_{\text{bagel}}^{0.22} P_{\text{fruit cake}}^{0.78} \end{aligned}$$

The relative world price of bagel in terms of fruit cake is 18.30.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 25991.8111 units.

29. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1076 units of labor to produce two goods: teapot and wine glass. The production possibilities frontier in this economy can be written as:

$$Q_{\text{wine glass}} = 577.86 - 8.79 \cdot Q_{\text{teapot}}$$

In this economy $U = 3.33 \cdot \ln D_{\text{teapot}} + 3.10 \cdot \ln D_{\text{wine glass}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of teapot in terms of wine glass is $\frac{P^{\text{world}}_{\text{teapot}}}{P^{\text{world}}_{\text{wine glass}}} = 12.81$.

Calculate the amount of teapot consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 34.0461 units of teapot.

30. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 548 units of labor to produce two goods: sweetcorn and orange. The production possibilities frontier in this economy can be written as:

2.

$$Q_{\text{orange}} = 874.00 - 6.31 \cdot Q_{\text{sweetcorn}}$$

In this economy $U = 2.62 \cdot \ln D_{\text{sweetcorn}} + 3.13 \cdot \ln D_{\text{orange}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of sweetcorn in terms of orange is $\frac{P^{\text{world}}_{\text{sweetcorn}}}{P^{\text{world}}_{\text{orange}}} = 23.00$.

Calculate the amount of sweetcorn consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 63.1125 units of sweetcorn.

31. Problem

In a small open economy there are just two firms: the firm that produces coffee and the firm that produces banana. The following functions characterize the production process:

$$Q_{\text{coffee}} = 14.64 \cdot L_{\text{coffee}}$$
$$Q_{\text{banana}} = 0.85 \cdot L_{\text{banana}}$$

The utility function of the consumer is given by $U = 1.78 \cdot \ln D_{\text{coffee}} + 5.57 \cdot \ln D_{\text{banana}}$, and the labor supply is fixed at 766.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{vilĂĄg}}_{\text{coffee}} = 5.37 \cdot L^{\text{vilĂĄg}}_{\text{coffee}}$$
$$Q^{\text{vilĂĄg}}_{\text{banana}} = 9.76 \cdot L^{\text{vilĂĄg}}_{\text{banana}}$$

What is the relative world price of coffee in terms of banana?

Solution: The relative world price is 1.8175 units.

32. Problem

In a small open economy – that has comparative advantage in producing wallet – the maximum amount of labor provided is 835 units. The unit labor requirement parameters are:

$$a_{\text{soup}} = 8.29$$
$$a_{\text{wallet}} = 10.10$$

The statistical office uses the formula of $P = P_{\text{soup}}^{0.34} P_{\text{wallet}}^{0.66}$ to calculate the price level. Under these circumstances the small open economy achieves 130.699571 units of real GDP.

What is the relative world price (price of soup in terms of wallet)?

Solution: The relative world price is 0.26 units.

2.

33. Problem

In a small open economy there are just two firms: the firm that produces hairdryer and the firm that produces hot dog. The following functions characterize the production process:

$$Q_{\text{hairdryer}} = 0.85 \cdot L_{\text{hairdryer}}$$
$$Q_{\text{hot dog}} = 15.29 \cdot L_{\text{hot dog}}$$

The utility function of the consumer is given by $U = 5.58 \cdot \ln D_{\text{hairdryer}} + 1.37 \cdot \ln D_{\text{hot dog}}$, and the labor supply is fixed at 992.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{hairdryer}}^{\text{világ}} = 7.00 \cdot L_{\text{hairdryer}}^{\text{világ}}$$
$$Q_{\text{hot dog}}^{\text{világ}} = 14.73 \cdot L_{\text{hot dog}}^{\text{világ}}$$

How many hairdryers does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 0.0000 units of hairdryer.

34. Problem

In a small open economy there are just two firms: the firm that produces mint tea and the firm that produces trifle. The following functions characterize the production process:

$$Q_{\text{mint tea}} = 7.88 \cdot L_{\text{mint tea}}$$

$$Q_{\text{trifle}} = 1.42 \cdot L_{\text{trifle}}$$

The utility function of the consumer is given by $U = 3.57 \cdot \ln D_{\text{mint tea}} + 3.05 \cdot \ln D_{\text{trifle}}$, and the labor supply is fixed at 457.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{vilĂAg}}_{\text{mint tea}} = 12.80 \cdot L^{\text{vilĂAg}}_{\text{mint tea}}$$
$$Q^{\text{vilĂAg}}_{\text{trifle}} = 14.94 \cdot L^{\text{vilĂAg}}_{\text{trifle}}$$

What is the relative world price of mint tea in terms of trifle?

Solution: The relative world price is 1.1672 units.

35. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 576 units of labor to produce two goods: orange and soup. The production possibilities frontier in this economy can be written as:

$$Q_{\text{soup}} = 724.11 - 6.13 \cdot Q_{\text{orange}}$$

In this economy $U = 0.24 \cdot \ln D_{\text{orange}} + 2.12 \cdot \ln D_{\text{soup}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of orange in terms of soup is $\frac{P^{\text{world}}_{\text{orange}}}{P^{\text{world}}_{\text{soup}}} = 6.24$.

What is the amount of soup produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of soup.

36. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 301 units of labor to produce two goods: coffee cup and teapot. The production possibilities frontier in this economy can be written as:

$$Q_{\text{teapot}} = 1370.19 - 10.19 \cdot Q_{\text{coffee cup}}$$

In this economy $U = 4.28 \cdot \ln D_{\text{coffee cup}} + 1.58 \cdot \ln D_{\text{teapot}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of coffee cup in terms of teapot is $\frac{P^{\text{world}}_{\text{coffee cup}}}{P^{\text{world}}_{\text{teapot}}} = 19.39$.

Determine the amount of coffee cup produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 134.4642 units of coffee cup.

37. Problem

2.

In a small open economy there are just two firms: the firm that produces coffee and the firm that produces jigsaw. The following functions characterize the production process:

$$Q_{\text{coffee}} = 15.74 \cdot L_{\text{coffee}}$$
$$Q_{\text{jigsaw}} = 14.63 \cdot L_{\text{jigsaw}}$$

The utility function of the representative consumer is given by $U = 1.73 \cdot \ln D_{\text{coffee}} + 2.37 \cdot \ln D_{\text{jigsaw}}$, and the labor supply is fixed at 313 units. The statistical office uses the formula of $P = P^{0.59}_{\text{coffee}} P^{0.41}_{\text{jigsaw}}$ to calculate the price level.

The relative world price is 12.30 units (price of coffee in terms of jigsaw).

By what percentage does free trade modify the real wage of the economic agents relative to the real wage in autarky?

Solution: Free trade increases real wage by 188.3254 percent.

38. Problem

In a small open economy – that has comparative advantage in producing pie – the maximum amount of labor provided is 1319 units. The unit labor requirement parameters are:

$$a_{\text{pie}} = 0.38$$
$$a_{\text{trifle}} = 1.62$$

The statistical office uses the formula of $P = P^{0.27}_{\text{pie}} P^{0.73}_{\text{trifle}}$ to calculate the price level. Under these circumstances the small open economy achieves 9527.632045 units of real GDP.

What is the real wage in this small open economy?

Solution: The real wage is 7.2234 units.

39. Problem

In a small open economy – that has comparative advantage in producing milkshake – the maximum amount of labor provided is 315 units. The unit labor requirement parameters are:

$$a_{\text{aubergine}} = 4.71$$
$$a_{\text{milkshake}} = 4.28$$

The statistical office uses the formula of $P = P_{\text{aubergine}}^{0.64} P_{\text{milkshake}}^{0.36}$ to calculate the price level. Under these circumstances the small open economy achieves 193.961828 units of real GDP.

What is the relative world price (price of aubergine in terms of milkshake)?

2.

Solution: The relative world price is 0.22 units.

40. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 1.79 \cdot \ln D_{\text{soup}} + 1.09 \cdot \ln D_{\text{lemon}}$$

Firms in the soup sector uses only labor to produce their output, the unit labor requirement is 5.83 units. The same parameter in the lemon sector is $a_{\text{lemon}} = 10.72$. The labor supply is fixed at $L = 1152$ units.

The small open economy trades actively with the rest of the world, where the price of soup in terms of lemon is $\frac{P_{\text{soup}}^{\text{world}}}{P_{\text{lemon}}^{\text{world}}} = 8.27$.

Determine the amount of soup produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 197.5986 units of soup.

41. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: soup and plate. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{soup}} = 5.42$ and $a_{\text{plate}} = 5.46$. The labor supply is constant, $L = 341$.

The utility function of the representative consumer takes the following form:

$$U = 3.22 \cdot \ln D_{\text{soup}}^{0.58} \cdot \ln D_{\text{plate}}^{0.42}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P^{\text{world}}_{\text{soup}}}{P^{\text{world}}_{\text{plate}}} = 5.93$.

Determine the amount of soup produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 62.9151 units of soup.

42. Problem

In a small open economy there are just two firms: the firm that produces peach and the firm that produces shampoo. The following functions characterize the production process:

$$Q_{\text{peach}} = 0.70 \cdot L_{\text{peach}}$$
$$Q_{\text{shampoo}} = 5.41 \cdot L_{\text{shampoo}}$$

The utility function of the consumer is given by $U = 0.25 \cdot \ln D_{\text{peach}} + 0.83 \cdot \ln D_{\text{shampoo}}$, and the labor supply is fixed at 1108.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{peach}} = 10.30 \cdot L^{\text{világ}}_{\text{peach}}$$
$$Q^{\text{világ}}_{\text{shampoo}} = 6.60 \cdot L^{\text{világ}}_{\text{shampoo}}$$

How many peachs does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 0.0000 units of peach.

43. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 5.02 \cdot \ln D_{\text{teacup}} + 1.36 \cdot \ln D_{\text{painting}}$$

Firms in the teacup sector uses only labor to produce their output, the unit labor requirement is 2.82 units. The same parameter in the painting sector is $a_{\text{painting}} = 11.12$. The labor supply is fixed at $L = 702$ units.

The small open economy trades actively with the rest of the world, where the price of teacup in terms of painting is $\frac{P^{\text{world}}_{\text{teacup}}}{P^{\text{world}}_{\text{painting}}} = 15.50$.

Find the amount of painting consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 822.5038 units of painting.

44. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 229 units. The unit labor requirement parameters in the almond and wine glass sector are $a_{\text{almond}} = 7.42$ and $a_{\text{wine glass}} = 14.11$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.46}_{\text{almond}} P^{0.54}_{\text{almond}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{almond}}}{P^{\text{world}}_{\text{wine glass}}} = 13.42$ as relative price.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 125.4348 units.

45. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{food processor}} = 14.36$$
$$a_{\text{sweetcorn}} = 4.78$$

In this economy the labor supply is constant: 727.

The utility function of the representative consumer is written as $U = 4.08 \cdot D^{0.32}_{\text{food processor}} D^{0.68}_{\text{sweetcorn}}$.

The relative world price is 14.16 (price of food processor in terms of sweetcorn).

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports food processor and the amount of export is $EX = 34.4262$ units.

46. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 2.06 \cdot D^{0.73}_{\text{soup}} D^{0.27}_{\text{cappuccino}}$$
$$5.64 \cdot Q_{\text{soup}} = L_{\text{soup}}$$

$$14.99 \cdot Q_{\text{cappuccino}} = L_{\text{cappuccino}}$$
$$L = 204$$
$$P = P_{\text{soup}}^{0.53} P_{\text{cappuccino}}^{0.47}$$

The relative world price of soup in terms of cappuccino is 17.80.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 139.9744 units.

47. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 515 units. The unit labor requirement parameters in the watermelon and cauliflower sector are $a_{\text{watermelon}} = 12.13$ and $a_{\text{cauliflower}} = 8.07$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P_{\text{watermelon}}^{0.41} P_{\text{watermelon}}^{0.59}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P_{\text{watermelon}}^{\text{world}}}{P_{\text{cauliflower}}^{\text{world}}} = 14.43$ as relative price.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.3982 units.

48. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{soup}} = 15.73$$
$$a_{\text{cappuccino}} = 14.54$$

In this economy the labor supply is constant: 230.

The utility function of the representative consumer is written as $U = 1.15 \cdot D_{\text{soup}}^{0.54} D_{\text{cappuccino}}^{0.46}$.

The relative world price is 7.40 (price of soup in terms of cappuccino).

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports cappuccino and the amount of import is $IM = 49.7724$ units.

49. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 1.57 \cdot \ln D_{\text{paper clip}} + 2.28 \cdot \ln D_{\text{teacup}}$$

Firms in the paper clip sector uses only labor to produce their output, the unit labor requirement is 10.44 units. The same parameter in the teacup sector is $a_{\text{teacup}} = 14.20$. The labor supply is fixed at $L = 1228$ units.

The small open economy trades actively with the rest of the world, where the price of paper clip in terms of teacup is $\frac{P^{\text{world}}_{\text{paper clip}}}{P^{\text{world}}_{\text{teacup}}} = 3.76$.

2.

Find the amount of teacup consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 261.9147 units of teacup.

50. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: ice cream and teacup. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{ice cream}} = 15.35$ and $a_{\text{teacup}} = 5.58$. The labor supply is constant, $L = 1165$.

The utility function of the representative consumer takes the following form:

$$U = 1.02 \cdot \ln D^{0.27}_{\text{ice cream}} \cdot \ln D^{0.73}_{\text{teacup}}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P^{\text{world}}_{\text{ice cream}}}{P^{\text{world}}_{\text{teacup}}} = 3.07$.

Find the amount of teacup consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 170.0900 units of teacup.

51. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 3.79 \cdot D^{0.32}_{\text{scarf}} D^{0.68}_{\text{hot chocolate}}$$

$$6.94 \cdot Q_{\text{scarf}} = L_{\text{scarf}}$$
$$13.38 \cdot Q_{\text{hot chocolate}} = L_{\text{hot chocolate}}$$
$$L = 975$$
$$P = P_{\text{scarf}}^{0.38} P_{\text{hot chocolate}}^{0.62}$$

The relative world price of scarf in terms of hot chocolate is 8.75.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.5529 units.

52. Problem

A small open economy, that can be described by the following set of formulas:

$$U = 3.86 \cdot \ln D_{\text{brioche}} + 2.42 \cdot \ln D_{\text{broccoli}}$$
$$4.12 \cdot Q_{\text{brioche}} = L_{\text{brioche}}$$
$$8.76 \cdot Q_{\text{broccoli}} = L_{\text{broccoli}}$$
$$L = 1128$$

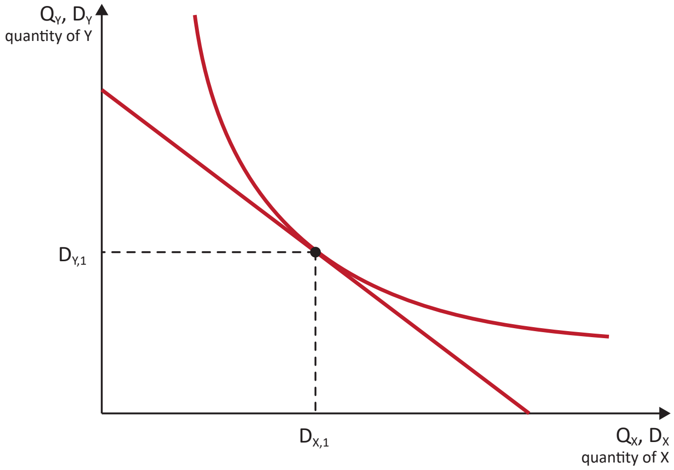
exports 105.503679 units of brioche and imports 372.427988 units of broccoli.

What is the relative world price (price of X in terms of Y) the economy faces while trading with the rest of the world?

Solution: The relative world price is 3.53 units.

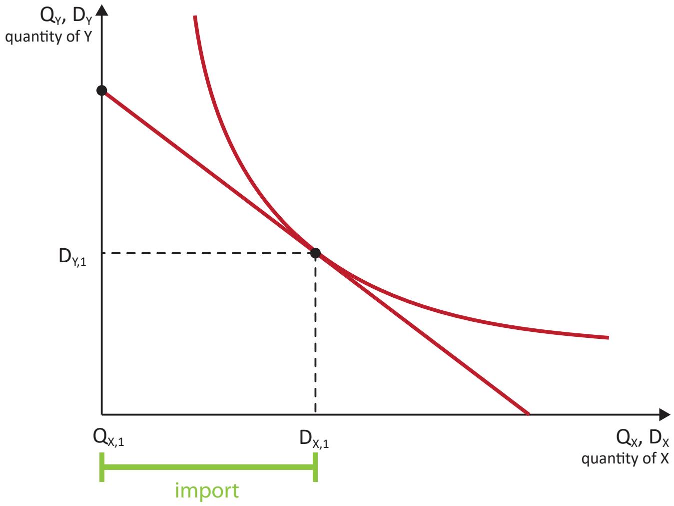
53. Problem

The following graph shows the budget constraint and the indifference curve that designates the optimal consumption bundle in a Ricardian small open economy under free trade.



The small open economy has comparative advantage in producing Y. Identify the amount of import.

Solution: The correct graph is the following:



54. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: pie and aubergine. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{pie}} = 8.48$ and $a_{\text{aubergine}} = 3.76$. The labor supply is constant, $L = 1217$.

The utility function of the representative consumer takes the following form:

$$U = 2.89 \cdot \ln D_{\text{pie}}^{0.58} \cdot \ln D_{\text{aubergine}}^{0.42}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{pie}}^{\text{world}}}{P_{\text{aubergine}}^{\text{world}}} = 16.74$.

Determine the amount of pie produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 143.5142 units of pie.

55. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 3.72 \cdot \ln D_{\text{pastry}} + 4.98 \cdot \ln D_{\text{yoghurt}}$$

Firms in the pastry sector uses only labor to produce their output, the unit labor requirement is 12.90 units. The same parameter in the yoghurt sector is $a_{\text{yoghurt}} = 3.02$. The labor supply is fixed at $L = 1394$ units.

The small open economy trades actively with the rest of the world, where the price of pastry in terms of yoghurt is $\frac{P_{\text{pastry}}^{\text{world}}}{P_{\text{yoghurt}}^{\text{world}}} = 22.70$.

What is the amount of yoghurt produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of yoghurt.

56. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 340 units of labor to produce two goods: trifle and jigsaw. The production possibilities frontier in this economy can be written as:

$$Q_{\text{jigsaw}} = 682.59 - 3.39 \cdot Q_{\text{trifle}}$$

In this economy $U = 0.98 \cdot \ln D_{\text{trifle}} + 5.68 \cdot \ln D_{\text{jigsaw}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of trifle in terms of jigsaw is $\frac{P^{\text{world}}_{\text{trifle}}}{P^{\text{world}}_{\text{jigsaw}}} = 9.75$.

Find the amount of jigsaw consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 1674.3219 units of jigsaw.

2.

57. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 5.44 \cdot \ln D_{\text{trifle}} + 1.10 \cdot \ln D_{\text{orange}}$$

Firms in the trifle sector uses only labor to produce their output, the unit labor requirement is 0.40 units. The same parameter in the orange sector is $a_{\text{orange}} = 2.45$. The labor supply is fixed at $L = 1256$ units.

The small open economy trades actively with the rest of the world, where the price of trifle in terms of orange is $\frac{P^{\text{world}}_{\text{trifle}}}{P^{\text{world}}_{\text{orange}}} = 11.56$.

Find the amount of orange consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 6105.2355 units of orange.

58. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1388 units of labor to produce two goods: pie and napkin. The production possibilities frontier in this economy can be written as:

$$Q_{\text{napkin}} = 630.52 - 11.75 \cdot Q_{\text{pie}}$$

In this economy $U = 4.69 \cdot \ln D_{\text{pie}} + 4.35 \cdot \ln D_{\text{napkin}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of pie in terms of napkin is $\frac{P^{\text{world}}_{\text{pie}}}{P^{\text{world}}_{\text{napkin}}} = 12.19$.

Determine the amount of pie produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 53.6613 units of pie.

59. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: hot dog and pizza. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{hot dog}} = 14.90$ and $a_{\text{pizza}} = 10.15$. The labor supply is constant, $L = 1156$.

The utility function of the representative consumer takes the following form:

$$U = 3.18 \cdot \ln D_{\text{hot dog}}^{0.48} \cdot \ln D_{\text{pizza}}^{0.52}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{hot dog}}^{\text{world}}}{P_{\text{pizza}}^{\text{world}}} = 6.29$.

Calculate the amount of hot dog consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 37.2403 units of hot dog.

60. Problem

In a small open economy – that has comparative advantage in producing teapot – the maximum amount of labor provided is 528 units. The unit labor requirement parameters are:

$$a_{\text{soup}} = 4.60$$
$$a_{\text{teapot}} = 4.47$$

The statistical office uses the formula of $P = P_{\text{soup}}^{0.51} P_{\text{teapot}}^{0.49}$ to calculate the price level. Under these circumstances the small open economy achieves 204.772745 units of real GDP.

What is the relative world price (price of soup in terms of teapot)?

Solution: The relative world price is 0.34 units.

61. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 361 units. The unit labor requirement parameters in the onion and chicken burger sector are $a_{\text{onion}} = 11.43$ and $a_{\text{chicken burger}} = 7.41$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P_{\text{onion}}^{0.31} P_{\text{onion}}^{0.69}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P_{\text{onion}}^{\text{world}}}{P_{\text{chicken burger}}^{\text{world}}} = 21.62$ as relative price.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 263.3367 units.

62. Problem

The functioning of a small open economy can be described by the following set of equations:

$$U = 0.96 \cdot \ln D_{\text{cola}} + 4.01 \cdot \ln D_{\text{coffee}}$$
$$15.76 \cdot Q_{\text{cola}} = L_{\text{cola}}$$
$$10.15 \cdot Q_{\text{coffee}} = L_{\text{coffee}}$$
$$L = 845$$
$$\frac{P_{\text{cola}}^{\text{world}}}{P_{\text{coffee}}^{\text{world}}} = 10.15$$

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports coffee and the amount of import is $IM = 870.8277$ units.

63. Problem

In a small open economy – that has comparative advantage in producing broccoli – the maximum amount of labor provided is 512 units. The unit labor requirement parameters are:

$$a_{\text{brioche}} = 5.84$$
$$a_{\text{broccoli}} = 8.98$$

The statistical office uses the formula of $P = P_{\text{brioche}}^{0.31} P_{\text{broccoli}}^{0.69}$ to calculate the price level. Under these circumstances the small open economy achieves 82.810620 units of real GDP.

What is the relative world price (price of brioche in terms of broccoli)?

Solution: The relative world price is 0.30 units.

64. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{pushchair}} = 13.47$$
$$a_{\text{paper clip}} = 3.76$$

In this economy the labor supply is constant: 506.

The utility function of the representative consumer is written as $U = 3.62 \cdot D_{\text{pushchair}}^{0.58} D_{\text{paper clip}}^{0.42}$.

The relative world price is 20.49 (price of pushchair in terms of paper clip).

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports paper clip and the amount of import is $IM = 323.2765$ units.

2.

65. Problem

In a Ricardian small open economy the unit labor requirement in the aubergine sector is 7.54 and the unit labor requirement in the hairspray sector is 11.20. The labor supply is 1358. The behavior of the representative consumer can be described by the following utility function $U = 3.71 \cdot \ln D_{\text{aubergine}} + 3.17 \cdot \ln D_{\text{hairspray}}$.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{aubergine}}^{0.41} P_{\text{hairspray}}^{0.59}$.

The relative world price of aubergine in terms of hairspray is 15.15.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 895.3068 units.

66. Problem

The functioning of a small open economy can be described by the following set of equations:

$$U = 5.02 \cdot \ln D_{\text{spring onion}} + 1.08 \cdot \ln D_{\text{peach}}$$
$$3.03 \cdot Q_{\text{spring onion}} = L_{\text{spring onion}}$$
$$14.25 \cdot Q_{\text{peach}} = L_{\text{peach}}$$
$$L = 670$$
$$\frac{P_{\text{spring onion}}^{\text{world}}}{P_{\text{peach}}^{\text{world}}} = 14.25$$

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports spring onion and the amount of export is $EX = 39.1495$ units.

67. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: pizza and paper clip. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{pizza}} = 8.10$ and $a_{\text{paper clip}} = 3.89$. The labor supply is constant, $L = 665$.

2.

The utility function of the representative consumer takes the following form:

$$U = 4.34 \cdot \ln D_{\text{pizza}}^{0.59} \cdot \ln D_{\text{paper clip}}^{0.41}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{pizza}}^{\text{world}}}{P_{\text{paper clip}}^{\text{world}}} = 15.57$.

Calculate the amount of pizza consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 48.4383 units of pizza.

68. Problem

In a Ricardian small open economy the unit labor requirement in the trifle sector is 6.61 and the unit labor requirement in the painting sector is 10.01. The labor supply is 262. The behavior of the representative consumer can be described by the following utility function $U = 5.36 \cdot \ln D_{\text{trifle}} + 3.36 \cdot \ln D_{\text{painting}}$.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{trifle}}^{0.70} P_{\text{painting}}^{0.30}$.

The relative world price of trifle in terms of painting is 21.57.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.3801 units.

69. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 966 units of labor to produce two goods: salad and porridge. The production possibilities frontier in this economy can be written as:

$$Q_{\text{porridge}} = 223.54 - 3.33 \cdot Q_{\text{salad}}$$

In this economy $U = 4.83 \cdot \ln D_{\text{salad}} + 3.78 \cdot \ln D_{\text{porridge}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of salad in terms of porridge is $\frac{P^{\text{world}}_{\text{salad}}}{P^{\text{world}}_{\text{porridge}}} = 3.61$.

What is the amount of porridge produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of porridge.

2.

70. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 1.25 \cdot \ln D_{\text{cappuccino}} + 0.36 \cdot \ln D_{\text{paper clip}}$$

Firms in the cappuccino sector uses only labor to produce their output, the unit labor requirement is 13.94 units. The same parameter in the paper clip sector is $a_{\text{paper clip}} = 7.95$. The labor supply is fixed at $L = 1151$ units.

The small open economy trades actively with the rest of the world, where the price of cappuccino in terms of paper clip is $\frac{P^{\text{world}}_{\text{cappuccino}}}{P^{\text{world}}_{\text{paper clip}}} = 18.06$.

Calculate the amount of cappuccino consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 64.1057 units of cappuccino.

71. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 1099 units. The unit labor requirement parameters in the coffee and plate sector are $a_{\text{coffee}} = 12.84$ and $a_{\text{plate}} = 12.97$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.21}_{\text{coffee}} P^{0.79}_{\text{coffee}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{coffee}}}{P^{\text{world}}_{\text{plate}}} = 13.16$ as relative price.

What fraction of the labor force is used in the coffee sector and what fraction of the labor is used in the plate sector?

Solution: Since the small open economy has comparative advantage in producing coffee, 100 percent of labor is used in the coffee sector and no labor is used in the plate sector (under free trade the specialization is complete).

72. Problem

In a Ricardian small open economy the unit labor requirement in the hairspray sector is 5.62 and the unit labor requirement in the milkshake sector is 8.60. The labor supply is 450. The behavior of the representative consumer can be described by the following utility function $U = 2.82 \cdot \ln D_{\text{hairspray}} + 5.59 \cdot \ln D_{\text{milkshake}}$.

2.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{hairspray}}^{0.69} P_{\text{milkshake}}^{0.31}$.

The relative world price of hairspray in terms of milkshake is 20.39.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.4531 units.

73. Problem

In a small open economy – that has comparative advantage in producing teacup – the maximum amount of labor provided is 1023 units. The unit labor requirement parameters are:

$$a_{\text{teacup}} = 3.68$$
$$a_{\text{coffee cup}} = 7.30$$

The statistical office uses the formula of $P = P_{\text{teacup}}^{0.67} P_{\text{coffee cup}}^{0.33}$ to calculate the price level. Under these circumstances the small open economy achieves 614.979354 units of real GDP.

What is the real wage in this small open economy?

Solution: The real wage is 0.6012 units.

74. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{lemonade}} = 12.71$$

$$a_{\text{peach}} = 4.73$$

In this economy the labor supply is constant: 458.

The utility function of the representative consumer is written as $U = 5.04 \cdot D_{\text{lemonade}}^{0.58} D_{\text{peach}}^{0.42}$.

The relative world price is 5.79 (price of lemonade in terms of peach).

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports lemonade and the amount of export is $EX = 15.1345$ units.

75. Problem

In a small open economy there are just two firms: the firm that produces coffee and the firm that produces pushchair. The following functions characterize the production process:

$$Q_{\text{coffee}} = 9.28 \cdot L_{\text{coffee}}$$
$$Q_{\text{pushchair}} = 0.57 \cdot L_{\text{pushchair}}$$

The utility function of the consumer is given by $U = 0.87 \cdot \ln D_{\text{coffee}} + 1.48 \cdot \ln D_{\text{pushchair}}$, and the labor supply is fixed at 684.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{coffee}}^{\text{vilĂAg}} = 11.15 \cdot L_{\text{coffee}}^{\text{vilĂAg}}$$
$$Q_{\text{pushchair}}^{\text{vilĂAg}} = 8.34 \cdot L_{\text{pushchair}}^{\text{vilĂAg}}$$

What is the relative world price of coffee in terms of pushchair?

Solution: The relative world price is 0.7480 units.

76. Problem

In a small open economy – that has comparative advantage in producing ice cream – the maximum amount of labor provided is 1102 units. The unit labor requirement parameters are:

$$a_{\text{napkin}} = 4.18$$
$$a_{\text{ice cream}} = 13.70$$

The statistical office uses the formula of $P = P_{\text{napkin}}^{0.67} P_{\text{ice cream}}^{0.33}$ to calculate the price level. Under these circumstances the small open economy achieves Inf units of real GDP.

What is the real wage in this small open economy?

Solution: The real wage is Inf units.

77. Problem

In a small open economy – that has comparative advantage in producing yoghurt – the maximum amount of labor provided is 277 units. The unit labor requirement parameters are:

$$a_{\text{yoghurt}} = 8.82$$
$$a_{\text{aubergine}} = 8.39$$

The statistical office uses the formula of $P = P_{\text{yoghurt}}^{0.63} P_{\text{aubergine}}^{0.37}$ to calculate the price level. Under these circumstances the small open economy achieves 95.100208 units of real GDP.

What is the relative world price (price of yoghurt in terms of aubergine)?

Solution: The relative world price is 19.97 units.

78. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1215 units of labor to produce two goods: hot dog and naan bread. The production possibilities frontier in this economy can be written as:

$$Q_{\text{naan bread}} = 466.75 - 13.18 \cdot Q_{\text{hot dog}}$$

In this economy $U = 4.84 \cdot \ln D_{\text{hot dog}} + 5.10 \cdot \ln D_{\text{naan bread}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of hot dog in terms of naan bread is $\frac{P_{\text{hot dog}}^{\text{world}}}{P_{\text{naan bread}}^{\text{world}}} = 1.14$.

Calculate the amount of hot dog consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 199.3602 units of hot dog.

2.

79. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 0.84 \cdot \ln D_{\text{backpack}} + 3.87 \cdot \ln D_{\text{rug}}$$

Firms in the backpack sector uses only labor to produce their output, the unit labor requirement is 4.75 units. The same parameter in the rug sector is $a_{\text{rug}} = 14.13$. The labor supply is fixed at $L = 220$ units.

The small open economy trades actively with the rest of the world, where the price of backpack in terms of rug is $\frac{P^{\text{world}}_{\text{backpack}}}{P^{\text{world}}_{\text{rug}}} = 5.94$.

What is the amount of rug produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of rug.

80. Problem

In a Ricardian small open economy the unit labor requirement in the platform shoe sector is 7.90 and the unit labor requirement in the cappuccino sector is 10.15. The labor supply is 1088. The behavior of the representative consumer can be described by the following utility function $U = 4.05 \cdot \ln D_{\text{platform shoe}} + 2.71 \cdot \ln D_{\text{cappuccino}}$.

The statistical office of the economy computes the price level by using the formula of $P = P^{0.74}_{\text{platform shoe}} P^{0.26}_{\text{cappuccino}}$.

The relative world price of platform shoe in terms of cappuccino is 10.16.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 251.6484 units.

81. Problem

In a small open economy – that has comparative advantage in producing cappuccino – the maximum amount of labor provided is 278 units. The unit labor requirement parameters are:

$$a_{\text{napkin}} = 1.88$$
$$a_{\text{cappuccino}} = 10.55$$

The statistical office uses the formula of $P = P^{0.56}_{\text{napkin}} P^{0.44}_{\text{cappuccino}}$ to calculate the price level. Under these circumstances the small open economy achieves Inf units of real GDP.

2.

What is the real wage in this small open economy?

Solution: The real wage is Inf units.

82. Problem

In a small open economy – that has comparative advantage in producing shampoo – the maximum amount of labor provided is 1301 units. The unit labor requirement parameters are:

$$a_{\text{shampoo}} = 14.95$$
$$a_{\text{cola}} = 0.77$$

The statistical office uses the formula of $P = P_{\text{shampoo}}^{0.44} P_{\text{cola}}^{0.56}$ to calculate the price level. Under these circumstances the small open economy achieves 2452.320131 units of real GDP.

What is the relative world price (price of shampoo in terms of cola)?

Solution: The relative world price is 388.31 units.

83. Problem

In a small open economy there are just two firms: the firm that produces hairdryer and the firm that produces onion. The following functions characterize the production process:

$$Q_{\text{hairdryer}} = 1.10 \cdot L_{\text{hairdryer}}$$
$$Q_{\text{onion}} = 14.72 \cdot L_{\text{onion}}$$

The utility function of the consumer is given by $U = 4.25 \cdot \ln D_{\text{hairdryer}} + 1.19 \cdot \ln D_{\text{onion}}$, and the labor supply is fixed at 1314.

The small open economy trades actively with the rest of the world, where the production functions are written as

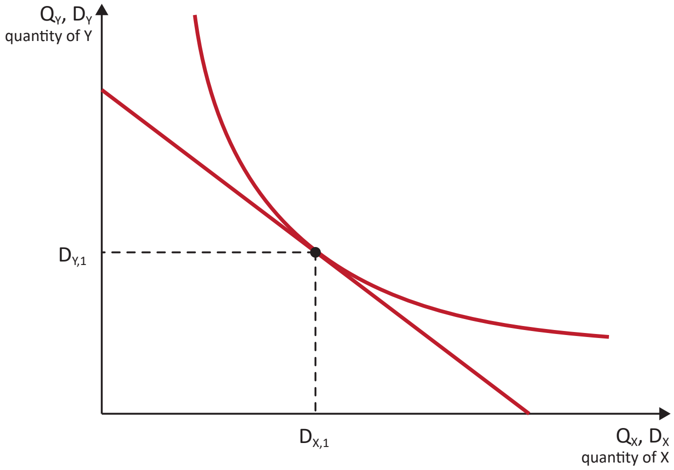
$$Q_{\text{hairdryer}}^{\text{világ}} = 8.07 \cdot L_{\text{hairdryer}}^{\text{világ}}$$
$$Q_{\text{onion}}^{\text{világ}} = 11.71 \cdot L_{\text{onion}}^{\text{világ}}$$

What amount of hairdryers are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 10413.8147 units of hairdryer.

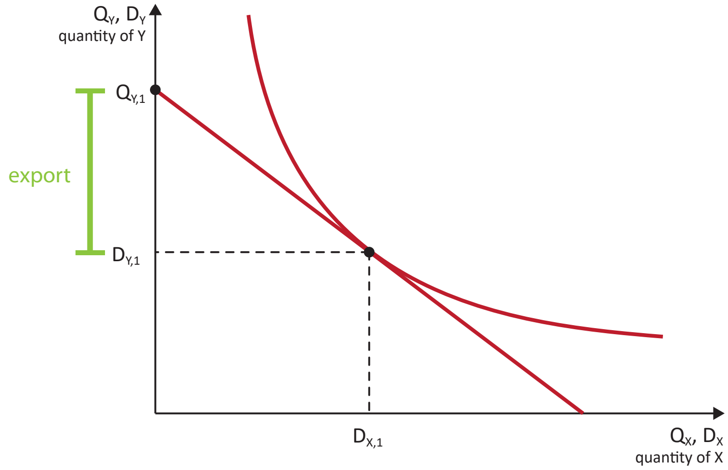
84. Problem

The following graph shows the budget constraint and the indifference curve that designates the optimal consumption bundle in a Ricardian small open economy under free trade.



The small open economy has comparative advantage in producing Y. Identify the amount of export.

Solution: The correct graph is the following:



85. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 0.95 \cdot D_{\text{peach}}^{0.24} D_{\text{platform shoe}}^{0.76}$$
$$14.16 \cdot Q_{\text{peach}} = L_{\text{peach}}$$
$$2.75 \cdot Q_{\text{platform shoe}} = L_{\text{platform shoe}}$$
$$L = 317$$
$$P = P_{\text{peach}}^{0.69} P_{\text{platform shoe}}^{0.31}$$

The relative world price of peach in terms of platform shoe is 16.23.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.1675 units.

86. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 4.20 \cdot D_{\text{wooden spoon}}^{0.49} D_{\text{mint tea}}^{0.51}$$

$$12.79 \cdot Q_{\text{wooden spoon}} = L_{\text{wooden spoon}}$$
$$0.95 \cdot Q_{\text{mint tea}} = L_{\text{mint tea}}$$
$$L = 488$$
$$P = P_{\text{wooden spoon}}^{0.65} P_{\text{mint tea}}^{0.35}$$

The relative world price of wooden spoon in terms of mint tea is 5.97.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 160.8099 units.

87. Problem

In a small open economy – that has comparative advantage in producing fruit cake – the maximum amount of labor provided is 754 units. The unit labor requirement parameters are:

$$a_{\text{lemon}} = 15.40$$
$$a_{\text{fruit cake}} = 10.84$$

The statistical office uses the formula of $P = P_{\text{lemon}}^{0.76} P_{\text{fruit cake}}^{0.24}$ to calculate the price level. Under these circumstances the small open economy achieves 178.204877 units of real GDP.

What is the real wage in this small open economy?

Solution: The real wage is 0.2363 units.

88. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: backpack and teapot. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{backpack}} = 9.53$ and $a_{\text{teapot}} = 5.14$. The labor supply is constant, $L = 327$.

The utility function of the representative consumer takes the following form:

$$U = 5.47 \cdot \ln D_{\text{backpack}}^{0.75} \cdot \ln D_{\text{teapot}}^{0.25}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{backpack}}^{\text{world}}}{P_{\text{teapot}}^{\text{world}}} = 11.82$.

What is the amount of teapot produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of teapot.

89. Problem

In a small open economy – that has comparative advantage in producing brioche – the maximum amount of labor provided is 1196 units. The unit labor requirement parameters are:

$$a_{\text{brioche}} = 11.38$$
$$a_{\text{bagel}} = 10.74$$

The statistical office uses the formula of $P = P_{\text{brioche}}^{0.32} P_{\text{bagel}}^{0.68}$ to calculate the price level. Under these circumstances the small open economy achieves 592.278533 units of real GDP.

What is the real wage in this small open economy?

2.

Solution: The real wage is 0.4952 units.

90. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 5.28 \cdot \ln D_{\text{coffee}} + 5.14 \cdot \ln D_{\text{fruit cake}}$$

Firms in the coffee sector uses only labor to produce their output, the unit labor requirement is 8.28 units. The same parameter in the fruit cake sector is $a_{\text{fruit cake}} = 15.49$. The labor supply is fixed at $L = 1205$ units.

The small open economy trades actively with the rest of the world, where the price of coffee in terms of fruit cake is $\frac{P_{\text{coffee}}^{\text{world}}}{P_{\text{fruit cake}}^{\text{world}}} = 23.88$.

Determine the amount of coffee produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 145.5314 units of coffee.

91. Problem

In a small open economy there are just two firms: the firm that produces cappuccino and the firm that produces milkshake. The following functions characterize the production process:

$$Q_{\text{cappuccino}} = 10.05 \cdot L_{\text{cappuccino}}$$
$$Q_{\text{milkshake}} = 9.70 \cdot L_{\text{milkshake}}$$

The utility function of the representative consumer is given by $U = 3.84 \cdot \ln D_{\text{cappuccino}} + 0.45 \cdot \ln D_{\text{milkshake}}$, and the labor supply is fixed at 1270 units. The statistical office uses the formula of $P = P_{\text{cappuccino}}^{0.54} P_{\text{milkshake}}^{0.46}$ to calculate the price level.

The relative world price is 2.48 units (price of cappuccino in terms of milkshake).

By what percentage does free trade modify the real wage of the economic agents relative to the real wage in autarky?

Solution: Free trade increases real wage by 54.3580 percent.

92. Problem

In a small open economy there are just two firms: the firm that produces wine glass and the firm that produces hairspray. The following functions characterize the production process:

$$Q_{\text{wine glass}} = 1.77 \cdot L_{\text{wine glass}}$$
$$Q_{\text{hairspray}} = 5.55 \cdot L_{\text{hairspray}}$$

The utility function of the consumer is given by $U = 2.97 \cdot \ln D_{\text{wine glass}} + 5.01 \cdot \ln D_{\text{hairspray}}$, and the labor supply is fixed at 568.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{wine glass}} = 15.31 \cdot L^{\text{világ}}_{\text{wine glass}}$$
$$Q^{\text{világ}}_{\text{hairspray}} = 10.58 \cdot L^{\text{világ}}_{\text{hairspray}}$$

What amount of hairsprays are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 1979.1383 units of hairspray.

93. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 970 units. The unit labor requirement parameters in the pie and wine glass sector are $a_{\text{pie}} = 12.43$ and $a_{\text{wine glass}} = 9.71$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.47}_{\text{pie}} P^{0.53}_{\text{pie}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{pie}}}{P^{\text{world}}_{\text{wine glass}}} = 25.57$ as relative price.

What fraction of the labor force is used in the pie sector and what fraction of the labor is used in the wine glass sector?

Solution: Since the small open economy has comparative advantage in producing pie, 100 percent of labor is used in the pie sector and no labor is used in the wine glass sector (under free trade the specialization is complete).

94. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 3.44 \cdot \ln D_{\text{cola}} + 4.62 \cdot \ln D_{\text{peach}}$$

2.

Firms in the cola sector uses only labor to produce their output, the unit labor requirement is 14.37 units. The same parameter in the peach sector is $a_{\text{peach}} = 7.85$. The labor supply is fixed at $L = 1342$ units.

The small open economy trades actively with the rest of the world, where the price of cola in terms of peach is $\frac{P^{\text{world}}_{\text{cola}}}{P^{\text{world}}_{\text{peach}}} = 14.00$.

Calculate the amount of cola consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 39.8583 units of cola.

95. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 1.81 \cdot \ln D_{\text{hairdryer}} + 4.56 \cdot \ln D_{\text{lemon}}$$

Firms in the hairdryer sector uses only labor to produce their output, the unit labor requirement is 13.55 units. The same parameter in the lemon sector is $a_{\text{lemon}} = 8.61$. The labor supply is fixed at $L = 316$ units.

The small open economy trades actively with the rest of the world, where the price of hairdryer in terms of lemon is $\frac{P^{\text{world}}_{\text{hairdryer}}}{P^{\text{world}}_{\text{lemon}}} = 13.37$.

What is the amount of lemon produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of lemon.

96. Problem

In a small open economy there are just two firms: the firm that produces cappuccino and the firm that produces plate. The following functions characterize the production process:

$$Q_{\text{cappuccino}} = 9.36 \cdot L_{\text{cappuccino}}$$
$$Q_{\text{plate}} = 6.15 \cdot L_{\text{plate}}$$

The utility function of the representative consumer is given by $U = 1.34 \cdot \ln D_{\text{cappuccino}} + 5.06 \cdot \ln D_{\text{plate}}$, and the labor supply is fixed at 625 units. The statistical office uses the formula of $P = P_{\text{cappuccino}}^{0.34} P_{\text{plate}}^{0.66}$ to calculate the price level.

The relative world price is 3.69 units (price of cappuccino in terms of plate).

By what percentage does free trade modify the real wage of the economic agents relative to the real wage in autarky?

Solution: Free trade increases real wage by 212.3359 percent.

97. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1057 units of labor to produce two goods: teacup and tomato. The production possibilities frontier in this economy can be written as:

$$Q_{\text{tomato}} = 410.00 - 10.20 \cdot Q_{\text{teacup}}$$

In this economy $U = 3.34 \cdot \ln D_{\text{teacup}} + 1.64 \cdot \ln D_{\text{tomato}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of teacup in terms of tomato is $\frac{P_{\text{teacup}}^{\text{world}}}{P_{\text{tomato}}^{\text{world}}} = 18.86$.

Find the amount of tomato consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 249.6548 units of tomato.

98. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 3.96 \cdot D_{\text{hairdryer}}^{0.56} D_{\text{coffee}}^{0.44}$$

$$8.87 \cdot Q_{\text{hairdryer}} = L_{\text{hairdryer}}$$
$$8.95 \cdot Q_{\text{coffee}} = L_{\text{coffee}}$$
$$L = 1200$$
$$P = P_{\text{hairdryer}}^{0.69} P_{\text{coffee}}^{0.31}$$

The relative world price of hairdryer in terms of coffee is 8.44.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.2184 units.

99. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 995 units of labor to produce two goods: cabbage and necklace. The production possibilities frontier in this economy can be written as:

$$Q_{\text{necklace}} = 918.96 - 13.86 \cdot Q_{\text{cabbage}}$$

In this economy $U = 5.07 \cdot \ln D_{\text{cabbage}} + 3.70 \cdot \ln D_{\text{necklace}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of cabbage in terms of necklace is $\frac{P_{\text{cabbage}}^{\text{world}}}{P_{\text{necklace}}^{\text{world}}} = 1.61$.

Determine the amount of cabbage produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 0.0000 units of cabbage.

100. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: watermelon and cappuccino. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{watermelon}} = 14.68$ and $a_{\text{cappuccino}} = 6.99$. The labor supply is constant, $L = 741$.

The utility function of the representative consumer takes the following form:

$$U = 3.68 \cdot \ln D_{\text{watermelon}}^{0.29} \cdot \ln D_{\text{cappuccino}}^{0.71}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{watermelon}}^{\text{world}}}{P_{\text{cappuccino}}^{\text{world}}} = 12.39$.

Find the amount of cappuccino consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 444.0397 units of cappuccino.

101. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: cabbage and platform shoe. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{cabbage}} = 5.55$ and $a_{\text{platform shoe}} = 5.46$. The labor supply is constant, $L = 471$.

The utility function of the representative consumer takes the following form:

$$U = 3.08 \cdot \ln D_{\text{cabbage}}^{0.19} \cdot \ln D_{\text{platform shoe}}^{0.81}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{cabbage}}^{\text{world}}}{P_{\text{platform shoe}}^{\text{world}}} = 14.95$.

Calculate the amount of cabbage consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 16.1243 units of cabbage.

102. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1357 units of labor to produce two goods: sweetcorn and salad. The production possibilities frontier in this economy can be written as:

$$Q_{\text{salad}} = 1194.94 - 15.43 \cdot Q_{\text{sweetcorn}}$$

In this economy $U = 4.75 \cdot \ln D_{\text{sweetcorn}} + 1.92 \cdot \ln D_{\text{salad}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of sweetcorn in terms of salad is $\frac{P_{\text{sweetcorn}}^{\text{world}}}{P_{\text{salad}}^{\text{world}}} = 9.21$.

Calculate the amount of sweetcorn consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 92.3962 units of sweetcorn.

103. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1349 units of labor to produce two goods: banana and watch. The production possibilities frontier in this economy can be written as:

$$Q_{\text{watch}} = 1041.02 - 9.03 \cdot Q_{\text{banana}}$$

In this economy $U = 2.93 \cdot \ln D_{\text{banana}} + 0.32 \cdot \ln D_{\text{watch}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of banana in terms of watch is $\frac{P^{\text{world}}_{\text{banana}}}{P^{\text{world}}_{\text{watch}}} = 15.53$.

2.

What is the amount of watch produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of watch.

104. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 662 units. The unit labor requirement parameters in the teapot and banana sector are $a_{\text{teapot}} = 1.84$ and $a_{\text{banana}} = 0.30$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.35}_{\text{teapot}} P^{0.65}_{\text{teapot}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{teapot}}}{P^{\text{world}}_{\text{banana}}} = 23.67$ as relative price.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 4.2502 units.

105. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 1382 units. The unit labor requirement parameters in the teapot and lemonade sector are $a_{\text{teapot}} = 13.97$ and $a_{\text{lemonade}} = 2.85$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.63}_{\text{teapot}} P^{0.37}_{\text{teapot}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{teapot}}}{P^{\text{world}}_{\text{lemonade}}} = 10.59$ as relative price.

What fraction of the labor force is used in the teapot sector and what fraction of the labor is used in the lemonade sector?

Solution: Since the small open economy has comparative advantage in producing teapot, 100 percent of labor is used in the teapot sector and no labor is used in the lemonade sector (under free trade the specialization is complete).

106. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 2.73 \cdot \ln D_{\text{food processor}} + 0.75 \cdot \ln D_{\text{ice cream}}$$

Firms in the food processor sector uses only labor to produce their output, the unit labor requirement is 6.77 units. The same parameter in the ice cream sector is $a_{\text{ice cream}} = 5.45$. The labor supply is fixed at $L = 1052$ units.

The small open economy trades actively with the rest of the world, where the price of food processor in terms of ice cream is $\frac{P^{\text{world}}_{\text{food processor}}}{P^{\text{world}}_{\text{ice cream}}} = 0.85$.

Calculate the amount of food processor consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 178.1491 units of food processor.

107. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 1.67 \cdot \ln D_{\text{necklace}} + 5.19 \cdot \ln D_{\text{mint tea}}$$

Firms in the necklace sector uses only labor to produce their output, the unit labor requirement is 6.60 units. The same parameter in the mint tea sector is $a_{\text{mint tea}} = 10.71$. The labor supply is fixed at $L = 911$ units.

The small open economy trades actively with the rest of the world, where the price of necklace in terms of mint tea is $\frac{P^{\text{world}}_{\text{necklace}}}{P^{\text{world}}_{\text{mint tea}}} = 13.37$.

Find the amount of mint tea consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 1396.2047 units of mint tea.

108. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: cabbage and almond. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{cabbage}} = 14.75$ and $a_{\text{almond}} = 4.52$. The labor supply is constant, $L = 369$.

The utility function of the representative consumer takes the following form:

$$U = 2.52 \cdot \ln D_{\text{cabbage}}^{0.72} \cdot \ln D_{\text{almond}}^{0.28}$$

2.

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{cabbage}}^{\text{world}}}{P_{\text{almond}}^{\text{world}}} = 20.48$.

Find the amount of almond consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 143.4572 units of almond.

109. Problem

The functioning of a small open economy can be described by the following set of equations:

$$\begin{aligned}
U &= 4.66 \cdot \ln D_{\text{cappuccino}} + 4.58 \cdot \ln D_{\text{food processor}} \\
8.81 \cdot Q_{\text{cappuccino}} &= L_{\text{cappuccino}} \\
2.14 \cdot Q_{\text{food processor}} &= L_{\text{food processor}} \\
L &= 1338 \\
\frac{P_{\text{cappuccino}}^{\text{world}}}{P_{\text{food processor}}^{\text{world}}} &= 2.14
\end{aligned}$$

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports cappuccino and the amount of export is $EX = 75.2790$ units.

110. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1383 units of labor to produce two goods: wine glass and watermelon. The production possibilities frontier in this economy can be written as:

$$Q_{\text{watermelon}} = 982.63 - 0.52 \cdot Q_{\text{wine glass}}$$

In this economy $U = 3.89 \cdot \ln D_{\text{wine glass}} + 4.55 \cdot \ln D_{\text{watermelon}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of wine glass in terms of watermelon is $\frac{P^{\text{world}}_{\text{wine glass}}}{P^{\text{world}}_{\text{watermelon}}} = 4.10$.

Determine the amount of wine glass produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 1889.6731 units of wine glass.

111. Problem

In a Ricardian small open economy the unit labor requirement in the wallet sector is 9.94 and the unit labor requirement in the trifle sector is 11.27. The labor supply is 256. The behavior of the representative consumer can be described by the following utility function $U = 4.88 \cdot \ln D_{\text{wallet}} + 4.28 \cdot \ln D_{\text{trifle}}$.

The statistical office of the economy computes the price level by using the formula of $P = P^{0.38}_{\text{wallet}} P^{0.62}_{\text{trifle}}$.

The relative world price of wallet in terms of trifle is 10.50.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.4323 units.

112. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 827 units of labor to produce two goods: lemonade and painting. The production possibilities frontier in this economy can be written as:

$$Q_{\text{painting}} = 585.33 - 6.47 \cdot Q_{\text{lemonade}}$$

In this economy $U = 0.84 \cdot \ln D_{\text{lemonade}} + 0.28 \cdot \ln D_{\text{painting}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of lemonade in terms of painting is $\frac{P^{\text{world}}_{\text{lemonade}}}{P^{\text{world}}_{\text{painting}}} = 13.08$.

Find the amount of painting consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 295.8314 units of painting.

113. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: brioche and handbag. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{brioche}} = 2.12$ and $a_{\text{handbag}} = 7.02$. The labor supply is constant, $L = 1391$.

The utility function of the representative consumer takes the following form:

$$U = 3.06 \cdot \ln D_{\text{brioche}}^{0.76} \cdot \ln D_{\text{handbag}}^{0.24}$$

2.

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{brioche}}^{\text{world}}}{P_{\text{handbag}}^{\text{world}}} = 4.11$.

Find the amount of handbag consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 647.2087 units of handbag.

114. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 1.70 \cdot \ln D_{\text{chicken burger}} + 0.52 \cdot \ln D_{\text{wine glass}}$$

Firms in the chicken burger sector uses only labor to produce their output, the unit labor requirement is 3.05 units. The same parameter in the wine glass sector is $a_{\text{wine glass}} = 8.88$. The labor supply is fixed at $L = 387$ units.

The small open economy trades actively with the rest of the world, where the price of chicken burger in terms of wine glass is $\frac{P_{\text{chicken burger}}^{\text{world}}}{P_{\text{wine glass}}^{\text{world}}} = 22.37$.

Determine the amount of chicken burger produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 126.8852 units of chicken burger.

115. Problem

In a small open economy – that has comparative advantage in producing blackcurrant – the maximum amount of labor provided is 269 units. The unit labor requirement parameters are:

$$a_{\text{blackcurrant}} = 15.46$$

$$a_{\text{bagel}} = 8.51$$

The statistical office uses the formula of $P = P_{\text{blackcurrant}}^{0.37} P_{\text{bagel}}^{0.63}$ to calculate the price level. Under these circumstances the small open economy achieves 167.316220 units of real GDP.

What is the relative world price (price of blackcurrant in terms of bagel)?

Solution: The relative world price is 36.33 units.

116. Problem

In a Ricardian small open economy the unit labor requirement in the pastry sector is 11.61 and the unit labor requirement in the backpack sector is 7.03. The labor supply is 853. The behavior of the representative consumer can be described by the following utility function $U = 3.19 \cdot \ln D_{\text{pastry}} + 1.60 \cdot \ln D_{\text{backpack}}$.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{pastry}}^{0.66} P_{\text{backpack}}^{0.34}$.

The relative world price of pastry in terms of backpack is 22.60.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 212.0868 units.

117. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 2.96 \cdot \ln D_{\text{pastry}} + 3.15 \cdot \ln D_{\text{peach}}$$

Firms in the pastry sector uses only labor to produce their output, the unit labor requirement is 13.26 units. The same parameter in the peach sector is $a_{\text{peach}} = 10.15$. The labor supply is fixed at $L = 1262$ units.

The small open economy trades actively with the rest of the world, where the price of pastry in terms of peach is $\frac{P_{\text{pastry}}^{\text{world}}}{P_{\text{peach}}^{\text{world}}} = 14.64$.

Determine the amount of pastry produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 95.1735 units of pastry.

118. Problem

A small open economy, that can be described by the following set of formulas:

$$\begin{aligned}
U &= 0.77 \cdot \ln D_{\text{lemonade}} + 4.49 \cdot \ln D_{\text{napkin}} \\
a_{\text{napkin}} &= 12.33 \\
L &= 268 \\
\frac{P^{\text{world}}_{\text{lemonade}}}{P^{\text{world}}_{\text{napkin}}} &= 19.81
\end{aligned}$$

exports 15.919837 units of lemonade and imports 315.414196 units of napkin.

Determine the unit labor requirement parameter for the X sector.

Solution: The unit labor requirement parameter in the lemonade sector is 14.37 units.

119. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: hairdryer and ice cream. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{hairdryer}} = 4.10$ and $a_{\text{ice cream}} = 1.05$. The labor supply is constant, $L = 445$.

The utility function of the representative consumer takes the following form:

$$U = 0.18 \cdot \ln D^{0.38}_{\text{hairdryer}} \cdot \ln D^{0.62}_{\text{ice cream}}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P^{\text{world}}_{\text{hairdryer}}}{P^{\text{world}}_{\text{ice cream}}} = 19.58$.

Calculate the amount of hairdryer consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 41.2439 units of hairdryer.

120. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 496 units. The unit labor requirement parameters in the yoghurt and rug sector are $a_{\text{yoghurt}} = 15.01$ and $a_{\text{rug}} = 6.55$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.59}_{\text{yoghurt}} P^{0.41}_{\text{yoghurt}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{yoghurt}}}{P^{\text{world}}_{\text{rug}}} = 3.57$ as relative price.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.1123 units.

121. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 2.66 \cdot \ln D_{\text{aubergine}} + 5.32 \cdot \ln D_{\text{tea}}$$

Firms in the aubergine sector uses only labor to produce their output, the unit labor requirement is 14.51 units. The same parameter in the tea sector is $a_{\text{tea}} = 12.97$. The labor supply is fixed at $L = 898$ units.

The small open economy trades actively with the rest of the world, where the price of aubergine in terms of tea is $\frac{P^{\text{world}}_{\text{aubergine}}}{P^{\text{world}}_{\text{tea}}} = 13.03$.

Find the amount of tea consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 537.6035 units of tea.

122. Problem

A small open economy, that can be described by the following set of formulas:

$$\begin{aligned} U &= 4.44 \cdot \ln D_{\text{yoghurt}} + 3.82 \cdot \ln D_{\text{aubergine}} \\ 13.11 \cdot Q_{\text{yoghurt}} &= L_{\text{yoghurt}} \\ 7.13 \cdot Q_{\text{aubergine}} &= L_{\text{aubergine}} \\ L &= 1410 \end{aligned}$$

exports 49.739308 units of yoghurt and imports 701.324239 units of aubergine.

What is the relative world price (price of X in terms of Y) the economy faces while trading with the rest of the world?

Solution: The relative world price is 14.10 units.

123. Problem

In a small open economy there are just two firms: the firm that produces paper clip and the firm that produces trifle. The following functions characterize the production process:

$$Q_{\text{paper clip}} = 4.87 \cdot L_{\text{paper clip}}$$
$$Q_{\text{trifle}} = 12.60 \cdot L_{\text{trifle}}$$

The utility function of the consumer is given by $U = 4.29 \cdot \ln D_{\text{paper clip}} + 5.06 \cdot \ln D_{\text{trifle}}$, and the labor supply is fixed at 706.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{vilĂAg}}_{\text{paper clip}} = 1.36 \cdot L^{\text{vilĂAg}}_{\text{paper clip}}$$
$$Q^{\text{vilĂAg}}_{\text{trifle}} = 10.82 \cdot L^{\text{vilĂAg}}_{\text{trifle}}$$

What is the relative world price of paper clip in terms of trifle?

Solution: The relative world price is 7.9559 units.

124. Problem

In a small open economy there are just two firms: the firm that produces pie and the firm that produces lemonade. The following functions characterize the production process:

$$Q_{\text{pie}} = 3.72 \cdot L_{\text{pie}}$$
$$Q_{\text{lemonade}} = 5.17 \cdot L_{\text{lemonade}}$$

The utility function of the consumer is given by $U = 3.46 \cdot \ln D_{\text{pie}} + 2.65 \cdot \ln D_{\text{lemonade}}$, and the labor supply is fixed at 946.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{pie}} = 10.84 \cdot L^{\text{világ}}_{\text{pie}}$$
$$Q^{\text{világ}}_{\text{lemonade}} = 2.93 \cdot L^{\text{világ}}_{\text{lemonade}}$$

What amount of lemonades are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 2121.2231 units of lemonade.

125. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: milkshake and pastry. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{milkshake}} = 14.88$ and $a_{\text{pastry}} = 8.15$. The labor supply is constant, $L = 251$.

The utility function of the representative consumer takes the following form:

$$U = 4.61 \cdot \ln D_{\text{milkshake}}^{0.40} \cdot \ln D_{\text{pastry}}^{0.60}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{milkshake}}^{\text{world}}}{P_{\text{pastry}}^{\text{world}}} = 5.76$.

Determine the amount of milkshake produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 16.8683 units of milkshake.

126. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{wine glass}} = 4.85$$
$$a_{\text{mint tea}} = 5.27$$

In this economy the labor supply is constant: 758.

The utility function of the representative consumer is written as $U = 2.55 \cdot D_{\text{wine glass}}^{0.17} D_{\text{mint tea}}^{0.83}$.

The relative world price is 1.10 (price of wine glass in terms of mint tea).

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports wine glass and the amount of export is $EX = 129.7196$ units.

127. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 277 units. The unit labor requirement parameters in the wallet and salad sector are $a_{\text{wallet}} = 14.54$ and $a_{\text{salad}} = 2.00$

respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P_{\text{wallet}}^{0.27} P_{\text{wallet}}^{0.73}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P_{\text{wallet}}^{\text{world}}}{P_{\text{salad}}^{\text{world}}} = 11.93$ as relative price.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 116.3759 units.

2.

128. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 901 units. The unit labor requirement parameters in the backpack and aubergine sector are $a_{\text{backpack}} = 3.08$ and $a_{\text{aubergine}} = 12.07$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P_{\text{backpack}}^{0.64} P_{\text{backpack}}^{0.36}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P_{\text{backpack}}^{\text{world}}}{P_{\text{aubergine}}^{\text{world}}} = 11.30$ as relative price.

What fraction of the labor force is used in the backpack sector and what fraction of the labor is used in the aubergine sector?

Solution: Since the small open economy has comparative advantage in producing backpack, 100 percent of labor is used in the backpack sector and no labor is used in the aubergine sector (under free trade the specialization is complete).

129. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: shampoo and paper clip. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{shampoo}} = 4.60$ and $a_{\text{paper clip}} = 0.56$. The labor supply is constant, $L = 1382$.

The utility function of the representative consumer takes the following form:

$$U = 5.07 \cdot \ln D_{\text{shampoo}}^{0.60} \cdot \ln D_{\text{paper clip}}^{0.40}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{shampoo}}^{\text{world}}}{P_{\text{paper clip}}^{\text{world}}} = 17.28$.

Determine the amount of shampoo produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 300.4348 units of shampoo.

130. Problem

In a Ricardian small open economy the unit labor requirement in the pie sector is 11.41 and the unit labor requirement in the necklace sector is 9.54. The labor supply is 966. The behavior of the representative consumer can be described by the following utility function $U = 4.55 \cdot \ln D_{\text{pie}} + 5.51 \cdot \ln D_{\text{necklace}}$.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{pie}}^{0.73} P_{\text{necklace}}^{0.27}$.

The relative world price of pie in terms of necklace is 9.77.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 0.1622 units.

131. Problem

The functioning of a small open economy can be described by the following set of equations:

$$\begin{aligned} U &= 2.38 \cdot \ln D_{\text{hot chocolate}} + 4.81 \cdot \ln D_{\text{banana}} \\ 2.24 \cdot Q_{\text{hot chocolate}} &= L_{\text{hot chocolate}} \\ 6.06 \cdot Q_{\text{banana}} &= L_{\text{banana}} \\ L &= 211 \\ \frac{P_{\text{hot chocolate}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} &= 6.06 \end{aligned}$$

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports banana and the amount of import is $IM = 366.1228$ units.

132. Problem

The functioning of a small open economy can be described by the following set of equations:

$$\begin{aligned} U &= 1.44 \cdot \ln D_{\text{cabbage}} + 4.69 \cdot \ln D_{\text{orange}} \\ 15.44 \cdot Q_{\text{cabbage}} &= L_{\text{cabbage}} \end{aligned}$$

2.

$$2.03 \cdot Q_{\text{orange}} = L_{\text{orange}}$$
$$L = 558$$
$$\frac{P^{\text{world}}_{\text{cabbage}}}{P^{\text{world}}_{\text{orange}}} = 2.03$$

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports cabbage and the amount of export is $EX = 27.6503$ units.

133. Problem

In a small open economy – that has comparative advantage in producing scarf – the maximum amount of labor provided is 1353 units. The unit labor requirement parameters are:

$$a_{\text{scarf}} = 4.12$$
$$a_{\text{hot dog}} = 12.97$$

The statistical office uses the formula of $P = P^{0.49}_{\text{scarf}} P^{0.51}_{\text{hot dog}}$ to calculate the price level. Under these circumstances the small open economy achieves 456.305718 units of real GDP.

What is the real wage in this small open economy?

Solution: The real wage is 0.3373 units.

134. Problem

In a small open economy there are just two firms: the firm that produces tomato and the firm that produces plate. The following functions characterize the production process:

$$Q_{\text{tomato}} = 15.06 \cdot L_{\text{tomato}}$$
$$Q_{\text{plate}} = 1.85 \cdot L_{\text{plate}}$$

The utility function of the consumer is given by $U = 4.98 \cdot \ln D_{\text{tomato}} + 4.63 \cdot \ln D_{\text{plate}}$, and the labor supply is fixed at 404.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{tomato}} = 4.87 \cdot L^{\text{világ}}_{\text{tomato}}$$
$$Q^{\text{világ}}_{\text{plate}} = 6.36 \cdot L^{\text{világ}}_{\text{plate}}$$

What amount of plates are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 3828.1778 units of plate.

135. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 4.48 \cdot D_{\text{hot dog}}^{0.50} D_{\text{muffin}}^{0.50}$$
$$14.35 \cdot Q_{\text{hot dog}} = L_{\text{hot dog}}$$
$$2.23 \cdot Q_{\text{muffin}} = L_{\text{muffin}}$$
$$L = 222$$
$$P = P_{\text{hot dog}}^{0.62} P_{\text{muffin}}^{0.38}$$

The relative world price of hot dog in terms of muffin is 1.84.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 68.2120 units.

136. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1373 units of labor to produce two goods: jigsaw and porridge. The production possibilities frontier in this economy can be written as:

$$Q_{\text{porridge}} = 275.86 - 0.71 \cdot Q_{\text{jigsaw}}$$

In this economy $U = 1.55 \cdot \ln D_{\text{jigsaw}} + 3.17 \cdot \ln D_{\text{porridge}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of jigsaw in terms of porridge is $\frac{P_{\text{jigsaw}}^{\text{world}}}{P_{\text{porridge}}^{\text{world}}} = 13.69$.

What is the amount of porridge produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of porridge.

137. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 1.25 \cdot D_{\text{pushchair}}^{0.45} D_{\text{pistachio}}^{0.55}$$
$$4.31 \cdot Q_{\text{pushchair}} = L_{\text{pushchair}}$$
$$0.18 \cdot Q_{\text{pistachio}} = L_{\text{pistachio}}$$
$$L = 298$$
$$P = P_{\text{pushchair}}^{0.29} P_{\text{pistachio}}^{0.71}$$

2.

The relative world price of pushchair in terms of pistachio is 7.98.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 3.0419 units.

138. Problem

A small open economy, that can be described by the following set of formulas:

$$U = 0.32 \cdot \ln D_{\text{strawberry}} + 3.70 \cdot \ln D_{\text{mint tea}}$$
$$3.96 \cdot Q_{\text{strawberry}} = L_{\text{strawberry}}$$
$$13.24 \cdot Q_{\text{mint tea}} = L_{\text{mint tea}}$$
$$L = 898$$

exports 208.716518 units of strawberry and imports 1421.359490 units of mint tea.

What is the relative world price (price of X in terms of Y) the economy faces while trading with the rest of the world?

Solution: The relative world price is 6.81 units.

139. Problem

The functioning of a small open economy can be described by the following set of equations:

$$U = 1.36 \cdot \ln D_{\text{almond}} + 1.30 \cdot \ln D_{\text{spring onion}}$$
$$9.71 \cdot Q_{\text{almond}} = L_{\text{almond}}$$

$$13.34 \cdot Q_{\text{spring onion}} = L_{\text{spring onion}}$$
$$L = 584$$
$$\frac{P^{\text{world}}_{\text{almond}}}{P^{\text{world}}_{\text{spring onion}}} = 13.34$$

Which good does the economy export and what is the amount of export?

Solution: The small open economy exports almond and the amount of export is $EX = 29.3938$ units.

140. Problem

Firms in a small open economy produce goods and services under the assumptions of the Ricardian model. They use only labor as input and the technology of the production process is characterized by the following unit labor requirements:

$$a_{\text{pistachio}} = 14.48$$
$$a_{\text{handbag}} = 9.22$$

In this economy the labor supply is constant: 1079.

The utility function of the representative consumer is written as $U = 4.26 \cdot D^{0.34}_{\text{pistachio}} D^{0.66}_{\text{handbag}}$.

The relative world price is 21.02 (price of pistachio in terms of handbag).

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports handbag and the amount of import is $IM = 1033.7833$ units.

141. Problem

The functioning of a small open economy can be described by the following set of equations:

$$U = 2.00 \cdot \ln D_{\text{shampoo}} + 4.71 \cdot \ln D_{\text{bagel}}$$
$$15.26 \cdot Q_{\text{shampoo}} = L_{\text{shampoo}}$$
$$13.42 \cdot Q_{\text{bagel}} = L_{\text{bagel}}$$
$$L = 913$$
$$\frac{P^{\text{world}}_{\text{shampoo}}}{P^{\text{world}}_{\text{bagel}}} = 13.42$$

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports bagel and the amount of import is $IM = 470.7824$ units.

142. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 2.61 \cdot \ln D_{\text{tea}} + 5.39 \cdot \ln D_{\text{naan bread}}$$

Firms in the tea sector uses only labor to produce their output, the unit labor requirement is 15.05 units. The same parameter in the naan bread sector is $a_{\text{naan bread}} = 4.70$. The labor supply is fixed at $L = 1309$ units.

2.

The small open economy trades actively with the rest of the world, where the price of tea in terms of naan bread is $\frac{P_{\text{tea}}^{\text{world}}}{P_{\text{naan bread}}^{\text{world}}} = 18.80$.

What is the amount of naan bread produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of naan bread.

143. Problem

In a Ricardian small open economy the unit labor requirement in the blackcurrant sector is 2.18 and the unit labor requirement in the coffee sector is 12.38. The labor supply is 1237. The behavior of the representative consumer can be described by the following utility function $U = 1.83 \cdot \ln D_{\text{blackcurrant}} + 4.95 \cdot \ln D_{\text{coffee}}$.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{blackcurrant}}^{0.61} P_{\text{coffee}}^{0.39}$.

The relative world price of blackcurrant in terms of coffee is 21.91.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 1891.3144 units.

144. Problem

In a small open economy – that has comparative advantage in producing watch – the maximum amount of labor provided is 236 units. The unit labor requirement parameters are:

$$a_{\text{watch}} = 7.78$$

$$a_{\text{painting}} = 8.33$$

The statistical office uses the formula of $P = P_{\text{watch}}^{0.75} P_{\text{painting}}^{0.25}$ to calculate the price level. Under these circumstances the small open economy achieves 68.597069 units of real GDP.

What is the real wage in this small open economy?

Solution: The real wage is 0.2907 units.

145. Problem

In a small open economy there are just two firms: the firm that produces ice cream and the firm that produces aubergine. The following functions characterize the production process:

$$Q_{\text{ice cream}} = 3.12 \cdot L_{\text{ice cream}}$$
$$Q_{\text{aubergine}} = 11.68 \cdot L_{\text{aubergine}}$$

The utility function of the representative consumer is given by $U = 0.35 \cdot \ln D_{\text{ice cream}} + 2.46 \cdot \ln D_{\text{aubergine}}$, and the labor supply is fixed at 1174 units. The statistical office uses the formula of $P = P_{\text{ice cream}}^{0.35} P_{\text{aubergine}}^{0.65}$ to calculate the price level.

The relative world price is 17.29 units (price of ice cream in terms of aubergine).

By what percentage does real GDP under free trade differ from real GDP in autarky?

Solution: Free trade increases real GDP by 170.3519 percent.

146. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: broccoli and milkshake. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{broccoli}} = 10.94$ and $a_{\text{milkshake}} = 11.73$. The labor supply is constant, $L = 990$.

The utility function of the representative consumer takes the following form:

$$U = 0.97 \cdot \ln D_{\text{broccoli}}^{0.59} \cdot \ln D_{\text{milkshake}}^{0.41}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{broccoli}}^{\text{world}}}{P_{\text{milkshake}}^{\text{world}}} = 1.01$.

What is the amount of milkshake produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of milkshake.

147. Problem

In a small open economy there are just two firms: the firm that produces hot dog and the firm that produces porridge. The following functions characterize the production process:

$$Q_{\text{hot dog}} = 13.70 \cdot L_{\text{hot dog}}$$
$$Q_{\text{porridge}} = 6.37 \cdot L_{\text{porridge}}$$

The utility function of the representative consumer is given by $U = 0.84 \cdot \ln D_{\text{hot dog}} + 1.42 \cdot \ln D_{\text{porridge}}$, and the labor supply is fixed at 548 units. The statistical office uses the formula of $P = P_{\text{hot dog}}^{0.66} P_{\text{porridge}}^{0.34}$ to calculate the price level.

2.

The relative world price is 3.07 units (price of hot dog in terms of porridge).

By what percentage does real GDP under free trade differ from real GDP in autarky?

Solution: Free trade increases real GDP by 89.9786 percent.

148. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: teapot and coffee cup. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{teapot}} = 8.31$ and $a_{\text{coffee cup}} = 11.32$. The labor supply is constant, $L = 1401$.

The utility function of the representative consumer takes the following form:

$$U = 1.33 \cdot \ln D_{\text{teapot}}^{0.22} \cdot \ln D_{\text{coffee cup}}^{0.78}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{teapot}}^{\text{world}}}{P_{\text{coffee cup}}^{\text{world}}} = 6.24$.

What is the amount of coffee cup produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of coffee cup.

149. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 2.95 \cdot \ln D_{\text{banana}} + 3.22 \cdot \ln D_{\text{hot chocolate}}$$

Firms in the banana sector uses only labor to produce their output, the unit labor requirement is 7.61 units. The same parameter in the hot chocolate sector is $a_{\text{hot chocolate}} = 13.86$. The labor supply is fixed at $L = 552$ units.

The small open economy trades actively with the rest of the world, where the price of banana in terms of hot chocolate is $\frac{P^{\text{world}}_{\text{banana}}}{P^{\text{world}}_{\text{hot chocolate}}} = 5.33$.

Determine the amount of banana produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 72.5361 units of banana.

150. Problem

2.

A small open economy – that functions under the assumptions of the Ricardian model – has 606 units of labor to produce two goods: bagel and platform shoe. The production possibilities frontier in this economy can be written as:

$$Q_{\text{platform shoe}} = 779.00 - 0.47 \cdot Q_{\text{bagel}}$$

In this economy $U = 0.51 \cdot \ln D_{\text{bagel}} + 1.65 \cdot \ln D_{\text{platform shoe}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of bagel in terms of platform shoe is $\frac{P^{\text{world}}_{\text{bagel}}}{P^{\text{world}}_{\text{platform shoe}}} = 5.67$.

What is the amount of platform shoe produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of platform shoe.

151. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 1016 units. The unit labor requirement parameters in the cola and lime sector are $a_{\text{cola}} = 1.42$ and $a_{\text{lime}} = 8.70$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.54}_{\text{cola}} P^{0.46}_{\text{cola}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{cola}}}{P^{\text{world}}_{\text{lime}}} = 4.93$ as relative price.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 1490.4415 units.

152. Problem

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$U = 1.44 \cdot D_{\text{teacup}}^{0.49} D_{\text{soup}}^{0.51}$$
$$2.15 \cdot Q_{\text{teacup}} = L_{\text{teacup}}$$
$$9.16 \cdot Q_{\text{soup}} = L_{\text{soup}}$$
$$L = 339$$
$$P = P_{\text{teacup}}^{0.23} P_{\text{soup}}^{0.77}$$

2.

The relative world price of teacup in terms of soup is 20.09.

What is the real wage in this small open economy?

Solution: Under free trade the real wage is 4.6866 units.

153. Problem

In a small open economy there are just two firms: the firm that produces pizza and the firm that produces brioche. The following functions characterize the production process:

$$Q_{\text{pizza}} = 15.55 \cdot L_{\text{pizza}}$$
$$Q_{\text{brioche}} = 3.69 \cdot L_{\text{brioche}}$$

The utility function of the consumer is given by $U = 2.81 \cdot \ln D_{\text{pizza}} + 4.81 \cdot \ln D_{\text{brioche}}$, and the labor supply is fixed at 471.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{pizza}}^{\text{világ}} = 15.45 \cdot L_{\text{pizza}}^{\text{világ}}$$
$$Q_{\text{brioche}}^{\text{világ}} = 12.46 \cdot L_{\text{brioche}}^{\text{világ}}$$

How many brioches does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 0.0000 units of brioche.

154. Problem

In a small open economy – that has comparative advantage in producing backpack – the maximum amount of labor provided is 481 units. The unit labor requirement parameters are:

$$a_{\text{backpack}} = 7.20$$
$$a_{\text{handbag}} = 2.48$$

The statistical office uses the formula of $P = P_{\text{backpack}}^{0.55} P_{\text{handbag}}^{0.45}$ to calculate the price level. Under these circumstances the small open economy achieves 365.048034 units of real GDP.

What is the relative world price (price of backpack in terms of handbag)?

Solution: The relative world price is 43.55 units.

155. Problem

In a small open economy there are just two firms: the firm that produces cappuccino and the firm that produces napkin. The following functions characterize the production process:

$$Q_{\text{cappuccino}} = 1.96 \cdot L_{\text{cappuccino}}$$
$$Q_{\text{napkin}} = 2.12 \cdot L_{\text{napkin}}$$

The utility function of the consumer is given by $U = 5.29 \cdot \ln D_{\text{cappuccino}} + 5.57 \cdot \ln D_{\text{napkin}}$, and the labor supply is fixed at 1011.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{cappuccino}}^{\text{világ}} = 7.78 \cdot L_{\text{cappuccino}}^{\text{világ}}$$
$$Q_{\text{napkin}}^{\text{világ}} = 12.63 \cdot L_{\text{napkin}}^{\text{világ}}$$

How many napkins does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 0.0000 units of napkin.

156. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: pushchair and backpack. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{pushchair}} = 12.86$ and $a_{\text{backpack}} = 2.93$. The labor supply is constant, $L = 565$.

The utility function of the representative consumer takes the following form:

$$U = 4.19 \cdot \ln D_{\text{pushchair}}^{0.27} \cdot \ln D_{\text{backpack}}^{0.73}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P_{\text{pushchair}}^{\text{world}}}{P_{\text{backpack}}^{\text{world}}} = 9.88$.

Determine the amount of pushchair produced in the small open economy.

Solution: Under free trade firms in the small open economy produce 43.9347 units of pushchair.

2.

157. Problem

In a small open economy – that has comparative advantage in producing teapot – the maximum amount of labor provided is 392 units. The unit labor requirement parameters are:

$$a_{\text{teapot}} = 9.77$$
$$a_{\text{food processor}} = 1.15$$

The statistical office uses the formula of $P = P_{\text{teapot}}^{0.32} P_{\text{food processor}}^{0.68}$ to calculate the price level. Under these circumstances the small open economy achieves 765.826132 units of real GDP.

What is the relative world price (price of teapot in terms of food processor)?

Solution: The relative world price is 76.46 units.

158. Problem

In a small open economy there are just two firms: the firm that produces muffin and the firm that produces hairdryer. The following functions characterize the production process:

$$Q_{\text{muffin}} = 4.91 \cdot L_{\text{muffin}}$$
$$Q_{\text{hairdryer}} = 1.82 \cdot L_{\text{hairdryer}}$$

The utility function of the consumer is given by $U = 0.18 \cdot \ln D_{\text{muffin}} + 1.32 \cdot \ln D_{\text{hairdryer}}$, and the labor supply is fixed at 1304.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{muffin}}^{\text{világ}} = 11.49 \cdot L_{\text{muffin}}^{\text{világ}}$$

$$Q_{\text{hairdryer}}^{\text{világ}} = 4.97 \cdot L_{\text{hairdryer}}^{\text{világ}}$$

How many hairdryers does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 0.0000 units of hairdryer.

159. Problem

In a small open economy there are just two firms: the firm that produces chicken burger and the firm that produces lemonade. The following functions characterize the production process:

$$Q_{\text{chicken burger}} = 12.77 \cdot L_{\text{chicken burger}}$$
$$Q_{\text{lemonade}} = 1.59 \cdot L_{\text{lemonade}}$$

The utility function of the consumer is given by $U = 1.94 \cdot \ln D_{\text{chicken burger}} + 0.22 \cdot \ln D_{\text{lemonade}}$, and the labor supply is fixed at 540.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{chicken burger}}^{\text{világ}} = 6.07 \cdot L_{\text{chicken burger}}^{\text{világ}}$$
$$Q_{\text{lemonade}}^{\text{világ}} = 11.88 \cdot L_{\text{lemonade}}^{\text{világ}}$$

How many chicken burgers does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 6895.8000 units of chicken burger.

160. Problem

In a small open economy there are just two firms: the firm that produces peach and the firm that produces muffin. The following functions characterize the production process:

$$Q_{\text{peach}} = 5.79 \cdot L_{\text{peach}}$$
$$Q_{\text{muffin}} = 13.79 \cdot L_{\text{muffin}}$$

The utility function of the consumer is given by $U = 0.72 \cdot \ln D_{\text{peach}} + 0.28 \cdot \ln D_{\text{muffin}}$, and the labor supply is fixed at 1069.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{peach}}^{\text{világ}} = 9.70 \cdot L_{\text{peach}}^{\text{világ}}$$

$$Q_{\text{muffin}}^{\text{világ}} = 9.09 \cdot L_{\text{muffin}}^{\text{világ}}$$

How many muffins does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 14741.5100 units of muffin.

161. Problem

2.

The the behavior of the representative agents in a small open economy can be characterized by the following expressions:

$$\begin{aligned} U &= 1.46 \cdot D_{\text{peach}}^{0.27} D_{\text{hairdryer}}^{0.73} \\ 1.56 \cdot Q_{\text{peach}} &= L_{\text{peach}} \\ 12.99 \cdot Q_{\text{hairdryer}} &= L_{\text{hairdryer}} \\ L &= 222 \\ P &= P_{\text{peach}}^{0.26} P_{\text{hairdryer}}^{0.74} \end{aligned}$$

The relative world price of peach in terms of hairdryer is 1.69.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 209.8285 units.

162. Problem

In a Ricardian small open economy the unit labor requirement in the fruit cake sector is 11.47 and the unit labor requirement in the shampoo sector is 7.83. The labor supply is 1059. The behavior of the representative consumer can be described by the following utility function $U = 3.48 \cdot \ln D_{\text{fruit cake}} + 3.34 \cdot \ln D_{\text{shampoo}}$.

The statistical office of the economy computes the price level by using the formula of $P = P_{\text{fruit cake}}^{0.38} P_{\text{shampoo}}^{0.62}$.

The relative world price of fruit cake in terms of shampoo is 16.08.

Determine the real GDP for this economy.

Solution: Under free trade the real GDP is 516.6898 units.

163. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 1135 units of labor to produce two goods: aubergine and spring onion. The production possibilities frontier in this economy can be written as:

$$Q_{\text{spring onion}} = 1324.73 - 3.88 \cdot Q_{\text{aubergine}}$$

In this economy $U = 1.98 \cdot \ln D_{\text{aubergine}} + 1.64 \cdot \ln D_{\text{spring onion}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of aubergine in terms of spring onion is $\frac{P^{\text{world}}_{\text{aubergine}}}{P^{\text{world}}_{\text{spring onion}}} = 4.69$.

Find the amount of spring onion consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 725.4438 units of spring onion.

164. Problem

In a Ricardian small open economy the maximum amount of labor available for production is 300 units. The unit labor requirement parameters in the wallet and platform shoe sector are $a_{\text{wallet}} = 0.42$ and $a_{\text{platform shoe}} = 15.19$ respectively. The statistical office of the country uses the following expression to calculate the price level: $P = P^{0.54}_{\text{wallet}} P^{0.46}_{\text{wallet}}$.

The small open economy trades actively with the rest of the world, where it faces $\frac{P^{\text{world}}_{\text{wallet}}}{P^{\text{world}}_{\text{platform shoe}}} = 3.05$ as relative price.

What fraction of the labor force is used in the wallet sector and what fraction of the labor is used in the platform shoe sector?

Solution: Since the small open economy has comparative advantage in producing wallet, 100 percent of labor is used in the wallet sector and no labor is used in the platform shoe sector (under free trade the specialization is complete).

165. Problem

In a small open economy there are just two firms: the firm that produces banana and the firm that produces wallet. The following functions characterize the production process:

$$Q_{\text{banana}} = 8.24 \cdot L_{\text{banana}}$$

2.

$$Q_{\text{wallet}} = 8.14 \cdot L_{\text{wallet}}$$

The utility function of the representative consumer is given by $U = 0.65 \cdot \ln D_{\text{banana}} + 2.61 \cdot \ln D_{\text{wallet}}$, and the labor supply is fixed at 553 units. The statistical office uses the formula of $P = P_{\text{banana}}^{0.62} P_{\text{wallet}}^{0.38}$ to calculate the price level.

The relative world price is 0.38 units (price of banana in terms of wallet).

By what percentage does real GDP under free trade differ from real GDP in autarky?

Solution: Free trade increases real GDP by 80.8200 percent.

166. Problem

The representative consumer of a small open economy seeks to maximize the following utility function:

$$U = 0.39 \cdot \ln D_{\text{fruit cake}} + 0.66 \cdot \ln D_{\text{strawberry}}$$

Firms in the fruit cake sector uses only labor to produce their output, the unit labor requirement is 0.80 units. The same parameter in the strawberry sector is $a_{\text{strawberry}} = 1.39$. The labor supply is fixed at $L = 845$ units.

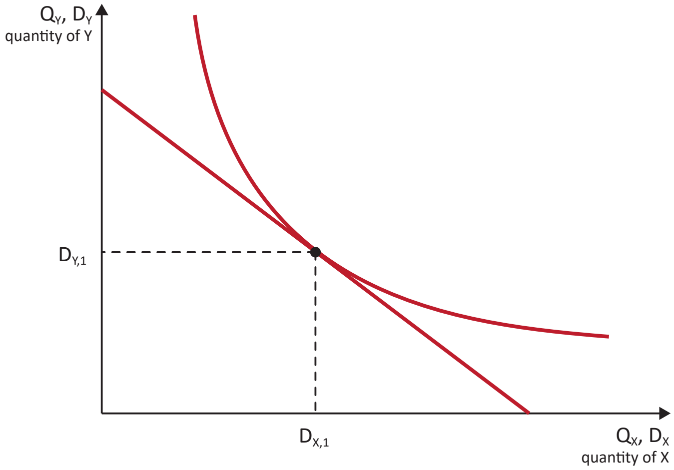
The small open economy trades actively with the rest of the world, where the price of fruit cake in terms of strawberry is $\frac{P_{\text{fruit cake}}^{\text{world}}}{P_{\text{strawberry}}^{\text{world}}} = 19.35$.

Calculate the amount of fruit cake consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 392.3214 units of fruit cake.

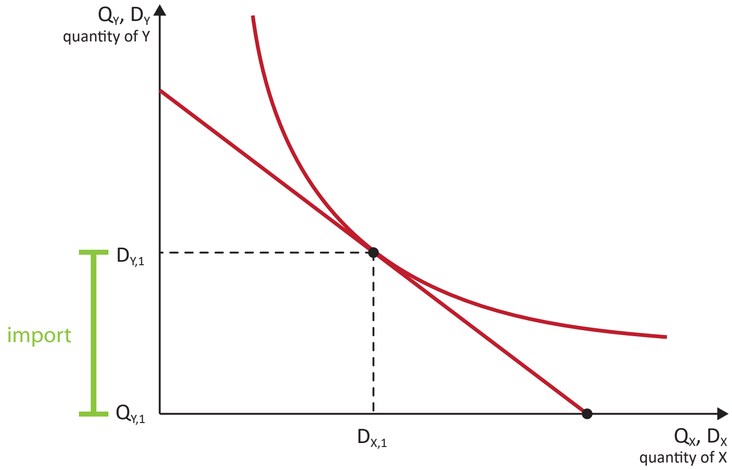
167. Problem

The following graph shows the budget constraint and the indifference curve that designates the optimal consumption bundle in a Ricardian small open economy under free trade.



The small open economy has comparative advantage in producing X. Identify the amount of import.

Solution: The correct graph is the following:



2.

168. Problem

In a small open economy there are just two firms: the firm that produces muffin and the firm that produces tomato. The following functions characterize the production process:

$$Q_{\text{muffin}} = 15.00 \cdot L_{\text{muffin}}$$
$$Q_{\text{tomato}} = 8.90 \cdot L_{\text{tomato}}$$

The utility function of the consumer is given by $U = 4.83 \cdot \ln D_{\text{muffin}} + 1.90 \cdot \ln D_{\text{tomato}}$, and the labor supply is fixed at 914.

2.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{muffin}}^{\text{vilĂAg}} = 5.71 \cdot L_{\text{muffin}}^{\text{vilĂAg}}$$
$$Q_{\text{tomato}}^{\text{vilĂAg}} = 12.64 \cdot L_{\text{tomato}}^{\text{vilĂAg}}$$

What is the relative world price of muffin in terms of tomato?

Solution: The relative world price is 2.2137 units.

169. Problem

In a small open economy there are just two firms: the firm that produces orange and the firm that produces wine glass. The following functions characterize the production process:

$$Q_{\text{orange}} = 12.73 \cdot L_{\text{orange}}$$
$$Q_{\text{wine glass}} = 14.04 \cdot L_{\text{wine glass}}$$

The utility function of the consumer is given by $U = 1.62 \cdot \ln D_{\text{orange}} + 3.87 \cdot \ln D_{\text{wine glass}}$, and the labor supply is fixed at 1144.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{orange}}^{\text{világ}} = 1.02 \cdot L_{\text{orange}}^{\text{világ}}$$
$$Q_{\text{wine glass}}^{\text{világ}} = 3.97 \cdot L_{\text{wine glass}}^{\text{világ}}$$

What amount of wine glasss are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 39956.1269 units of wine glass.

170. Problem

A small open economy, that can be described by the following set of formulas:

$$\begin{aligned} U &= 3.00 \cdot \ln D_{\text{hairspray}} + 4.06 \cdot \ln D_{\text{pizza}} \\ a_{\text{pizza}} &= 5.27 \\ L &= 681 \\ \frac{P^{\text{world}}_{\text{hairspray}}}{P^{\text{world}}_{\text{pizza}}} &= 21.12 \end{aligned}$$

exports 73.891175 units of hairspray and imports 1560.547973 units of pizza.

Determine the unit labor requirement parameter for the X sector.

Solution: The unit labor requirement parameter in the hairspray sector is 5.30 units.

2.

171. Problem

A small open economy, that can be described by the following set of formulas:

$$\begin{aligned} U &= 4.98 \cdot \ln D_{\text{salad}} + 2.02 \cdot \ln D_{\text{wine glass}} \\ 10.65 \cdot Q_{\text{salad}} &= L_{\text{salad}} \\ 3.73 \cdot Q_{\text{wine glass}} &= L_{\text{wine glass}} \\ L &= 629 \end{aligned}$$

exports 17.043327 units of salad and imports 70.388939 units of wine glass.

What is the relative world price (price of X in terms of Y) the economy faces while trading with the rest of the world?

Solution: The relative world price is 4.13 units.

172. Problem

A small open economy, that can be described by the following set of formulas:

$$\begin{aligned} U &= 5.34 \cdot \ln D_{\text{mint tea}} + 4.43 \cdot \ln D_{\text{platform shoe}} \\ a_{\text{platform shoe}} &= 12.09 \\ L &= 989 \end{aligned}$$

$$\frac{P^{\text{world}}_{\text{mint tea}}}{P^{\text{world}}_{\text{platform shoe}}} = 10.25$$

exports 50.671316 units of mint tea and imports 519.286687 units of platform shoe.

Determine the unit labor requirement parameter for the X sector.

Solution: The unit labor requirement parameter in the mint tea sector is 8.85 units.

173. Problem

In a small open economy there are just two firms: the firm that produces cabbage and the firm that produces pistachio. The following functions characterize the production process:

$$Q_{\text{cabbage}} = 15.28 \cdot L_{\text{cabbage}}$$
$$Q_{\text{pistachio}} = 10.13 \cdot L_{\text{pistachio}}$$

The utility function of the consumer is given by $U = 2.93 \cdot \ln D_{\text{cabbage}} + 1.66 \cdot \ln D_{\text{pistachio}}$, and the labor supply is fixed at 634.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{cabbage}} = 6.17 \cdot L^{\text{világ}}_{\text{cabbage}}$$
$$Q^{\text{világ}}_{\text{pistachio}} = 5.38 \cdot L^{\text{világ}}_{\text{pistachio}}$$

What amount of cabbages are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 6183.9725 units of cabbage.

174. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: tomato and hot dog. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{tomato}} = 11.91$ and $a_{\text{hot dog}} = 15.56$. The labor supply is constant, $L = 225$.

The utility function of the representative consumer takes the following form:

$$U = 2.51 \cdot \ln D^{0.69}_{\text{tomato}} \cdot \ln D^{0.31}_{\text{hot dog}}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P^{\text{world}}_{\text{tomato}}}{P^{\text{world}}_{\text{hot dog}}} = 17.44$.

What is the amount of hot dog produced in the small open economy?

Solution: Under free trade firms in the small open economy produce 0.0000 units of hot dog.

175. Problem

In a small open economy there are just two firms: the firm that produces cauliflower and the firm that produces pie. The following functions characterize the production process:

$$Q_{\text{cauliflower}} = 8.11 \cdot L_{\text{cauliflower}}$$
$$Q_{\text{pie}} = 14.17 \cdot L_{\text{pie}}$$

The utility function of the consumer is given by $U = 3.90 \cdot \ln D_{\text{cauliflower}} + 5.26 \cdot \ln D_{\text{pie}}$, and the labor supply is fixed at 1318.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{cauliflower}} = 13.94 \cdot L^{\text{világ}}_{\text{cauliflower}}$$
$$Q^{\text{világ}}_{\text{pie}} = 7.65 \cdot L^{\text{világ}}_{\text{pie}}$$

What amount of cauliflowers are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 14489.5778 units of cauliflower.

176. Problem

In a small open economy there are just two firms: the firm that produces tomato and the firm that produces pistachio. The following functions characterize the production process:

$$Q_{\text{tomato}} = 1.21 \cdot L_{\text{tomato}}$$
$$Q_{\text{pistachio}} = 1.59 \cdot L_{\text{pistachio}}$$

The utility function of the consumer is given by $U = 4.70 \cdot \ln D_{\text{tomato}} + 5.04 \cdot \ln D_{\text{pistachio}}$, and the labor supply is fixed at 291.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{tomato}} = 8.04 \cdot L^{\text{világ}}_{\text{tomato}}$$
$$Q^{\text{világ}}_{\text{pistachio}} = 3.39 \cdot L^{\text{világ}}_{\text{pistachio}}$$

How many pistachios does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 462.6900 units of pistachio.

177. Problem

A small open economy – that functions under the assumptions of the Ricardian model – has 906 units of labor to produce two goods: watermelon and watch. The production possibilities frontier in this economy can be written as:

$$Q_{\text{watch}} = 243.00 - 14.83 \cdot Q_{\text{watermelon}}$$

In this economy $U = 5.00 \cdot \ln D_{\text{watermelon}} + 5.06 \cdot \ln D_{\text{watch}}$ utility function characterizes the preferences of the representative consumer.

The small open economy trades actively with the rest of the world, where the price of watermelon in terms of watch is $\frac{P^{\text{world}}_{\text{watermelon}}}{P^{\text{world}}_{\text{watch}}} = 12.80$.

Find the amount of watch consumed in the small open economy in equilibrium.

Solution: In optimum, the representative consumer consumes 122.2247 units of watch.

178. Problem

In a small open economy there are just two firms: the firm that produces almond and the firm that produces mint tea. The following functions characterize the production process:

$$Q_{\text{almond}} = 9.99 \cdot L_{\text{almond}}$$
$$Q_{\text{mint tea}} = 0.85 \cdot L_{\text{mint tea}}$$

The utility function of the consumer is given by $U = 5.10 \cdot \ln D_{\text{almond}} + 2.22 \cdot \ln D_{\text{mint tea}}$, and the labor supply is fixed at 1380.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{almond}} = 3.76 \cdot L^{\text{világ}}_{\text{almond}}$$
$$Q^{\text{világ}}_{\text{mint tea}} = 3.86 \cdot L^{\text{világ}}_{\text{mint tea}}$$

How many almonds does the small open economy produce under free trade?

Solution: Under free trade firms in the small open economy produce 13786.2000 units of almond.

179. Problem

In a small open economy there are just two firms: the firm that produces platform shoe and the firm that produces pie. The following functions characterize the production process:

$$Q_{\text{platform shoe}} = 5.88 \cdot L_{\text{platform shoe}}$$
$$Q_{\text{pie}} = 3.21 \cdot L_{\text{pie}}$$

The utility function of the representative consumer is given by $U = 4.86 \cdot \ln D_{\text{platform shoe}} + 3.06 \cdot \ln D_{\text{pie}}$, and the labor supply is fixed at 575 units. The statistical office uses the formula of $P = P_{\text{platform shoe}}^{0.75} P_{\text{pie}}^{0.25}$ to calculate the price level.

The relative world price is 23.15 units (price of platform shoe in terms of pie).

By what percentage does real GDP under free trade differ from real GDP in autarky?

Solution: Free trade increases real GDP by 155.1854 percent.

180. Problem

A small open economy, that can be described by the following set of formulas:

$$\begin{aligned} U &= 2.94 \cdot \ln D_{\text{wine glass}} + 1.07 \cdot \ln D_{\text{porridge}} \\ a_{\text{porridge}} &= 7.69 \\ L &= 1005 \\ \frac{P_{\text{wine glass}}^{\text{world}}}{P_{\text{porridge}}^{\text{world}}} &= 0.86 \end{aligned}$$

exports 893.890274 units of wine glass and imports 767.188012 units of porridge.

Determine the unit labor requirement parameter for the X sector.

Solution: The unit labor requirement parameter in the wine glass sector is 0.30 units.

181. Problem

The functioning of a small open economy can be described by the following set of equations:

$$\begin{aligned} U &= 1.05 \cdot \ln D_{\text{napkin}} + 1.10 \cdot \ln D_{\text{ice cream}} \\ 11.52 \cdot Q_{\text{napkin}} &= L_{\text{napkin}} \end{aligned}$$

$$
\begin{aligned}
4.33 \cdot Q_{\text{ice cream}} &= L_{\text{ice cream}} \\
L &= 419 \\
\frac{P^{\text{world}}_{\text{napkin}}}{P^{\text{world}}_{\text{ice cream}}} &= 4.33
\end{aligned}
$$

Which good does the economy import and what is the amount of import?

Solution: The small open economy imports ice cream and the amount of import is $IM = 451.0746$ units.

2.

182. Problem

A small open economy operates under the assumptions of the Ricardian model, and produces only two goods: milkshake and soup. The production process can be described by linear production functions, where the unit labor requirements are $a_{\text{milkshake}} = 10.01$ and $a_{\text{soup}} = 5.05$. The labor supply is constant, $L = 506$.

The utility function of the representative consumer takes the following form:

$$U = 4.37 \cdot \ln D^{0.27}_{\text{milkshake}} \cdot \ln D^{0.73}_{\text{soup}}$$

The small open economy trades with the rest of the world, where the relative price is $\frac{P^{\text{world}}_{\text{milkshake}}}{P^{\text{world}}_{\text{soup}}} = 18.13$.

Calculate the amount of milkshake consumed by the representative consumer.

Solution: In optimum, the representative consumer consumes 13.6484 units of milkshake.

183. Problem

In a small open economy there are just two firms: the firm that produces bookshelf and the firm that produces pizza. The following functions characterize the production process:

$$
\begin{aligned}
Q_{\text{bookshelf}} &= 3.06 \cdot L_{\text{bookshelf}} \\
Q_{\text{pizza}} &= 5.20 \cdot L_{\text{pizza}}
\end{aligned}
$$

The utility function of the representative consumer is given by $U = 5.45 \cdot \ln D_{\text{bookshelf}} + 5.07 \cdot \ln D_{\text{pizza}}$, and the labor supply is fixed at 664 units. The statistical office uses the formula of $P = P^{0.28}_{\text{bookshelf}} P^{0.72}_{\text{pizza}}$ to calculate the price level.

The relative world price is 19.22 units (price of bookshelf in terms of pizza).

By what percentage does real GDP under free trade differ from real GDP in autarky?

Solution: Free trade increases real GDP by 473.4551 percent.

184. Problem

In a small open economy there are just two firms: the firm that produces painting and the firm that produces soup. The following functions characterize the production process:

$$Q_{\text{painting}} = 12.26 \cdot L_{\text{painting}}$$
$$Q_{\text{soup}} = 4.81 \cdot L_{\text{soup}}$$

The utility function of the consumer is given by $U = 4.56 \cdot \ln D_{\text{painting}} + 0.96 \cdot \ln D_{\text{soup}}$, and the labor supply is fixed at 1404.

2.

The small open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{világ}}_{\text{painting}} = 13.11 \cdot L^{\text{világ}}_{\text{painting}}$$
$$Q^{\text{világ}}_{\text{soup}} = 5.35 \cdot L^{\text{világ}}_{\text{soup}}$$

What amount of soups are purchased in the small economy under free trade?

Solution: In optimum, the representative consumer consumes 1221.6332 units of soup.

Ricardian Model
Large Open Economy

1. Problem

2.

In economy A it takes 2.47 units of labor to produce one unit of wine glass and 6.62 units of labor to produce one unit of lime. In economy B the unit labor requirement parameter in wine glass sector is 7.17 and it takes 1.36 units of labor to produce one unit of lime. The maximum amount of labor provided in economy A is 444, and the labor supply in economy B is 471.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 2.32 \cdot \ln D^A_{\text{wine glass}} + 1.47 \cdot \ln D^A_{\text{lime}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.46 \cdot \ln D^B_{\text{wine glass}} + 2.00 \cdot \ln D^B_{\text{lime}}$.

The two countries trade with each other as large open economies.

Which country exports wine glass and what is the amount of export?

Solution: Country A exports wine glass. The amount of export is 69.7211 units.

2. Problem

In economy A it takes 6.05 units of labor to produce one unit of cabbage and 7.69 units of labor to produce one unit of fruit cake. In economy B the unit labor requirement parameter in cabbage sector is 8.01 and it takes 4.70 units of labor to produce one unit of fruit cake. The maximum amount of labor provided in economy A is 100, and the labor supply in economy B is 268.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.35 \cdot \ln D^A_{\text{cabbage}} + 1.60 \cdot \ln D^A_{\text{fruit cake}}$ while the utility function of the representative consumer in country B is written as $U^B = 2.40 \cdot \ln D^B_{\text{cabbage}} + 0.29 \cdot \ln D^B_{\text{fruit cake}}$.

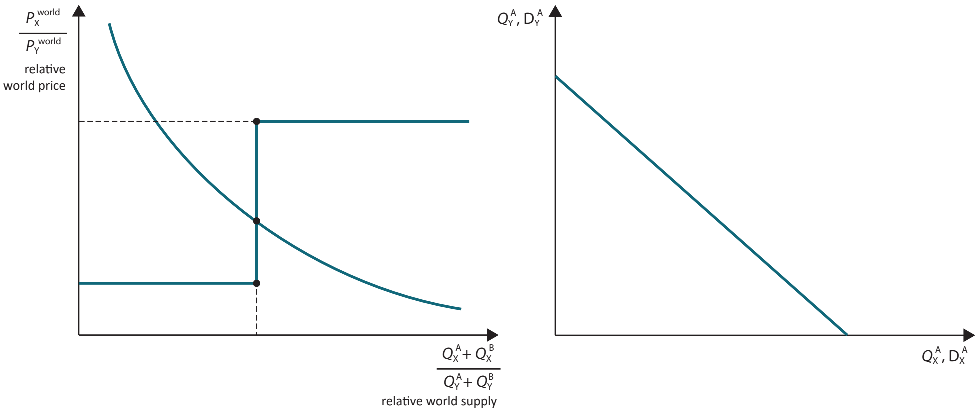
The two countries trade with each other as large open economies.

Which country imports cabbage and what is the amount of import?

Solution: Country B imports cabbage. The amount of import is 13.5622 units.

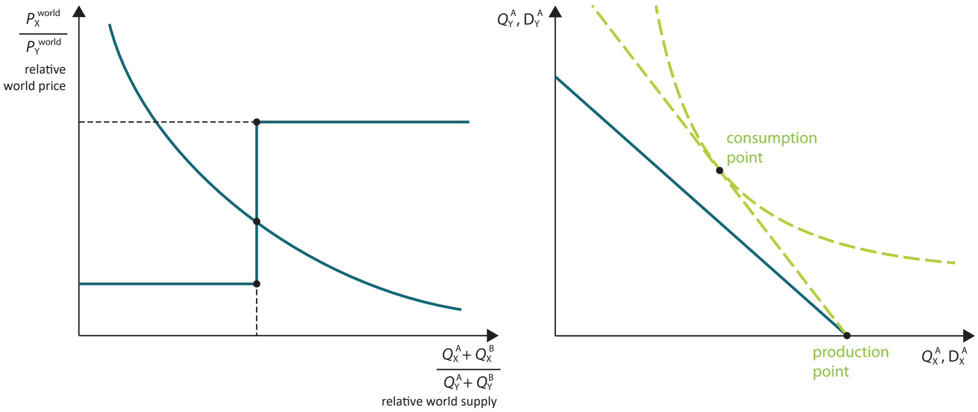
3. Problem

The world consists of only two economies: A and B. The first graph on the following image illustrates the relative world supply and relative world demand curves, and the second graph shows the production possibilities frontier function in country A. Country A has comparative advantage in producing X.



Illustrate the budget constraint and the indifference curve, that designates the optimal consumption bundle under free trade, on the second graph.

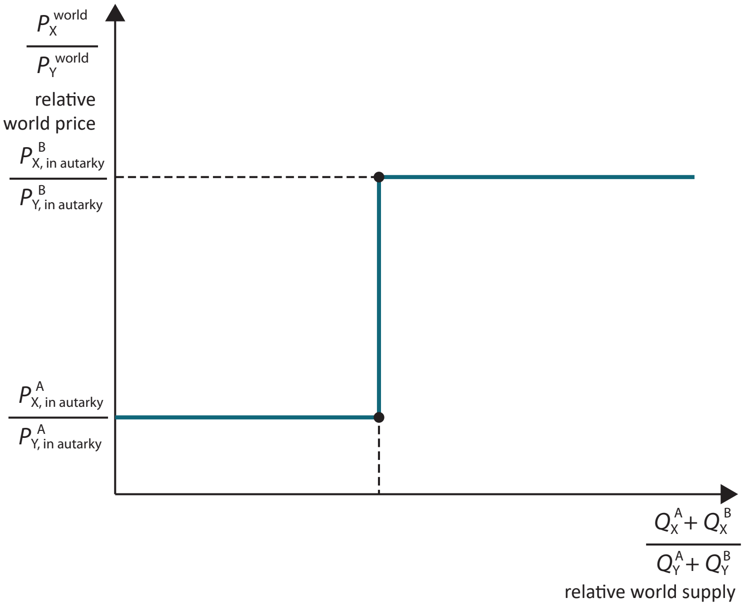
Solution: The correct graph is the following:



2.

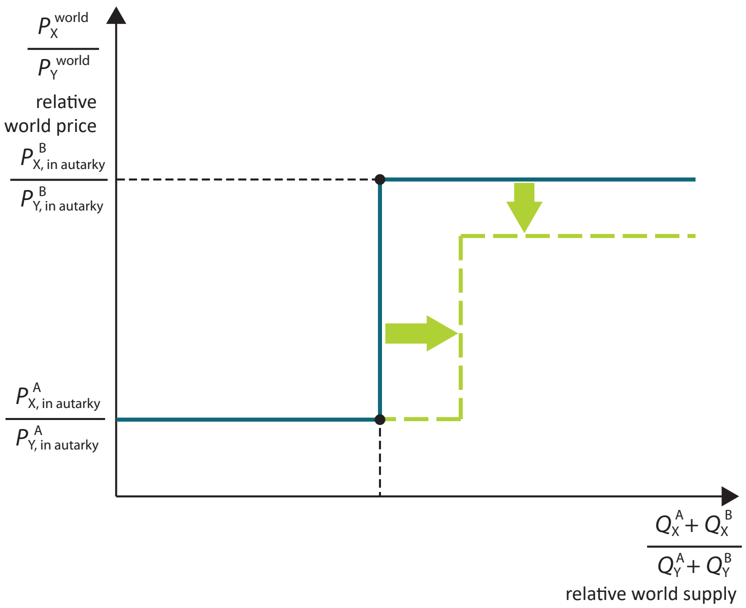
4. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is a decrease in the unit labor requirement parameter in the Y sector of in economy B.

Solution: The correct graph looks like as follows:



5. Problem

In economy A it takes 2.97 units of labor to produce one unit of necklace and 0.53 units of labor to produce one unit of paper clip. In economy B the unit labor requirement parameter in necklace sector is 3.42 and it takes 3.61 units of labor to produce one unit of paper clip. The maximum amount of labor provided in economy A is 517, and the labor supply in economy B is 288.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.38 \cdot \ln D^A_{\text{necklace}} + 1.09 \cdot \ln D^A_{\text{paper clip}}$ while the utility function of the representative consumer in country B is written as $U^B = 1.65 \cdot \ln D^B_{\text{necklace}} + 0.70 \cdot \ln D^B_{\text{paper clip}}$.

The two countries trade with each other as large open economies.

Which country imports necklace and what is the amount of import?

Solution: Country B imports necklace. The amount of import is 44.9987 units.

6. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$
\begin{aligned}
U^A &= 0.69 \cdot \ln D^A_{\text{milkshake}} + 1.76 \cdot \ln D^A_{\text{orange}} \\
Q^A_{\text{milkshake}} &= 6.76 \cdot L^A_{\text{milkshake}} \\
Q^A_{\text{orange}} &= 7.58 \cdot L^A_{\text{orange}} \\
L^A &= 292 \\
U^B &= 2.09 \cdot \ln D^B_{\text{milkshake}} + 0.91 \cdot \ln D^B_{\text{orange}} \\
Q^B_{\text{milkshake}} &= 3.36 \cdot L^B_{\text{milkshake}} \\
Q^B_{\text{orange}} &= 11.96 \cdot L^B_{\text{orange}} \\
L^B &= 356
\end{aligned}
$$

What is the amount of milkshake produced in economy A and what is the amount of milkshake produced in economy B?

Solution: Economy A produces 1973.92 units of milkshake and economy B does not produce any milkshakes.

7. Problem

In economy A it takes 9.36 units of labor to produce one unit of tomato and 10.65 units of labor to produce one unit of strawberry. In economy B the unit labor requirement parameter in tomato sector is 9.76 and it takes 4.93 units of labor to produce one unit of strawberry. The maximum amount of labor provided in economy A is 73, and the labor supply in economy B is 596.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.66 \cdot \ln D^A_{\text{tomato}} + 0.71 \cdot \ln D^A_{\text{strawberry}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.19 \cdot \ln D^B_{\text{tomato}} + 0.92 \cdot \ln D^B_{\text{strawberry}}$.

The two countries trade with each other as large open economies.

Which country imports tomato and what is the amount of import?

Solution: Country B imports tomato. The amount of import is 4.0419 units.

8. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$
\begin{aligned}
U^A &= 0.97 \cdot \ln D^A_{\text{peach}} + 1.55 \cdot \ln D^A_{\text{wallet}} \\
Q^A_{\text{peach}} &= 9.35 \cdot L^A_{\text{peach}} \\
Q^A_{\text{wallet}} &= 11.98 \cdot L^A_{\text{wallet}} \\
L^A &= 121 \\
U^B &= 2.18 \cdot \ln D^B_{\text{peach}} + 1.92 \cdot \ln D^B_{\text{wallet}} \\
Q^B_{\text{peach}} &= 2.49 \cdot L^B_{\text{peach}} \\
Q^B_{\text{wallet}} &= 8.19 \cdot L^B_{\text{wallet}} \\
L^B &= 86
\end{aligned}
$$

What is the amount of peach produced in economy A and what is the amount of peach produced in economy B?

Solution: $Q^A_{\text{peach}} = 727.7672$ and $Q^B_{\text{peach}} = 0$.

9. Problem

In a large open economy there are just two firms: the firm that produces onion and the firm that produces porridge. The following functions characterize the production process:

$$
\begin{aligned}
Q_{\text{onion}} &= 3.39 \cdot L_{\text{onion}} \\
Q_{\text{porridge}} &= 2.25 \cdot L_{\text{porridge}}
\end{aligned}
$$

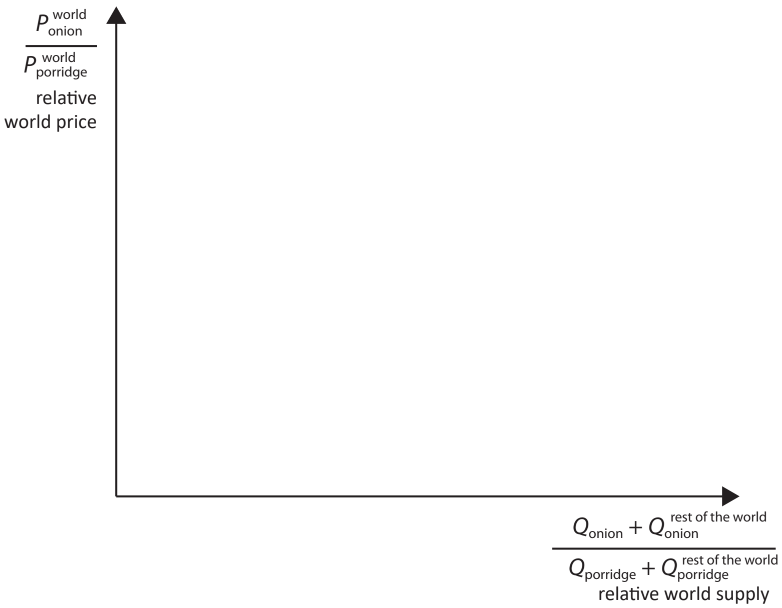
The labor supply is fixed at 1418 units.

The large open economy trades actively with the rest of the world, where the production functions are written as

$$
\begin{aligned}
Q^{\text{world}}_{\text{onion}} &= 13.95 \cdot L^{\text{world}}_{\text{onion}} \\
Q^{\text{world}}_{\text{porridge}} &= 14.74 \cdot L^{\text{world}}_{\text{porridge}}
\end{aligned}
$$

The labor supply is fixed at 1288 units.

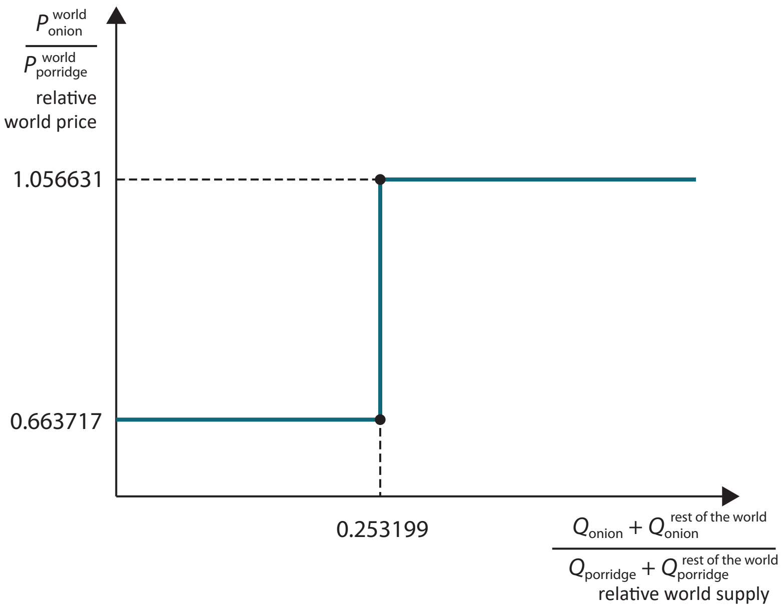
Write down the relative world supply curve and on the following graph illustrate this curve:



Solution: The relative world supply curve can be written as:

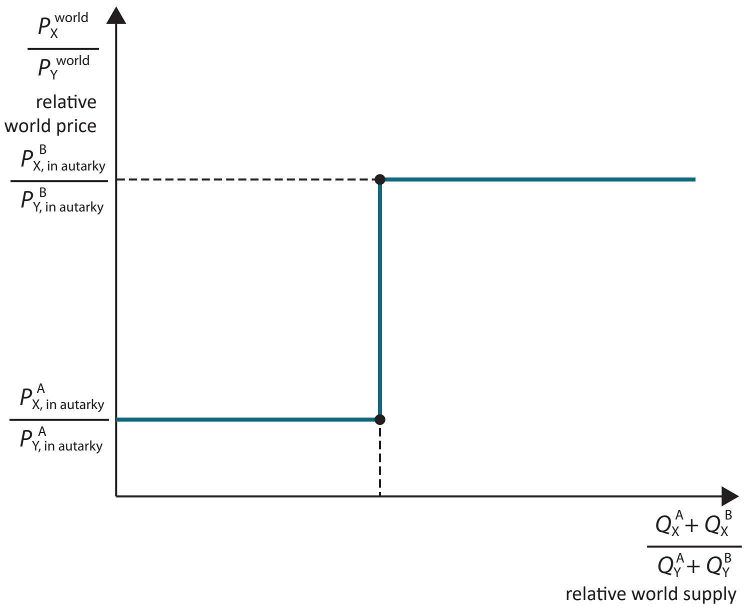
$$\frac{Q^A_{\text{onion}} + Q^B_{\text{onion}}}{Q^A_{\text{porridge}} + Q^B_{\text{porridge}}} = \begin{cases} \text{if the relative world price is equal to } 0.663717 & (0, 0.253199] \\ \text{if the relative world price is between } 0.663717 \text{ and } 1.056631 & 0.253199 \\ \text{if the relative world price is equal to } 1.056631 & [0.253199, \infty) \end{cases}$$

And the correct graph looks like this



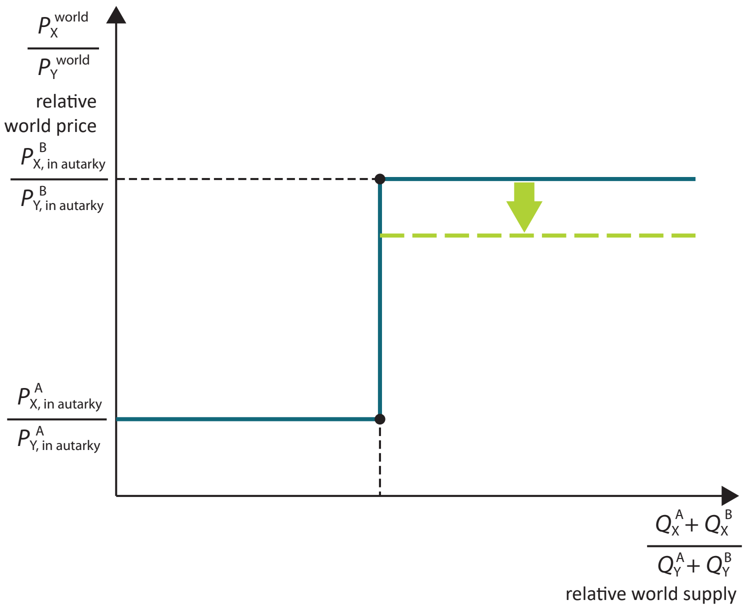
10. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is a decrease in the unit labor requirement parameter in the X sector of in economy B.

Solution: The correct graph looks like as follows:



11. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$\begin{aligned}
U^A &= 2.30 \cdot \ln D^A_{\text{pastry}} + 0.22 \cdot \ln D^A_{\text{lemonade}} \\
Q^A_{\text{pastry}} &= 4.32 \cdot L^A_{\text{pastry}} \\
Q^A_{\text{lemonade}} &= 0.83 \cdot L^A_{\text{lemonade}} \\
L^A &= 588 \\
U^B &= 0.69 \cdot \ln D^B_{\text{pastry}} + 1.49 \cdot \ln D^B_{\text{lemonade}} \\
Q^B_{\text{pastry}} &= 7.40 \cdot L^B_{\text{pastry}} \\
Q^B_{\text{lemonade}} &= 6.11 \cdot L^B_{\text{lemonade}} \\
L^B &= 591
\end{aligned}$$

Determine the relative world price of pastry in terms of lemonade.

Solution: The relative world price of pastry in terms of lemonade is 0.8257.

12. Problem

We analyze the functioning of two large open economies A and B. In economy A it takes 3.48 units of labor to produce one unit of hairdryer and the unit labor requirement parameter in fruit cake sector is 0.90. The unit labor requirement parameters in economy B are $a^B_{\text{hairdryer}} = 5.13$ and $a^B_{\text{fruit cake}} = 5.90$. The maximum amount of labor provided in economy A is 1411 units and the labor supply in economy B is 977 units.

Write down the relative world supply curve.

Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{hairdryer}} + Q^B_{\text{hairdryer}}}{Q^A_{\text{fruit cake}} + Q^B_{\text{fruit cake}}} = \begin{cases} \text{if the relative world price is equal to } 0.869492 & (0, 0.121477] \\ \text{if the relative world price is between } 0.869492 \text{ and } 3.866667 & 0.121477 \\ \text{if the relative world price is equal to } 3.866667 & [0.121477, \infty) \end{cases}$$

2.

13. Problem

In economy A it takes 4.31 units of labor to produce one unit of jigsaw and 5.99 units of labor to produce one unit of coffee. In economy B the unit labor requirement parameter in jigsaw sector is 8.99 and it takes 6.64 units of labor to produce one unit of coffee. The maximum amount of labor provided in economy A is 412, and the labor supply in economy B is 519.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 1.50 \cdot \ln D^A_{\text{jigsaw}} + 2.12 \cdot \ln D^A_{\text{coffee}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.34 \cdot \ln D^B_{\text{jigsaw}} + 0.58 \cdot \ln D^B_{\text{coffee}}$.

The two countries trade with each other as large open economies.

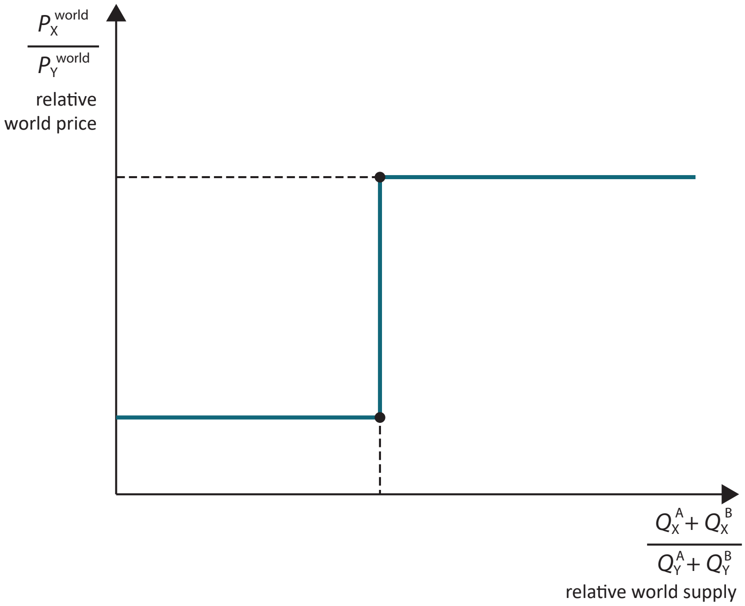
Which country exports jigsaw and what is the amount of export?

Solution: Country A exports jigsaw. The amount of export is 40.1458 units.

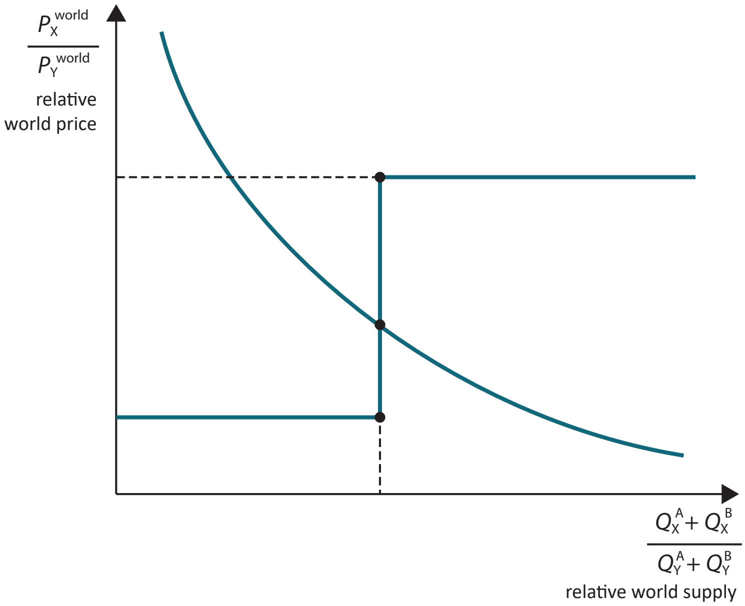
14. Problem

The world consists of only two economies: A and B. The following graph illustrates the relative world supply curve. Under free trade country A has comparative advantage in producing X and it produces only X. Country B specializes in Y production (and the specialization is complete).

Draw in a relative world demand curve that fits the circumstances described above.



Solution: The correct graph is the following:



15. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
$a_{\text{platform shoe}}$	6.64	6.90
a_{tea}	9.45	7.90
L	249	363

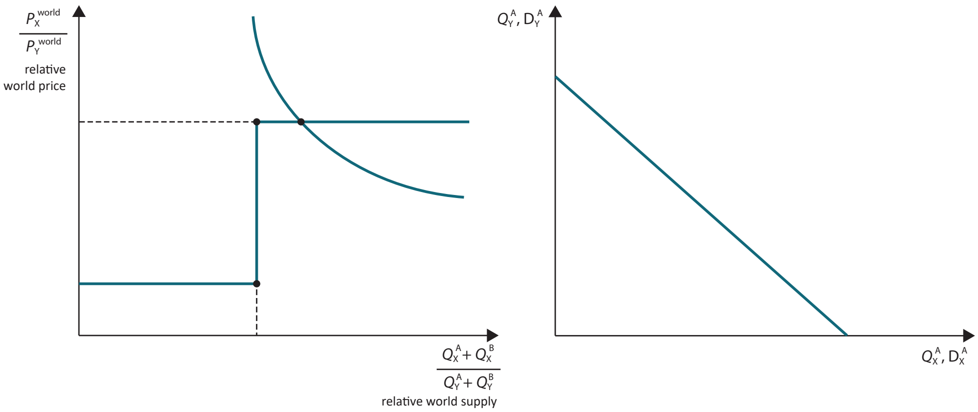
The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.76 \cdot \ln D^A_{\text{platform shoe}} + 0.22 \cdot \ln D^A_{\text{tea}}$ while the utility function of the representative consumer in country B is written as $U^B = 2.06 \cdot \ln D^B_{\text{platform shoe}} + 0.37 \cdot \ln D^B_{\text{tea}}$.

What is the amount of tea produced in economy A and what is the amount of tea produced in economy B?

Solution: In economy A firms do not produce any tea, in economy B firms produce 17.0665 units of tea.

16. Problem

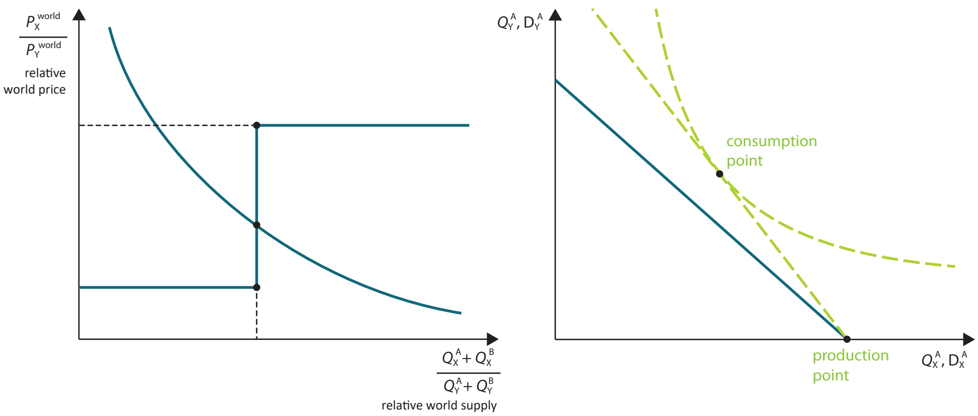
The world consists of only two economies: A and B. The first graph on the following image illustrates the relative world supply and relative world demand curves, and the second graph shows the production possibilities frontier function in country A. In autarky, the relative price of X in terms of Y would have been lower in economy A, than the same variable in economy B.



2.

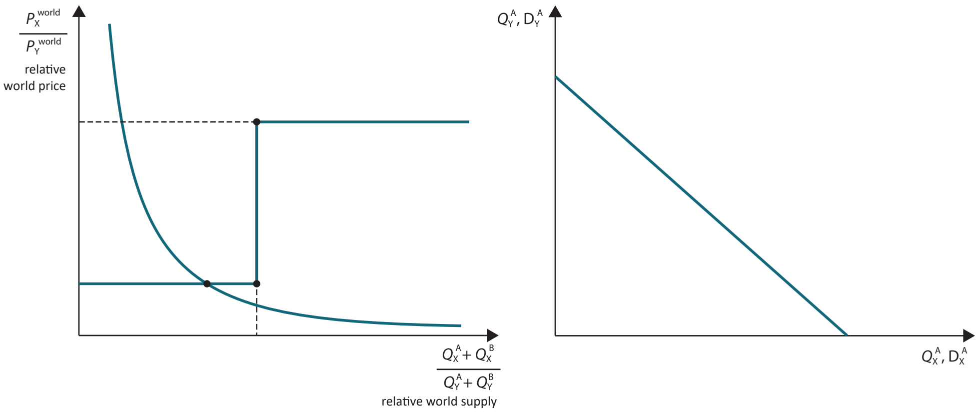
Illustrate the budget constraint and the indifference curve, that designates the optimal consumption bundle under free trade, on the second graph.

Solution: The correct graph is the following:



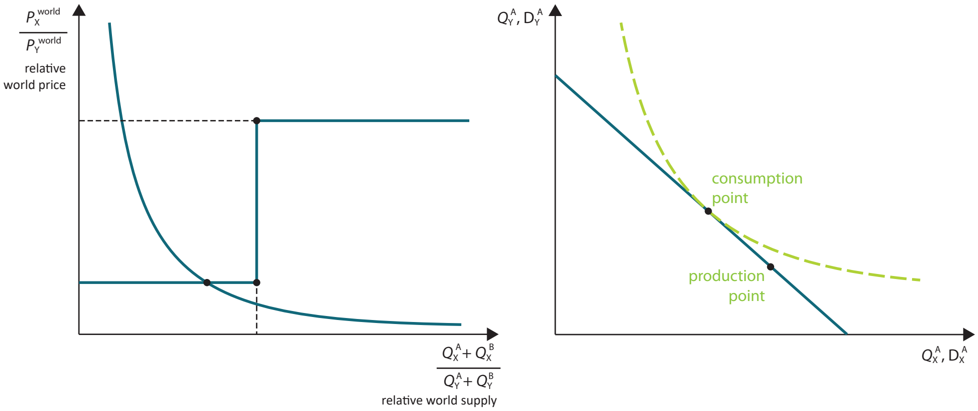
17. Problem

The world consists of only two economies: A and B. The first graph on the following image illustrates the relative world supply and relative world demand curves, and the second graph shows the production possibilities frontier function in country A. In autarky, the relative price of X in terms of Y would have been lower in economy A, than the same variable in economy B.



2. Illustrate the budget constraint and the indifference curve, that designates the optimal consumption bundle under free trade, on the second graph.

Solution: The correct graph is the following:



18. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
a_{pizza}	4.38	10.18
a_{napkin}	4.06	5.34
L	78	499

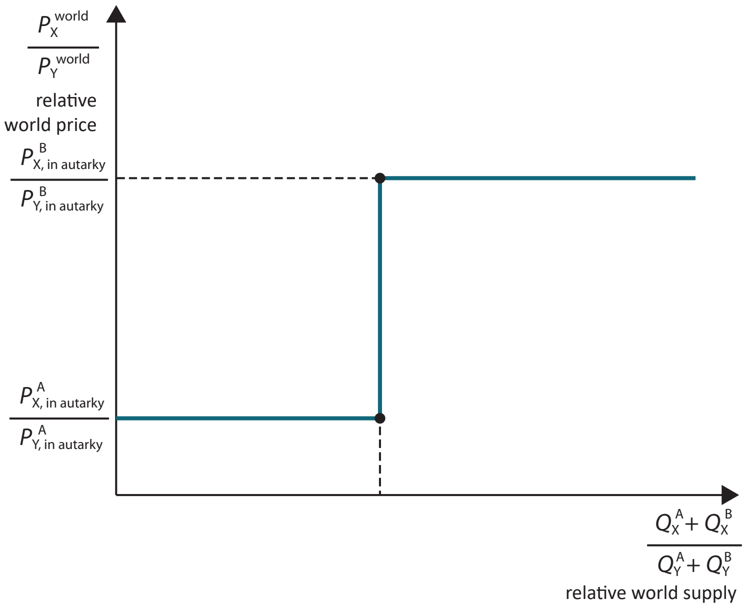
The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.51 \cdot \ln D^A_{\text{pizza}} + 2.18 \cdot \ln D^A_{\text{napkin}}$ while the utility function of the representative consumer in country B is written as $U^B = 1.54 \cdot \ln D^B_{\text{pizza}} + 2.19 \cdot \ln D^B_{\text{napkin}}$.

What is the amount of napkin produced in economy A and what is the amount of napkin produced in economy B?

Solution: In economy A firms do not produce any napkins, in economy B firms produce 65.8375 units of napkin.

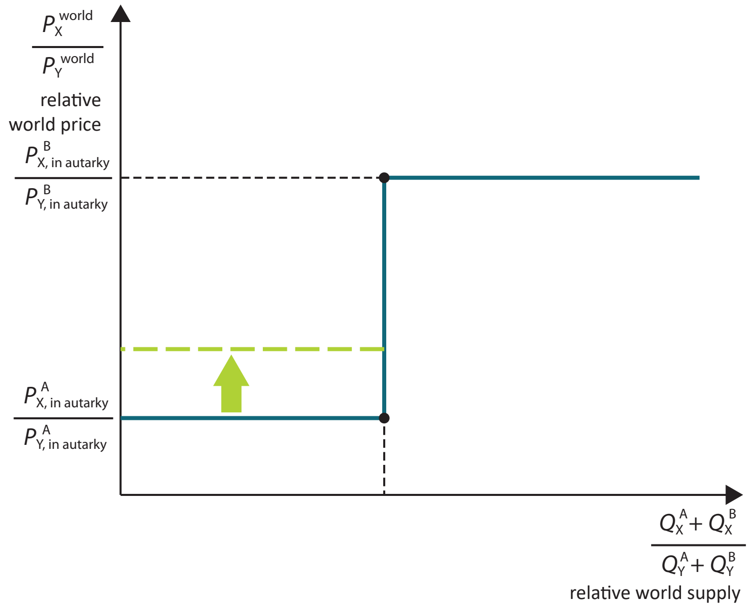
19. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is a decrease in the unit labor requirement parameter in the Y sector of in economy A.

Solution: The correct graph looks like as follows:



20. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
$a_{\text{strawberry}}$	7.29	5.71
a_{onion}	10.70	0.19
L	123	517

The representative consumer of country A seeks to maximize her utility that takes the following form

$U^A = 1.27 \cdot \ln D^A_{\text{strawberry}} + 2.11 \cdot \ln D^A_{\text{onion}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.27 \cdot \ln D^B_{\text{strawberry}} + 2.05 \cdot \ln D^B_{\text{onion}}$.

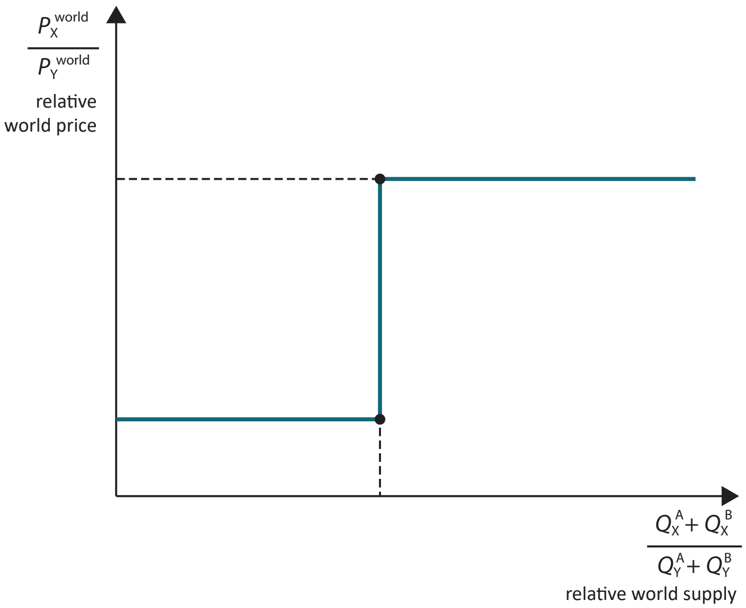
What is the amount of onion produced in economy A and what is the amount of onion produced in economy B?

Solution: In economy A firms do not produce any onions, in economy B firms produce 2721.0526 units of onion.

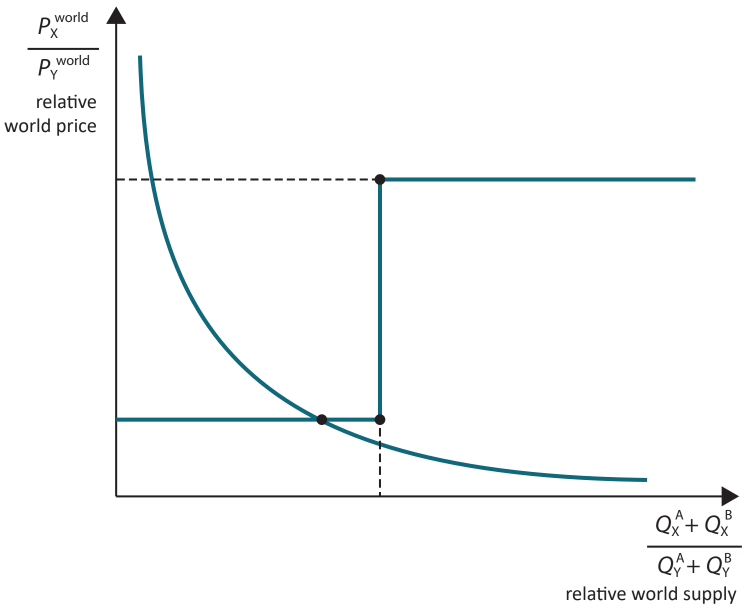
21. Problem

The world consists of only two economies: A and B. The following graph illustrates the relative world supply curve. Under free trade country A has comparative advantage in producing Y and it produces only Y. Country B produces both X and Y.

Draw in a relative world demand curve that fits the circumstances described above.



Solution: The correct graph is the following:



2.

22. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
$a_{\text{coffee cup}}$	2.36	7.31
a_{pizza}	6.94	12.25
L	197	531

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 1.60 \cdot \ln D^A_{\text{coffee cup}} + 0.39 \cdot \ln D^A_{\text{pizza}}$ while the utility function of the representative consumer in country B is written as $U^B = 1.20 \cdot \ln D^B_{\text{coffee cup}} + 1.39 \cdot \ln D^B_{\text{pizza}}$.

What is the amount of pizza produced in economy A and what is the amount of pizza produced in economy B?

Solution: In economy A firms do not produce any pizza, in economy B firms produce 32.5315 units of pizza.

23. Problem

We analyze the functioning of two large open economies A and B. In economy A it takes 4.61 units of labor to produce one unit of almond and the unit labor requirement parameter in rug sector is 1.48. The unit labor requirement parameters in economy B are $a^B_{\text{almond}} = 10.94$ and $a^B_{\text{rug}} = 6.00$. The maximum amount of labor provided in economy A is 403 units and the labor supply in economy B is 1007 units.

Write down the relative world supply curve.

Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{almond}} + Q^B_{\text{almond}}}{Q^A_{\text{rug}} + Q^B_{\text{rug}}} = \begin{cases} \text{if the relative world price is equal to } 1.823333 & (0, 0.338041] \\ \text{if the relative world price is between } 1.823333 \text{ and } 3.114865 & 0.338041 \\ \text{if the relative world price is equal to } 3.114865 & [0.338041, \infty) \end{cases}$$

2.

24. Problem

Two large open economies – A and B – trade actively with each other. Both economies operate under the assumptions of the Ricardian model. In economy A the representative consumer seeks to maximize the following utility function $U^A = 1.56 \cdot \ln D^A_{\text{hairspray}} + 0.30 \cdot \ln D^A_{\text{cauliflower}}$, the labor supply is fixed at 320 units and the unit labor requirement parameters are 9.58 in hairspray sector and 5.82 in cauliflower sector.

The functioning of economy B can be described by the following expressions:

$$\begin{aligned} U^B &= 0.87 \cdot \ln D^B_{\text{hairspray}} + 0.47 \cdot \ln D^B_{\text{cauliflower}} \\ Q^B_{\text{hairspray}} &= 6.65 \cdot L^B_{\text{hairspray}} \\ Q^B_{\text{cauliflower}} &= 6.51 \cdot L^B_{\text{cauliflower}} \\ L^B &= 346 \end{aligned}$$

What is the amount of hairspray consumed in economy A and what is the amount of hairspray consumed in economy B?

Solution: In economy A the representative consumer consumes 484.0421 units of hairspray, in economy B the representative consumer consumes 1493.8679 units of hairspray.

25. Problem

In economy A it takes 2.02 units of labor to produce one unit of bookshelf and 4.94 units of labor to produce one unit of scarf. In economy B the unit labor requirement parameter in bookshelf sector is 2.33 and it takes 1.53 units of labor to produce one unit of scarf. The maximum amount of labor provided in economy A is 251, and the labor supply in economy B is 364.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.67 \cdot \ln D^A_{\text{bookshelf}} + 1.00 \cdot \ln D^A_{\text{scarf}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.20 \cdot \ln D^B_{\text{bookshelf}} + 1.00 \cdot \ln D^B_{\text{scarf}}$.

The two countries trade with each other as large open economies.

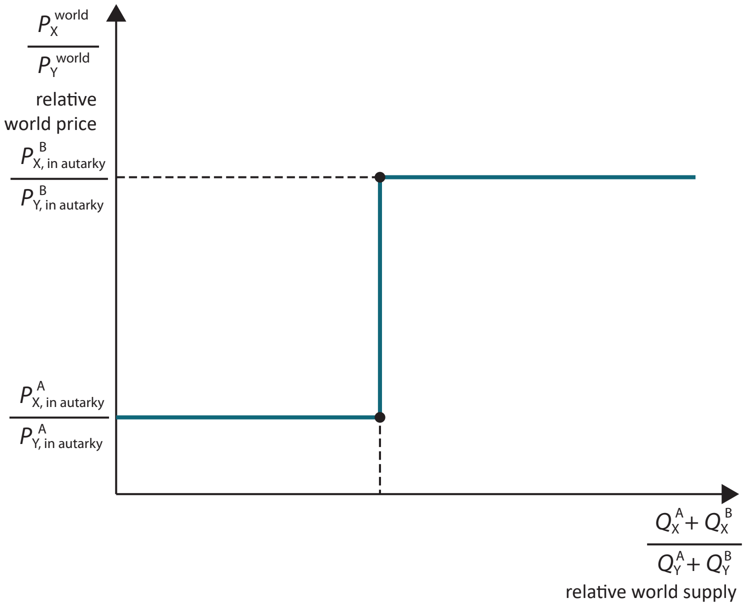
2.

Which country exports bookshelf and what is the amount of export?

Solution: Country A exports bookshelf. The amount of export is 74.4056 units.

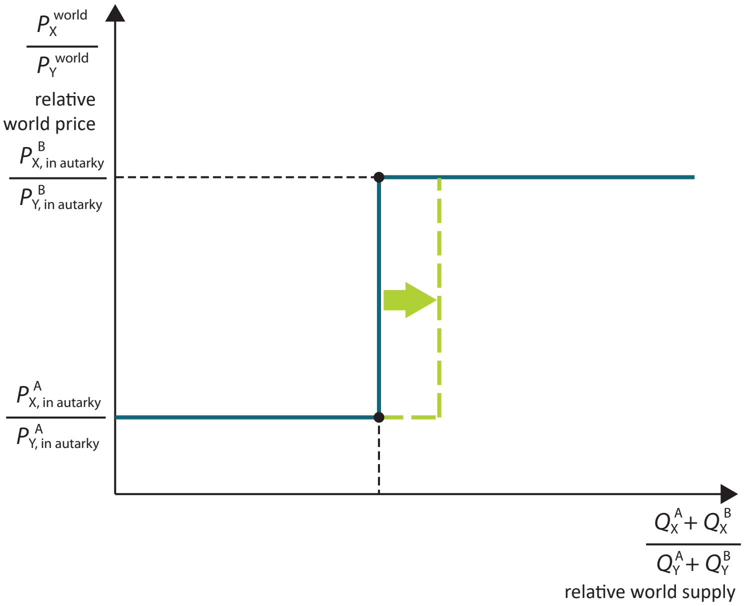
26. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is an increase in the maximum amount of labor provided in economy A.

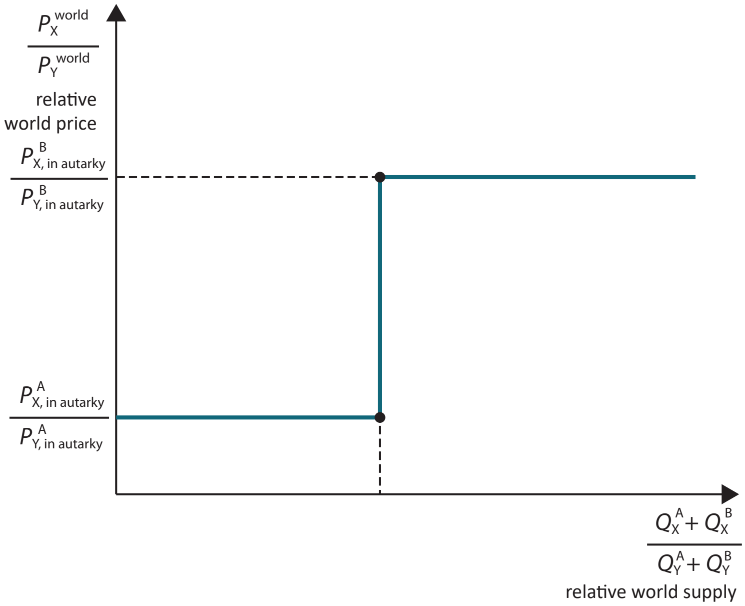
Solution: The correct graph looks like as follows:



27. Problem

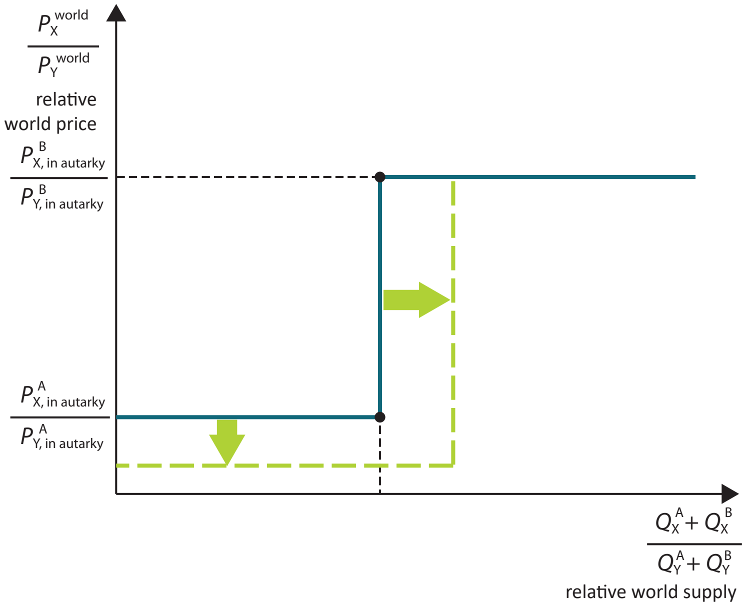
The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.

2.



Show on the graph what happens to the relative world supply curve if there is a decrease in the unit labor requirement parameter in the X sector of in economy A.

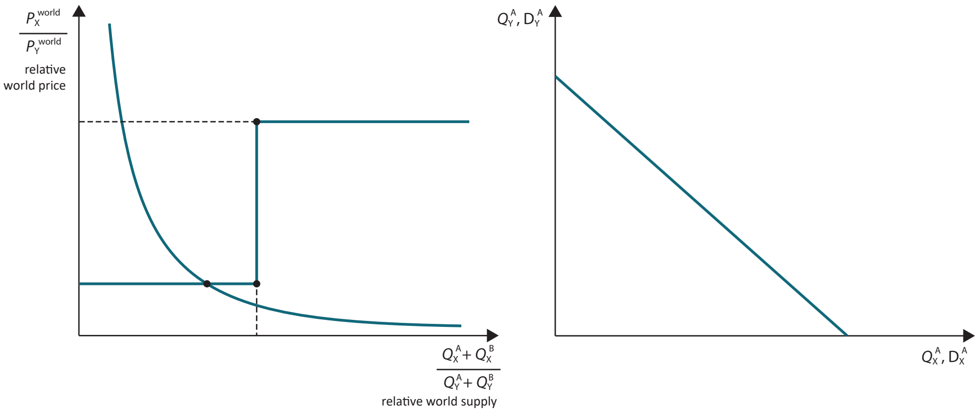
Solution: The correct graph looks like as follows:



2.

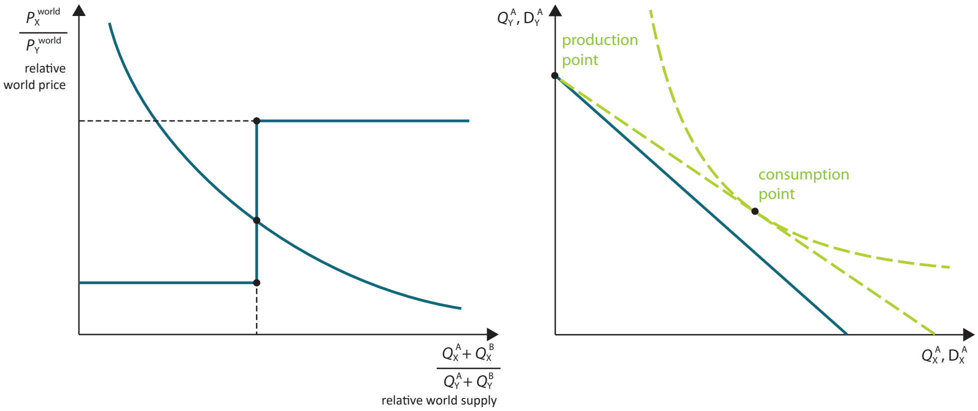
28. Problem

The world consists of only two economies: A and B. The first graph on the following image illustrates the relative world supply and relative world demand curves, and the second graph shows the production possibilities frontier function in country A. In autarky, the relative price of X in terms of Y would have been greater in economy A, than the same variable in economy B.



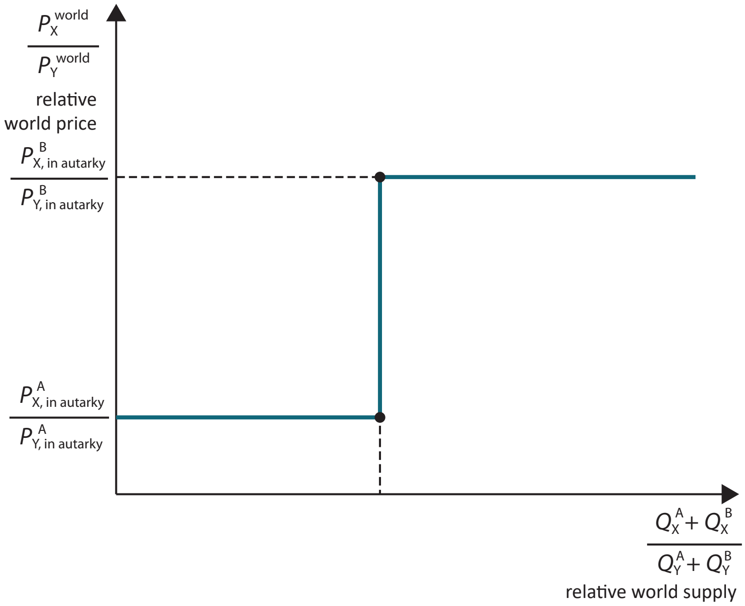
Illustrate the budget constraint and the indifference curve, that designates the optimal consumption bundle under free trade, on the second graph.

Solution: The correct graph is the following:



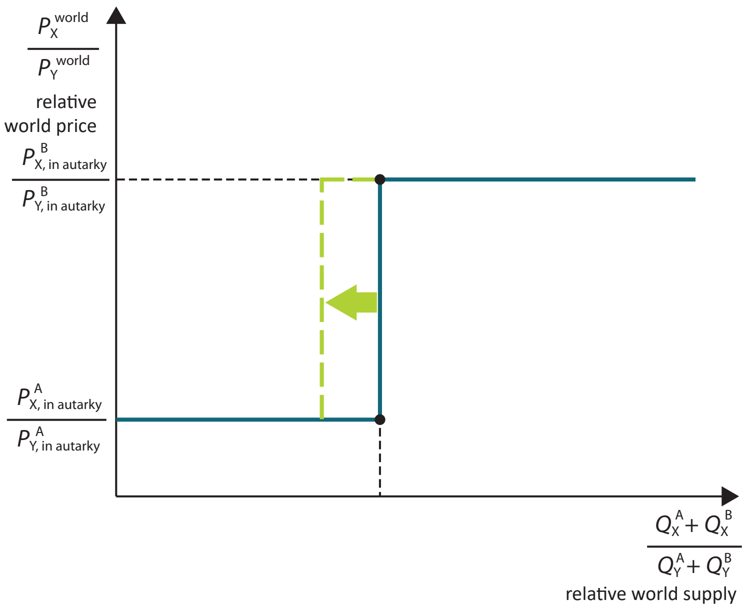
29. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is an increase in the maximum amount of labor provided in economy B.

Solution: The correct graph looks like as follows:



30. Problem

Two large open economies – A and B – trade actively with each other. Both economies operate under the assumptions of the Ricardian model. In economy A the representative consumer seeks to maximize the following utility function $U^A = 1.75 \cdot \ln D^A_{\text{porridge}} + 0.84 \cdot \ln D^A_{\text{chicken burger}}$, the labor supply is fixed at 598 units and the unit labor requirement parameters are 9.87 in porridge sector and 10.56 in chicken burger sector.

The functioning of economy B can be described by the following expressions:

$$\begin{aligned} U^B &= 0.84 \cdot \ln D^B_{\text{porridge}} + 0.68 \cdot \ln D^B_{\text{chicken burger}} \\ Q^B_{\text{porridge}} &= 2.64 \cdot L^B_{\text{porridge}} \\ Q^B_{\text{chicken burger}} &= 10.55 \cdot L^B_{\text{chicken burger}} \\ L^B &= 325 \end{aligned}$$

What is the amount of porridge consumed in economy A and what is the amount of porridge consumed in economy B?

Solution: In economy A the representative consumer consumes 3988.0135 units of porridge, in economy B the representative consumer consumes 1771.0253 units of porridge.

31. Problem

We analyze the functioning of two large open economies A and B. In economy A it takes 13.96 units of labor to produce one unit of teacup and the unit labor requirement parameter in chicken burger sector is 1.19. The unit labor requirement parameters in economy B are $a^B_{\text{teacup}} = 15.25$ and $a^B_{\text{chicken burger}} = 15.49$. The maximum amount of labor provided in economy A is 405 units and the labor supply in economy B is 469 units.

Write down the relative world supply curve.

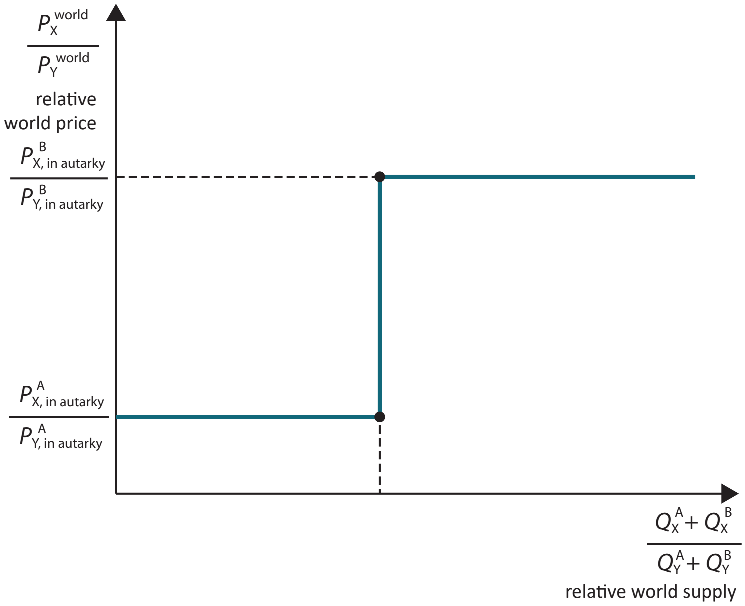
Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{teacup}} + Q^B_{\text{teacup}}}{Q^A_{\text{chicken burger}} + Q^B_{\text{chicken burger}}} = \begin{cases} \text{if the relative world price is equal to } 0.984506 & (0, 0.090364] \\ \text{if the relative world price is between } 0.984506 \text{ and } 11.731092 & 0.090364 \\ \text{if the relative world price is equal to } 11.731092 & [0.090364, \infty) \end{cases}$$

2.

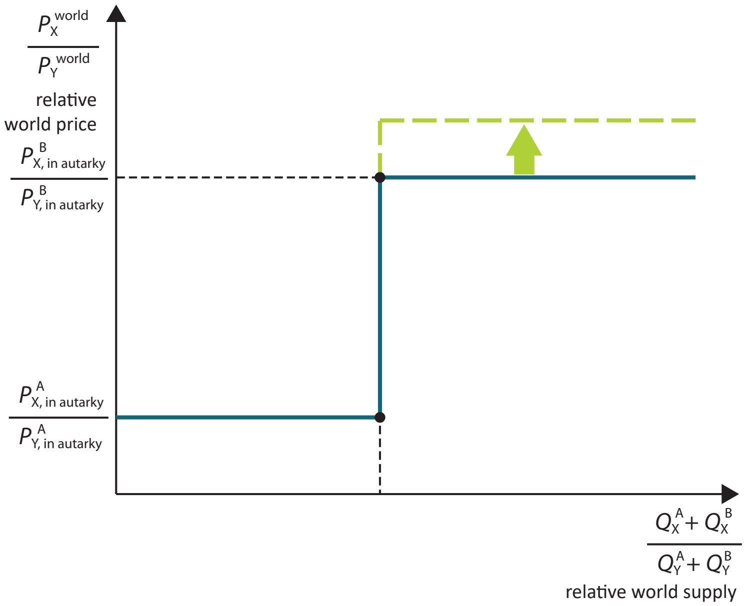
32. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is an increase in the unit labor requirement parameter in the X sector of in economy B.

Solution: The correct graph looks like as follows:



33. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
a_{lemon}	7.64	9.56
a_{salad}	8.96	5.21
L	417	67

The representative consumer of country A seeks to maximize her utility that takes the following form

$U^A = 2.14 \cdot \ln D^A_{\text{lemon}} + 1.29 \cdot \ln D^A_{\text{salad}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.41 \cdot \ln D^B_{\text{lemon}} + 1.72 \cdot \ln D^B_{\text{salad}}$.

What is the amount of salad consumed in economy A and what is the amount of salad consumed in economy B?

Solution: In economy A the representative consumer consumes 16.4049 units of salad, in economy B the representative consumer consumes 10.3845 units of salad.

34. Problem

2.

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
a_{coffee}	4.37	2.98
a_{peach}	12.14	6.44
L	83	443

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 2.04 \cdot \ln D^A_{\text{coffee}} + 2.18 \cdot \ln D^A_{\text{peach}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.40 \cdot \ln D^B_{\text{coffee}} + 0.53 \cdot \ln D^B_{\text{peach}}$.

What is the amount of peach consumed in economy A and what is the amount of peach consumed in economy B?

Solution: In economy A the representative consumer consumes 18.4958 units of peach, in economy B the representative consumer consumes 39.2022 units of peach.

35. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$U^A = 0.18 \cdot \ln D^A_{\text{spring onion}} + 1.88 \cdot \ln D^A_{\text{coffee cup}}$$

$$
\begin{aligned}
Q^A_{\text{spring onion}} &= 12.09 \cdot L^A_{\text{spring onion}} \\
Q^A_{\text{coffee cup}} &= 5.63 \cdot L^A_{\text{coffee cup}} \\
L^A &= 295 \\
U^B &= 0.64 \cdot \ln D^B_{\text{spring onion}} + 0.40 \cdot \ln D^B_{\text{coffee cup}} \\
Q^B_{\text{spring onion}} &= 4.11 \cdot L^B_{\text{spring onion}} \\
Q^B_{\text{coffee cup}} &= 4.10 \cdot L^B_{\text{coffee cup}} \\
L^B &= 425
\end{aligned}
$$

Determine the relative world price of spring onion in terms of coffee cup.

Solution: In equilibrium, the relative world price of spring onion in terms of coffee cup is 0.4657.

2.

36. Problem

In a large open economy there are just two firms: the firm that produces milkshake and the firm that produces cabbage. The following functions characterize the production process:

$$
\begin{aligned}
Q_{\text{milkshake}} &= 12.28 \cdot L_{\text{milkshake}} \\
Q_{\text{cabbage}} &= 10.48 \cdot L_{\text{cabbage}}
\end{aligned}
$$

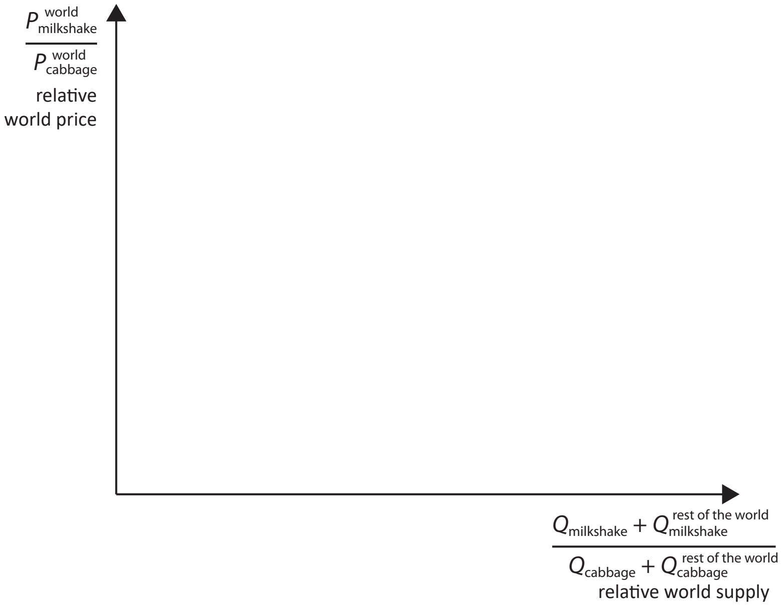
The labor supply is fixed at 1173 units.

The large open economy trades actively with the rest of the world, where the production functions are written as

$$
\begin{aligned}
Q^{\text{world}}_{\text{milkshake}} &= 10.75 \cdot L^{\text{world}}_{\text{milkshake}} \\
Q^{\text{world}}_{\text{cabbage}} &= 3.67 \cdot L^{\text{world}}_{\text{cabbage}}
\end{aligned}
$$

The labor supply is fixed at 347 units.

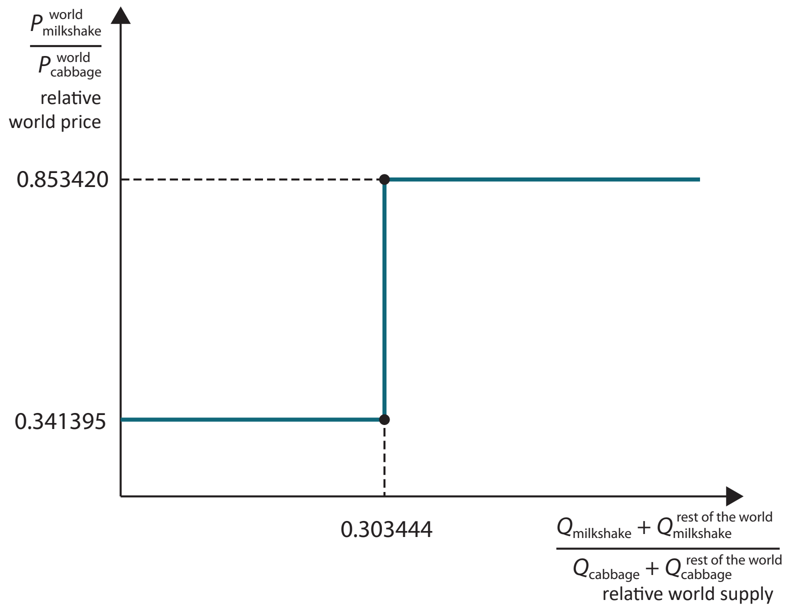
Write down the relative world supply curve and on the following graph illustrate this curve:



Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{milkshake}} + Q^B_{\text{milkshake}}}{Q^A_{\text{cabbage}} + Q^B_{\text{cabbage}}} = \begin{cases} \text{if the relative world price is equal to } 0.341395 & (0, 0.303444] \\ \text{if the relative world price is between } 0.341395 \text{ and } 0.853420 & 0.303444 \\ \text{if the relative world price is equal to } 0.853420 & [0.303444, \infty) \end{cases}$$

And the correct graph looks like this



37. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
$a_{\text{paper clip}}$	0.49	1.48
a_{lemon}	7.96	5.97
L	142	154

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.80 \cdot \ln D^A_{\text{paper clip}} + 0.21 \cdot \ln D^A_{\text{lemon}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.36 \cdot \ln D^B_{\text{paper clip}} + 2.19 \cdot \ln D^B_{\text{lemon}}$.

What is the amount of lemon produced in economy A and what is the amount of lemon produced in economy B?

Solution: In economy A firms produce 16.3074 units of lemon, in economy B firms produce 25.7956 units of lemon.

38. Problem

Two large open economies – A and B – trade actively with each other. Both economies operate under the assumptions of the Ricardian model. In economy A the representative consumer seeks to maximize the following utility function $U^A = 0.54 \cdot \ln D^A_{\text{trifle}} + 1.47 \cdot \ln D^A_{\text{hairspray}}$, the labor supply is fixed at 267 units and the unit labor requirement parameters are 4.25 in trifle sector and 5.29 in hairspray sector.

The functioning of economy B can be described by the following expressions:

$$\begin{aligned} U^B &= 0.93 \cdot \ln D^B_{\text{trifle}} + 1.27 \cdot \ln D^B_{\text{hairspray}} \\ Q^B_{\text{trifle}} &= 1.38 \cdot L^B_{\text{trifle}} \\ Q^B_{\text{hairspray}} &= 9.32 \cdot L^B_{\text{hairspray}} \\ L^B &= 496 \end{aligned}$$

What is the amount of trifle consumed in economy A and what is the amount of trifle consumed in economy B?

Solution: In economy A the representative consumer consumes 304.8582 units of trifle, in economy B the representative consumer consumes 829.8933 units of trifle.

39. Problem

In economy A it takes 2.05 units of labor to produce one unit of blackcurrant and 2.16 units of labor to produce one unit of cappuccino. In economy B the unit labor requirement parameter in blackcurrant sector is 3.10 and it takes 2.99 units of labor to produce one unit of cappuccino. The maximum amount of labor provided in economy A is 549, and the labor supply in economy B is 554.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.59 \cdot \ln D^A_{\text{blackcurrant}} + 0.85 \cdot \ln D^A_{\text{cappuccino}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.59 \cdot \ln D^B_{\text{blackcurrant}} + 0.31 \cdot \ln D^B_{\text{cappuccino}}$.

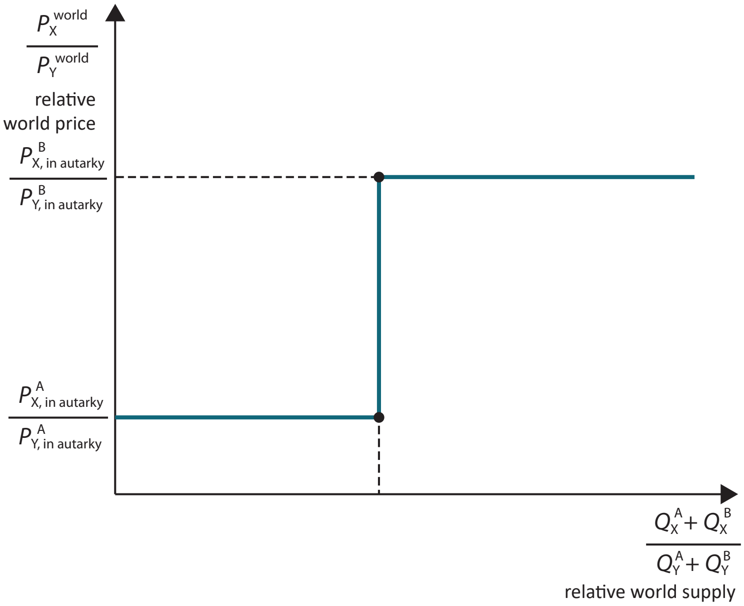
The two countries trade with each other as large open economies.

Which country exports blackcurrant and what is the amount of export?

Solution: Country A exports blackcurrant. The amount of export is 109.7256 units.

40. Problem

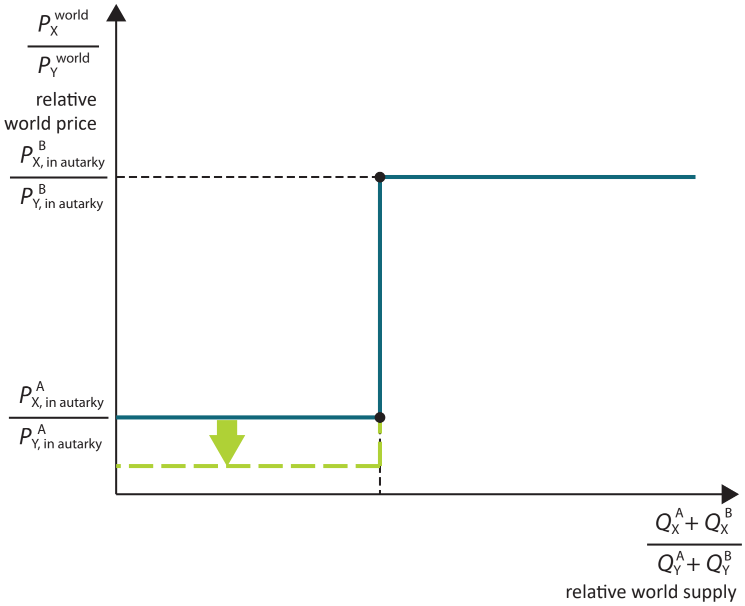
The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is an increase in the unit labor requirement parameter in the Y sector of in economy A.

Solution: The correct graph looks like as follows:

2.



41. Problem

We analyze the functioning of two large open economies A and B. In economy A it takes 8.92 units of labor to produce one unit of blackcurrant and the unit labor requirement parameter in almond sector is 3.43. The unit labor requirement parameters in economy B are $a^B_{\text{blackcurrant}} = 7.96$ and $a^B_{\text{almond}} = 8.95$. The maximum amount of labor provided in economy A is 1368 units and the labor supply in economy B is 616 units.

Write down the relative world supply curve.

Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{blackcurrant}} + Q^B_{\text{blackcurrant}}}{Q^A_{\text{almond}} + Q^B_{\text{almond}}} = \begin{cases} \text{if the relative world price is equal to } 0.889385 & (0, 0.194033] \\ \text{if the relative world price is between } 0.889385 \text{ and } 2.600583 & 0.194033 \\ \text{if the relative world price is equal to } 2.600583 & [0.194033, \infty) \end{cases}$$

42. Problem

Two large open economies – A and B – trade actively with each other. Both economies operate under the assumptions of the Ricardian model. In economy A the representative consumer seeks to maximize the following utility function $U^A = 2.35 \cdot \ln D^A_{\text{spring onion}} + 0.96 \cdot \ln D^A_{\text{paper clip}}$, the labor supply is fixed at 441 units and the unit labor requirement parameters are 9.38 in spring onion sector and 0.58 in paper clip sector.

The functioning of economy B can be described by the following expressions:

$$\begin{aligned} U^B &= 1.67 \cdot \ln D^B_{\text{spring onion}} + 0.53 \cdot \ln D^B_{\text{paper clip}} \\ Q^B_{\text{spring onion}} &= 3.72 \cdot L^B_{\text{spring onion}} \\ Q^B_{\text{paper clip}} &= 0.35 \cdot L^B_{\text{paper clip}} \\ L^B &= 367 \end{aligned}$$

What is the amount of spring onion consumed in economy A and what is the amount of spring onion consumed in economy B?

2.

Solution: In economy A the representative consumer consumes 2936.8468 units of spring onion, in economy B the representative consumer consumes 1199.3260 units of spring onion.

43. Problem

In a large open economy there are just two firms: the firm that produces plate and the firm that produces strawberry. The following functions characterize the production process:

$$\begin{aligned} Q_{\text{plate}} &= 6.51 \cdot L_{\text{plate}} \\ Q_{\text{strawberry}} &= 7.26 \cdot L_{\text{strawberry}} \end{aligned}$$

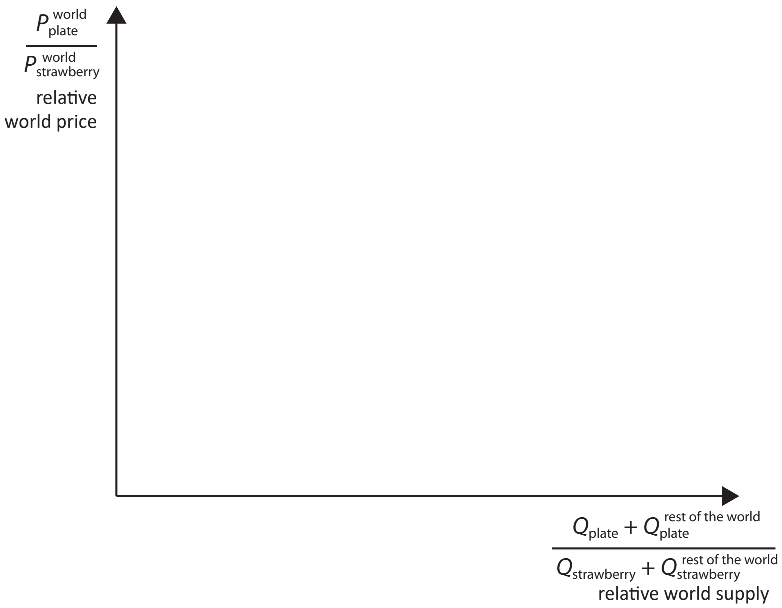
The labor supply is fixed at 624 units.

The large open economy trades actively with the rest of the world, where the production functions are written as

$$\begin{aligned} Q^{\text{world}}_{\text{plate}} &= 2.36 \cdot L^{\text{world}}_{\text{plate}} \\ Q^{\text{world}}_{\text{strawberry}} &= 1.11 \cdot L^{\text{world}}_{\text{strawberry}} \end{aligned}$$

The labor supply is fixed at 1096 units.

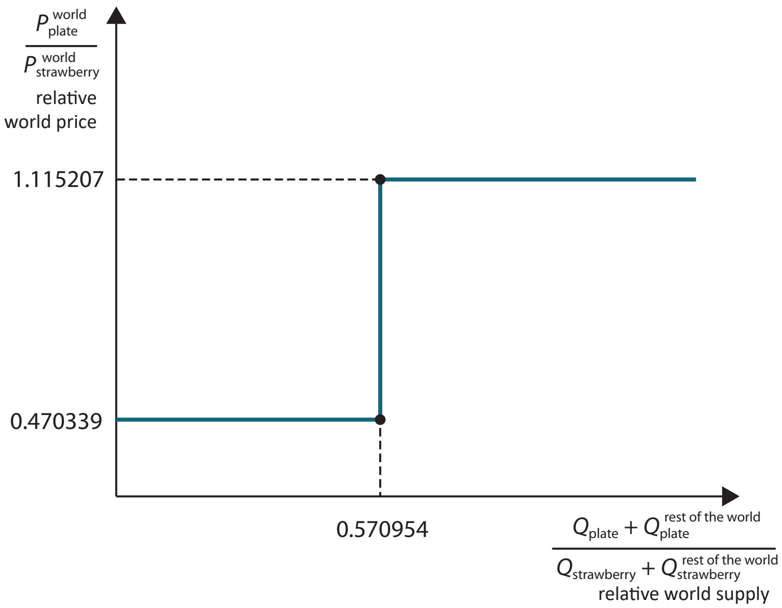
Write down the relative world supply curve and on the following graph illustrate this curve:



Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{plate}} + Q^B_{\text{plate}}}{Q^A_{\text{strawberry}} + Q^B_{\text{strawberry}}} = \begin{cases} \text{if the relative world price is equal to } 0.470339 & (0, 0.570954] \\ \text{if the relative world price is between } 0.470339 \text{ and } 1.115207 & 0.570954 \\ \text{if the relative world price is equal to } 1.115207 & [0.570954, \infty) \end{cases}$$

And the correct graph looks like this



44. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$
\begin{aligned}
U^A &= 2.40 \cdot \ln D^A_{\text{backpack}} + 2.19 \cdot \ln D^A_{\text{platform shoe}} \\
Q^A_{\text{backpack}} &= 10.53 \cdot L^A_{\text{backpack}} \\
Q^A_{\text{platform shoe}} &= 11.23 \cdot L^A_{\text{platform shoe}} \\
L^A &= 161 \\
U^B &= 1.63 \cdot \ln D^B_{\text{backpack}} + 1.57 \cdot \ln D^B_{\text{platform shoe}} \\
Q^B_{\text{backpack}} &= 1.48 \cdot L^B_{\text{backpack}} \\
Q^B_{\text{platform shoe}} &= 3.48 \cdot L^B_{\text{platform shoe}} \\
L^B &= 540
\end{aligned}
$$

Determine the relative world price of backpack in terms of platform shoe.

Solution: Under the given circumstances the relative world price of backpack in terms of platform shoe is 1.1834.

45. Problem

Two large open economies – A and B – trade actively with each other. Both economies operate under the assumptions of the Ricardian model. In economy A the representative consumer seeks to maximize the following utility function $U^A = 0.46 \cdot \ln D^A_{\text{porridge}} + 1.80 \cdot \ln D^A_{\text{paper clip}}$, the labor supply is fixed at 544 units and the unit labor requirement parameters are 1.98 in porridge sector and 6.48 in paper clip sector.

The functioning of economy B can be described by the following expressions:

$$\begin{aligned} U^B &= 2.31 \cdot \ln D^B_{\text{porridge}} + 2.41 \cdot \ln D^B_{\text{paper clip}} \\ Q^B_{\text{porridge}} &= 2.51 \cdot L^B_{\text{porridge}} \\ Q^B_{\text{paper clip}} &= 11.71 \cdot L^B_{\text{paper clip}} \\ L^B &= 112 \end{aligned}$$

2.

What is the amount of porridge consumed in economy A and what is the amount of porridge consumed in economy B?

Solution: In economy A the representative consumer consumes 219.2368 units of porridge, in economy B the representative consumer consumes 196.1260 units of porridge.

46. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
a_{cabbage}	7.51	9.35
a_{cola}	10.57	1.18
L	484	203

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 1.82 \cdot \ln D^A_{\text{cabbage}} + 1.65 \cdot \ln D^A_{\text{cola}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.93 \cdot \ln D^B_{\text{cabbage}} + 1.96 \cdot \ln D^B_{\text{cola}}$.

What is the amount of cola consumed in economy A and what is the amount of cola consumed in economy B?

Solution: In economy A the representative consumer consumes 55.3602 units of cola, in economy B the representative consumer consumes 116.6735 units of cola.

47. Problem

In a large open economy there are just two firms: the firm that produces pie and the firm that produces watch. The following functions characterize the production process:

$$Q_{\text{pie}} = 9.05 \cdot L_{\text{pie}}$$
$$Q_{\text{watch}} = 9.54 \cdot L_{\text{watch}}$$

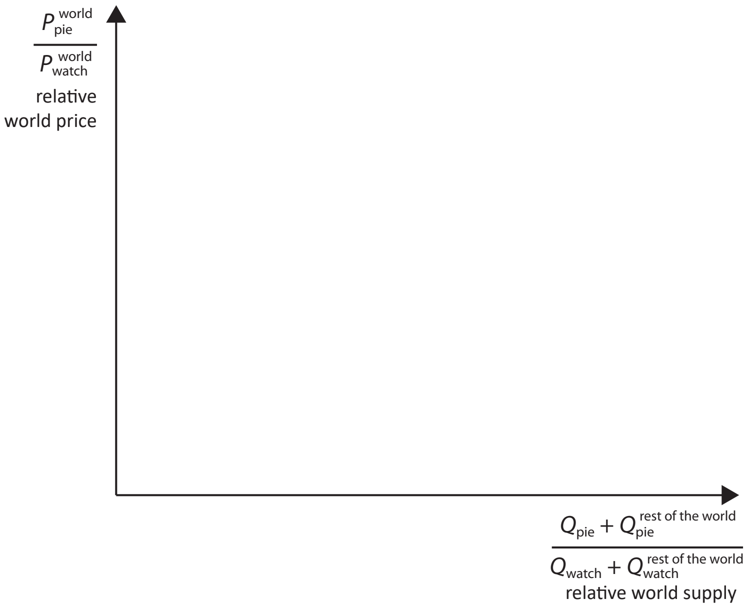
The labor supply is fixed at 225 units.

The large open economy trades actively with the rest of the world, where the production functions are written as

$$Q_{\text{pie}}^{\text{world}} = 6.42 \cdot L_{\text{pie}}^{\text{world}}$$
$$Q_{\text{watch}}^{\text{world}} = 12.81 \cdot L_{\text{watch}}^{\text{world}}$$

The labor supply is fixed at 848 units.

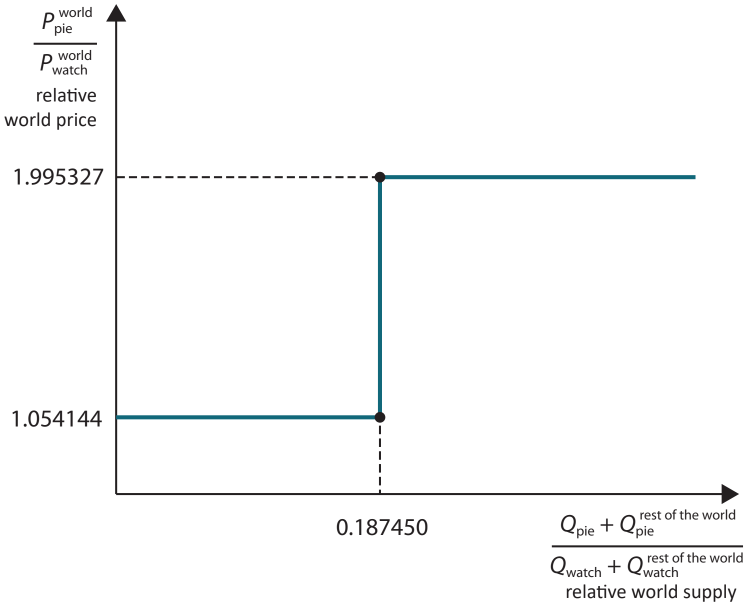
Write down the relative world supply curve and on the following graph illustrate this curve:



Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{pie}} + Q^B_{\text{pie}}}{Q^A_{\text{watch}} + Q^B_{\text{watch}}} = \begin{cases} \text{if the relative world price is equal to } 1.054144 & (0, 0.187450] \\ \text{if the relative world price is between } 1.054144 \text{ and } 1.995327 & 0.187450 \\ \text{if the relative world price is equal to } 1.995327 & [0.187450, \infty) \end{cases}$$

And the correct graph looks like this



48. Problem

In economy A it takes 2.44 units of labor to produce one unit of hairspray and 5.97 units of labor to produce one unit of painting. In economy B the unit labor requirement parameter in hairspray sector is 0.94 and it takes 1.66 units of labor to produce one unit of painting. The maximum amount of labor provided in economy A is 575, and the labor supply in economy B is 437.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 1.45 \cdot \ln D^A_{\text{hairspray}} + 0.41 \cdot \ln D^A_{\text{painting}}$ while the utility function of the representative consumer in country B is written as $U^B = 2.40 \cdot \ln D^B_{\text{hairspray}} + 1.80 \cdot \ln D^B_{\text{painting}}$.

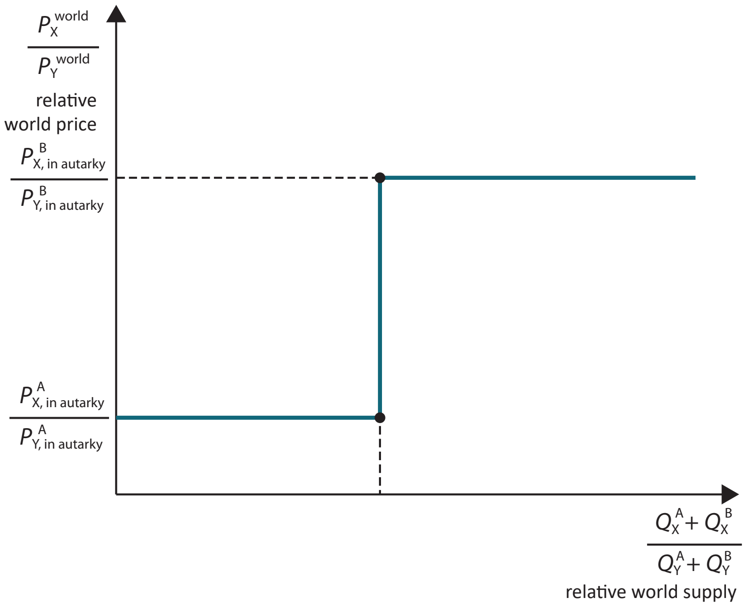
The two countries trade with each other as large open economies.

Which country exports hairspray and what is the amount of export?

Solution: Country A exports hairspray. The amount of export is 51.9456 units.

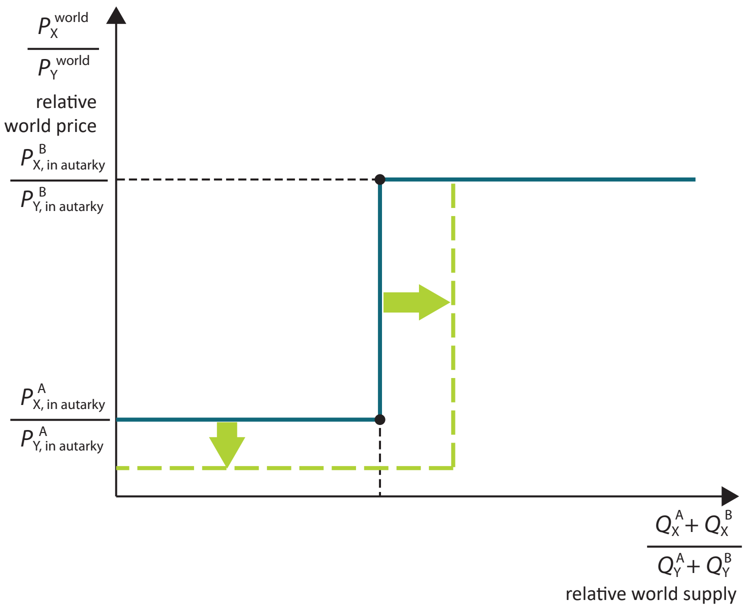
49. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is an increase in the unit labor requirement parameter in the X sector of in economy A.

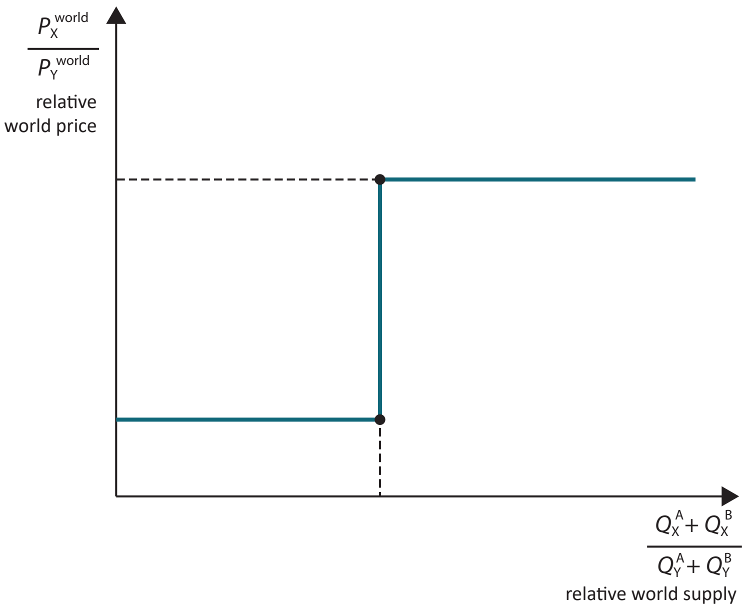
Solution: The correct graph looks like as follows:



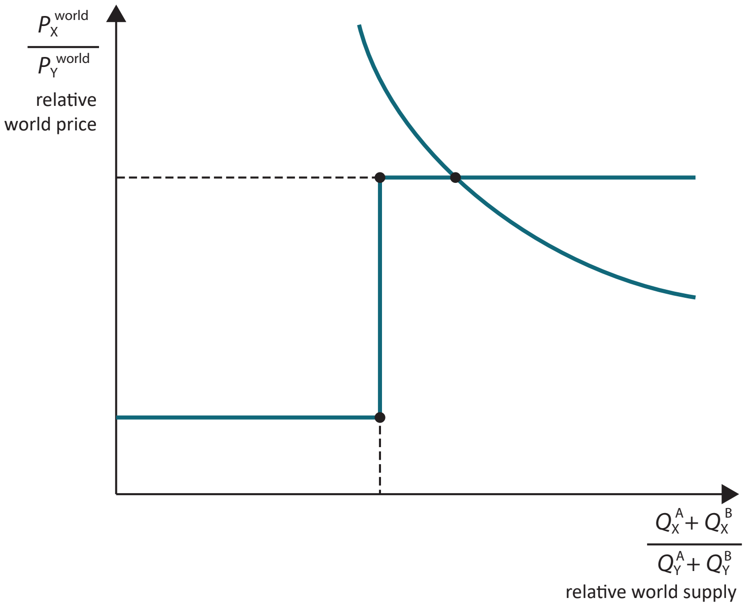
50. Problem

The world consists of only two economies: A and B. The following graph illustrates the relative world supply curve. Under free trade country A has comparative advantage in producing X and it produces only X. Country B produces both X and Y.

Draw in a relative world demand curve that fits the circumstances described above.



Solution: The correct graph is the following:



2.

51. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$
\begin{aligned}
U^A &= 1.83 \cdot \ln D^A_{\text{tea}} + 0.39 \cdot \ln D^A_{\text{fruit cake}} \\
Q^A_{\text{tea}} &= 1.17 \cdot L^A_{\text{tea}} \\
Q^A_{\text{fruit cake}} &= 0.39 \cdot L^A_{\text{fruit cake}} \\
L^A &= 568 \\
U^B &= 0.23 \cdot \ln D^B_{\text{tea}} + 2.27 \cdot \ln D^B_{\text{fruit cake}} \\
Q^B_{\text{tea}} &= 8.92 \cdot L^B_{\text{tea}} \\
Q^B_{\text{fruit cake}} &= 11.55 \cdot L^B_{\text{fruit cake}} \\
L^B &= 597
\end{aligned}
$$

2.

What is the amount of tea produced in economy A and what is the amount of tea produced in economy B?

Solution: The tea production in economy B is 373.1751 units and the tea production in economy B is 664.56 units.

52. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
a_{pie}	1.97	11.10
a_{cola}	12.13	12.04
L	328	286

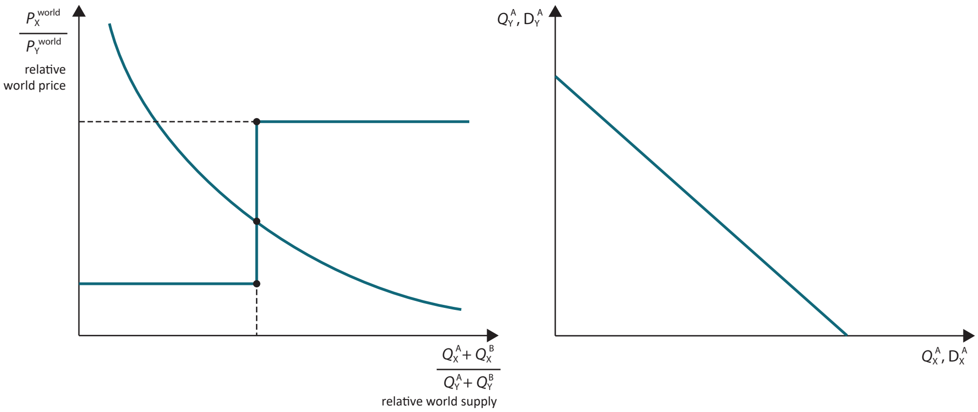
The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.53 \cdot \ln D^A_{\text{pie}} + 0.24 \cdot \ln D^A_{\text{cola}}$ while the utility function of the representative consumer in country B is written as $U^B = 1.69 \cdot \ln D^B_{\text{pie}} + 0.13 \cdot \ln D^B_{\text{cola}}$.

What is the amount of cola consumed in economy A and what is the amount of cola consumed in economy B?

Solution: In economy A the representative consumer consumes 22.0555 units of cola, in economy B the representative consumer consumes 1.6967 units of cola.

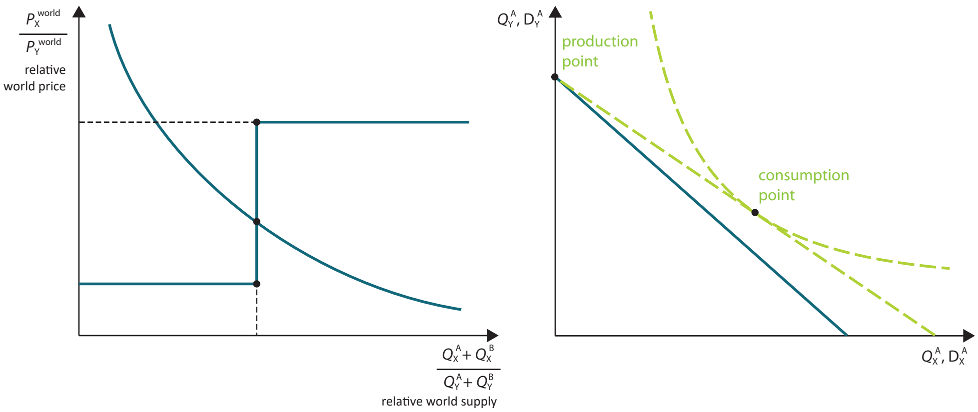
53. Problem

The world consists of only two economies: A and B. The first graph on the following image illustrates the relative world supply and relative world demand curves, and the second graph shows the production possibilities frontier function in country A. Country A has comparative advantage in producing Y.



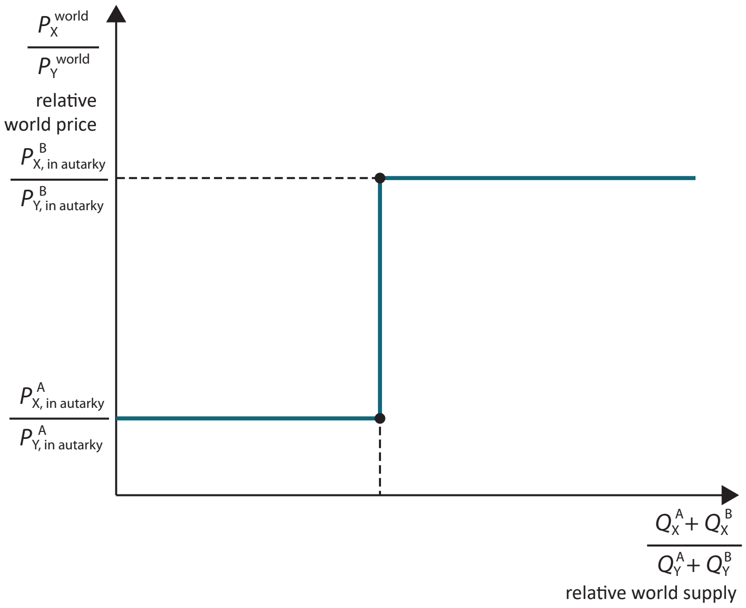
Illustrate the budget constraint and the indifference curve, that designates the optimal consumption bundle under free trade, on the second graph.

Solution: The correct graph is the following:



54. Problem

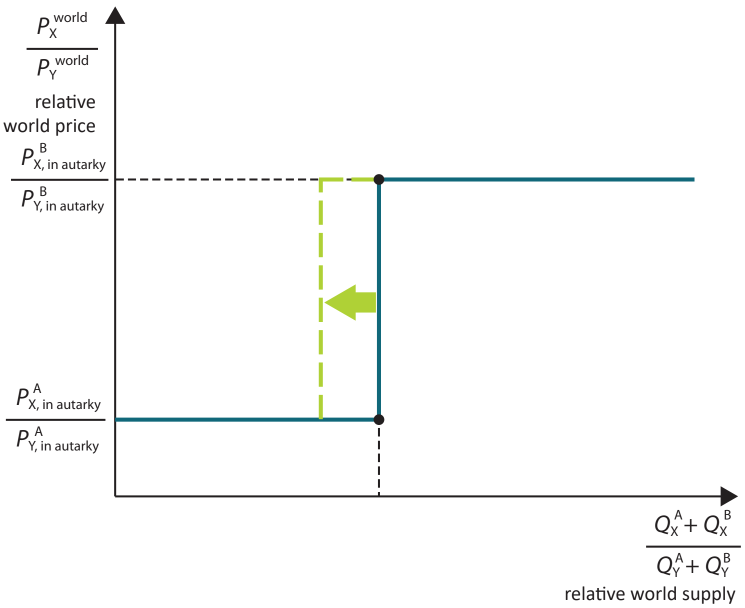
The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is a decrease in the maximum amount of labor provided in economy A.

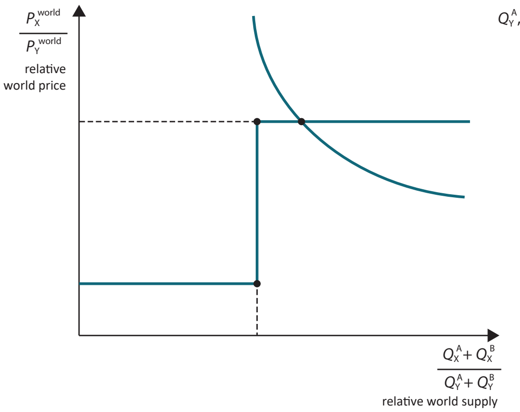
Solution: The correct graph looks like as follows:

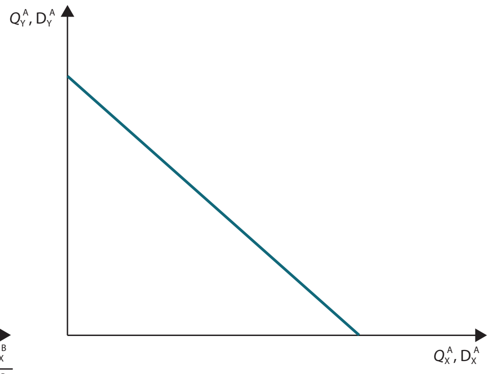
2.



55. Problem

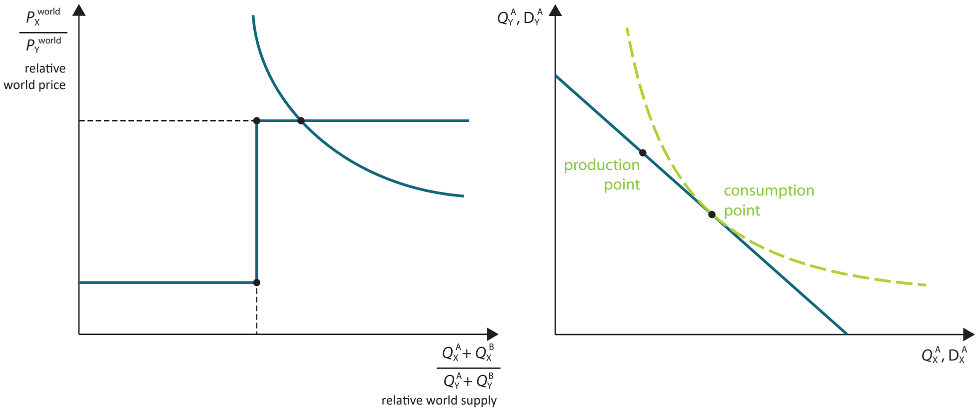
The world consists of only two economies: A and B. The first graph on the following image illustrates the relative world supply and relative world demand curves, and the second graph shows the production possibilities frontier function in country A. In autarky, the relative price of X in terms of Y would have been greater in economy A, than the same variable in economy B.





Illustrate the budget constraint and the indifference curve, that designates the optimal consumption bundle under free trade, on the second graph.

Solution: The correct graph is the following:



56. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$\begin{aligned}
U^A &= 0.63 \cdot \ln D^A_{\text{ice cream}} + 1.82 \cdot \ln D^A_{\text{orange}} \\
Q^A_{\text{ice cream}} &= 10.89 \cdot L^A_{\text{ice cream}} \\
Q^A_{\text{orange}} &= 3.09 \cdot L^A_{\text{orange}} \\
L^A &= 110 \\
U^B &= 1.46 \cdot \ln D^B_{\text{ice cream}} + 1.26 \cdot \ln D^B_{\text{orange}} \\
Q^B_{\text{ice cream}} &= 4.36 \cdot L^B_{\text{ice cream}} \\
Q^B_{\text{orange}} &= 2.31 \cdot L^B_{\text{orange}} \\
L^B &= 360
\end{aligned}$$

What is the amount of ice cream produced in economy A and what is the amount of ice cream produced in economy B?

Solution: $Q^A_{\text{ice cream}} = 1197.9$ and $Q^B_{\text{ice cream}} = 0$.

57. Problem

In economy A it takes 0.23 units of labor to produce one unit of tomato and 10.84 units of labor to produce one unit of brioche. In economy B the unit labor requirement parameter in tomato sector is 0.93 and it takes 1.52 units of labor to produce one unit of brioche. The maximum amount of labor provided in economy A is 450, and the labor supply in economy B is 281.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 0.29 \cdot \ln D^A_{\text{tomato}} + 1.25 \cdot \ln D^A_{\text{brioche}}$ while the utility function of the representative consumer in country B is written as $U^B = 1.82 \cdot \ln D^B_{\text{tomato}} + 0.59 \cdot \ln D^B_{\text{brioche}}$.

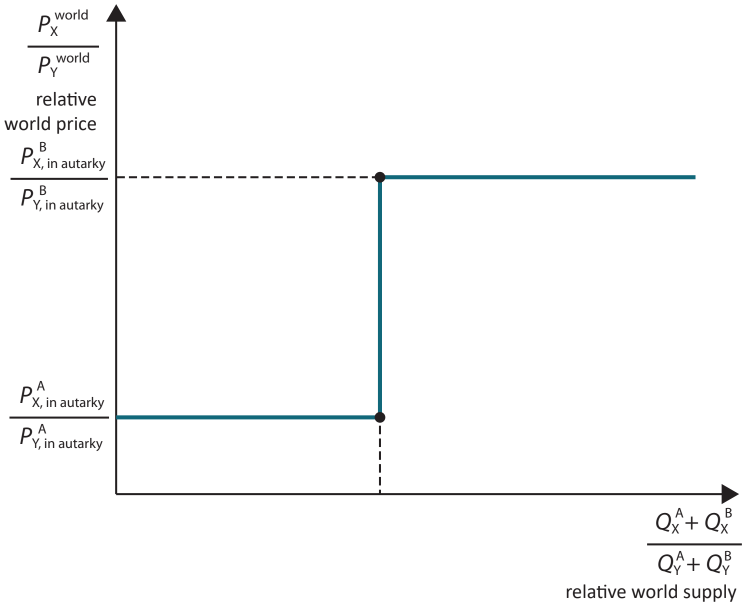
The two countries trade with each other as large open economies.

Which country imports tomato and what is the amount of import?

Solution: Country B imports tomato. The amount of import is 1588.0858 units.

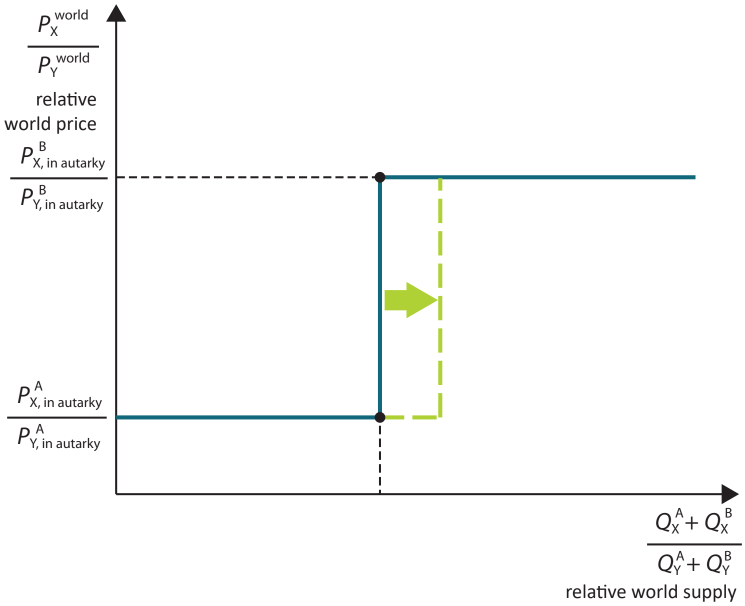
58. Problem

The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.



Show on the graph what happens to the relative world supply curve if there is a decrease in the maximum amount of labor provided in economy B.

Solution: The correct graph looks like as follows:



2.

59. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$\begin{aligned}
U^A &= 1.83 \cdot \ln D^A_{\text{almond}} + 0.77 \cdot \ln D^A_{\text{salad}} \\
Q^A_{\text{almond}} &= 9.24 \cdot L^A_{\text{almond}} \\
Q^A_{\text{salad}} &= 7.80 \cdot L^A_{\text{salad}} \\
L^A &= 361 \\
U^B &= 0.92 \cdot \ln D^B_{\text{almond}} + 1.39 \cdot \ln D^B_{\text{salad}} \\
Q^B_{\text{almond}} &= 5.22 \cdot L^B_{\text{almond}} \\
Q^B_{\text{salad}} &= 11.34 \cdot L^B_{\text{salad}} \\
L^B &= 336
\end{aligned}$$

What is the amount of almond produced in economy A and what is the amount of almond produced in economy B?

Solution: Economy A produces 3335.64 units of almond and economy B does not produce any almonds.

60. Problem

In economy A it takes 4.96 units of labor to produce one unit of watermelon and 1.65 units of labor to produce one unit of hairspray. In economy B the unit labor requirement parameter in watermelon sector is 9.93 and it takes 2.87 units of labor to produce one unit of hairspray. The maximum amount of labor provided in economy A is 455, and the labor supply in economy B is 103.

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 1.83 \cdot \ln D^A_{\text{watermelon}} + 1.22 \cdot \ln D^A_{\text{hairspray}}$ while the utility function of the representative consumer in country B is written as $U^B = 0.26 \cdot \ln D^B_{\text{watermelon}} + 0.70 \cdot \ln D^B_{\text{hairspray}}$.

The two countries trade with each other as large open economies.

Which country imports watermelon and what is the amount of import?

Solution: Country B imports watermelon. The amount of import is 3.2334 units.

61. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$\begin{aligned}
U^A &= 1.69 \cdot \ln D^A_{\text{handbag}} + 2.25 \cdot \ln D^A_{\text{cauliflower}} \\
Q^A_{\text{handbag}} &= 9.81 \cdot L^A_{\text{handbag}} \\
Q^A_{\text{cauliflower}} &= 2.00 \cdot L^A_{\text{cauliflower}} \\
L^A &= 576 \\
U^B &= 2.04 \cdot \ln D^B_{\text{handbag}} + 1.36 \cdot \ln D^B_{\text{cauliflower}} \\
Q^B_{\text{handbag}} &= 6.49 \cdot L^B_{\text{handbag}} \\
Q^B_{\text{cauliflower}} &= 4.47 \cdot L^B_{\text{cauliflower}} \\
L^B &= 465
\end{aligned}$$

Determine the relative world price of handbag in terms of cauliflower.

Solution: The relative world price of handbag in terms of cauliflower is 0.3865.

62. Problem

We analyze the functioning of two large open economies A and B. In economy A it takes 6.12 units of labor to produce one unit of backpack and the unit labor requirement parameter in brioche sector is 1.11. The unit labor requirement parameters in economy B are $a^B_{\text{backpack}} = 3.33$ and $a^B_{\text{brioche}} = 12.28$. The maximum amount of labor provided in economy A is 865 units and the labor supply in economy B is 1406 units.

Write down the relative world supply curve.

Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{backpack}} + Q^B_{\text{backpack}}}{Q^A_{\text{brioche}} + Q^B_{\text{brioche}}} = \begin{cases} \text{if the relative world price is equal to } 0.271173 & (0, 0.541811] \\ \text{if the relative world price is between } 0.271173 \text{ and } 5.513514 & 0.541811 \\ \text{if the relative world price is equal to } 5.513514 & [0.541811, \infty) \end{cases}$$

63. Problem

In a large open economy there are just two firms: the firm that produces lemonade and the firm that produces jigsaw. The following functions characterize the production process:

$$Q_{\text{lemonade}} = 7.49 \cdot L_{\text{lemonade}}$$
$$Q_{\text{jigsaw}} = 7.34 \cdot L_{\text{jigsaw}}$$

The labor supply is fixed at 696 units.

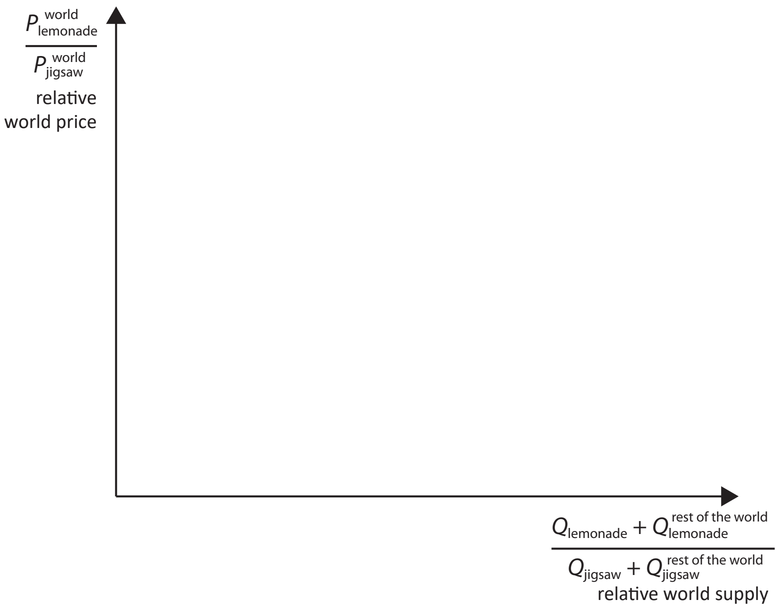
The large open economy trades actively with the rest of the world, where the production functions are written as

$$Q^{\text{world}}_{\text{lemonade}} = 5.35 \cdot L^{\text{world}}_{\text{lemonade}}$$
$$Q^{\text{world}}_{\text{jigsaw}} = 7.05 \cdot L^{\text{world}}_{\text{jigsaw}}$$

The labor supply is fixed at 542 units.

Write down the relative world supply curve and on the following graph illustrate this curve:

2.

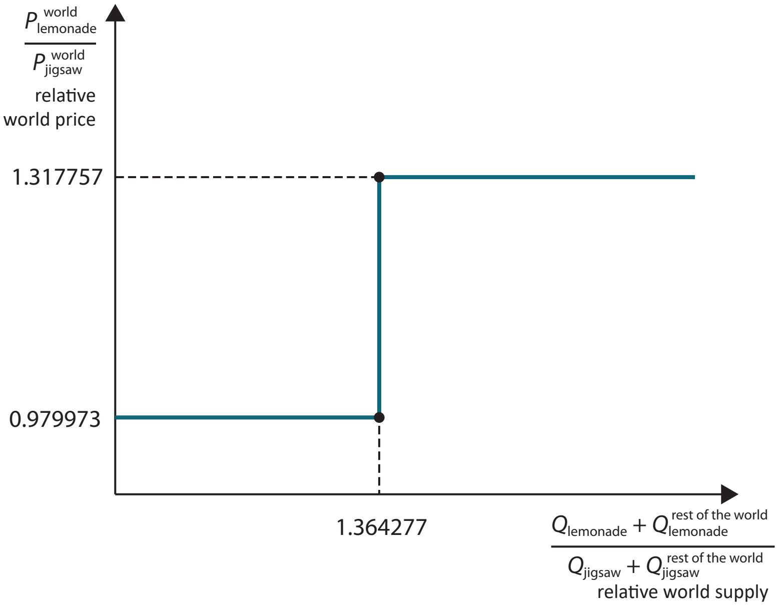


2.

Solution: The relative world supply curve can be written as:

$$\frac{Q^A_{\text{lemonade}} + Q^B_{\text{lemonade}}}{Q^A_{\text{jigsaw}} + Q^B_{\text{jigsaw}}} = \begin{cases} \text{if the relative world price is equal to } 0.979973 & (0, 1.364277] \\ \text{if the relative world price is between } 0.979973 \text{ and } 1.317757 & 1.364277 \\ \text{if the relative world price is equal to } 1.317757 & [1.364277, \infty) \end{cases}$$

And the correct graph looks like this



2.

64. Problem

Countries A and B operate under the assumptions of the Ricardian model. They trade with each other as large open economies. The following table shows the unit labor requirement parameters and labor supply for both economies:

	Country A	Country B
a_{teapot}	12.29	7.56
a_{plate}	10.23	6.03
L	263	365

The representative consumer of country A seeks to maximize her utility that takes the following form $U^A = 1.26 \cdot \ln D^A_{teapot} + 2.33 \cdot \ln D^A_{plate}$ while the utility function of the representative consumer in country B is written as $U^B = 1.99 \cdot \ln D^B_{teapot} + 0.97 \cdot \ln D^B_{plate}$.

What is the amount of plate consumed in economy A and what is the amount of plate consumed in economy B?

Solution: In economy A the representative consumer consumes 23.5626 units of plate, in economy B the representative consumer consumes 19.8361 units of plate.

65. Problem

The known world consists of two economies A and B. Both economies operate under the assumptions of the Ricardian model and both are large open economies. The functioning of these countries can be described by the following equations and exogenous variables:

$$\begin{aligned}
U^A &= 2.22 \cdot \ln D^A_{\text{spring onion}} + 2.31 \cdot \ln D^A_{\text{broccoli}} \\
Q^A_{\text{spring onion}} &= 11.18 \cdot L^A_{\text{spring onion}} \\
Q^A_{\text{broccoli}} &= 0.69 \cdot L^A_{\text{broccoli}} \\
L^A &= 120 \\
U^B &= 2.14 \cdot \ln D^B_{\text{spring onion}} + 0.20 \cdot \ln D^B_{\text{broccoli}} \\
Q^B_{\text{spring onion}} &= 9.06 \cdot L^B_{\text{spring onion}} \\
Q^B_{\text{broccoli}} &= 7.38 \cdot L^B_{\text{broccoli}} \\
L^B &= 240
\end{aligned}$$

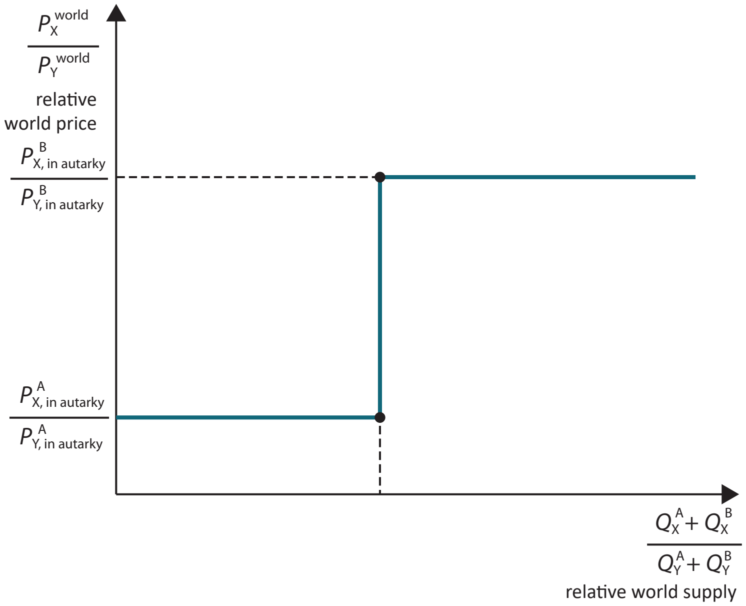
Determine the relative world price of spring onion in terms of broccoli.

Solution: The relative world price of spring onion in terms of broccoli is 0.8146.

66. Problem

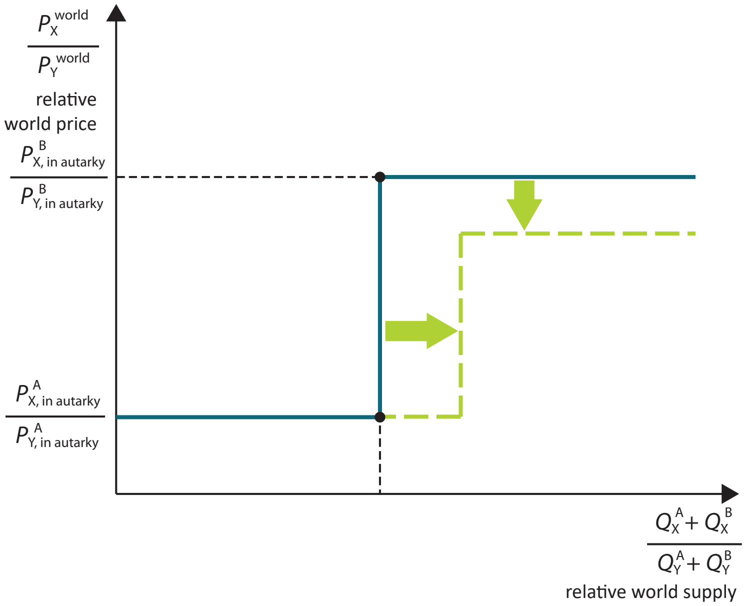
The world operates under the assumptions of the Ricardian model. It consists of two large open economies, A and B. The following graph illustrates the relative world supply curve.

2.



Show on the graph what happens to the relative world supply curve if there is an increase in the unit labor requirement parameter in the Y sector of in economy B.

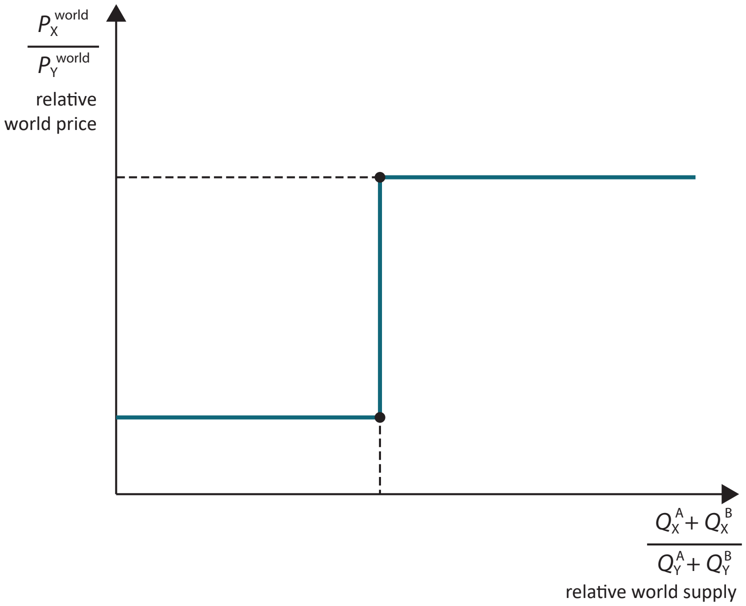
Solution: The correct graph looks like as follows:



67. Problem

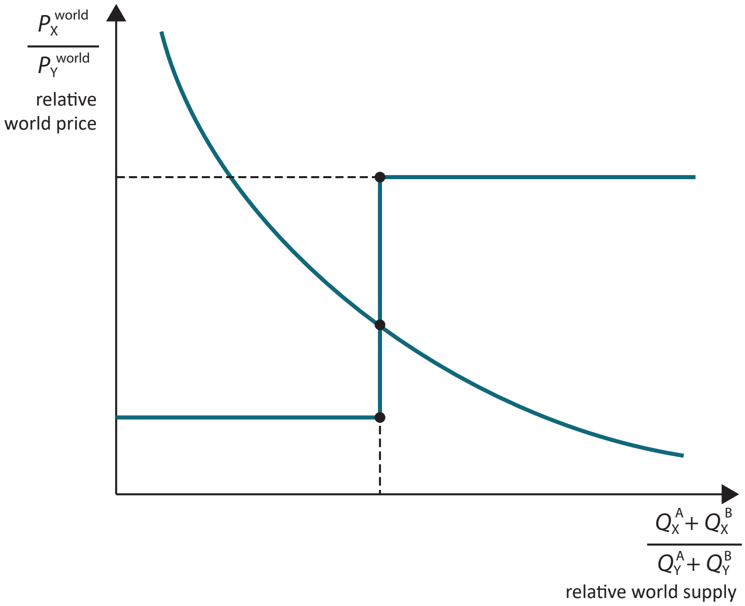
The world consists of only two economies: A and B. The following graph illustrates the relative world supply curve. Under free trade country A has comparative advantage in producing Y and it produces only Y. Country B specializes in X production (and the specialization is complete).

Draw in a relative world demand curve that fits the circumstances described above.



Solution: The correct graph is the following:

2.


$\frac{P_X^{world}}{P_Y^{world}}$
relative
world price
$\frac{Q_X^A + Q_X^B}{Q_Y^A + Q_Y^B}$
relative world supply

3. SPECIFIC FACTORS MODEL AUTARKY

3.

Specific Factors Model
Autarky

1. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.41 \cdot D_{\text{tea}}^{0.21} \cdot D_{\text{napkin}}^{0.79}$$
$$Q_{\text{tea}} = 1.11 \cdot K^{0.66} L_{\text{tea}}^{0.34}$$
$$Q_{\text{napkin}} = 1.06 \cdot T^{0.66} L_{\text{napkin}}^{0.34}$$
$$L = 108$$
$$K = 147$$
$$T = 159$$
$$P = P_{\text{tea}}^{0.48} P_{\text{napkin}}^{0.52}$$

Calculate the real rental rate of capital.

Solution: The real rental rate of capital is 0.2470.

2. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 2.20 \cdot \ln D_{\text{blackcurrant}} + 1.09 \cdot \ln D_{\text{hairdryer}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{blackcurrant}} = 2.20 \cdot K^{0.15} L_{\text{blackcurrant}}^{0.85}$$
$$Q_{\text{hairdryer}} = 0.47 \cdot T^{0.15} L_{\text{hairdryer}}^{0.85}$$

The maximum amount of inputs are constant. The economy uses 92 units of labor, 166 units of capital and 213 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Calculate the amount of blackcurrant produced by the economy.

Solution: In optimum 157.0729 is the amount of .blackcurrant produced.

3. Problem

3.

The following set of formulas represents the functioning of a closed economy:

$$
\begin{aligned}
U &= 1.09 \cdot D_{\text{chicken burger}}^{0.33} \cdot D_{\text{backpack}}^{0.67} \\
Q_{\text{chicken burger}} &= 2.25 \cdot K^{0.66} L_{\text{chicken burger}}^{0.34} \\
Q_{\text{backpack}} &= 1.76 \cdot T^{0.66} L_{\text{backpack}}^{0.34} \\
L &= 78 \\
K &= 93 \\
T &= 217 \\
P &= P_{\text{chicken burger}}^{0.46} P_{\text{backpack}}^{0.54}
\end{aligned}
$$

Determine the price of chicken burger in terms of backpack.

Solution: The price of chicken burger in terms of backpack is 0.8574 units.

4. Problem

The following set of formulas represents the functioning of a closed economy:

$$
\begin{aligned}
U &= 0.63 \cdot D_{\text{lemon}}^{0.64} \cdot D_{\text{teapot}}^{0.36} \\
Q_{\text{lemon}} &= 1.71 \cdot K^{0.26} L_{\text{lemon}}^{0.74} \\
Q_{\text{teapot}} &= 1.10 \cdot T^{0.26} L_{\text{teapot}}^{0.74} \\
L &= 495 \\
K &= 144 \\
T &= 115 \\
P &= P_{\text{lemon}}^{0.45} P_{\text{teapot}}^{0.55}
\end{aligned}
$$

Calculate the real rental rate of capital.

Solution: The real rental rate of capital is 0.6573.

5. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.30 \cdot \ln D_{\text{cappuccino}} + 2.39 \cdot \ln D_{\text{coffee cup}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{cappuccino}} = 2.37 \cdot K^{0.49} L_{\text{cappuccino}}^{0.51}$$
$$Q_{\text{coffee cup}} = 1.66 \cdot T^{0.49} L_{\text{coffee cup}}^{0.51}$$

The maximum amount of inputs are constant. The economy uses 257 units of labor, 93 units of capital and 135 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the relative price (price of cappuccino to price of coffee cup) in this economy?

Solution: The relative price is 0.3041 in this economy.

6. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.28 \cdot \ln D_{\text{pizza}} + 0.38 \cdot \ln D_{\text{almond}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{pizza}} = 2.34 \cdot K^{0.66} L_{\text{pizza}}^{0.34}$$
$$Q_{\text{almond}} = 1.08 \cdot T^{0.66} L_{\text{almond}}^{0.34}$$

The maximum amount of inputs are constant. The economy uses 612 units of labor, 72 units of capital and 149 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Determine the amount of almond purchased by the utility maximizing consumer.

Solution: In optimum 215.6273 is the amount of .almond consumed.

7. Problem

In a closed economy the production function in the pizza sector is $Q_{\text{pizza}} = 2.14 \cdot K^{0.30} L_{\text{pizza}}^{0.70}$ and the technology used by the firm in the brioche sector takes the following form $Q_{\text{brioche}} = 2.20 \cdot T^{0.57} L_{\text{brioche}}^{0.43}$.

3.

The input endowments are:

$$L = 264$$
$$K = 151$$
$$T = 84$$

Currently the economy produces 50 units of pizza.

Determine the real GDP if $P = P_{\text{pizza}}^{0.13} P_{\text{brioche}}^{0.87}$.

Solution: The real GDP in this economy is 389.5228.

8. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{necklace}} = 0.91 \cdot K^{0.17} L_{\text{necklace}}^{0.83}$$
$$Q_{\text{tomato}} = 0.58 \cdot T^{0.53} L_{\text{tomato}}^{0.47}$$

The maximum amount of labor available to this economy is 344, the capital supply is 104, and the land endowment is 158. Labor is a mobile factor but capital is used only in necklace sector and land is an industry specific factor to the tomato sector. The utility function of the representative consumer is written as $U = 1.34 \cdot D_{\text{necklace}}^{0.27} \cdot D_{\text{tomato}}^{0.73}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{necklace}}^{0.66} P_{\text{tomato}}^{0.34}$.

What is the real GDP in this economy?

Solution: The real GDP in this economy is 299.1365.

9. Problem

In a closed economy the production function in the tea sector is $Q_{\text{tea}} = 2.24 \cdot K^{0.15} L_{\text{tea}}^{0.85}$ and the technology used by the firm in the hot dog sector takes the following form $Q_{\text{hot dog}} = 1.11 \cdot T^{0.34} L_{\text{hot dog}}^{0.66}$. The input endowments are:

$$L = 319$$
$$K = 105$$
$$T = 205$$

Currently the economy produces 100 units of tea.

What is the price of tea in terms of hot dog?

Solution: The price of tea in terms of hot dog is 0.2974.

10. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 2.21 \cdot D_{\text{watch}}^{0.71} \cdot D_{\text{painting}}^{0.29}$$
$$Q_{\text{watch}} = 1.14 \cdot K^{0.46} L_{\text{watch}}^{0.54}$$
$$Q_{\text{painting}} = 0.48 \cdot T^{0.46} L_{\text{painting}}^{0.54}$$
$$L = 577$$
$$K = 118$$
$$T = 182$$
$$P = P_{\text{watch}}^{0.69} P_{\text{painting}}^{0.31}$$

Determine the price of watch in terms of painting.

Solution: The price of watch in terms of painting is 0.7759 units.

11. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 1.21 \cdot D_{\text{hot dog}}^{0.35} \cdot D_{\text{milkshake}}^{0.65}$$
$$Q_{\text{hot dog}} = 1.12 \cdot K^{0.77} L_{\text{hot dog}}^{0.23}$$
$$Q_{\text{milkshake}} = 0.52 \cdot T^{0.77} L_{\text{milkshake}}^{0.23}$$
$$L = 146$$
$$K = 216$$
$$T = 123$$
$$P = P_{\text{hot dog}}^{0.45} P_{\text{milkshake}}^{0.55}$$

Calculate the real GDP.

Solution: The real GDP is 197.2086.

12. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the porridge industry capital is used as specific factor, and land is specific to lemon sector. The production functions are written as

$$Q_{\text{porridge}} = 2.21 \cdot K^{0.62} L_{\text{porridge}}^{0.38}$$
$$Q_{\text{lemon}} = 1.83 \cdot T^{0.62} L_{\text{lemon}}^{0.38}$$

The supply of the factors are constant. The maximum amount of labor available is 254, the capital supply is 156 and the endowment of land is 185.

3.

The utility function of the representative consumer is written as $U = 1.20 \cdot \ln D_{\text{porridge}} + 1.77 \cdot \ln D_{\text{lemon}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{porridge}}^{0.34} P_{\text{lemon}}^{0.66}$.

Calculate the real rental rate of land.

Solution: The real rental rate of land is 1.1737.

13. Problem

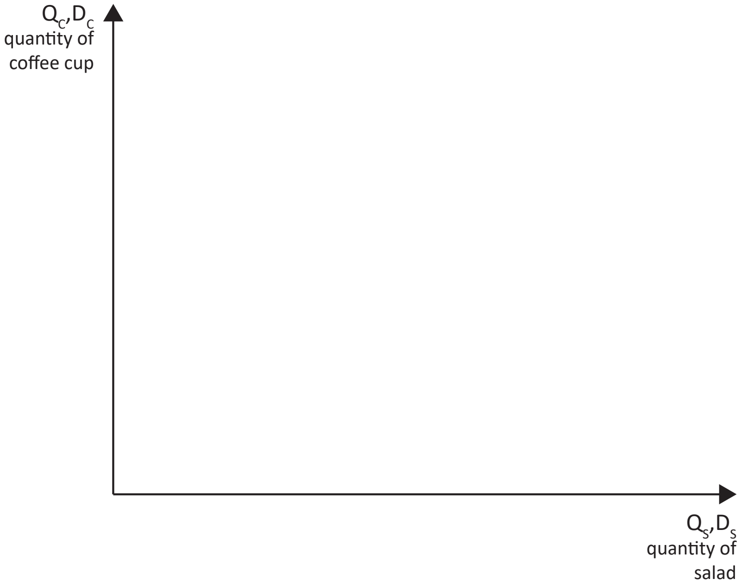
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{salad}} = 0.99 \cdot K^{0.27} L_{\text{salad}}^{0.73}$$
$$Q_{\text{coffee cup}} = 0.91 \cdot T^{0.77} L_{\text{coffee cup}}^{0.23}$$

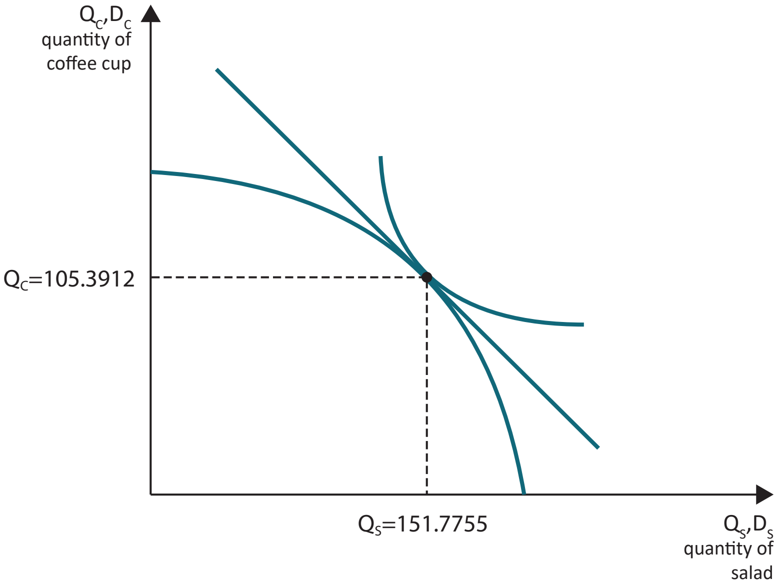
The maximum amount of labor available to this economy is 220, the capital supply is 105, and the land endowment is 155. Labor is a mobile factor but capital is used only in salad sector and land is an industry specific factor to the coffee cup sector. The utility function of the representative consumer is written as $U = 2.20 \cdot D_{\text{salad}}^{0.56} \cdot D_{\text{coffee cup}}^{0.44}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{salad}}^{0.12} P_{\text{coffee cup}}^{0.88}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:



14. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.85 \cdot \ln D_{\text{bagel}} + 2.25 \cdot \ln D_{\text{pastry}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{bagel}} = 1.76 \cdot K^{0.83} L_{\text{bagel}}^{0.17}$$
$$Q_{\text{pastry}} = 2.34 \cdot T^{0.83} L_{\text{pastry}}^{0.17}$$

The maximum amount of inputs are constant. The economy uses 170 units of labor, 86 units of capital and 204 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

3.

Find the amount of pastry produced by the firms in pastry sector.

Solution: In optimum 438.2529 is the amount of .pastry produced.

15. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.82 \cdot D_{\text{naan bread}}^{0.46} \cdot D_{\text{strawberry}}^{0.54}$$
$$Q_{\text{naan bread}} = 0.94 \cdot K^{0.71} L_{\text{naan bread}}^{0.29}$$
$$Q_{\text{strawberry}} = 2.00 \cdot T^{0.71} L_{\text{strawberry}}^{0.29}$$
$$L = 444$$
$$K = 124$$
$$T = 160$$
$$P = P_{\text{naan bread}}^{0.55} P_{\text{strawberry}}^{0.45}$$

Determine the real wage.

Solution: The real wage is 0.2769.

16. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the scarf industry capital is used as specific factor, and land is specific to orange sector. The production functions are written as

$$Q_{\text{scarf}} = 0.37 \cdot K^{0.52} L_{\text{scarf}}^{0.48}$$
$$Q_{\text{orange}} = 1.42 \cdot T^{0.52} L_{\text{orange}}^{0.48}$$

The supply of the factors are constant. The maximum amount of labor available is 321, the capital supply is 94 and the endowment of land is 117.

The utility function of the representative consumer is written as $U = 2.30 \cdot \ln D_{\text{scarf}} + 2.41 \cdot \ln D_{\text{orange}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{scarf}}^{0.18} P_{\text{orange}}^{0.82}$.

Calculate the real rental rate of land.

Solution: The real rental rate of land is 0.6712.

3.

17. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the tea industry capital is used as specific factor, and land is specific to broccoli sector. The production functions are written as

$$Q_{\text{tea}} = 2.18 \cdot K^{0.66} L_{\text{tea}}^{0.34}$$
$$Q_{\text{broccoli}} = 0.43 \cdot T^{0.66} L_{\text{broccoli}}^{0.34}$$

The supply of the factors are constant. The maximum amount of labor available is 599, the capital supply is 113 and the endowment of land is 120.

The utility function of the representative consumer is written as $U = 1.01 \cdot \ln D_{\text{tea}} + 2.30 \cdot \ln D_{\text{broccoli}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{tea}}^{0.62} P_{\text{broccoli}}^{0.38}$.

What is the real GDP in this economy?

Solution: The real GDP is 423.7028.

18. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the wallet industry capital is used as specific factor, and land is specific to teacup sector. The production functions are written as

$$Q_{\text{wallet}} = 1.43 \cdot K^{0.77} L_{\text{wallet}}^{0.23}$$

$$Q_{\text{teacup}} = 2.21 \cdot T^{0.77} L_{\text{teacup}}^{0.23}$$

The supply of the factors are constant. The maximum amount of labor available is 437, the capital supply is 206 and the endowment of land is 94.

The utility function of the representative consumer is written as $U = 1.92 \cdot \ln D_{\text{wallet}} + 1.88 \cdot \ln D_{\text{teacup}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{wallet}}^{0.68} P_{\text{teacup}}^{0.32}$.

What is the real GDP in this economy?

Solution: The real GDP is 564.1683.

19. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.85 \cdot \ln D_{\text{mint tea}} + 2.10 \cdot \ln D_{\text{pushchair}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{mint tea}} = 1.17 \cdot K^{0.31} L_{\text{mint tea}}^{0.69}$$
$$Q_{\text{pushchair}} = 1.00 \cdot T^{0.31} L_{\text{pushchair}}^{0.69}$$

The maximum amount of inputs are constant. The economy uses 610 units of labor, 95 units of capital and 140 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Determine the amount of pushchair purchased by the utility maximizing consumer.

Solution: In optimum 305.7253 is the amount of .pushchair consumed.

20. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.71 \cdot D_{\text{porridge}}^{0.24} \cdot D_{\text{peach}}^{0.76}$$
$$Q_{\text{porridge}} = 1.79 \cdot K^{0.30} L_{\text{porridge}}^{0.70}$$
$$Q_{\text{peach}} = 1.42 \cdot T^{0.30} L_{\text{peach}}^{0.70}$$
$$L = 483$$
$$K = 184$$
$$T = 208$$

$$P = P_{\text{porridge}}^{0.46} P_{\text{peach}}^{0.54}$$

What is the real rental rate of land in this economy?

Solution: The real rental rate of land is 0.8130.

21. Problem

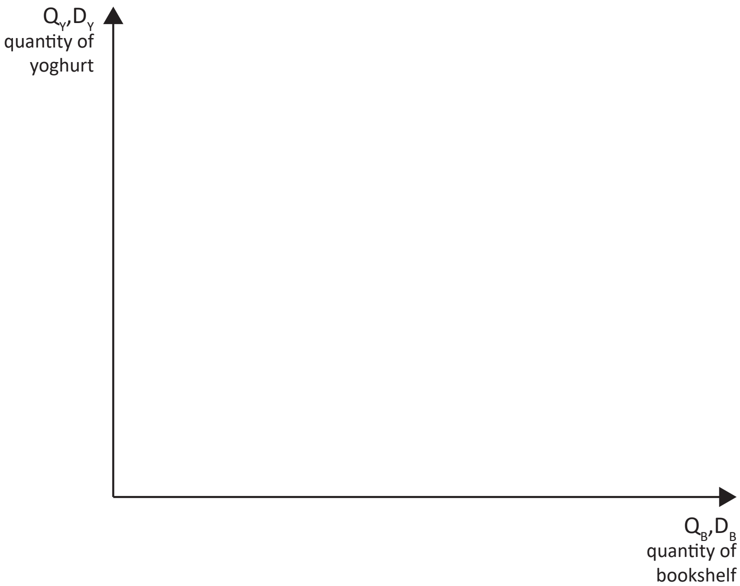
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{bookshelf}} = 0.91 \cdot K^{0.80} L_{\text{bookshelf}}^{0.20}$$
$$Q_{\text{yoghurt}} = 0.99 \cdot T^{0.43} L_{\text{yoghurt}}^{0.57}$$

The maximum amount of labor available to this economy is 503, the capital supply is 125, and the land endowment is 93. Labor is a mobile factor but capital is used only in bookshelf sector and land is an industry specific factor to the yoghurt sector. The utility function of the representative consumer is written as $U = 1.24 \cdot D_{\text{bookshelf}}^{0.31} \cdot D_{\text{yoghurt}}^{0.69}$.

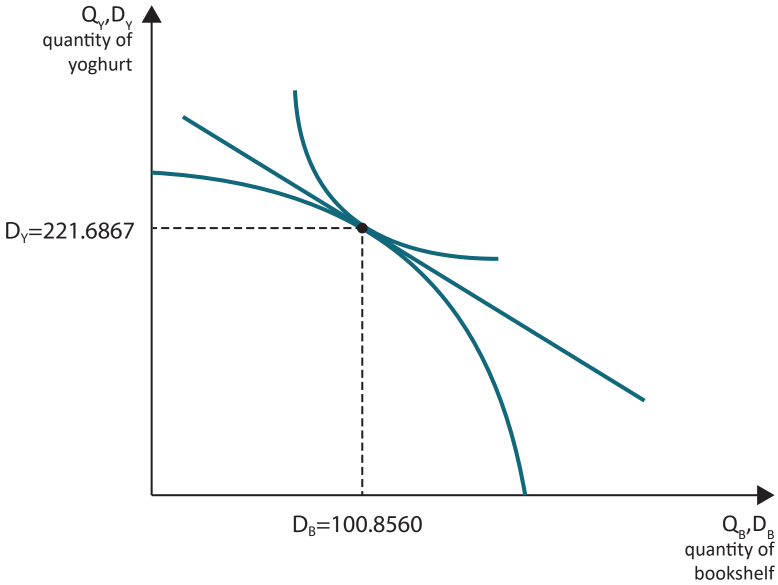
The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{bookshelf}}^{0.75} P_{\text{yoghurt}}^{0.25}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



3.

Solution: The correct graph is the following:



3.

22. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the shampoo industry capital is used as specific factor, and land is specific to handbag sector. The production functions are written as

$$Q_{\text{shampoo}} = 0.43 \cdot K^{0.29} L_{\text{shampoo}}^{0.71}$$
$$Q_{\text{handbag}} = 0.44 \cdot T^{0.29} L_{\text{handbag}}^{0.71}$$

The supply of the factors are constant. The maximum amount of labor available is 186, the capital supply is 78 and the endowment of land is 151.

The utility function of the representative consumer is written as $U = 1.14 \cdot \ln D_{\text{shampoo}} + 1.02 \cdot \ln D_{\text{handbag}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{shampoo}}^{0.27} P_{\text{handbag}}^{0.73}$.

Determine the real rental rate of capital.

Solution: The real rental rate of capital is 0.1758.

23. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.36 \cdot \ln D_{\text{painting}} + 1.19 \cdot \ln D_{\text{pie}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{painting}} = 0.32 \cdot K^{0.70} L_{\text{painting}}^{0.30}$$
$$Q_{\text{pie}} = 1.08 \cdot T^{0.70} L_{\text{pie}}^{0.30}$$

The maximum amount of inputs are constant. The economy uses 130 units of labor, 77 units of capital and 115 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Find the amount of pie produced by the firms in pie sector.

Solution: In optimum 119.0309 is the amount of .pie produced.

24. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.47 \cdot D_{\text{wine glass}}^{0.14} \cdot D_{\text{necklace}}^{0.86}$$
$$Q_{\text{wine glass}} = 2.16 \cdot K^{0.74} L_{\text{wine glass}}^{0.26}$$
$$Q_{\text{necklace}} = 1.93 \cdot T^{0.74} L_{\text{necklace}}^{0.26}$$
$$L = 122$$
$$K = 218$$
$$T = 72$$
$$P = P_{\text{wine glass}}^{0.82} P_{\text{necklace}}^{0.18}$$

Determine the price of wine glass in terms of necklace.

Solution: The price of wine glass in terms of necklace is 0.1027 units.

25. Problem

In a closed economy the production function in the wooden spoon sector is $Q_{\text{wooden spoon}} = 1.36 \cdot K^{0.53} L_{\text{wooden spoon}}^{0.47}$ and the technology used by the firm in the banana sector takes the following form

$Q_{\text{banana}} = 0.51 \cdot T^{0.77} L_{\text{banana}}^{0.23}$. The input endowments are:

$$L = 269$$
$$K = 135$$
$$T = 131$$

Currently the economy produces 146 units of wooden spoon.

What is the price of wooden spoon in terms of banana?

Solution: The price of wooden spoon in terms of banana is 0.1082.

3.

26. Problem

In a closed economy the production function in the food processor sector is $Q_{\text{food processor}} = 0.47 \cdot K^{0.20} L_{\text{food processor}}^{0.80}$ and the technology used by the firm in the banana sector takes the following form $Q_{\text{banana}} = 1.56 \cdot T^{0.46} L_{\text{banana}}^{0.54}$. The input endowments are:

$$L = 617$$
$$K = 166$$
$$T = 218$$

Currently the economy produces 104 units of food processor.

Determine the real GDP if $P = P_{\text{food processor}}^{0.67} P_{\text{banana}}^{0.33}$.

Solution: The real GDP in this economy is 429.7025.

27. Problem

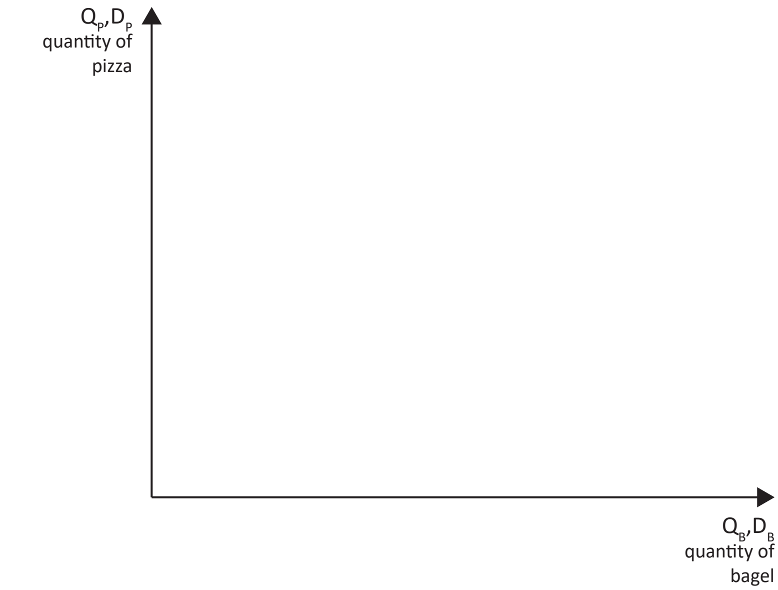
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{bagel}} = 0.65 \cdot K^{0.46} L_{\text{bagel}}^{0.54}$$
$$Q_{\text{pizza}} = 1.93 \cdot T^{0.17} L_{\text{pizza}}^{0.83}$$

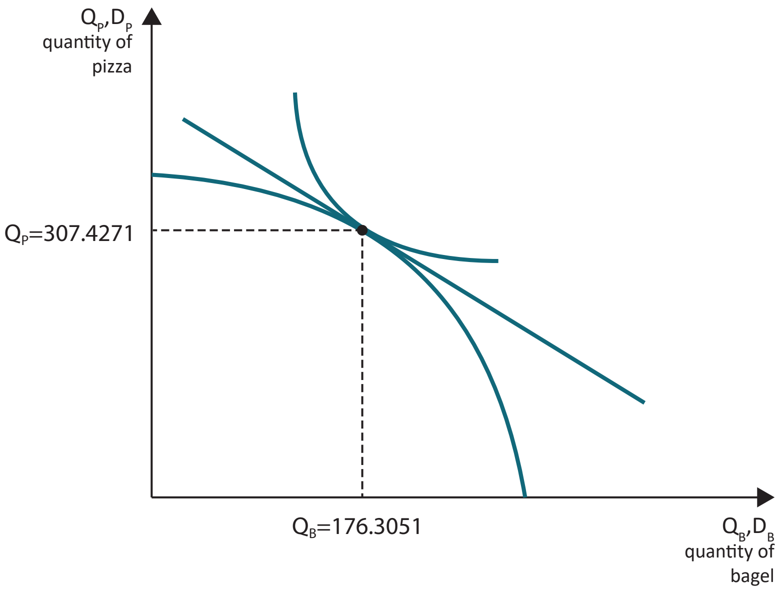
The maximum amount of labor available to this economy is 559, the capital supply is 170, and the land endowment is 181. Labor is a mobile factor but capital is used only in bagel sector and land is an industry specific factor to the pizza sector. The utility function of the representative consumer is written as $U = 2.14 \cdot D_{\text{bagel}}^{0.80} \cdot D_{\text{pizza}}^{0.20}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{bagel}}^{0.71} P_{\text{pizza}}^{0.29}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:



3.

28. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{milkshake}} = 2.22 \cdot K^{0.46} L_{\text{milkshake}}^{0.54}$$
$$Q_{\text{food processor}} = 0.83 \cdot T^{0.75} L_{\text{food processor}}^{0.25}$$

The maximum amount of labor available to this economy is 214, the capital supply is 148, and the land endowment is 148. Labor is a mobile factor but capital is used only in milkshake sector and land is an industry specific factor to the food processor sector. The utility function of the representative consumer is written as $U = 1.68 \cdot D_{\text{milkshake}}^{0.64} \cdot D_{\text{food processor}}^{0.36}$.

3.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{milkshake}}^{0.28} P_{\text{food processor}}^{0.72}$.

Determine the price of milkshake in terms of food processor.

Solution: The price of milkshake in terms of food processor is 0.4563.

29. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.19 \cdot \ln D_{\text{naan bread}} + 1.83 \cdot \ln D_{\text{food processor}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{naan bread}} = 0.52 \cdot K^{0.80} L_{\text{naan bread}}^{0.20}$$
$$Q_{\text{food processor}} = 1.40 \cdot T^{0.80} L_{\text{food processor}}^{0.20}$$

The maximum amount of inputs are constant. The economy uses 329 units of labor, 162 units of capital and 178 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the optimal amount of naan bread consumed?

Solution: In optimum 60.4972 is the amount of .naan bread consumed.

30. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{scarf}} = 0.96 \cdot K^{0.69} L_{\text{scarf}}^{0.31}$$

$$Q_{\text{backpack}} = 1.30 \cdot T^{0.51} L_{\text{backpack}}^{0.49}$$

The maximum amount of labor available to this economy is 109, the capital supply is 224, and the land endowment is 175. Labor is a mobile factor but capital is used only in scarf sector and land is an industry specific factor to the backpack sector. The utility function of the representative consumer is written as $U = 0.76 \cdot D_{\text{scarf}}^{0.74} \cdot D_{\text{backpack}}^{0.26}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{scarf}}^{0.83} P_{\text{backpack}}^{0.17}$.

Determine the price of scarf in terms of backpack.

Solution: The price of scarf in terms of backpack is 2.0666.

31. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the hot dog industry capital is used as specific factor, and land is specific to necklace sector. The production functions are written as

$$Q_{\text{hot dog}} = 0.33 \cdot K^{0.66} L_{\text{hot dog}}^{0.34}$$
$$Q_{\text{necklace}} = 2.02 \cdot T^{0.66} L_{\text{necklace}}^{0.34}$$

The supply of the factors are constant. The maximum amount of labor available is 478, the capital supply is 134 and the endowment of land is 116.

The utility function of the representative consumer is written as $U = 1.19 \cdot \ln D_{\text{hot dog}} + 1.13 \cdot \ln D_{\text{necklace}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{hot dog}}^{0.20} P_{\text{necklace}}^{0.80}$.

What is the real GDP in this economy?

Solution: The real GDP is 429.5616.

32. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.35 \cdot \ln D_{\text{cola}} + 2.42 \cdot \ln D_{\text{mint tea}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{cola}} = 0.95 \cdot K^{0.84} L_{\text{cola}}^{0.16}$$
$$Q_{\text{mint tea}} = 0.70 \cdot T^{0.84} L_{\text{mint tea}}^{0.16}$$

The maximum amount of inputs are constant. The economy uses 73 units of labor, 139 units of capital and 69 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the optimal amount of cola consumed?

Solution: In optimum 85.5543 is the amount of .cola consumed.

33. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 2.15 \cdot D_{\text{bagel}}^{0.28} \cdot D_{\text{wine glass}}^{0.72}$$
$$Q_{\text{bagel}} = 1.51 \cdot K^{0.28} L_{\text{bagel}}^{0.72}$$
$$Q_{\text{wine glass}} = 0.64 \cdot T^{0.28} L_{\text{wine glass}}^{0.72}$$
$$L = 458$$
$$K = 183$$
$$T = 151$$
$$P = P_{\text{bagel}}^{0.84} P_{\text{wine glass}}^{0.16}$$

What is the real rental rate of land in this economy?

Solution: The real rental rate of land is 0.8450.

34. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.85 \cdot D_{\text{brioche}}^{0.33} \cdot D_{\text{pastry}}^{0.67}$$
$$Q_{\text{brioche}} = 1.10 \cdot K^{0.20} L_{\text{brioche}}^{0.80}$$
$$Q_{\text{pastry}} = 1.75 \cdot T^{0.20} L_{\text{pastry}}^{0.80}$$
$$L = 528$$
$$K = 69$$
$$T = 99$$
$$P = P_{\text{brioche}}^{0.34} P_{\text{pastry}}^{0.66}$$

Calculate the real rental rate of capital.

Solution: The real rental rate of capital is 0.5990.

35. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the orange industry capital is used as specific factor, and land is specific to cola sector. The production functions are written as

$$Q_{\text{orange}} = 0.53 \cdot K^{0.39} L_{\text{orange}}^{0.61}$$
$$Q_{\text{cola}} = 0.80 \cdot T^{0.39} L_{\text{cola}}^{0.61}$$

The supply of the factors are constant. The maximum amount of labor available is 471, the capital supply is 176 and the endowment of land is 187.

The utility function of the representative consumer is written as $U = 1.13 \cdot \ln D_{\text{orange}} + 1.70 \cdot \ln D_{\text{cola}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{orange}}^{0.14} P_{\text{cola}}^{0.86}$.

Calculate the real wage paid to workers.

Solution: The real wage is 0.3995.

36. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 1.20 \cdot D_{\text{scarf}}^{0.49} \cdot D_{\text{ice cream}}^{0.51}$$
$$Q_{\text{scarf}} = 0.63 \cdot K^{0.16} L_{\text{scarf}}^{0.84}$$
$$Q_{\text{ice cream}} = 0.69 \cdot T^{0.16} L_{\text{ice cream}}^{0.84}$$
$$L = 604$$
$$K = 226$$
$$T = 99$$
$$P = P_{\text{scarf}}^{0.13} P_{\text{ice cream}}^{0.87}$$

Calculate the real GDP.

Solution: The real GDP is 349.6971.

3.

37. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the cabbage industry capital is used as specific factor, and land is specific to shampoo sector. The production functions are written as

$$Q_{\text{cabbage}} = 1.77 \cdot K^{0.33} L_{\text{cabbage}}^{0.67}$$
$$Q_{\text{shampoo}} = 1.71 \cdot T^{0.33} L_{\text{shampoo}}^{0.67}$$

The supply of the factors are constant. The maximum amount of labor available is 351, the capital supply is 96 and the endowment of land is 117.

The utility function of the representative consumer is written as $U = 0.28 \cdot \ln D_{\text{cabbage}} + 0.49 \cdot \ln D_{\text{shampoo}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{cabbage}}^{0.36} P_{\text{shampoo}}^{0.64}$.

Calculate the real wage paid to workers.

Solution: The real wage is 0.9783.

38. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the pistachio industry capital is used as specific factor, and land is specific to pie sector. The production functions are written as

$$Q_{\text{pistachio}} = 1.86 \cdot K^{0.81} L_{\text{pistachio}}^{0.19}$$
$$Q_{\text{pie}} = 0.53 \cdot T^{0.81} L_{\text{pie}}^{0.19}$$

The supply of the factors are constant. The maximum amount of labor available is 286, the capital supply is 98 and the endowment of land is 107.

The utility function of the representative consumer is written as $U = 1.84 \cdot \ln D_{\text{pistachio}} + 0.40 \cdot \ln D_{\text{pie}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{pistachio}}^{0.75} P_{\text{pie}}^{0.25}$.

What is the real GDP in this economy?

Solution: The real GDP is 265.4240.

39. Problem

In a closed economy the production function in the coffee sector is $Q_{\text{coffee}} = 2.29 \cdot K^{0.55} L_{\text{coffee}}^{0.45}$ and the technology used by the firm in the rug sector takes the following form $Q_{\text{rug}} = 1.28 \cdot T^{0.19} L_{\text{rug}}^{0.81}$. The input endowments are:

$$L = 188$$
$$K = 137$$
$$T = 69$$

Currently the economy produces 47 units of coffee.

Determine the real GDP if $P = P_{\text{coffee}}^{0.16} P_{\text{rug}}^{0.84}$.

Solution: The real GDP in this economy is 300.0230.

40. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.74 \cdot D_{\text{napkin}}^{0.18} \cdot D_{\text{sweetcorn}}^{0.82}$$
$$Q_{\text{napkin}} = 1.97 \cdot K^{0.17} L_{\text{napkin}}^{0.83}$$
$$Q_{\text{sweetcorn}} = 0.43 \cdot T^{0.17} L_{\text{sweetcorn}}^{0.83}$$
$$L = 399$$
$$K = 224$$
$$T = 157$$
$$P = P_{\text{napkin}}^{0.35} P_{\text{sweetcorn}}^{0.65}$$

Determine the price of napkin in terms of sweetcorn.

Solution: The price of napkin in terms of sweetcorn is 0.1588 units.

41. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{yoghurt}} = 1.84 \cdot K^{0.78} L_{\text{yoghurt}}^{0.22}$$

$$Q_{\text{lemon}} = 1.30 \cdot T^{0.32} L_{\text{lemon}}^{0.68}$$

The maximum amount of labor available to this economy is 472, the capital supply is 93, and the land endowment is 192. Labor is a mobile factor but capital is used only in yoghurt sector and land is an industry specific factor to the lemon sector. The utility function of the representative consumer is written as $U = 0.31 \cdot D_{\text{yoghurt}}^{0.53} \cdot D_{\text{lemon}}^{0.47}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{yoghurt}}^{0.12} P_{\text{lemon}}^{0.88}$.

What is the real GDP in this economy?

Solution: The real GDP in this economy is 717.1956.

3.

42. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 2.16 \cdot \ln D_{\text{soup}} + 1.72 \cdot \ln D_{\text{coffee}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{soup}} = 1.81 \cdot K^{0.22} L_{\text{soup}}^{0.78}$$
$$Q_{\text{coffee}} = 1.94 \cdot T^{0.22} L_{\text{coffee}}^{0.78}$$

The maximum amount of inputs are constant. The economy uses 627 units of labor, 177 units of capital and 117 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the relative price (price of soup to price of coffee) in this economy?

Solution: The relative price is 1.0288 in this economy.

43. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the lemonade industry capital is used as specific factor, and land is specific to cabbage sector. The production functions are written as

$$Q_{\text{lemonade}} = 2.11 \cdot K^{0.72} L_{\text{lemonade}}^{0.28}$$
$$Q_{\text{cabbage}} = 0.22 \cdot T^{0.72} L_{\text{cabbage}}^{0.28}$$

The supply of the factors are constant. The maximum amount of labor available is 565, the capital supply is 163 and the endowment of land is 163.

The utility function of the representative consumer is written as $U = 1.65 \cdot \ln D_{\text{lemonade}} + 2.28 \cdot \ln D_{\text{cabbage}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{lemonade}}^{0.84} P_{\text{cabbage}}^{0.16}$.

Determine the real rental rate of capital.

Solution: The real rental rate of capital is 1.1323.

44. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.65 \cdot \ln D_{\text{coffee cup}} + 0.27 \cdot \ln D_{\text{handbag}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{coffee cup}} = 0.64 \cdot K^{0.44} L_{\text{coffee cup}}^{0.56}$$
$$Q_{\text{handbag}} = 1.15 \cdot T^{0.44} L_{\text{handbag}}^{0.56}$$

The maximum amount of inputs are constant. The economy uses 368 units of labor, 143 units of capital and 75 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Determine the amount of handbag purchased by the utility maximizing consumer.

Solution: In optimum 105.7894 is the amount of .handbag consumed.

45. Problem

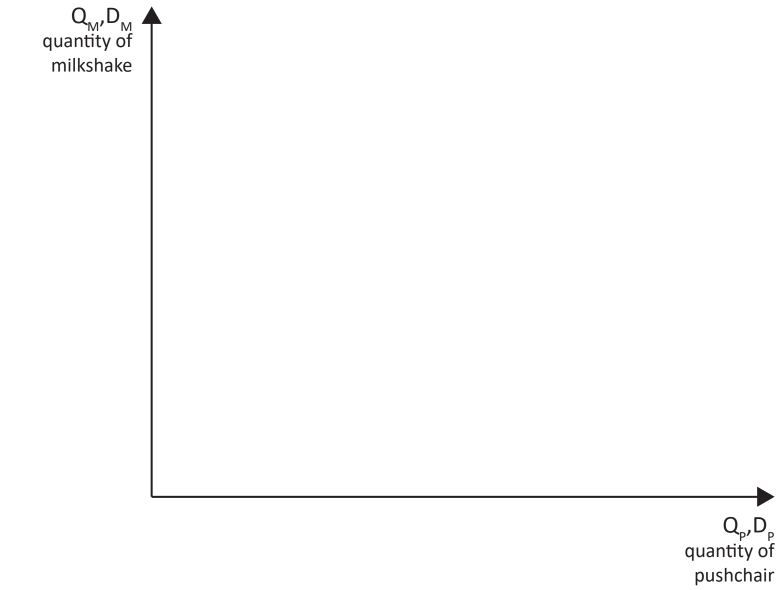
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{pushchair}} = 1.35 \cdot K^{0.23} L_{\text{pushchair}}^{0.77}$$
$$Q_{\text{milkshake}} = 2.17 \cdot T^{0.16} L_{\text{milkshake}}^{0.84}$$

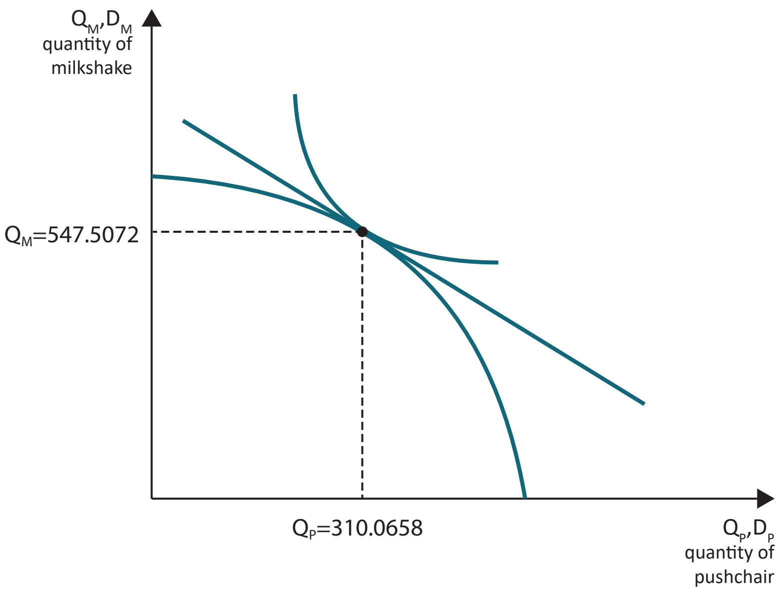
The maximum amount of labor available to this economy is 536, the capital supply is 159, and the land endowment is 147. Labor is a mobile factor but capital is used only in pushchair sector and land is an industry specific factor to the milkshake sector. The utility function of the representative consumer is written as $U = 1.44 \cdot D_{\text{pushchair}}^{0.50} \cdot D_{\text{milkshake}}^{0.50}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{pushchair}}^{0.66} P_{\text{milkshake}}^{0.34}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:



46. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the pastry industry capital is used as specific factor, and land is specific to backpack sector. The production functions are written as

$$Q_{\text{pastry}} = 0.83 \cdot K^{0.63} L_{\text{pastry}}^{0.37}$$
$$Q_{\text{backpack}} = 2.12 \cdot T^{0.63} L_{\text{backpack}}^{0.37}$$

The supply of the factors are constant. The maximum amount of labor available is 369, the capital supply is 131 and the endowment of land is 197.

The utility function of the representative consumer is written as $U = 0.43 \cdot \ln D_{\text{pastry}} + 1.49 \cdot \ln D_{\text{backpack}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{pastry}}^{0.36} P_{\text{backpack}}^{0.64}$.

Determine the real rental rate of capital.

Solution: The real rental rate of capital is 0.5739.

47. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{shampoo}} = 1.22 \cdot K^{0.40} L_{\text{shampoo}}^{0.60}$$
$$Q_{\text{soup}} = 0.64 \cdot T^{0.27} L_{\text{soup}}^{0.73}$$

The maximum amount of labor available to this economy is 301, the capital supply is 117, and the land endowment is 80. Labor is a mobile factor but capital is used only in shampoo sector and land is an industry specific factor to the soup sector. The utility function of the representative consumer is written as $U = 0.33 \cdot D_{\text{shampoo}}^{0.57} \cdot D_{\text{soup}}^{0.43}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{shampoo}}^{0.76} P_{\text{soup}}^{0.24}$.

Determine the price of shampoo in terms of soup.

Solution: The price of shampoo in terms of soup is 0.6124.

48. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the watch industry capital is used as specific factor, and land is specific to painting sector. The production functions are written as

$$Q_{\text{watch}} = 0.75 \cdot K^{0.47} L_{\text{watch}}^{0.53}$$
$$Q_{\text{painting}} = 1.71 \cdot T^{0.47} L_{\text{painting}}^{0.53}$$

The supply of the factors are constant. The maximum amount of labor available is 433, the capital supply is 179 and the endowment of land is 169.

The utility function of the representative consumer is written as $U = 2.14 \cdot \ln D_{\text{watch}} + 1.31 \cdot \ln D_{\text{painting}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{watch}}^{0.33} P_{\text{painting}}^{0.67}$.

Determine the real rental rate of capital.

3.

Solution: The real rental rate of capital is 0.8702.

49. Problem

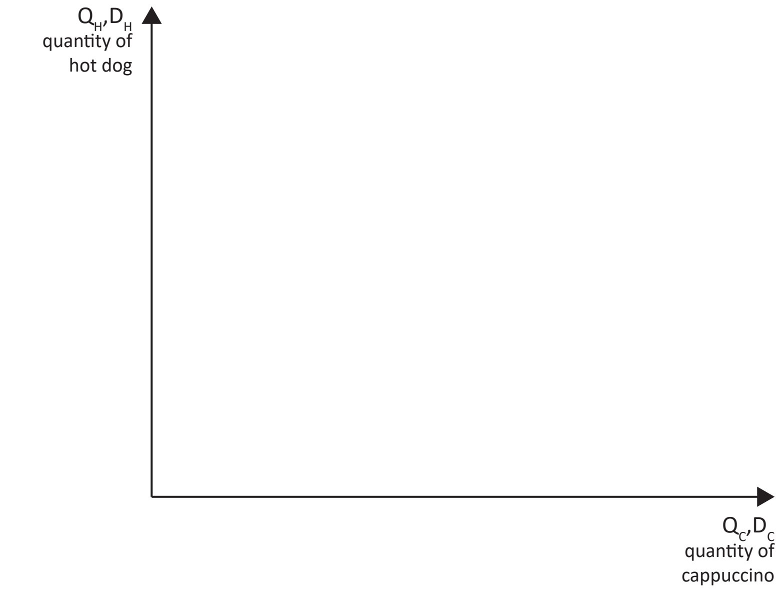
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{cappuccino}} = 1.05 \cdot K^{0.84} L_{\text{cappuccino}}^{0.16}$$
$$Q_{\text{hot dog}} = 2.04 \cdot T^{0.27} L_{\text{hot dog}}^{0.73}$$

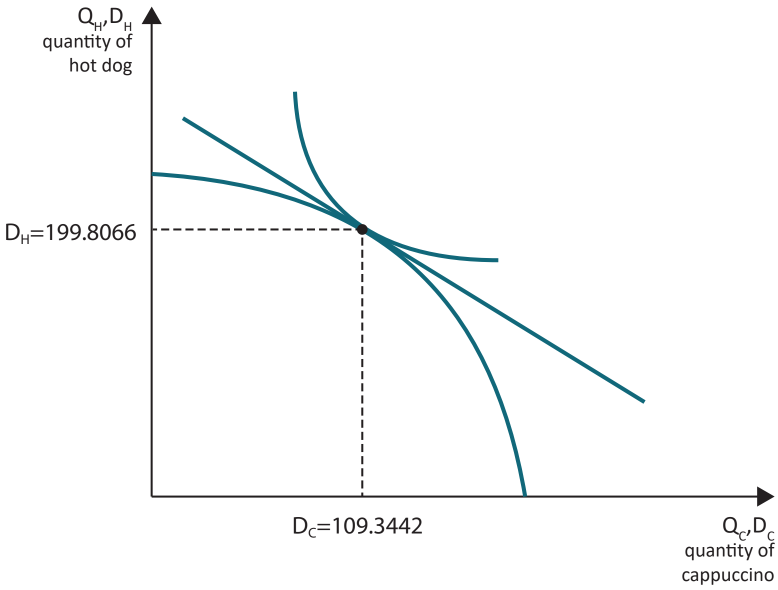
The maximum amount of labor available to this economy is 99, the capital supply is 159, and the land endowment is 132. Labor is a mobile factor but capital is used only in cappuccino sector and land is an industry specific factor to the hot dog sector. The utility function of the representative consumer is written as $U = 0.35 \cdot D_{\text{cappuccino}}^{0.37} \cdot D_{\text{hot dog}}^{0.63}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{cappuccino}}^{0.63} P_{\text{hot dog}}^{0.37}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:



50. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.26 \cdot D_{\text{hairdryer}}^{0.16} \cdot D_{\text{pastry}}^{0.84}$$
$$Q_{\text{hairdryer}} = 0.81 \cdot K^{0.60} L_{\text{hairdryer}}^{0.40}$$
$$Q_{\text{pastry}} = 0.76 \cdot T^{0.60} L_{\text{pastry}}^{0.40}$$
$$L = 170$$
$$K = 79$$
$$T = 122$$
$$P = P_{\text{hairdryer}}^{0.17} P_{\text{pastry}}^{0.83}$$

Determine the real wage.

Solution: The real wage is 0.3168.

51. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 1.13 \cdot \ln D_{\text{wallet}} + 0.34 \cdot \ln D_{\text{soup}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{wallet}} = 0.28 \cdot K^{0.21} L_{\text{wallet}}^{0.79}$$
$$Q_{\text{soup}} = 2.05 \cdot T^{0.21} L_{\text{soup}}^{0.79}$$

The maximum amount of inputs are constant. The economy uses 626 units of labor, 120 units of capital and 147 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Calculate the amount of wallet produced by the economy.

Solution: In optimum 100.6540 is the amount of .wallet produced.

52. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of

$U = 1.44 \cdot \ln D_{\text{hot dog}} + 0.59 \cdot \ln D_{\text{banana}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{hot dog}} = 0.53 \cdot K^{0.42} L_{\text{hot dog}}^{0.58}$$
$$Q_{\text{banana}} = 0.88 \cdot T^{0.42} L_{\text{banana}}^{0.58}$$

The maximum amount of inputs are constant. The economy uses 226 units of labor, 178 units of capital and 138 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Calculate the amount of hot dog produced by the economy.

Solution: In optimum 88.7846 is the amount of .hot dog produced.

53. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 2.29 \cdot \ln D_{\text{pie}} + 2.41 \cdot \ln D_{\text{cabbage}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{pie}} = 0.58 \cdot K^{0.52} L_{\text{pie}}^{0.48}$$
$$Q_{\text{cabbage}} = 1.42 \cdot T^{0.52} L_{\text{cabbage}}^{0.48}$$

The maximum amount of inputs are constant. The economy uses 487 units of labor, 147 units of capital and 87 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the relative price (price of pie to price of cabbage) in this economy?

Solution: The relative price is 1.8150 in this economy.

54. Problem

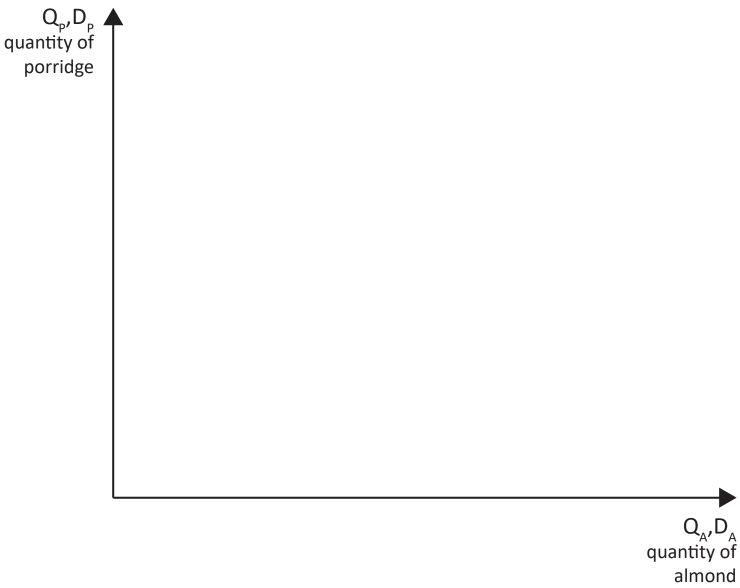
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{almond}} = 0.96 \cdot K^{0.36} L_{\text{almond}}^{0.64}$$
$$Q_{\text{porridge}} = 1.62 \cdot T^{0.83} L_{\text{porridge}}^{0.17}$$

The maximum amount of labor available to this economy is 604, the capital supply is 169, and the land endowment is 201. Labor is a mobile factor but capital is used only in almond sector and land is an industry specific factor to the porridge sector. The utility function of the representative consumer is written as $U = 1.66 \cdot D_{\text{almond}}^{0.51} \cdot D_{\text{porridge}}^{0.49}$.

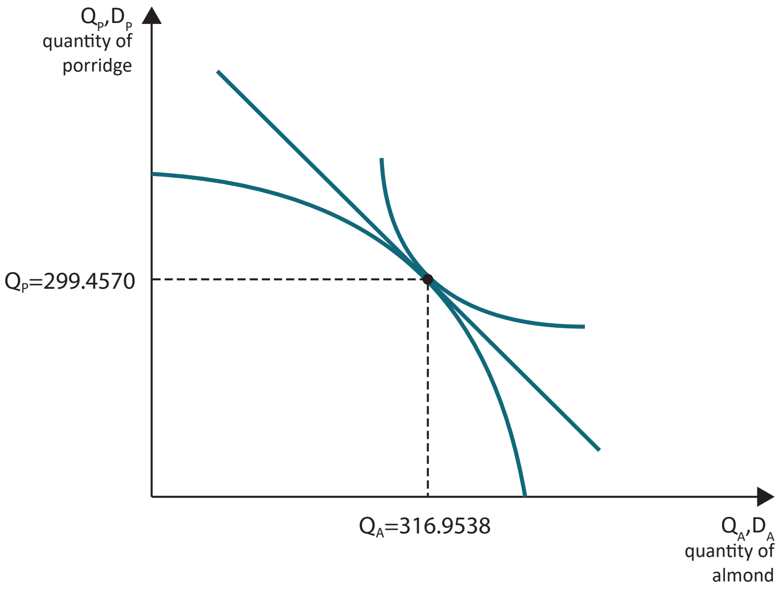
The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{almond}}^{0.19} P_{\text{porridge}}^{0.81}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:

3.



55. Problem

The following set of formulas represents the functioning of a closed economy:

$$
\begin{aligned}
U &= 1.62 \cdot D_{\text{soup}}^{0.71} \cdot D_{\text{sweetcorn}}^{0.29} \\
Q_{\text{soup}} &= 0.58 \cdot K^{0.15} L_{\text{soup}}^{0.85} \\
Q_{\text{sweetcorn}} &= 0.77 \cdot T^{0.15} L_{\text{sweetcorn}}^{0.85} \\
L &= 388 \\
K &= 177 \\
T &= 87 \\
P &= P_{\text{soup}}^{0.40} P_{\text{sweetcorn}}^{0.60}
\end{aligned}
$$

Determine the real wage.

Solution: The real wage is 0.5560.

56. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 1.08 \cdot \ln D_{\text{paper clip}} + 2.39 \cdot \ln D_{\text{spring onion}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{paper clip}} = 0.20 \cdot K^{0.56} L_{\text{paper clip}}^{0.44}$$
$$Q_{\text{spring onion}} = 0.58 \cdot T^{0.56} L_{\text{spring onion}}^{0.44}$$

The maximum amount of inputs are constant. The economy uses 493 units of labor, 155 units of capital and 119 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Find the amount of spring onion produced by the firms in spring onion sector.

Solution: In optimum 109.4806 is the amount of .spring onion produced.

57. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 1.11 \cdot \ln D_{\text{handbag}} + 0.69 \cdot \ln D_{\text{onion}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{handbag}} = 2.02 \cdot K^{0.52} L_{\text{handbag}}^{0.48}$$
$$Q_{\text{onion}} = 1.54 \cdot T^{0.52} L_{\text{onion}}^{0.48}$$

The maximum amount of inputs are constant. The economy uses 390 units of labor, 187 units of capital and 161 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Find the amount of onion produced by the firms in onion sector.

Solution: In optimum 239.2753 is the amount of .onion produced.

58. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.20 \cdot D_{\text{tea}}^{0.65} \cdot D_{\text{lemonade}}^{0.35}$$

$$Q_{\text{tea}} = 0.15 \cdot K^{0.20} L_{\text{tea}}^{0.80}$$
$$Q_{\text{lemonade}} = 0.22 \cdot T^{0.20} L_{\text{lemonade}}^{0.80}$$
$$L = 224$$
$$K = 140$$
$$T = 154$$
$$P = P_{\text{tea}}^{0.64} P_{\text{lemonade}}^{0.36}$$

Determine the real wage.

Solution: The real wage is 0.1439.

59. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{sweetcorn}} = 2.19 \cdot K^{0.51} L_{\text{sweetcorn}}^{0.49}$$
$$Q_{\text{napkin}} = 2.38 \cdot T^{0.71} L_{\text{napkin}}^{0.29}$$

The maximum amount of labor available to this economy is 341, the capital supply is 153, and the land endowment is 193. Labor is a mobile factor but capital is used only in sweetcorn sector and land is an industry specific factor to the napkin sector. The utility function of the representative consumer is written as $U = 1.14 \cdot D_{\text{sweetcorn}}^{0.19} \cdot D_{\text{napkin}}^{0.81}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{sweetcorn}}^{0.78} P_{\text{napkin}}^{0.22}$.

What is the real GDP in this economy?

Solution: The real GDP in this economy is 1170.8378.

60. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 1.76 \cdot \ln D_{\text{cappuccino}} + 0.88 \cdot \ln D_{\text{yoghurt}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{cappuccino}} = 2.05 \cdot K^{0.34} L_{\text{cappuccino}}^{0.66}$$
$$Q_{\text{yoghurt}} = 1.50 \cdot T^{0.34} L_{\text{yoghurt}}^{0.66}$$

The maximum amount of inputs are constant. The economy uses 166 units of labor, 98 units of capital and 147 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Calculate the amount of cappuccino produced by the economy.

Solution: In optimum 217.6817 is the amount of .cappuccino produced.

61. Problem

3.

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 2.24 \cdot \ln D_{\text{almond}} + 2.19 \cdot \ln D_{\text{lemon}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{almond}} = 1.92 \cdot K^{0.56} L_{\text{almond}}^{0.44}$$
$$Q_{\text{lemon}} = 0.36 \cdot T^{0.56} L_{\text{lemon}}^{0.44}$$

The maximum amount of inputs are constant. The economy uses 382 units of labor, 125 units of capital and 91 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the optimal amount of almond consumed?

Solution: In optimum 290.6499 is the amount of .almond consumed.

62. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.45 \cdot D_{\text{salad}}^{0.77} \cdot D_{\text{teacup}}^{0.23}$$
$$Q_{\text{salad}} = 1.95 \cdot K^{0.35} L_{\text{salad}}^{0.65}$$
$$Q_{\text{teacup}} = 1.16 \cdot T^{0.35} L_{\text{teacup}}^{0.65}$$
$$L = 520$$
$$K = 146$$
$$T = 188$$
$$P = P_{\text{salad}}^{0.52} P_{\text{teacup}}^{0.48}$$

What is the real rental rate of land in this economy?

Solution: The real rental rate of land is 0.3038.

63. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 2.09 \cdot \ln D_{\text{hairdryer}} + 2.31 \cdot \ln D_{\text{broccoli}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{hairdryer}} = 0.59 \cdot K^{0.49} L_{\text{hairdryer}}^{0.51}$$
$$Q_{\text{broccoli}} = 1.62 \cdot T^{0.49} L_{\text{broccoli}}^{0.51}$$

The maximum amount of inputs are constant. The economy uses 617 units of labor, 141 units of capital and 132 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

3.

Calculate the amount of hairdryer produced by the economy.

Solution: In optimum 120.8171 is the amount of .hairdryer produced.

64. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 1.24 \cdot D_{\text{wooden spoon}}^{0.82} \cdot D_{\text{soup}}^{0.18}$$
$$Q_{\text{wooden spoon}} = 0.88 \cdot K^{0.80} L_{\text{wooden spoon}}^{0.20}$$
$$Q_{\text{soup}} = 1.80 \cdot T^{0.80} L_{\text{soup}}^{0.20}$$
$$L = 249$$
$$K = 76$$
$$T = 99$$
$$P = P_{\text{wooden spoon}}^{0.17} P_{\text{soup}}^{0.83}$$

Determine the real wage.

Solution: The real wage is 0.4717.

65. Problem

In a closed economy the production function in the porridge sector is $Q_{\text{porridge}} = 1.24 \cdot K^{0.55} L_{\text{porridge}}^{0.45}$ and the technology used by the firm in the bagel sector takes the following form $Q_{\text{bagel}} = 1.98 \cdot T^{0.40} L_{\text{bagel}}^{0.60}$. The input endowments are:

$$L = 559$$
$$K = 78$$
$$T = 84$$

Currently the economy produces 119 units of porridge.

Determine the real GDP if $P = P_{\text{porridge}}^{0.68} P_{\text{bagel}}^{0.32}$.

Solution: The real GDP in this economy is 484.7490.

3.

66. Problem

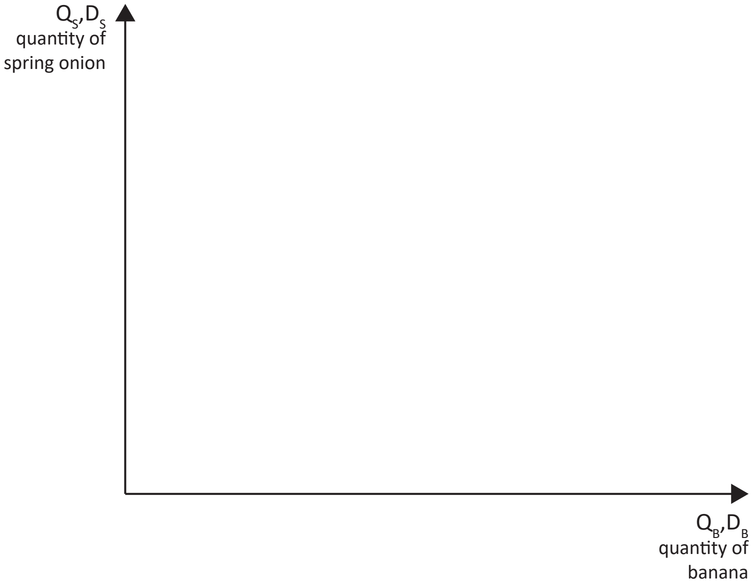
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{banana}} = 1.76 \cdot K^{0.25} L_{\text{banana}}^{0.75}$$
$$Q_{\text{spring onion}} = 1.10 \cdot T^{0.30} L_{\text{spring onion}}^{0.70}$$

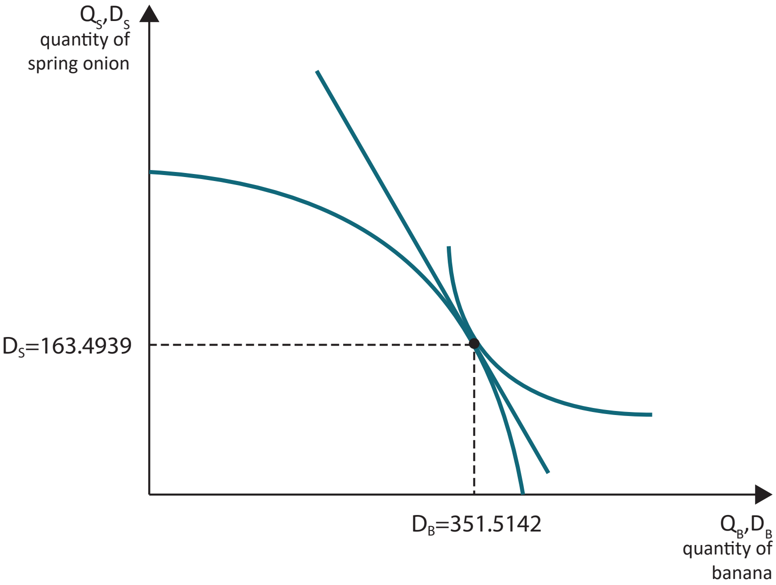
The maximum amount of labor available to this economy is 334, the capital supply is 201, and the land endowment is 187. Labor is a mobile factor but capital is used only in banana sector and land is an industry specific factor to the spring onion sector. The utility function of the representative consumer is written as $U = 1.25 \cdot D_{\text{banana}}^{0.58} \cdot D_{\text{spring onion}}^{0.42}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{banana}}^{0.13} P_{\text{spring onion}}^{0.87}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:



67. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.55 \cdot \ln D_{\text{bookshelf}} + 0.74 \cdot \ln D_{\text{chicken burger}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{bookshelf}} = 2.19 \cdot K^{0.36} L_{\text{bookshelf}}^{0.64}$$
$$Q_{\text{chicken burger}} = 1.38 \cdot T^{0.36} L_{\text{chicken burger}}^{0.64}$$

The maximum amount of inputs are constant. The economy uses 243 units of labor, 161 units of capital and 186 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

3.

Determine the amount of chicken burger purchased by the utility maximizing consumer.

Solution: In optimum 213.4139 is the amount of .chicken burger consumed.

68. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the pie industry capital is used as specific factor, and land is specific to broccoli sector. The production functions are written as

$$Q_{\text{pie}} = 2.14 \cdot K^{0.44} L_{\text{pie}}^{0.56}$$
$$Q_{\text{broccoli}} = 1.50 \cdot T^{0.44} L_{\text{broccoli}}^{0.56}$$

The supply of the factors are constant. The maximum amount of labor available is 162, the capital supply is 98 and the endowment of land is 142.

The utility function of the representative consumer is written as $U = 2.36 \cdot \ln D_{\text{pie}} + 1.90 \cdot \ln D_{\text{broccoli}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{pie}}^{0.54} P_{\text{broccoli}}^{0.46}$.

Calculate the real rental rate of land.

Solution: The real rental rate of land is 0.4763.

69. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 1.41 \cdot D_{\text{necklace}}^{0.19} \cdot D_{\text{sweetcorn}}^{0.81}$$

$$
\begin{aligned}
Q_{\text{necklace}} &= 0.42 \cdot K^{0.41} L_{\text{necklace}}^{0.59} \\
Q_{\text{sweetcorn}} &= 1.65 \cdot T^{0.41} L_{\text{sweetcorn}}^{0.59} \\
L &= 272 \\
K &= 105 \\
T &= 223 \\
P &= P_{\text{necklace}}^{0.22} P_{\text{sweetcorn}}^{0.78}
\end{aligned}
$$

What is the real rental rate of land in this economy?

Solution: The real rental rate of land is 0.5293.

3.

70. Problem

The following set of formulas represents the functioning of a closed economy:

$$
\begin{aligned}
U &= 0.80 \cdot D_{\text{wallet}}^{0.42} \cdot D_{\text{strawberry}}^{0.58} \\
Q_{\text{wallet}} &= 1.20 \cdot K^{0.65} L_{\text{wallet}}^{0.35} \\
Q_{\text{strawberry}} &= 0.23 \cdot T^{0.65} L_{\text{strawberry}}^{0.35} \\
L &= 272 \\
K &= 110 \\
T &= 152 \\
P &= P_{\text{wallet}}^{0.13} P_{\text{strawberry}}^{0.87}
\end{aligned}
$$

Calculate the real GDP.

Solution: The real GDP is 75.6908.

71. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$
\begin{aligned}
Q_{\text{cabbage}} &= 1.00 \cdot K^{0.66} L_{\text{cabbage}}^{0.34} \\
Q_{\text{muffin}} &= 0.69 \cdot T^{0.82} L_{\text{muffin}}^{0.18}
\end{aligned}
$$

The maximum amount of labor available to this economy is 433, the capital supply is 174, and the land endowment is 105. Labor is a mobile factor but capital is used only in cabbage sector and land is an industry specific factor to the muffin sector. The utility function of the representative consumer is written as $U = 1.99 \cdot D_{\text{cabbage}}^{0.34} \cdot D_{\text{muffin}}^{0.66}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{cabbage}}^{0.44} P_{\text{muffin}}^{0.56}$.

What is the real GDP in this economy?

Solution: The real GDP in this economy is 240.0186.

72. Problem

3.

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the broccoli industry capital is used as specific factor, and land is specific to lemon sector. The production functions are written as

$$Q_{\text{broccoli}} = 1.36 \cdot K^{0.22} L_{\text{broccoli}}^{0.78}$$
$$Q_{\text{lemon}} = 2.00 \cdot T^{0.22} L_{\text{lemon}}^{0.78}$$

The supply of the factors are constant. The maximum amount of labor available is 423, the capital supply is 110 and the endowment of land is 194.

The utility function of the representative consumer is written as $U = 0.33 \cdot \ln D_{\text{broccoli}} + 0.21 \cdot \ln D_{\text{lemon}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{broccoli}}^{0.26} P_{\text{lemon}}^{0.74}$.

Calculate the real rental rate of land.

Solution: The real rental rate of land is 0.3301.

73. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the lemon industry capital is used as specific factor, and land is specific to bagel sector. The production functions are written as

$$Q_{\text{lemon}} = 1.76 \cdot K^{0.57} L_{\text{lemon}}^{0.43}$$
$$Q_{\text{bagel}} = 1.70 \cdot T^{0.57} L_{\text{bagel}}^{0.43}$$

The supply of the factors are constant. The maximum amount of labor available is 426, the capital supply is 105 and the endowment of land is 75.

The utility function of the representative consumer is written as $U = 1.72 \cdot \ln D_{\text{lemon}} + 0.15 \cdot \ln D_{\text{bagel}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{lemon}}^{0.33} P_{\text{bagel}}^{0.67}$.

Determine the real rental rate of capital.

Solution: The real rental rate of capital is 3.8549.

74. Problem

The following set of formulas represents the functioning of a closed economy:

$$\begin{aligned}
U &= 0.40 \cdot D_{\text{bookshelf}}^{0.13} \cdot D_{\text{lemonade}}^{0.87} \\
Q_{\text{bookshelf}} &= 0.34 \cdot K^{0.78} L_{\text{bookshelf}}^{0.22} \\
Q_{\text{lemonade}} &= 0.61 \cdot T^{0.78} L_{\text{lemonade}}^{0.22} \\
L &= 282 \\
K &= 122 \\
T &= 144 \\
P &= P_{\text{bookshelf}}^{0.41} P_{\text{lemonade}}^{0.59}
\end{aligned}$$

Calculate the real rental rate of capital.

Solution: The real rental rate of capital is 0.1293.

75. Problem

In a closed economy the production function in the rug sector is $Q_{\text{rug}} = 1.92 \cdot K^{0.70} L_{\text{rug}}^{0.30}$ and the technology used by the firm in the hot chocolate sector takes the following form $Q_{\text{hot chocolate}} = 2.17 \cdot T^{0.75} L_{\text{hot chocolate}}^{0.25}$. The input endowments are:

$$\begin{aligned}
L &= 136 \\
K &= 93 \\
T &= 115
\end{aligned}$$

Currently the economy produces 167 units of rug.

What is the price of rug in terms of hot chocolate?

Solution: The price of rug in terms of hot chocolate is 1.2868.

76. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 1.18 \cdot \ln D_{\text{ice cream}} + 0.17 \cdot \ln D_{\text{yoghurt}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{ice cream}} = 1.36 \cdot K^{0.84} L_{\text{ice cream}}^{0.16}$$
$$Q_{\text{yoghurt}} = 1.50 \cdot T^{0.84} L_{\text{yoghurt}}^{0.16}$$

The maximum amount of inputs are constant. The economy uses 239 units of labor, 142 units of capital and 155 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

3.

What is the optimal amount of ice cream consumed?

Solution: In optimum 205.4246 is the amount of .ice cream consumed.

77. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{necklace}} = 0.45 \cdot K^{0.29} L_{\text{necklace}}^{0.71}$$
$$Q_{\text{watch}} = 1.94 \cdot T^{0.45} L_{\text{watch}}^{0.55}$$

The maximum amount of labor available to this economy is 489, the capital supply is 74, and the land endowment is 170. Labor is a mobile factor but capital is used only in necklace sector and land is an industry specific factor to the watch sector. The utility function of the representative consumer is written as $U = 2.24 \cdot D_{\text{necklace}}^{0.77} \cdot D_{\text{watch}}^{0.23}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{necklace}}^{0.30} P_{\text{watch}}^{0.70}$.

Determine the price of necklace in terms of watch.

Solution: The price of necklace in terms of watch is 7.1703.

78. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the pizza industry capital is used as specific factor, and land is specific to milkshake sector. The production functions are written as

$$Q_{\text{pizza}} = 1.87 \cdot K^{0.13} L_{\text{pizza}}^{0.87}$$
$$Q_{\text{milkshake}} = 0.71 \cdot T^{0.13} L_{\text{milkshake}}^{0.87}$$

The supply of the factors are constant. The maximum amount of labor available is 142, the capital supply is 185 and the endowment of land is 215.

The utility function of the representative consumer is written as $U = 1.87 \cdot \ln D_{\text{pizza}} + 1.20 \cdot \ln D_{\text{milkshake}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{pizza}}^{0.32} P_{\text{milkshake}}^{0.68}$.

What is the real GDP in this economy?

Solution: The real GDP is 159.9033.

3.

79. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 2.03 \cdot \ln D_{\text{paper clip}} + 1.95 \cdot \ln D_{\text{mint tea}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{paper clip}} = 1.00 \cdot K^{0.13} L_{\text{paper clip}}^{0.87}$$
$$Q_{\text{mint tea}} = 1.28 \cdot T^{0.13} L_{\text{mint tea}}^{0.87}$$

The maximum amount of inputs are constant. The economy uses 338 units of labor, 191 units of capital and 135 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the optimal amount of paper clip consumed?

Solution: In optimum 174.7089 is the amount of .paper clip consumed.

80. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{soup}} = 1.12 \cdot K^{0.46} L_{\text{soup}}^{0.54}$$
$$Q_{\text{salad}} = 1.71 \cdot T^{0.38} L_{\text{salad}}^{0.62}$$

The maximum amount of labor available to this economy is 257, the capital supply is 115, and the land endowment is 77. Labor is a mobile factor but capital is used only in soup sector and land is an industry specific factor to the salad sector. The utility function of the representative consumer is written as $U = 2.27 \cdot D_{\text{soup}}^{0.49} \cdot D_{\text{salad}}^{0.51}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{soup}}^{0.73} P_{\text{salad}}^{0.27}$.

What is the real GDP in this economy?

Solution: The real GDP in this economy is 291.1434.

3.

81. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the muffin industry capital is used as specific factor, and land is specific to fruit cake sector. The production functions are written as

$$Q_{\text{muffin}} = 0.51 \cdot K^{0.37} L_{\text{muffin}}^{0.63}$$
$$Q_{\text{fruit cake}} = 1.91 \cdot T^{0.37} L_{\text{fruit cake}}^{0.63}$$

The supply of the factors are constant. The maximum amount of labor available is 158, the capital supply is 98 and the endowment of land is 78.

The utility function of the representative consumer is written as $U = 0.29 \cdot \ln D_{\text{muffin}} + 1.86 \cdot \ln D_{\text{fruit cake}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{muffin}}^{0.22} P_{\text{fruit cake}}^{0.78}$.

Calculate the real rental rate of land.

Solution: The real rental rate of land is 0.8919.

82. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the tomato industry capital is used as specific factor, and land is specific to lime sector. The production functions are written as

$$Q_{\text{tomato}} = 1.87 \cdot K^{0.32} L_{\text{tomato}}^{0.68}$$
$$Q_{\text{lime}} = 0.85 \cdot T^{0.32} L_{\text{lime}}^{0.68}$$

The supply of the factors are constant. The maximum amount of labor available is 116, the capital supply is 128 and the endowment of land is 174.

The utility function of the representative consumer is written as $U = 1.75 \cdot \ln D_{\text{tomato}} + 2.08 \cdot \ln D_{\text{lime}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{tomato}}^{0.34} P_{\text{lime}}^{0.66}$.

Calculate the real wage paid to workers.

Solution: The real wage is 1.0309.

83. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.96 \cdot \ln D_{\text{watermelon}} + 2.00 \cdot \ln D_{\text{trifle}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{watermelon}} = 0.94 \cdot K^{0.63} L_{\text{watermelon}}^{0.37}$$
$$Q_{\text{trifle}} = 1.73 \cdot T^{0.63} L_{\text{trifle}}^{0.37}$$

The maximum amount of inputs are constant. The economy uses 90 units of labor, 148 units of capital and 119 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the relative price (price of watermelon to price of trifle) in this economy?

Solution: The relative price is 1.0103 in this economy.

84. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 1.66 \cdot \ln D_{\text{plate}} + 1.60 \cdot \ln D_{\text{paper clip}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{plate}} = 0.15 \cdot K^{0.13} L_{\text{plate}}^{0.87}$$
$$Q_{\text{paper clip}} = 2.15 \cdot T^{0.13} L_{\text{paper clip}}^{0.87}$$

The maximum amount of inputs are constant. The economy uses 92 units of labor, 201 units of capital and 101 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Find the amount of paper clip produced by the firms in paper clip sector.

Solution: In optimum 107.7906 is the amount of .paper clip produced.

85. Problem

The following set of formulas represents the functioning of a closed economy:

$$
\begin{aligned}
U &= 0.71 \cdot D_{\text{coffee cup}}^{0.29} \cdot D_{\text{watch}}^{0.71} \\
Q_{\text{coffee cup}} &= 0.86 \cdot K^{0.44} L_{\text{coffee cup}}^{0.56} \\
Q_{\text{watch}} &= 1.13 \cdot T^{0.44} L_{\text{watch}}^{0.56} \\
L &= 263 \\
K &= 74 \\
T &= 120 \\
P &= P_{\text{coffee cup}}^{0.29} P_{\text{watch}}^{0.71}
\end{aligned}
$$

3.

Calculate the real GDP.

Solution: The real GDP is 238.2213.

86. Problem

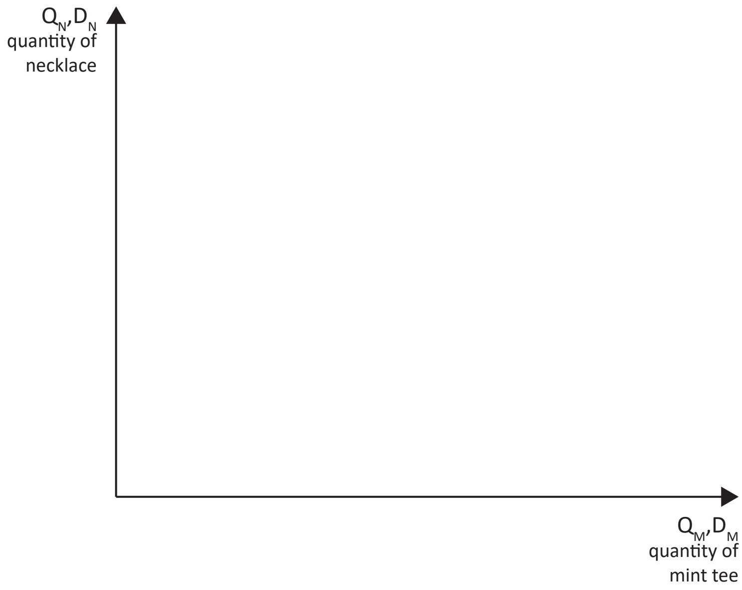
In an economy that produces only two goods, the production process can be described by the following production functions:

$$
\begin{aligned}
Q_{\text{mint tea}} &= 1.08 \cdot K^{0.32} L_{\text{mint tea}}^{0.68} \\
Q_{\text{necklace}} &= 1.34 \cdot T^{0.74} L_{\text{necklace}}^{0.26}
\end{aligned}
$$

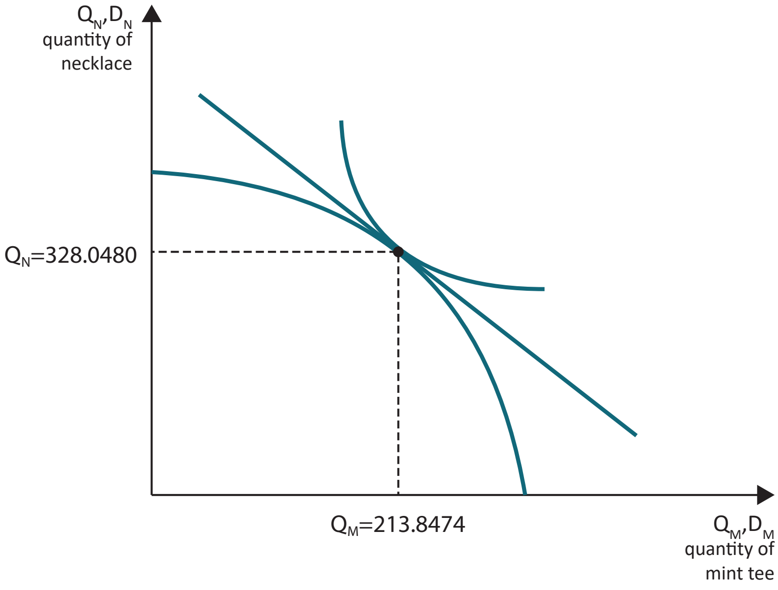
The maximum amount of labor available to this economy is 603, the capital supply is 145, and the land endowment is 211. Labor is a mobile factor but capital is used only in mint tea sector and land is an industry specific factor to the necklace sector. The utility function of the representative consumer is written as $U = 1.83 \cdot D_{\text{mint tea}}^{0.19} \cdot D_{\text{necklace}}^{0.81}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{mint tea}}^{0.29} P_{\text{necklace}}^{0.71}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:



87. Problem

In a closed economy the production function in the strawberry sector is $Q_{\text{strawberry}} = 0.99 \cdot K^{0.18} L_{\text{strawberry}}^{0.82}$ and the technology used by the firm in the teacup sector takes the following form $Q_{\text{teacup}} = 0.50 \cdot T^{0.61} L_{\text{teacup}}^{0.39}$. The input endowments are:

$$L = 498$$
$$K = 175$$
$$T = 216$$

Currently the economy produces 169 units of strawberry.

3.

Determine the real GDP if $P = P_{\text{strawberry}}^{0.47} P_{\text{teacup}}^{0.53}$.

Solution: The real GDP in this economy is 350.0668.

88. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 1.78 \cdot \ln D_{\text{teapot}} + 1.20 \cdot \ln D_{\text{naan bread}}$. The technology used by the firms can be characterized by the following production functions:

$$Q_{\text{teapot}} = 0.79 \cdot K^{0.61} L_{\text{teapot}}^{0.39}$$
$$Q_{\text{naan bread}} = 2.28 \cdot T^{0.61} L_{\text{naan bread}}^{0.39}$$

The maximum amount of inputs are constant. The economy uses 452 units of labor, 77 units of capital and 190 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

What is the relative price (price of teapot to price of naan bread) in this economy?

Solution: The relative price is 6.3686 in this economy.

89. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 0.89 \cdot D_{\text{hairdryer}}^{0.42} \cdot D_{\text{yoghurt}}^{0.58}$$
$$Q_{\text{hairdryer}} = 0.18 \cdot K^{0.52} L_{\text{hairdryer}}^{0.48}$$

$$
\begin{aligned}
Q_{\text{yoghurt}} &= 0.75 \cdot T^{0.52} L_{\text{yoghurt}}^{0.48} \\
L &= 468 \\
K &= 105 \\
T &= 227 \\
P &= P_{\text{hairdryer}}^{0.44} P_{\text{yoghurt}}^{0.56}
\end{aligned}
$$

Calculate the real GDP.

Solution: The real GDP is 154.0584.

90. Problem

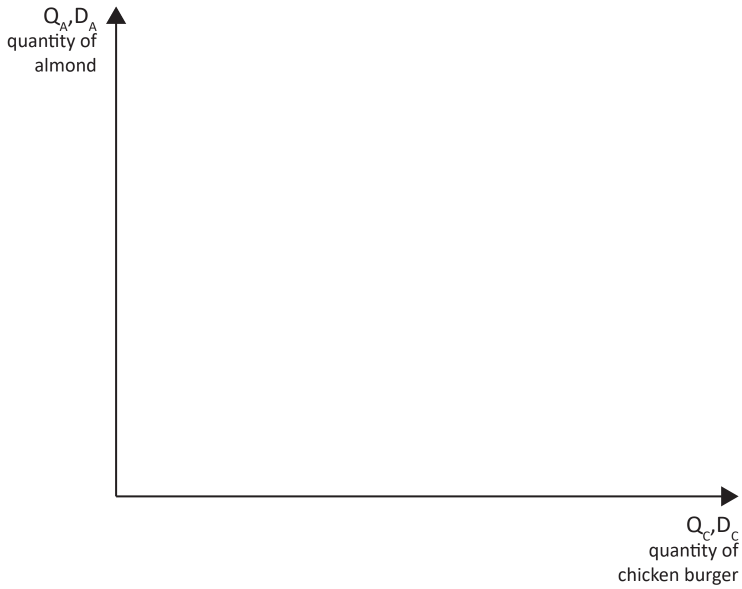
In an economy that produces only two goods, the production process can be described by the following production functions:

$$
\begin{aligned}
Q_{\text{chicken burger}} &= 1.87 \cdot K^{0.83} L_{\text{chicken burger}}^{0.17} \\
Q_{\text{almond}} &= 0.22 \cdot T^{0.28} L_{\text{almond}}^{0.72}
\end{aligned}
$$

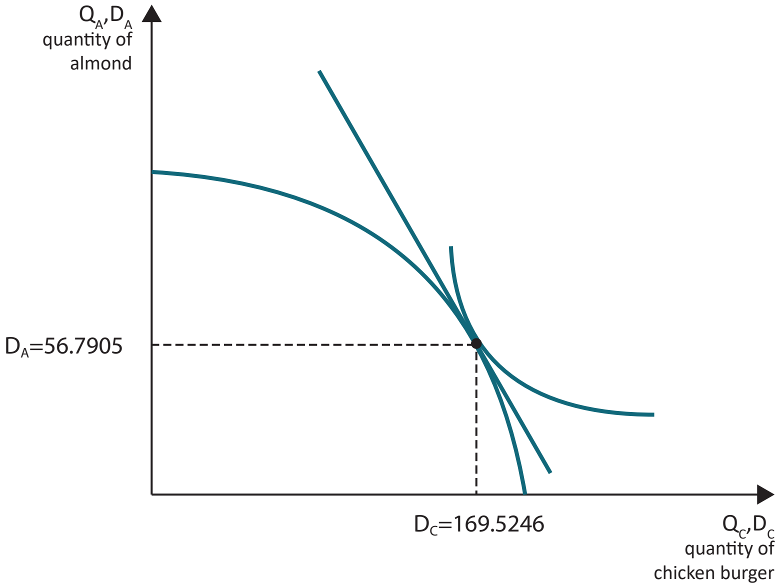
The maximum amount of labor available to this economy is 502, the capital supply is 75, and the land endowment is 223. Labor is a mobile factor but capital is used only in chicken burger sector and land is an industry specific factor to the almond sector. The utility function of the representative consumer is written as $U = 0.19 \cdot D_{\text{chicken burger}}^{0.78} \cdot D_{\text{almond}}^{0.22}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{chicken burger}}^{0.27} P_{\text{almond}}^{0.73}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:



91. Problem

The following set of formulas represents the functioning of a closed economy:

$$\begin{aligned} U &= 0.18 \cdot D_{\text{pushchair}}^{0.22} \cdot D_{\text{tomato}}^{0.78} \\ Q_{\text{pushchair}} &= 1.89 \cdot K^{0.64} L_{\text{pushchair}}^{0.36} \\ Q_{\text{tomato}} &= 2.35 \cdot T^{0.64} L_{\text{tomato}}^{0.36} \\ L &= 159 \\ K &= 166 \\ T &= 109 \\ P &= P_{\text{pushchair}}^{0.15} P_{\text{tomato}}^{0.85} \end{aligned}$$

Determine the price of pushchair in terms of tomato.

Solution: The price of pushchair in terms of tomato is 0.4226 units.

92. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the peach industry capital is used as specific factor, and land is specific to aubergine sector. The production functions are written as

$$\begin{aligned} Q_{\text{peach}} &= 2.04 \cdot K^{0.77} L_{\text{peach}}^{0.23} \\ Q_{\text{aubergine}} &= 0.74 \cdot T^{0.77} L_{\text{aubergine}}^{0.23} \end{aligned}$$

The supply of the factors are constant. The maximum amount of labor available is 334, the capital supply is 205 and the endowment of land is 137.

The utility function of the representative consumer is written as $U = 0.62 \cdot \ln D_{\text{peach}} + 1.85 \cdot \ln D_{\text{aubergine}}$.

The statistical office calculates price level by using the following formula: $P = P_{\text{peach}}^{0.81} P_{\text{aubergine}}^{0.19}$.

Calculate the real wage paid to workers.

Solution: The real wage is 0.6189.

93. Problem

The following set of formulas represents the functioning of a closed economy:

$$U = 1.22 \cdot D_{\text{shampoo}}^{0.37} \cdot D_{\text{coffee}}^{0.63}$$

$$
\begin{aligned}
Q_{\text{shampoo}} &= 0.19 \cdot K^{0.53} L_{\text{shampoo}}^{0.47} \\
Q_{\text{coffee}} &= 0.55 \cdot T^{0.53} L_{\text{coffee}}^{0.47} \\
L &= 213 \\
K &= 212 \\
T &= 116 \\
P &= P_{\text{shampoo}}^{0.44} P_{\text{coffee}}^{0.56}
\end{aligned}
$$

What is the real rental rate of land in this economy?

Solution: The real rental rate of land is 0.2548.

3.

94. Problem

We analyse the functioning of a closed economy. The representative consumer chooses the amount of goods that maximizes her utility subject to a budget constraint. The utility function takes the form of $U = 0.99 \cdot \ln D_{\text{trifle}} + 1.89 \cdot \ln D_{\text{aubergine}}$. The technology used by the firms can be characterized by the following production functions:

$$
\begin{aligned}
Q_{\text{trifle}} &= 2.37 \cdot K^{0.71} L_{\text{trifle}}^{0.29} \\
Q_{\text{aubergine}} &= 0.46 \cdot T^{0.71} L_{\text{aubergine}}^{0.29}
\end{aligned}
$$

The maximum amount of inputs are constant. The economy uses 537 units of labor, 179 units of capital and 75 units of land. Labor is a mobile factor, it moves freely between industries, but capital and land are industry specific factors.

Determine the amount of aubergine purchased by the utility maximizing consumer.

Solution: In optimum 54.0373 is the amount of .aubergine consumed.

95. Problem

The following set of formulas represents the functioning of a closed economy:

$$
\begin{aligned}
U &= 1.61 \cdot D_{\text{hairdryer}}^{0.28} \cdot D_{\text{pistachio}}^{0.72} \\
Q_{\text{hairdryer}} &= 0.63 \cdot K^{0.22} L_{\text{hairdryer}}^{0.78} \\
Q_{\text{pistachio}} &= 1.25 \cdot T^{0.22} L_{\text{pistachio}}^{0.78} \\
L &= 95 \\
K &= 127
\end{aligned}
$$

$$T = 95$$
$$P = P_{\text{hairdryer}}^{0.63} P_{\text{pistachio}}^{0.37}$$

Determine the real wage.

Solution: The real wage is 0.8077.

96. Problem

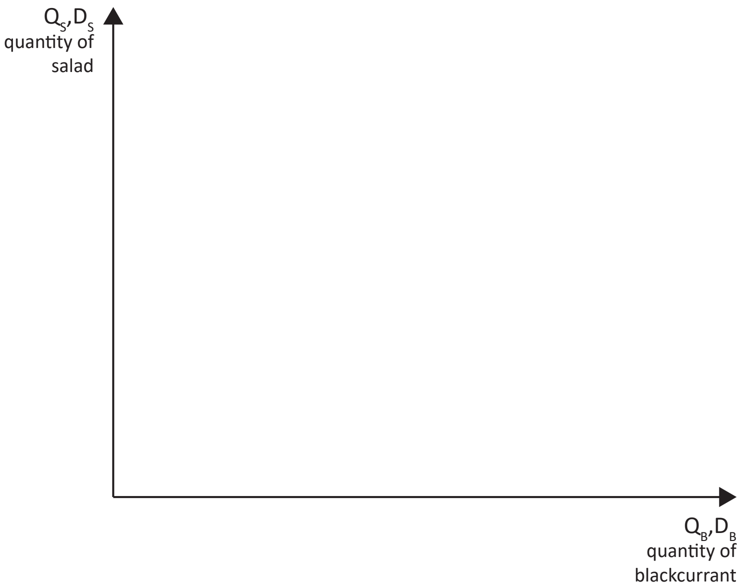
In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{blackcurrant}} = 0.54 \cdot K^{0.15} L_{\text{blackcurrant}}^{0.85}$$
$$Q_{\text{salad}} = 1.77 \cdot T^{0.76} L_{\text{salad}}^{0.24}$$

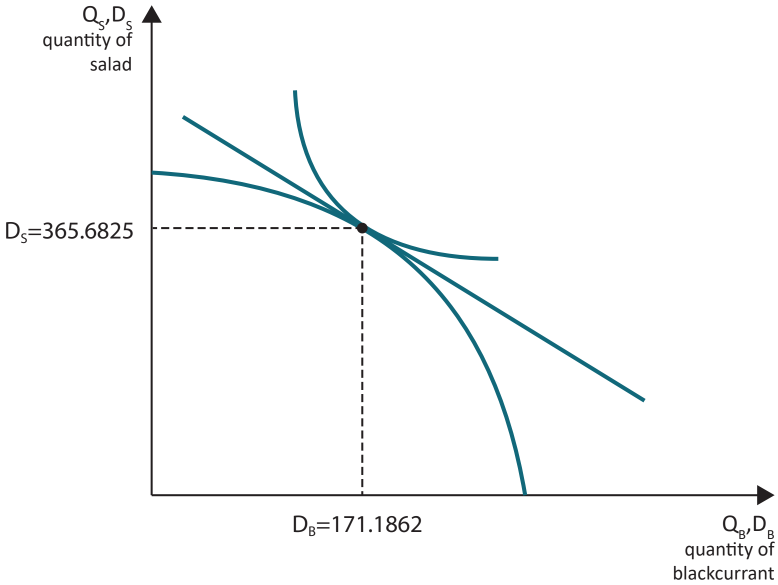
The maximum amount of labor available to this economy is 555, the capital supply is 173, and the land endowment is 208. Labor is a mobile factor but capital is used only in blackcurrant sector and land is an industry specific factor to the salad sector. The utility function of the representative consumer is written as $U = 0.93 \cdot D_{\text{blackcurrant}}^{0.33} \cdot D_{\text{salad}}^{0.67}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{blackcurrant}}^{0.31} P_{\text{salad}}^{0.69}$.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:



97. Problem

In a closed economy the production function in the chicken burger sector is $Q_{\text{chicken burger}} = 1.63 \cdot K^{0.76} L_{\text{chicken burger}}^{0.24}$ and the technology used by the firm in the pistachio sector takes the following form $Q_{\text{pistachio}} = 0.56 \cdot T^{0.58} L_{\text{pistachio}}^{0.42}$. The input endowments are:

$$L = 199$$
$$K = 177$$
$$T = 120$$

Currently the economy produces 64 units of chicken burger.

What is the price of chicken burger in terms of pistachio?

Solution: The price of chicken burger in terms of pistachio is 0.0038.

98. Problem

In a closed economy the production function in the naan bread sector is $Q_{\text{naan bread}} = 1.44 \cdot K^{0.22} L^{0.78}_{\text{naan bread}}$ and the technology used by the firm in the hairdryer sector takes the following form $Q_{\text{hairdryer}} = 0.18 \cdot T^{0.43} L^{0.57}_{\text{hairdryer}}$. The input endowments are:

$$L = 287$$
$$K = 137$$
$$T = 150$$

Currently the economy produces 145 units of naan bread.

What is the price of naan bread in terms of hairdryer?

Solution: The price of naan bread in terms of hairdryer is 0.0749.

99. Problem

Consider a closed economy where firms apart from labor, that moves freely between industries, firms use specific factors as well. In the pie industry capital is used as specific factor, and land is specific to pushchair sector. The production functions are written as

$$Q_{\text{pie}} = 0.64 \cdot K^{0.46} L^{0.54}_{\text{pie}}$$
$$Q_{\text{pushchair}} = 1.51 \cdot T^{0.46} L^{0.54}_{\text{pushchair}}$$

The supply of the factors are constant. The maximum amount of labor available is 262, the capital supply is 226 and the endowment of land is 82.

The utility function of the representative consumer is written as $U = 1.95 \cdot \ln D_{\text{pie}} + 1.90 \cdot \ln D_{\text{pushchair}}$.

The statistical office calculates price level by using the following formula: $P = P^{0.36}_{\text{pie}} P^{0.64}_{\text{pushchair}}$.

Calculate the real wage paid to workers.

Solution: The real wage is 0.5718.

100. Problem

In an economy that produces only two goods, the production process can be described by the following production functions:

$$Q_{\text{napkin}} = 1.33 \cdot K^{0.36} L^{0.64}_{\text{napkin}}$$

$$Q_{\text{salad}} = 1.71 \cdot T^{0.29} L_{\text{salad}}^{0.71}$$

The maximum amount of labor available to this economy is 532, the capital supply is 124, and the land endowment is 169. Labor is a mobile factor but capital is used only in napkin sector and land is an industry specific factor to the salad sector. The utility function of the representative consumer is written as $U = 2.26 \cdot D_{\text{napkin}}^{0.50} \cdot D_{\text{salad}}^{0.50}$.

The statistical office of the economy calculates the price level by using the formula of $P = P_{\text{napkin}}^{0.13} P_{\text{salad}}^{0.87}$.

Determine the price of napkin in terms of salad.

Solution: The price of napkin in terms of salad is 1.5912.

3.

4. SPECIFIC FACTORS MODEL FREE TRADE

Specific Factors Model
Small Open Economy

1. Problem

Consider a model of specific factors with two goods lime and banana. lime is produced with labor and capital, banana is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 90$$
$$K = 106$$
$$T = 172$$

The production functions for tablets and oranges are:

$$Q_{\text{lime}} = 0.76 \cdot K^{0.40} L_{\text{lime}}^{0.60}$$
$$Q_{\text{banana}} = 1.58 \cdot T^{0.40} L_{\text{banana}}^{0.60}$$

The utility function of the representative consumer is written as $U = 1.23 \cdot \ln D_{\text{lime}} + 0.49 \cdot \ln D_{\text{banana}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{lime}}^{0.13} P_{\text{banana}}^{0.87}$.

The country faces $\frac{P_{\text{lime}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} = 4.15$ relative world price.

What is the optimal amount of lime consumed?

Solution: In optimum 57.7900 is the amount of .lime consumed.

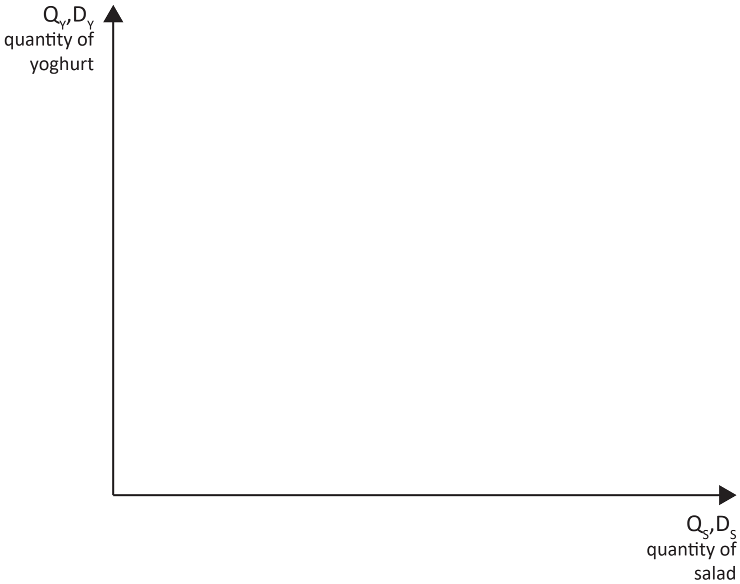
2. Problem

The functioning of a small open economy can be characterized by the following formulas:

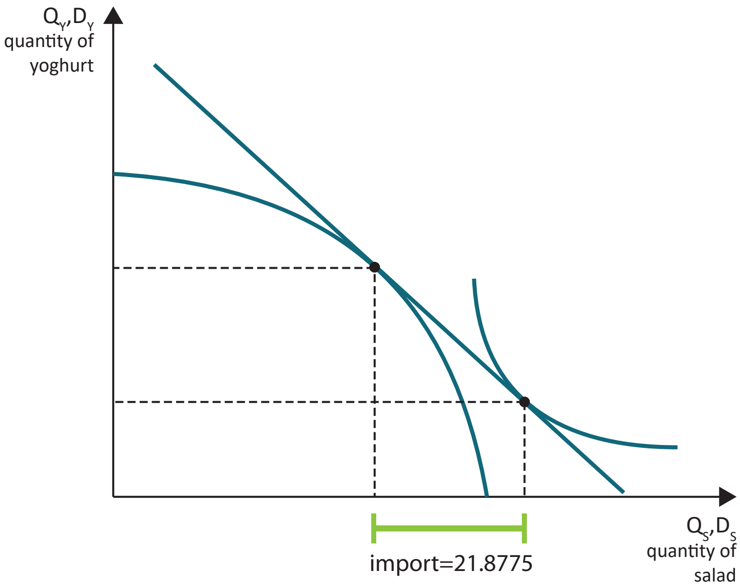
$$U = 2.17 \cdot \ln D_{\text{salad}} + 0.36 \cdot \ln D_{\text{yoghurt}}$$
$$Q_{\text{salad}} = 1.12 \cdot K^{0.73} L_{\text{salad}}^{0.27}$$
$$Q_{\text{yoghurt}} = 1.80 \cdot T^{0.73} L_{\text{yoghurt}}^{0.27}$$
$$L = 285$$

$$K = 70$$
$$T = 90$$
$$P = P_{\text{salad}}^{0.15} P_{\text{yoghurt}}^{0.85}$$
$$\frac{P_{\text{salad}}^{\text{world}}}{P_{\text{yoghurt}}^{\text{world}}} = 3.70$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the import, and calculate the amount of import.



Solution: The correct graph is the following:



3. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{teacup}} = 0.47 \cdot K^{0.41} L_{\text{teacup}}^{0.59}$$
$$Q_{\text{lime}} = 0.90 \cdot T^{0.41} L_{\text{lime}}^{0.59}$$

Firms are able to use 218 units of labor, 212 units of capital and 80 units of land to produce their output, and under free trade they produce 90.090417 of teacup and 47.322382 of lime. The statistical office determines the price level by using the formula of $P = P_{\text{teacup}}^{0.64} \cdot P_{\text{lime}}^{0.36}$.

Determine the real GDP of this small open economy under free trade.

Solution: In this small open economy the real GDP is 150.3778 units.

4. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{rug}} = 0.98 \cdot K^{0.62} L_{\text{rug}}^{0.38}$$

$$Q_{\text{scarf}} = 1.58 \cdot T^{0.62} L_{\text{scarf}}^{0.38}$$

Firms are able to use 441 units of labor, 209 units of capital and 156 units of land to produce their output, and under free trade they produce 252.555773 of rug and 189.655785 of scarf. In autarky the relative price of rug in terms of scarf would have been 0.926940.

Solution: The small open economy has comparative advantage in producing rug, under free trade it exports rug and imports scarf. Land is specific to scarf industry, thus land owners are worse off with free trade.

5. Problem

4.

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{bagel}} = 1.89 \cdot K^{0.51} L_{\text{bagel}}^{0.49}$$
$$Q_{\text{teapot}} = 0.40 \cdot T^{0.51} L_{\text{teapot}}^{0.49}$$

Firms are able to use 608 units of labor, 214 units of capital and 65 units of land to produce their output, and under free trade they produce 674.550506 of bagel and 1.539782 of teapot. In autarky the relative price of bagel in terms of teapot would have been 0.155547.

Solution: The small open economy has comparative advantage in producing bagel, under free trade it exports bagel and imports teapot. Land is specific to teapot industry, thus land owners are worse off with free trade.

6. Problem

Consider a model of specific factors with two goods watermelon and banana. watermelon is produced with labor and capital, banana is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 478$$
$$K = 76$$
$$T = 96$$

The production functions for tablets and oranges are:

$$Q_{\text{watermelon}} = 1.63 \cdot K^{0.17} L_{\text{watermelon}}^{0.83}$$
$$Q_{\text{banana}} = 1.27 \cdot T^{0.17} L_{\text{banana}}^{0.83}$$

The utility function of the representative consumer is written as $U = 1.44 \cdot \ln D_{\text{watermelon}} + 1.44 \cdot \ln D_{\text{banana}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{watermelon}}^{0.39} P_{\text{banana}}^{0.61}$.

The country faces $\frac{P_{\text{watermelon}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} = 5.93$ relative world price.

Find the amount of banana produced by the firms in banana sector.

Solution: In optimum 0.0279 is the amount of .banana produced.

7. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{jigsaw}	165.217476	226.610746
Q_{trifle}	286.111817	230.702132
D_{jigsaw}	165.217476	86.985854
D_{trifle}	286.111817	442.931968
L_{jigsaw}	136.781609	356.335900
L_{trifle}	458.218391	238.664100

The two production functions are given by

$$Q_{\text{jigsaw}} = 1.50 \cdot K^{0.67} L_{\text{jigsaw}}^{0.33}$$
$$Q_{\text{trifle}} = 2.22 \cdot T^{0.67} L_{\text{trifle}}^{0.33}$$

The maximum amount of capital is 99 units and the land endowment is 69 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{jigsaw}}^{0.72} \cdot P_{\text{trifle}}^{0.28}$.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by 85.5150 percent.

8. Problem

A small open economy uses labor, capital and land to produce two goods cola and painting. The production functions are written as:

$$Q_{\text{cola}} = 1.99 \cdot K^{0.21} L_{\text{cola}}^{0.79}$$
$$Q_{\text{painting}} = 2.31 \cdot T^{0.21} L_{\text{painting}}^{0.79}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 342$, $K = 117$ and $T = 199$.

The utility function of the representative consumer is given by $U = 1.10 \cdot D_{\text{cola}}^{0.52} D_{\text{painting}}^{0.48}$. The statistical office determines the price level by using the formula of $P = P_{\text{cola}}^{0.54} P_{\text{painting}}^{0.46}$.

The small open economy trades actively with the rest of the world, where the price of cola in terms of painting is 2.52.

By what percentage does free trade change the real wage of workers?

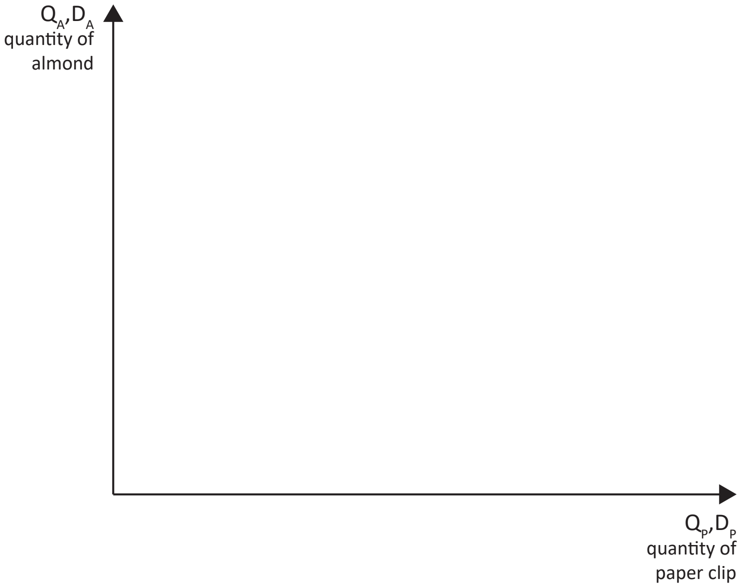
Solution: Free trade changes the reál wage by 18.4035 percent.

9. Problem

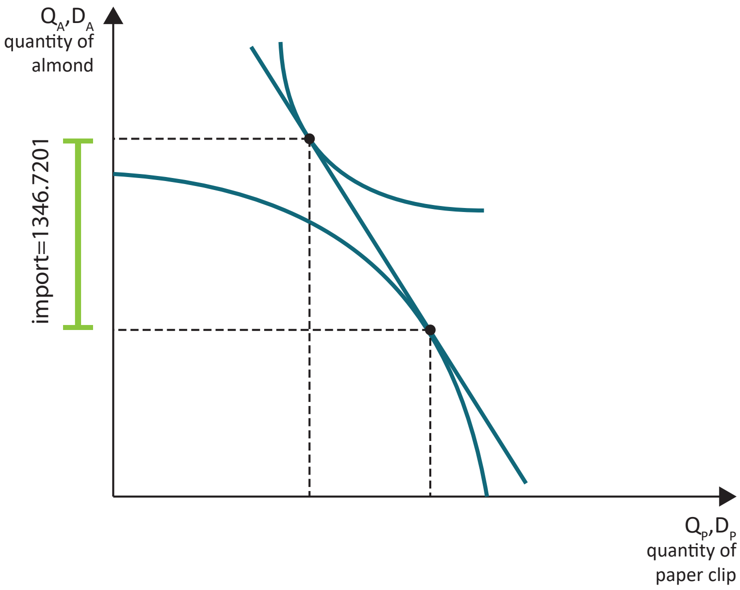
The functioning of a small open economy can be characterized by the following formulas:

$$U = 0.13 \cdot \ln D_{\text{paper clip}} + 1.09 \cdot \ln D_{\text{almond}}$$
$$Q_{\text{paper clip}} = 2.20 \cdot K^{0.16} L_{\text{paper clip}}^{0.84}$$
$$Q_{\text{almond}} = 0.81 \cdot T^{0.16} L_{\text{almond}}^{0.84}$$
$$L = 253$$
$$K = 158$$
$$T = 196$$
$$P = P_{\text{paper clip}}^{0.24} P_{\text{almond}}^{0.76}$$
$$\frac{P_{\text{paper clip}}^{\text{world}}}{P_{\text{almond}}^{\text{world}}} = 2.92$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the import, and calculate the amount of import.



Solution: The correct graph is the following:



10. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{wooden spoon}} = 0.91 \cdot K^{0.69} L_{\text{wooden spoon}}^{0.31}$$
$$Q_{\text{bagel}} = 0.69 \cdot T^{0.69} L_{\text{bagel}}^{0.31}$$

Firms are able to use 91 units of labor, 138 units of capital and 178 units of land to produce their output, and under free trade they produce 108.529900 of wooden spoon and 40.096578 of bagel. The statistical office determines the price level by using the formula of $P = P_{\text{wooden spoon}}^{0.55} \cdot P_{\text{bagel}}^{0.45}$.

4.

What is the real wage in this economy under free trade?

Solution: In this small open economy the real wage is 0.9138 units.

11. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{orange}} = 0.70 \cdot K^{0.41} L_{\text{orange}}^{0.59}$$
$$Q_{\text{wallet}} = 0.78 \cdot T^{0.41} L_{\text{wallet}}^{0.59}$$

Firms are able to use 226 units of labor, 82 units of capital and 193 units of land to produce their output, and under free trade they produce 102.828646 of orange and 18.886352 of wallet. The statistical office determines the price level by using the formula of $P = P_{\text{orange}}^{0.60} \cdot P_{\text{wallet}}^{0.40}$.

Calculate the real rental rate of capital under free trade?

Solution: In this small open economy the real rental rate of capital is 1.1242 units.

12. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{wooden spoon}} = 2.41 \cdot K^{0.45} L_{\text{wooden spoon}}^{0.55}$$
$$Q_{\text{scarf}} = 0.71 \cdot T^{0.45} L_{\text{scarf}}^{0.55}$$

Firms are able to use 476 units of labor, 90 units of capital and 143 units of land to produce their output, and under free trade they produce 541.473788 of wooden spoon and 6.840664 of scarf. The statistical office determines the price level by using the formula of $P = P_{\text{wooden spoon}}^{0.29} \cdot P_{\text{scarf}}^{0.71}$.

Calculate the real rental rate of capital under free trade?

Solution: In this small open economy the real rental rate of capital is 9.2693 units.

13. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$\begin{aligned}
U &= 2.07 \cdot \ln D_{\text{coffee cup}} + 0.25 \cdot \ln D_{\text{wine glass}} \\
Q_{\text{coffee cup}} &= 0.14 \cdot K^{0.28} L_{\text{coffee cup}}^{0.72} \\
Q_{\text{wine glass}} &= 0.64 \cdot T^{0.28} L_{\text{wine glass}}^{0.72} \\
L &= 184 \\
K &= 158 \\
T &= 153 \\
P &= P_{\text{coffee cup}}^{0.63} P_{\text{wine glass}}^{0.37} \\
\frac{P_{\text{coffee cup}}^{\text{world}}}{P_{\text{wine glass}}^{\text{world}}} &= 3.99
\end{aligned}$$

Which good does the economy export and what is the amount of export?

Solution: The economy exports wine glass and the amount of export is $EX = 64.6529$.

14. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods wooden spoon and pushchair, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned}
U &= 0.34 \cdot \ln D_{\text{wooden spoon}} + 1.05 \cdot \ln D_{\text{pushchair}} \\
Q_{\text{wooden spoon}} &= 1.14 \cdot K^{0.13} L_{\text{wooden spoon}}^{0.87} \\
Q_{\text{pushchair}} &= 1.93 \cdot T^{0.13} L_{\text{pushchair}}^{0.87} \\
L &= 230 \\
K &= 223
\end{aligned}$$

$$T = 182$$
$$P = P_{\text{wooden spoon}}^{0.50} P_{\text{pushchair}}^{0.50}$$
$$\frac{P_{\text{wooden spoon}}^{\text{world}}}{P_{\text{pushchair}}^{\text{world}}} = 1.80$$

Calculate the real rental rate of capital under free trade?

Solution: The real rental rate of capital in this small open economy is 0.1428 units.

4.

15. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in plate industry and land is specific to handbag industry.

The relative price of plate in terms of handbag is 2.48 in the rest of the world. The relative price of plate in terms of handbag would have been 10.16 in the small open economy in autarky.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing handbag, under free trade it exports handbag. Land is specific to handbag industry, thus land owners are better off with free trade.

16. Problem

A small open economy uses labor, capital and land to produce two goods almond and lime. The production functions are written as:

$$Q_{\text{almond}} = 1.41 \cdot K^{0.44} L_{\text{almond}}^{0.56}$$
$$Q_{\text{lime}} = 1.25 \cdot T^{0.44} L_{\text{lime}}^{0.56}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 349$, $K = 102$ and $T = 107$.

The utility function of the representative consumer is given by $U = 1.62 \cdot D_{\text{almond}}^{0.30} D_{\text{lime}}^{0.70}$. The statistical office determines the price level by using the formula of $P = P_{\text{almond}}^{0.49} P_{\text{lime}}^{0.51}$.

The small open economy trades actively with the rest of the world, where the price of almond in terms of lime is 1.39.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by 2.0124 percent.

17. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{backpack}} = 1.16 \cdot K^{0.75} L_{\text{backpack}}^{0.25}$$
$$Q_{\text{tomato}} = 1.41 \cdot T^{0.75} L_{\text{tomato}}^{0.25}$$

Firms are able to use 533 units of labor, 191 units of capital and 147 units of land to produce their output, and under free trade they produce 278.262161 of backpack and 164.124106 of tomato. The statistical office determines the price level by using the formula of $P = P_{\text{backpack}}^{0.59} \cdot P_{\text{tomato}}^{0.41}$.

Determine the real GDP of this small open economy under free trade.

Solution: In this small open economy the real GDP is 596.2809 units.

18. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods ice cream and paper clip, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned}
U &= 1.06 \cdot \ln D_{\text{ice cream}} + 1.37 \cdot \ln D_{\text{paper clip}} \\
Q_{\text{ice cream}} &= 2.07 \cdot K^{0.25} L_{\text{ice cream}}^{0.75} \\
Q_{\text{paper clip}} &= 2.11 \cdot T^{0.25} L_{\text{paper clip}}^{0.75} \\
L &= 600 \\
K &= 138 \\
T &= 153 \\
P &= P_{\text{ice cream}}^{0.32} P_{\text{paper clip}}^{0.68} \\
\frac{P_{\text{ice cream}}^{\text{world}}}{P_{\text{paper clip}}^{\text{world}}} &= 5.02
\end{aligned}$$

Determine the real GDP of this small open economy under free trade.

Solution: The real GDP in this small open economy is 2577.7246 units.

19. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{rug}	65.192164	270.060921
Q_{brioche}	155.536324	0.009638
D_{rug}	65.192164	50.730138
D_{brioche}	155.536324	859.786309
L_{rug}	64.243094	341.996886
L_{brioche}	277.756906	0.003114

The two production functions are given by

$$Q_{\text{rug}} = 0.90 \cdot K^{0.15} L_{\text{rug}}^{0.85}$$
$$Q_{\text{brioche}} = 0.67 \cdot T^{0.15} L_{\text{brioche}}^{0.85}$$

The maximum amount of capital is 143 units and the land endowment is 84 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{rug}}^{0.29} \cdot P_{\text{brioche}}^{0.71}$.

By what percentage does free trade change the relative price (price of rug in terms of brioche)?

Solution: Free trade changes the relative price by 610.3756 percent.

20. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{painting}} = 0.72 \cdot K^{0.48} L_{\text{painting}}^{0.52}$$
$$Q_{\text{bagel}} = 2.27 \cdot T^{0.48} L_{\text{bagel}}^{0.52}$$

Firms are able to use 476 units of labor, 77 units of capital and 219 units of land to produce their output, and under free trade they produce 90.410830 of painting and 563.607216 of bagel. The statistical office determines the price level by using the formula of $P = P_{\text{painting}}^{0.56} \cdot P_{\text{bagel}}^{0.44}$.

What is the real wage in this economy under free trade?

Solution: In this small open economy the real wage is 0.4580 units.

21. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods hot dog and hairspray, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$
\begin{aligned}
U &= 0.56 \cdot \ln D_{\text{hot dog}} + 0.66 \cdot \ln D_{\text{hairspray}} \\
Q_{\text{hot dog}} &= 1.75 \cdot K^{0.78} L_{\text{hot dog}}^{0.22} \\
Q_{\text{hairspray}} &= 1.01 \cdot T^{0.78} L_{\text{hairspray}}^{0.22} \\
L &= 419 \\
K &= 198 \\
T &= 142 \\
P &= P_{\text{hot dog}}^{0.12} P_{\text{hairspray}}^{0.88} \\
\frac{P_{\text{hot dog}}^{\text{world}}}{P_{\text{hairspray}}^{\text{world}}} &= 5.35
\end{aligned}
$$

What is the real wage in this economy under free trade?

Solution: The real wage in this small open economy is 0.9687 units.

22. Problem

Consider a model of specific factors with two goods watermelon and broccoli. watermelon is produced with labor and capital, broccoli is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$
\begin{aligned}
L &= 432 \\
K &= 108 \\
T &= 150
\end{aligned}
$$

The production functions for tablets and oranges are:

$$Q_{\text{watermelon}} = 1.72 \cdot K^{0.19} L_{\text{watermelon}}^{0.81}$$

$$Q_{\text{broccoli}} = 0.81 \cdot T^{0.19} L_{\text{broccoli}}^{0.81}$$

The utility function of the representative consumer is written as $U = 0.93 \cdot \ln D_{\text{watermelon}} + 0.49 \cdot \ln D_{\text{broccoli}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{watermelon}}^{0.45} P_{\text{broccoli}}^{0.55}$.

The country faces $\frac{P_{\text{watermelon}}^{\text{world}}}{P_{\text{broccoli}}^{\text{world}}} = 2.12$ relative world price.

Find the amount of broccoli produced by the firms in broccoli sector.

Solution: In optimum 0.6118 is the amount of .broccoli produced.

4.

23. Problem

A small open economy uses labor, capital and land to produce two goods tea and jigsaw. The production functions are written as:

$$Q_{\text{tea}} = 1.98 \cdot K^{0.75} L_{\text{tea}}^{0.25}$$
$$Q_{\text{jigsaw}} = 1.01 \cdot T^{0.75} L_{\text{jigsaw}}^{0.25}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 393$, $K = 67$ and $T = 122$.

The utility function of the representative consumer is given by $U = 1.36 \cdot D_{\text{tea}}^{2.16} D_{\text{jigsaw}}^{-1.16}$. The statistical office determines the price level by using the formula of $P = P_{\text{tea}}^{0.24} P_{\text{jigsaw}}^{0.76}$.

The small open economy trades actively with the rest of the world, where the price of tea in terms of jigsaw is 1.83.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by -122.0507 percent.

24. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods banana and spring onion, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$U = 1.27 \cdot \ln D_{\text{banana}} + 0.56 \cdot \ln D_{\text{spring onion}}$$
$$Q_{\text{banana}} = 0.76 \cdot K^{0.48} L_{\text{banana}}^{0.52}$$

$$
\begin{aligned}
Q_{\text{spring onion}} &= 1.18 \cdot T^{0.48} L_{\text{spring onion}}^{0.52} \\
L &= 332 \\
K &= 146 \\
T &= 208 \\
P &= P_{\text{banana}}^{0.22} P_{\text{spring onion}}^{0.78} \\
\frac{P_{\text{banana}}^{\text{world}}}{P_{\text{spring onion}}^{\text{world}}} &= 1.96
\end{aligned}
$$

Find the real rental rate of land under free trade.

Solution: The real rental rate of land in this small open economy is 388.9517 units.

4.

25. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in porridge industry and land is specific to wallet industry.

The relative price of porridge in terms of wallet is 4.92 in the rest of the world. The relative price of porridge in terms of wallet would have been 7.30 in the small open economy in autarky.

Solution: The small open economy has comparative advantage in producing wallet, under free trade it exports wallet and imports porridge. Capital is specific to porridge industry, thus capital owners are worse off with free trade.

26. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods coffee cup and aubergine, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$
\begin{aligned}
U &= 0.13 \cdot \ln D_{\text{coffee cup}} + 2.16 \cdot \ln D_{\text{aubergine}} \\
Q_{\text{coffee cup}} &= 1.00 \cdot K^{0.54} L_{\text{coffee cup}}^{0.46} \\
Q_{\text{aubergine}} &= 0.20 \cdot T^{0.54} L_{\text{aubergine}}^{0.46} \\
L &= 349 \\
K &= 166 \\
T &= 180 \\
P &= P_{\text{coffee cup}}^{0.53} P_{\text{aubergine}}^{0.47}
\end{aligned}
$$

$$\frac{P^{\text{world}}_{\text{coffee cup}}}{P^{\text{world}}_{\text{aubergine}}} = 5.09$$

Find the real rental rate of land under free trade.

Solution: The real rental rate of land in this small open economy is 502.7461 units.

27. Problem

4.

A small open economy uses labor, capital and land to produce two goods handbag and plate. The production functions are written as:

$$Q_{\text{handbag}} = 0.85 \cdot K^{0.61} L_{\text{handbag}}^{0.39}$$
$$Q_{\text{plate}} = 1.46 \cdot T^{0.61} L_{\text{plate}}^{0.39}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 545$, $K = 219$ and $T = 205$.

The utility function of the representative consumer is given by $U = 0.19 \cdot D_{\text{handbag}}^{1.76} D_{\text{plate}}^{-0.76}$. The statistical office determines the price level by using the formula of $P = P_{\text{handbag}}^{0.22} P_{\text{plate}}^{0.78}$.

The small open economy trades actively with the rest of the world, where the price of handbag in terms of plate is 1.12.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by -89.8505 percent.

28. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods trifle and wine glass, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$U = 2.29 \cdot \ln D_{\text{trifle}} + 0.74 \cdot \ln D_{\text{wine glass}}$$
$$Q_{\text{trifle}} = 1.72 \cdot K^{0.33} L_{\text{trifle}}^{0.67}$$
$$Q_{\text{wine glass}} = 0.30 \cdot T^{0.33} L_{\text{wine glass}}^{0.67}$$
$$L = 280$$
$$K = 226$$

$$T = 110$$
$$P = P_{\text{trifle}}^{0.48} P_{\text{wine glass}}^{0.52}$$
$$\frac{P_{\text{trifle}}^{\text{world}}}{P_{\text{wine glass}}^{\text{world}}} = 0.88$$

Find the real rental rate of land under free trade.

Solution: The real rental rate of land in this small open economy is 420.3657 units.

29. Problem

4.

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{tomato}	299.135087	248.928655
Q_{muffin}	221.483821	279.634700
D_{tomato}	299.135087	398.722695
D_{muffin}	221.483821	153.807707
L_{tomato}	256.300000	160.011996
L_{muffin}	117.700000	213.988004

The two production functions are given by

$$Q_{\text{tomato}} = 1.41 \cdot K^{0.61} L_{\text{tomato}}^{0.39}$$
$$Q_{\text{muffin}} = 1.65 \cdot T^{0.61} L_{\text{muffin}}^{0.39}$$

The maximum amount of capital is 188 units and the land endowment is 146 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{tomato}}^{0.18} \cdot P_{\text{muffin}}^{0.82}$.

By what percentage does free trade change the relative price (price of tomato in terms of muffin)?

Solution: Free trade changes the relative price by -47.9006 percent.

30. Problem

A small open economy uses labor, capital and land to produce two goods bookshelf and naan bread. The production functions are written as:

$$Q_{\text{bookshelf}} = 0.38 \cdot K^{0.19} L_{\text{bookshelf}}^{0.81}$$
$$Q_{\text{naan bread}} = 2.16 \cdot T^{0.19} L_{\text{naan bread}}^{0.81}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 325$, $K = 122$ and $T = 193$.

The utility function of the representative consumer is given by $U = 2.23 \cdot D_{\text{bookshelf}}^{2.06} D_{\text{naan bread}}^{-1.06}$. The statistical office determines the price level by using the formula of $P = P_{\text{bookshelf}}^{0.52} P_{\text{naan bread}}^{0.48}$.

The small open economy trades actively with the rest of the world, where the price of bookshelf in terms of naan bread is 6.76.

By what percentage does free trade change the relative price (price of bookshelf in terms of naan bread)?

Solution: Free trade changes the relative price by -20.5397 percent.

31. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$U = 0.68 \cdot \ln D_{\text{pie}} + 0.21 \cdot \ln D_{\text{banana}}$$
$$Q_{\text{pie}} = 1.10 \cdot K^{0.32} L_{\text{pie}}^{0.68}$$
$$Q_{\text{banana}} = 1.64 \cdot T^{0.32} L_{\text{banana}}^{0.68}$$
$$L = 140$$
$$K = 185$$
$$T = 184$$
$$P = P_{\text{pie}}^{0.25} P_{\text{banana}}^{0.75}$$
$$\frac{P_{\text{pie}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} = 2.46$$

Which good does the economy export and what is the amount of export?

Solution: The economy exports pie and the amount of export is $EX = 11.4090$.

4.

32. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{spring onion}}$	176.352090	135.481858
Q_{muffin}	85.207875	168.735694
$D_{\text{spring onion}}$	176.352090	222.801379
D_{muffin}	85.207875	46.488365
$L_{\text{spring onion}}$	208.870293	127.010594
L_{muffin}	31.129707	112.989406

The two production functions are given by

$$Q_{\text{spring onion}} = 0.92 \cdot K^{0.47} L_{\text{spring onion}}^{0.53}$$
$$Q_{\text{muffin}} = 1.15 \cdot T^{0.47} L_{\text{muffin}}^{0.53}$$

The maximum amount of capital is 174 units and the land endowment is 197 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{spring onion}}^{0.19} \cdot P_{\text{muffin}}^{0.81}$.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by -36.0041 percent.

33. Problem

A small open economy uses labor, capital and land to produce two goods coffee and shampoo. The production functions are written as:

$$Q_{\text{coffee}} = 0.40 \cdot K^{0.77} L_{\text{coffee}}^{0.23}$$
$$Q_{\text{shampoo}} = 1.76 \cdot T^{0.77} L_{\text{shampoo}}^{0.23}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 427$, $K = 203$ and $T = 184$.

The utility function of the representative consumer is given by $U = 0.57 \cdot D_{\text{coffee}}^{0.91} D_{\text{shampoo}}^{0.09}$. The statistical office determines the price level by using the formula of $P = P_{\text{coffee}}^{0.43} P_{\text{shampoo}}^{0.57}$.

The small open economy trades actively with the rest of the world, where the price of coffee in terms of shampoo is 2.00.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by 370.9582 percent.

4.

34. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in wallet industry and land is specific to handbag industry.

The relative price of wallet in terms of handbag is 3.08 in the rest of the world. The relative price of wallet in terms of handbag would have been 6.40 in the small open economy in autarky.

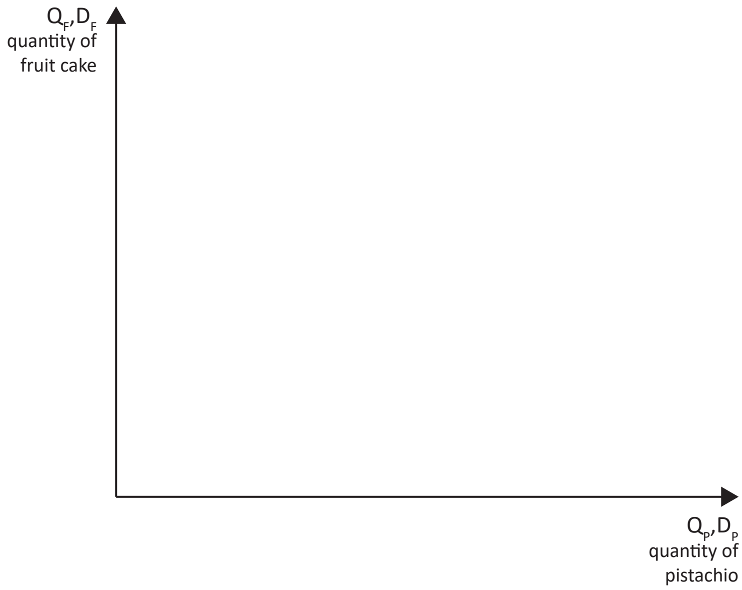
Solution: The small open economy has comparative advantage in producing handbag, under free trade it exports handbag and imports wallet. Capital is specific to wallet industry, thus capital owners are worse off with free trade.

35. Problem

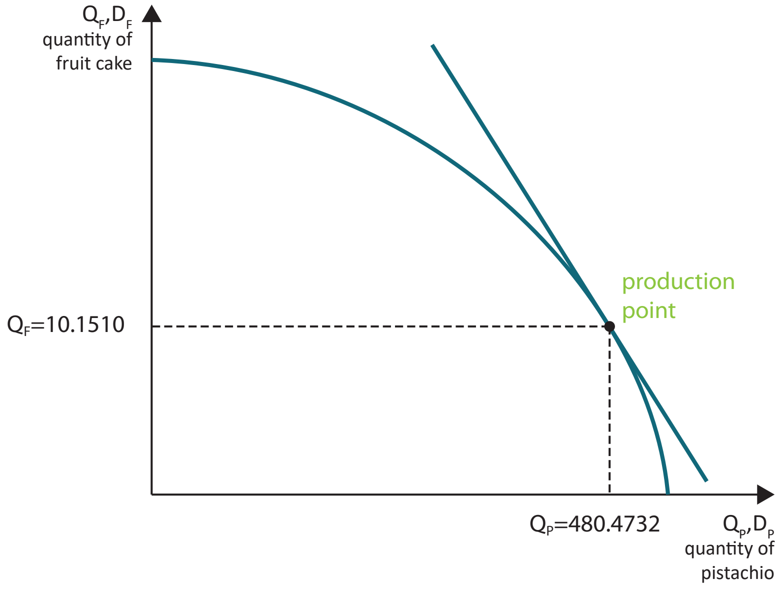
The functioning of a small open economy can be characterized by the following formulas:

$$\begin{aligned}
U &= 0.54 \cdot \ln D_{\text{pistachio}} + 1.14 \cdot \ln D_{\text{fruit cake}} \\
Q_{\text{pistachio}} &= 1.04 \cdot K^{0.19} L_{\text{pistachio}}^{0.81} \\
Q_{\text{fruit cake}} &= 2.01 \cdot T^{0.19} L_{\text{fruit cake}}^{0.81} \\
L &= 588 \\
K &= 168 \\
T &= 149 \\
P &= P_{\text{pistachio}}^{0.30} P_{\text{fruit cake}}^{0.70} \\
\frac{P_{\text{pistachio}}^{\text{world}}}{P_{\text{fruit cake}}^{\text{world}}} &= 5.42
\end{aligned}$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:



36. Problem

Consider a model of specific factors with two goods pie and coffee. pie is produced with labor and capital, coffee is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 146$$
$$K = 123$$
$$T = 219$$

The production functions for tablets and oranges are:

$$Q_{\text{pie}} = 2.16 \cdot K^{0.61} L_{\text{pie}}^{0.39}$$
$$Q_{\text{coffee}} = 0.62 \cdot T^{0.61} L_{\text{coffee}}^{0.39}$$

The utility function of the representative consumer is written as $U = 1.92 \cdot \ln D_{\text{pie}} + 2.34 \cdot \ln D_{\text{coffee}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{pie}}^{0.47} P_{\text{coffee}}^{0.53}$.

The country faces $\frac{P_{\text{pie}}^{\text{world}}}{P_{\text{coffee}}^{\text{world}}} = 6.89$ relative world price.

Find the amount of coffee produced by the firms in coffee sector.

Solution: In optimum 18.9564 is the amount of .coffee produced.

37. Problem

Consider a model of specific factors with two goods cauliflower and ice cream. cauliflower is produced with labor and capital, ice cream is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 164$$
$$K = 127$$
$$T = 184$$

The production functions for tablets and oranges are:

$$Q_{\text{cauliflower}} = 2.36 \cdot K^{0.73} L_{\text{cauliflower}}^{0.27}$$
$$Q_{\text{ice cream}} = 1.39 \cdot T^{0.73} L_{\text{ice cream}}^{0.27}$$

The utility function of the representative consumer is written as $U = 1.83 \cdot \ln D_{\text{cauliflower}} + 1.37 \cdot \ln D_{\text{ice cream}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{cauliflower}}^{0.76} P_{\text{ice cream}}^{0.24}$.

4.

The country faces $\frac{P^{\text{world}}_{\text{cauliflower}}}{P^{\text{world}}_{\text{ice cream}}} = 1.68$ relative world price.

Calculate the amount of cauliflower produced by the economy.

Solution: In optimum 296.4610 is the amount of .cauliflower produced.

38. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods necklace and hairspray, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$
\begin{aligned}
U &= 1.78 \cdot \ln D_{\text{necklace}} + 2.27 \cdot \ln D_{\text{hairspray}} \\
Q_{\text{necklace}} &= 1.64 \cdot K^{0.12} L^{0.88}_{\text{necklace}} \\
Q_{\text{hairspray}} &= 1.83 \cdot T^{0.12} L^{0.88}_{\text{hairspray}} \\
L &= 546 \\
K &= 211 \\
T &= 72 \\
P &= P^{0.81}_{\text{necklace}} P^{0.19}_{\text{hairspray}} \\
\frac{P^{\text{world}}_{\text{necklace}}}{P^{\text{world}}_{\text{hairspray}}} &= 2.79
\end{aligned}
$$

What is the real wage in this economy under free trade?

Solution: The real wage in this small open economy is 1.5648 units.

39. Problem

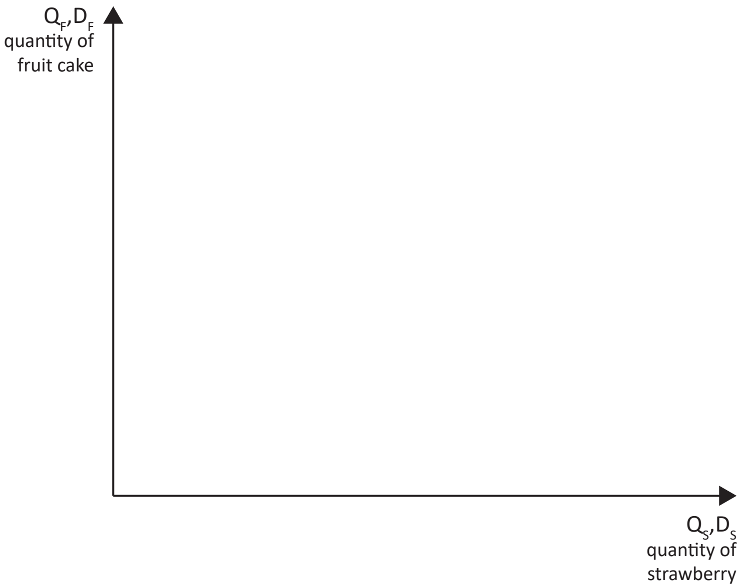
The functioning of a small open economy can be characterized by the following formulas:

$$
\begin{aligned}
U &= 0.76 \cdot \ln D_{\text{strawberry}} + 0.62 \cdot \ln D_{\text{fruit cake}} \\
Q_{\text{strawberry}} &= 0.58 \cdot K^{0.69} L^{0.31}_{\text{strawberry}} \\
Q_{\text{fruit cake}} &= 0.18 \cdot T^{0.69} L^{0.31}_{\text{fruit cake}} \\
L &= 363 \\
K &= 200 \\
T &= 186
\end{aligned}
$$

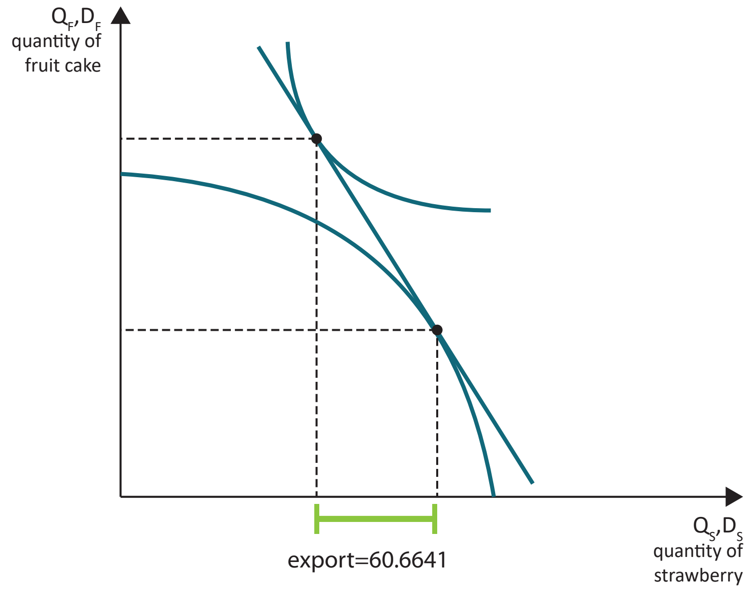
$$P = P_{\text{strawberry}}^{0.33} P_{\text{fruit cake}}^{0.67}$$

$$\frac{P_{\text{strawberry}}^{\text{world}}}{P_{\text{fruit cake}}^{\text{world}}} = 4.21$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the export, and calculate the amount of export.



Solution: The correct graph is the following:



4.

40. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{cauliflower}}$	170.445720	215.825555
$Q_{\text{wooden spoon}}$	66.128051	10.919209
$D_{\text{cauliflower}}$	170.445720	131.985514
$D_{\text{wooden spoon}}$	66.128051	465.332230
$L_{\text{cauliflower}}$	55.135294	90.158420
$L_{\text{wooden spoon}}$	35.864706	0.841580

The two production functions are given by

$$Q_{\text{cauliflower}} = 2.41 \cdot K^{0.52} L_{\text{cauliflower}}^{0.48}$$

$$Q_{\text{wooden spoon}} = 0.85 \cdot T^{0.52} L_{\text{wooden spoon}}^{0.48}$$

The maximum amount of capital is 89 units and the land endowment is 159 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{cauliflower}}^{0.21} \cdot P_{\text{wooden spoon}}^{0.79}$.

By what percentage does free trade change the relative price (price of cauliflower in terms of wooden spoon)?

Solution: Free trade changes the relative price by 808.7350 percent.

41. Problem

4.

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods jigsaw and pie, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned}
U &= 0.12 \cdot \ln D_{\text{jigsaw}} + 0.42 \cdot \ln D_{\text{pie}} \\
Q_{\text{jigsaw}} &= 0.61 \cdot K^{0.61} L_{\text{jigsaw}}^{0.39} \\
Q_{\text{pie}} &= 0.31 \cdot T^{0.61} L_{\text{pie}}^{0.39} \\
L &= 155 \\
K &= 151 \\
T &= 225 \\
P &= P_{\text{jigsaw}}^{0.24} P_{\text{pie}}^{0.76} \\
\frac{P_{\text{jigsaw}}^{\text{world}}}{P_{\text{pie}}^{\text{world}}} &= 6.33
\end{aligned}$$

Determine the real GDP of this small open economy under free trade.

Solution: The real GDP in this small open economy is 383.7483 units.

42. Problem

A small open economy uses labor, capital and land to produce two goods yoghurt and milkshake. The production functions are written as:

$$Q_{\text{yoghurt}} = 1.85 \cdot K^{0.45} L_{\text{yoghurt}}^{0.55}$$
$$Q_{\text{milkshake}} = 2.16 \cdot T^{0.45} L_{\text{milkshake}}^{0.55}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 411$, $K = 124$ and $T = 75$.

The utility function of the representative consumer is given by $U = 2.03 \cdot D_{\text{yoghurt}}^{0.87} D_{\text{milkshake}}^{0.13}$. The statistical office determines the price level by using the formula of $P = P_{\text{yoghurt}}^{0.18} P_{\text{milkshake}}^{0.82}$.

The small open economy trades actively with the rest of the world, where the price of yoghurt in terms of milkshake is 1.12.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by -31.8669 percent.

43. Problem

Consider a model of specific factors with two goods ice cream and banana. ice cream is produced with labor and capital, banana is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 380$$
$$K = 175$$
$$T = 225$$

The production functions for tablets and oranges are:

$$Q_{\text{ice cream}} = 1.96 \cdot K^{0.48} L_{\text{ice cream}}^{0.52}$$
$$Q_{\text{banana}} = 0.94 \cdot T^{0.48} L_{\text{banana}}^{0.52}$$

The utility function of the representative consumer is written as $U = 0.25 \cdot \ln D_{\text{ice cream}} + 1.60 \cdot \ln D_{\text{banana}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{ice cream}}^{0.75} P_{\text{banana}}^{0.25}$.

The country faces $\frac{P_{\text{ice cream}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} = 6.90$ relative world price.

Determine the amount of banana bought by the utility maximizing consumer.

Solution: In optimum 3070.6720 is the amount of .banana consumed.

44. Problem

A small open economy uses labor, capital and land to produce two goods teacup and blackcurrant. The production functions are written as:

$$Q_{\text{teacup}} = 0.67 \cdot K^{0.40} L_{\text{teacup}}^{0.60}$$
$$Q_{\text{blackcurrant}} = 1.27 \cdot T^{0.40} L_{\text{blackcurrant}}^{0.60}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 505$, $K = 96$ and $T = 134$.

The utility function of the representative consumer is given by $U = 2.17 \cdot D_{\text{teacup}}^{1.70} D_{\text{blackcurrant}}^{-0.70}$. The statistical office determines the price level by using the formula of $P = P_{\text{teacup}}^{0.83} P_{\text{blackcurrant}}^{0.17}$.

4.

The small open economy trades actively with the rest of the world, where the price of teacup in terms of blackcurrant is 4.99.

By what percentage does free trade change the relative price (price of teacup in terms of blackcurrant)?

Solution: Free trade changes the relative price by -50.0794 percent.

45. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in chicken burger industry and land is specific to coffee industry.

The relative price of chicken burger in terms of coffee is 6.71 in the rest of the world. The relative price of chicken burger in terms of coffee would have been 10.14 in the small open economy in autarky.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing coffee, under free trade it exports coffee. Land is specific to coffee industry, thus land owners are better off with free trade.

46. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$U = 1.27 \cdot \ln D_{\text{ice cream}} + 0.78 \cdot \ln D_{\text{banana}}$$
$$Q_{\text{ice cream}} = 0.26 \cdot K^{0.39} L_{\text{ice cream}}^{0.61}$$
$$Q_{\text{banana}} = 0.23 \cdot T^{0.39} L_{\text{banana}}^{0.61}$$

$$
\begin{aligned}
L &= 165 \\
K &= 66 \\
T &= 136 \\
P &= P_{\text{ice cream}}^{0.83} P_{\text{banana}}^{0.17} \\
\frac{P_{\text{ice cream}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} &= 2.61
\end{aligned}
$$

Which good does the economy import and what is the amount of import?

Solution: The economy imports banana and the amount of import is $IM = 21.8869$.

4.

47. Problem

A small open economy uses labor, capital and land to produce two goods spring onion and food processor. The production functions are written as:

$$
\begin{aligned}
Q_{\text{spring onion}} &= 2.04 \cdot K^{0.60} L_{\text{spring onion}}^{0.40} \\
Q_{\text{food processor}} &= 2.00 \cdot T^{0.60} L_{\text{food processor}}^{0.40}
\end{aligned}
$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 375$, $K = 146$ and $T = 187$.

The utility function of the representative consumer is given by $U = 0.26 \cdot D_{\text{spring onion}}^{0.57} D_{\text{food processor}}^{0.43}$. The statistical office determines the price level by using the formula of $P = P_{\text{spring onion}}^{0.49} P_{\text{food processor}}^{0.51}$.

The small open economy trades actively with the rest of the world, where the price of spring onion in terms of food processor is 5.04.

By what percentage does free trade change the relative price (price of spring onion in terms of food processor)?

Solution: Free trade changes the relative price by 274.1912 percent.

48. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$
\begin{aligned}
Q_{\text{watermelon}} &= 1.63 \cdot K^{0.83} L_{\text{watermelon}}^{0.17} \\
Q_{\text{yoghurt}} &= 1.44 \cdot T^{0.83} L_{\text{yoghurt}}^{0.17}
\end{aligned}
$$

Firms are able to use 154 units of labor, 154 units of capital and 219 units of land to produce their output, and under free trade they produce 244.833860 of watermelon and 211.734345 of yoghurt. The statistical office determines the price level by using the formula of $P = P_{\text{watermelon}}^{0.16} \cdot P_{\text{yoghurt}}^{0.84}$.

Determine the real GDP of this small open economy under free trade.

Solution: In this small open economy the real GDP is 1181.7537 units.

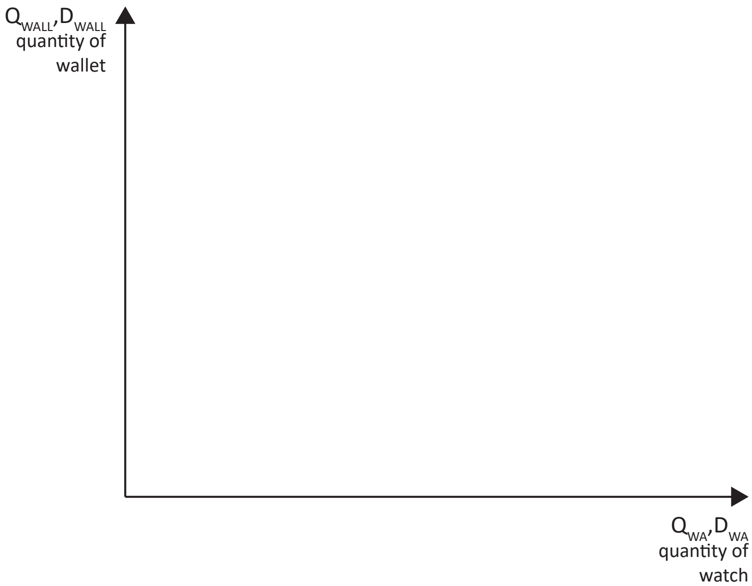
49. Problem

4.

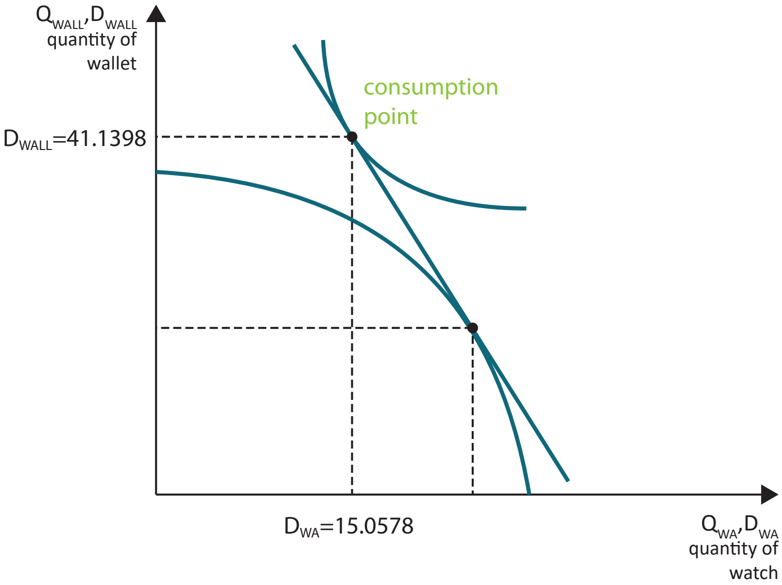
The functioning of a small open economy can be characterized by the following formulas:

$$\begin{aligned}
U &= 1.65 \cdot \ln D_{\text{watch}} + 1.61 \cdot \ln D_{\text{wallet}} \\
Q_{\text{watch}} &= 0.25 \cdot K^{0.25} L_{\text{watch}}^{0.75} \\
Q_{\text{wallet}} &= 0.36 \cdot T^{0.25} L_{\text{wallet}}^{0.75} \\
L &= 130 \\
K &= 81 \\
T &= 147 \\
P &= P_{\text{watch}}^{0.63} P_{\text{wallet}}^{0.37} \\
\frac{P_{\text{watch}}^{\text{world}}}{P_{\text{wallet}}^{\text{world}}} &= 2.80
\end{aligned}$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:

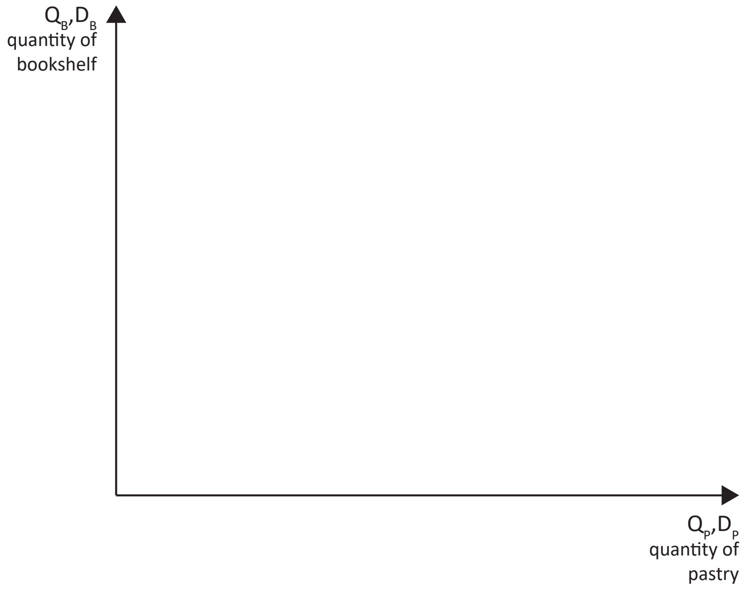


50. Problem

The functioning of a small open economy can be characterized by the following formulas:

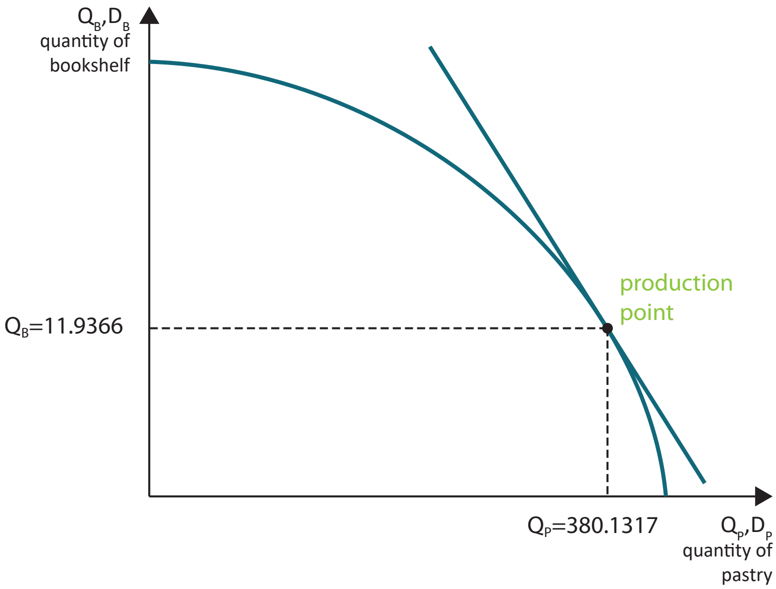
$$
\begin{aligned}
U &= 1.89 \cdot \ln D_{\text{pastry}} + 0.61 \cdot \ln D_{\text{bookshelf}} \\
Q_{\text{pastry}} &= 2.25 \cdot K^{0.57} L_{\text{pastry}}^{0.43} \\
Q_{\text{bookshelf}} &= 0.51 \cdot T^{0.57} L_{\text{bookshelf}}^{0.43} \\
L &= 294 \\
K &= 112 \\
T &= 121 \\
P &= P_{\text{pastry}}^{0.81} P_{\text{bookshelf}}^{0.19} \\
\frac{P_{\text{pastry}}^{\text{world}}}{P_{\text{bookshelf}}^{\text{world}}} &= 3.45
\end{aligned}
$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:

4.



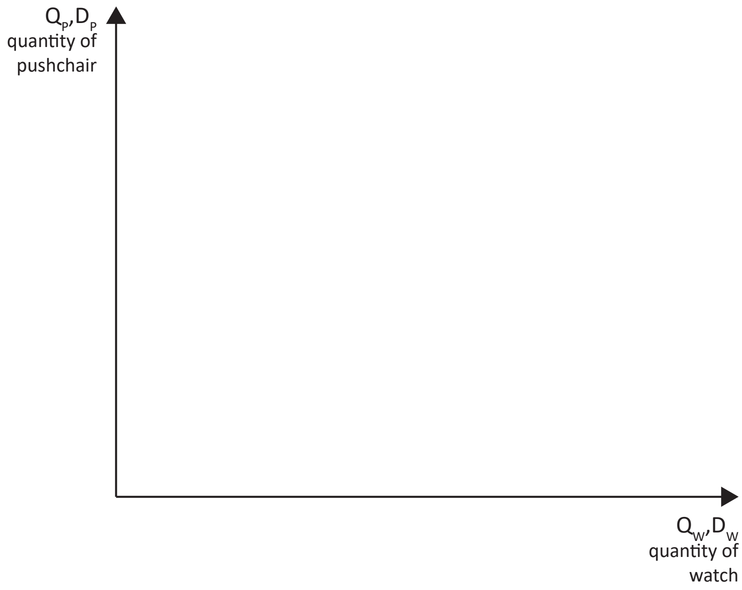
51. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$U = 1.62 \cdot \ln D_{\text{watch}} + 1.06 \cdot \ln D_{\text{pushchair}}$$
$$Q_{\text{watch}} = 1.13 \cdot K^{0.71} L_{\text{watch}}^{0.29}$$
$$Q_{\text{pushchair}} = 1.63 \cdot T^{0.71} L_{\text{pushchair}}^{0.29}$$
$$L = 87$$
$$K = 214$$
$$T = 162$$
$$P = P_{\text{watch}}^{0.29} P_{\text{pushchair}}^{0.71}$$
$$\frac{P_{\text{watch}}^{\text{world}}}{P_{\text{pushchair}}^{\text{world}}} = 1.10$$

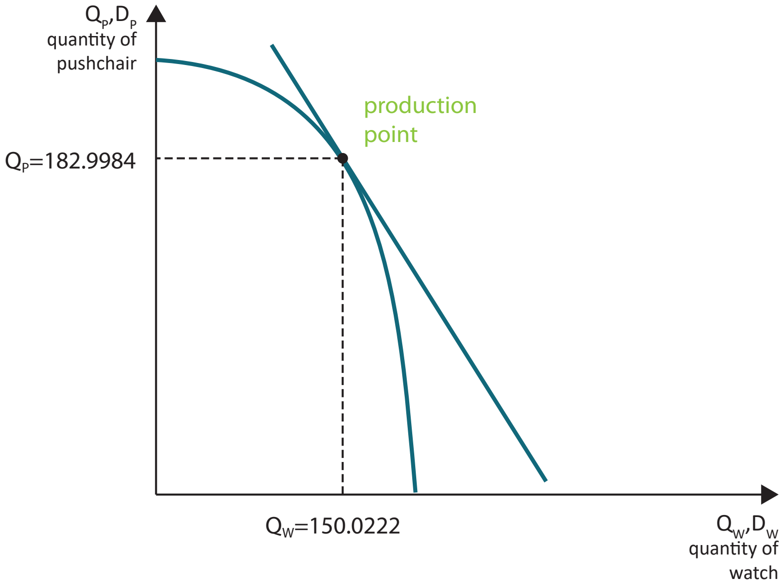
On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.

4.



4.

Solution: The correct graph is the following:



52. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{teacup}	354.179082	665.871095
$Q_{\text{hot dog}}$	251.464398	1.024489
D_{teacup}	354.179082	293.311299
$D_{\text{hot dog}}$	251.464398	1301.258178
L_{teacup}	221.470149	502.778350
$L_{\text{hot dog}}$	281.529851	0.221650

The two production functions are given by

$$Q_{\text{teacup}} = 1.60 \cdot K^{0.23} L_{\text{teacup}}^{0.77}$$
$$Q_{\text{hot dog}} = 1.01 \cdot T^{0.23} L_{\text{hot dog}}^{0.77}$$

The maximum amount of capital is 221 units and the land endowment is 165 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{teacup}}^{0.49} \cdot P_{\text{hot dog}}^{0.51}$.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by 378.6473 percent.

53. Problem

The functioning of a small open economy can be characterized by the following formulas:

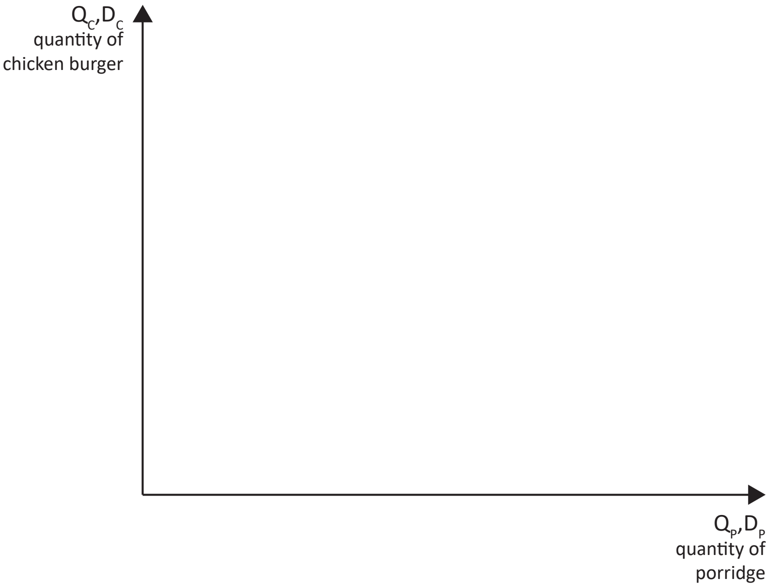
$$U = 1.23 \cdot \ln D_{\text{porridge}} + 0.79 \cdot \ln D_{\text{chicken burger}}$$
$$Q_{\text{porridge}} = 1.01 \cdot K^{0.16} L_{\text{porridge}}^{0.84}$$
$$Q_{\text{chicken burger}} = 1.22 \cdot T^{0.16} L_{\text{chicken burger}}^{0.84}$$
$$L = 451$$

4.

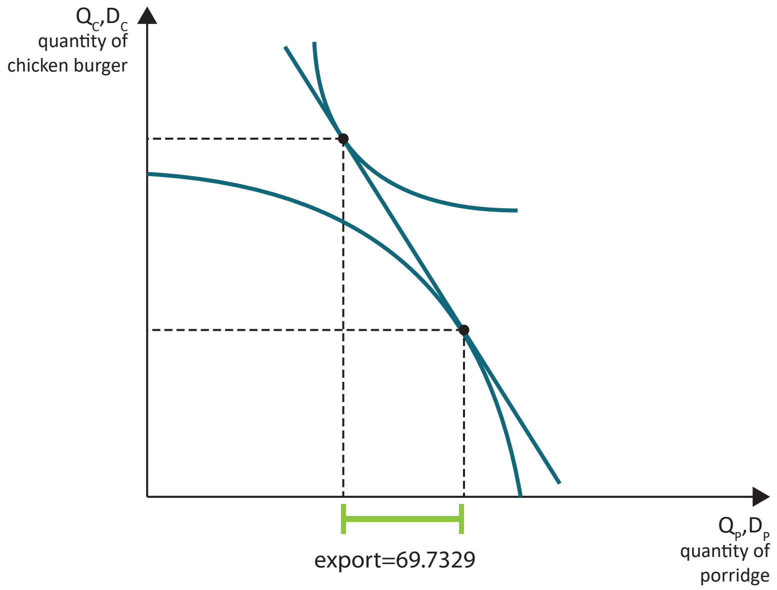
$$K = 159$$
$$T = 157$$
$$P = P_{\text{porridge}}^{0.29} P_{\text{chicken burger}}^{0.71}$$
$$\frac{P_{\text{porridge}}^{\text{world}}}{P_{\text{chicken burger}}^{\text{world}}} = 1.48$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the export, and calculate the amount of export.

4.



Solution: The correct graph is the following:



54. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{peach}	231.847392	394.038866
$Q_{\text{wine glass}}$	358.118785	216.614616
D_{peach}	231.847392	59.279901
$D_{\text{wine glass}}$	358.118785	1304.581253
L_{peach}	20.845588	138.562511
$L_{\text{wine glass}}$	141.154412	23.437489

The two production functions are given by

$$Q_{\text{peach}} = 2.13 \cdot K^{0.72} L_{\text{peach}}^{0.28}$$

$$Q_{\text{wine glass}} = 2.08 \cdot T^{0.72} L_{\text{wine glass}}^{0.28}$$

The maximum amount of capital is 207 units and the land endowment is 186 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{peach}}^{0.81} \cdot P_{\text{wine glass}}^{0.19}$.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -92.9671 percent.

55. Problem

Consider a model of specific factors with two goods trifle and ice cream. trifle is produced with labor and capital, ice cream is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 591$$
$$K = 84$$
$$T = 110$$

The production functions for tablets and oranges are:

$$Q_{\text{trifle}} = 2.13 \cdot K^{0.19} L_{\text{trifle}}^{0.81}$$
$$Q_{\text{ice cream}} = 0.91 \cdot T^{0.19} L_{\text{ice cream}}^{0.81}$$

The utility function of the representative consumer is written as $U = 0.29 \cdot \ln D_{\text{trifle}} + 0.77 \cdot \ln D_{\text{ice cream}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{trifle}}^{0.34} P_{\text{ice cream}}^{0.66}$.

The country faces $\frac{P_{\text{trifle}}^{\text{world}}}{P_{\text{ice cream}}^{\text{world}}} = 1.22$ relative world price.

Find the amount of ice cream produced by the firms in ice cream sector.

Solution: In optimum 5.5234 is the amount of .ice cream produced.

56. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{food processor}} = 2.10 \cdot K^{0.62} L_{\text{food processor}}^{0.38}$$
$$Q_{\text{orange}} = 0.15 \cdot T^{0.62} L_{\text{orange}}^{0.38}$$

Firms are able to use 221 units of labor, 147 units of capital and 70 units of land to produce their output, and under free trade they produce 360.314850 of food processor and 1.114646 of orange. The statistical office determines the price level by using the formula of $P = P_{\text{food processor}}^{0.23} \cdot P_{\text{orange}}^{0.77}$.

What is the real wage in this economy under free trade?

Solution: In this small open economy the real wage is 1.6520 units.

57. Problem

Consider a model of specific factors with two goods handbag and hot dog. handbag is produced with labor and capital, hot dog is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 261$$
$$K = 70$$
$$T = 163$$

The production functions for tablets and oranges are:

$$Q_{\text{handbag}} = 0.39 \cdot K^{0.75} L_{\text{handbag}}^{0.25}$$
$$Q_{\text{hot dog}} = 0.89 \cdot T^{0.75} L_{\text{hot dog}}^{0.25}$$

The utility function of the representative consumer is written as $U = 1.15 \cdot \ln D_{\text{handbag}} + 1.92 \cdot \ln D_{\text{hot dog}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{handbag}}^{0.47} P_{\text{hot dog}}^{0.53}$.

The country faces $\frac{P_{\text{handbag}}^{\text{world}}}{P_{\text{hot dog}}^{\text{world}}} = 4.29$ relative world price.

Determine the amount of hot dog bought by the utility maximizing consumer.

Solution: In optimum 171.4092 is the amount of .hot dog consumed.

58. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

4.

	In Autarky	Under Free Trade
$Q_{\text{spring onion}}$	116.714977	267.973481
$Q_{\text{watermelon}}$	402.729819	153.381386
$D_{\text{spring onion}}$	116.714977	37.038279
$D_{\text{watermelon}}$	402.729819	1527.445841
$L_{\text{spring onion}}$	29.504348	213.465179
$L_{\text{watermelon}}$	204.495652	20.534821

The two production functions are given by

$$Q_{\text{spring onion}} = 1.61 \cdot K^{0.58} L_{\text{spring onion}}^{0.42}$$
$$Q_{\text{watermelon}} = 2.17 \cdot T^{0.58} L_{\text{watermelon}}^{0.42}$$

The maximum amount of capital is 139 units and the land endowment is 173 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{spring onion}}^{0.66} \cdot P_{\text{watermelon}}^{0.34}$.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by 433.6920 percent.

59. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{banana}} = 1.59 \cdot K^{0.49} L_{\text{banana}}^{0.51}$$
$$Q_{\text{napkin}} = 1.57 \cdot T^{0.49} L_{\text{napkin}}^{0.51}$$

Firms are able to use 523 units of labor, 75 units of capital and 153 units of land to produce their output, and under free trade they produce 306.573086 of banana and 129.162993 of napkin. In autarky the relative price of banana in terms of napkin would have been 1.436208.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing banana, under free trade it exports banana. Capital is specific to banana industry, thus capital owners are better off with free trade.

60. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$\begin{aligned}
U &= 2.32 \cdot \ln D_{\text{bagel}} + 1.55 \cdot \ln D_{\text{banana}} \\
Q_{\text{bagel}} &= 1.18 \cdot K^{0.62} L_{\text{bagel}}^{0.38} \\
Q_{\text{banana}} &= 2.39 \cdot T^{0.62} L_{\text{banana}}^{0.38} \\
L &= 117 \\
K &= 196 \\
T &= 142 \\
P &= P_{\text{bagel}}^{0.35} P_{\text{banana}}^{0.65} \\
\frac{P_{\text{bagel}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} &= 0.90
\end{aligned}$$

Which good does the economy import and what is the amount of import?

Solution: The economy imports bagel and the amount of import is $IM = 139.7773$.

61. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$\begin{aligned}
Q_{\text{lime}} &= 0.99 \cdot K^{0.22} L_{\text{lime}}^{0.78} \\
Q_{\text{orange}} &= 2.08 \cdot T^{0.22} L_{\text{orange}}^{0.78}
\end{aligned}$$

Firms are able to use 408 units of labor, 124 units of capital and 143 units of land to produce their output, and under free trade they produce 309.424952 of lime and 12.024752 of orange. The statistical office determines the price level by using the formula of $P = P_{\text{lime}}^{0.58} \cdot P_{\text{orange}}^{0.42}$.

Find the real rental rate of land under free trade.

Solution: In this small open economy the real rental rate of land is 0.0061 units.

62. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods cauliflower and milkshake, it uses three factors: labor (L), capital (K) and land

4.

(T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned} U &= 0.31 \cdot \ln D_{\text{cauliflower}} + 0.91 \cdot \ln D_{\text{milkshake}} \\ Q_{\text{cauliflower}} &= 2.02 \cdot K^{0.30} L_{\text{cauliflower}}^{0.70} \\ Q_{\text{milkshake}} &= 0.16 \cdot T^{0.30} L_{\text{milkshake}}^{0.70} \\ L &= 406 \\ K &= 118 \\ T &= 110 \\ P &= P_{\text{cauliflower}}^{0.76} P_{\text{milkshake}}^{0.24} \\ \frac{P_{\text{cauliflower}}^{\text{world}}}{P_{\text{milkshake}}^{\text{world}}} &= 3.70 \end{aligned}$$

What is the real wage in this economy under free trade?

Solution: The real wage in this small open economy is 1.3361 units.

63. Problem

A small open economy uses labor, capital and land to produce two goods pie and tomato. The production functions are written as:

$$\begin{aligned} Q_{\text{pie}} &= 1.59 \cdot K^{0.78} L_{\text{pie}}^{0.22} \\ Q_{\text{tomato}} &= 1.13 \cdot T^{0.78} L_{\text{tomato}}^{0.22} \end{aligned}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 75$, $K = 145$ and $T = 178$.

The utility function of the representative consumer is given by $U = 1.60 \cdot D_{\text{pie}}^{1.19} D_{\text{tomato}}^{-0.19}$. The statistical office determines the price level by using the formula of $P = P_{\text{pie}}^{0.75} P_{\text{tomato}}^{0.25}$.

The small open economy trades actively with the rest of the world, where the price of pie in terms of tomato is 1.18.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by -46.1471 percent.

64. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{painting}	108.241728	113.367032
Q_{pizza}	65.978243	36.729429
D_{painting}	108.241728	106.015130
D_{pizza}	65.978243	85.840130
L_{painting}	143.594595	153.552544
L_{pizza}	17.405405	7.447456

The two production functions are given by

$$Q_{\text{painting}} = 0.69 \cdot K^{0.31} L_{\text{painting}}^{0.69}$$
$$Q_{\text{pizza}} = 2.27 \cdot T^{0.31} L_{\text{pizza}}^{0.69}$$

The maximum amount of capital is 191 units and the land endowment is 91 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{painting}}^{0.34} \cdot P_{\text{pizza}}^{0.66}$.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -49.4541 percent.

65. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods cabbage and pushchair, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$U = 1.42 \cdot \ln D_{\text{cabbage}} + 2.42 \cdot \ln D_{\text{pushchair}}$$
$$Q_{\text{cabbage}} = 0.52 \cdot K^{0.77} L_{\text{cabbage}}^{0.23}$$

$$
\begin{aligned}
Q_{\text{pushchair}} &= 2.04 \cdot T^{0.77} L_{\text{pushchair}}^{0.23} \\
L &= 138 \\
K &= 209 \\
T &= 141 \\
P &= P_{\text{cabbage}}^{0.47} P_{\text{pushchair}}^{0.53} \\
\frac{P_{\text{cabbage}}^{\text{world}}}{P_{\text{pushchair}}^{\text{world}}} &= 2.53
\end{aligned}
$$

Calculate the real rental rate of capital under free trade?

Solution: The real rental rate of capital in this small open economy is 0.4969 units.

66. Problem

Consider a model of specific factors with two goods pizza and cabbage. pizza is produced with labor and capital, cabbage is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$
\begin{aligned}
L &= 374 \\
K &= 149 \\
T &= 86
\end{aligned}
$$

The production functions for tablets and oranges are:

$$
\begin{aligned}
Q_{\text{pizza}} &= 0.27 \cdot K^{0.57} L_{\text{pizza}}^{0.43} \\
Q_{\text{cabbage}} &= 0.48 \cdot T^{0.57} L_{\text{cabbage}}^{0.43}
\end{aligned}
$$

The utility function of the representative consumer is written as $U = 1.42 \cdot \ln D_{\text{pizza}} + 1.27 \cdot \ln D_{\text{cabbage}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{pizza}}^{0.15} P_{\text{cabbage}}^{0.85}$.

The country faces $\frac{P_{\text{pizza}}^{\text{world}}}{P_{\text{cabbage}}^{\text{world}}} = 4.93$ relative world price.

Calculate the amount of pizza produced by the economy.

Solution: In optimum 57.4413 is the amount of .pizza produced.

67. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods hairdryer and wallet, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned}
U &= 1.82 \cdot \ln D_{\text{hairdryer}} + 1.68 \cdot \ln D_{\text{wallet}} \\
Q_{\text{hairdryer}} &= 0.29 \cdot K^{0.18} L_{\text{hairdryer}}^{0.82} \\
Q_{\text{wallet}} &= 1.68 \cdot T^{0.18} L_{\text{wallet}}^{0.82} \\
L &= 610 \\
K &= 93 \\
T &= 97 \\
P &= P_{\text{hairdryer}}^{0.84} P_{\text{wallet}}^{0.16} \\
\frac{P_{\text{hairdryer}}^{\text{world}}}{P_{\text{wallet}}^{\text{world}}} &= 1.58
\end{aligned}$$

Determine the real GDP of this small open economy under free trade.

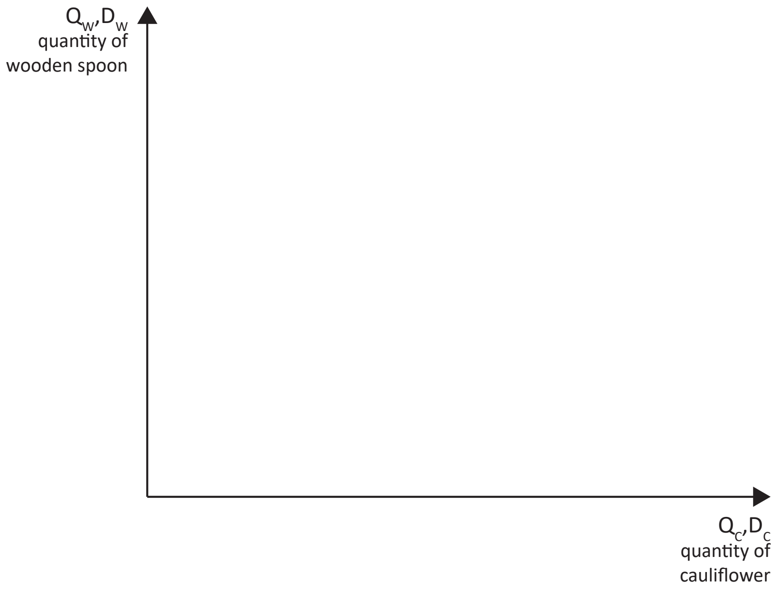
Solution: The real GDP in this small open economy is 501.2815 units.

68. Problem

The functioning of a small open economy can be characterized by the following formulas:

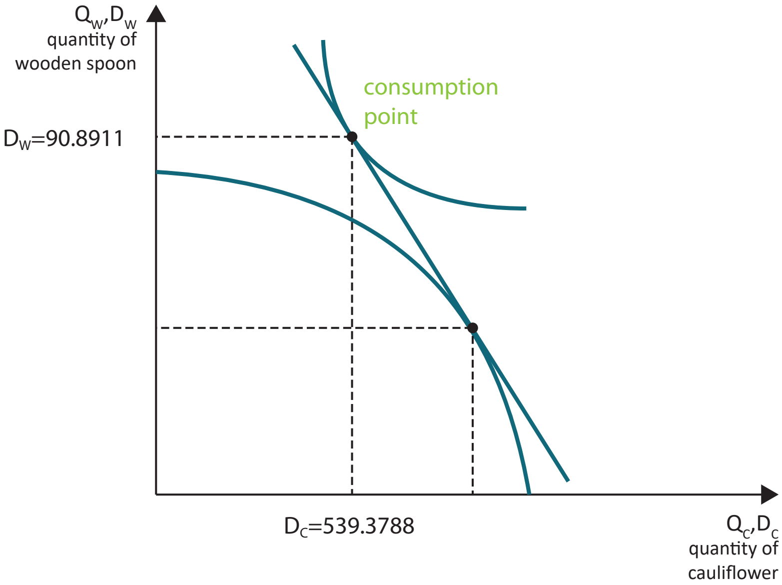
$$\begin{aligned}
U &= 1.88 \cdot \ln D_{\text{cauliflower}} + 0.22 \cdot \ln D_{\text{wooden spoon}} \\
Q_{\text{cauliflower}} &= 2.40 \cdot K^{0.77} L_{\text{cauliflower}}^{0.23} \\
Q_{\text{wooden spoon}} &= 0.68 \cdot T^{0.77} L_{\text{wooden spoon}}^{0.23} \\
L &= 509 \\
K &= 192 \\
T &= 93 \\
P &= P_{\text{cauliflower}}^{0.44} P_{\text{wooden spoon}}^{0.56} \\
\frac{P_{\text{cauliflower}}^{\text{world}}}{P_{\text{wooden spoon}}^{\text{world}}} &= 1.44
\end{aligned}$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point point. Calculate the elements of the production bundle.



4.

Solution: The correct graph is the following:



69. Problem

Consider a model of specific factors with two goods chicken burger and spring onion. chicken burger is produced with labor and capital, spring onion is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 343$$
$$K = 77$$
$$T = 74$$

The production functions for tablets and oranges are:

$$Q_{\text{chicken burger}} = 0.99 \cdot K^{0.37} L_{\text{chicken burger}}^{0.63}$$
$$Q_{\text{spring onion}} = 0.50 \cdot T^{0.37} L_{\text{spring onion}}^{0.63}$$

The utility function of the representative consumer is written as $U = 1.57 \cdot \ln D_{\text{chicken burger}} + 1.23 \cdot \ln D_{\text{spring onion}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{chicken burger}}^{0.79} P_{\text{spring onion}}^{0.21}$.

The country faces $\frac{P_{\text{chicken burger}}^{\text{world}}}{P_{\text{spring onion}}^{\text{world}}} = 3.93$ relative world price.

Determine the amount of spring onion bought by the utility maximizing consumer.

Solution: In optimum 337.7643 is the amount of .spring onion consumed.

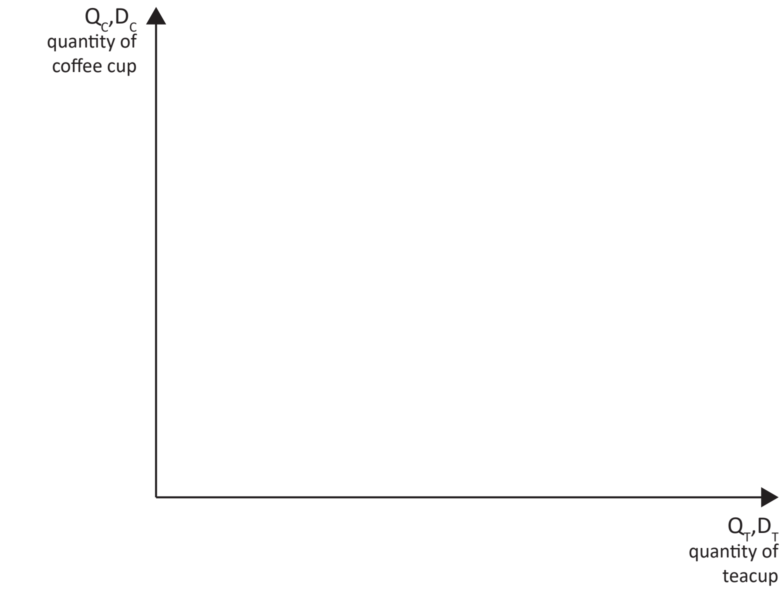
70. Problem

The functioning of a small open economy can be characterized by the following formulas:

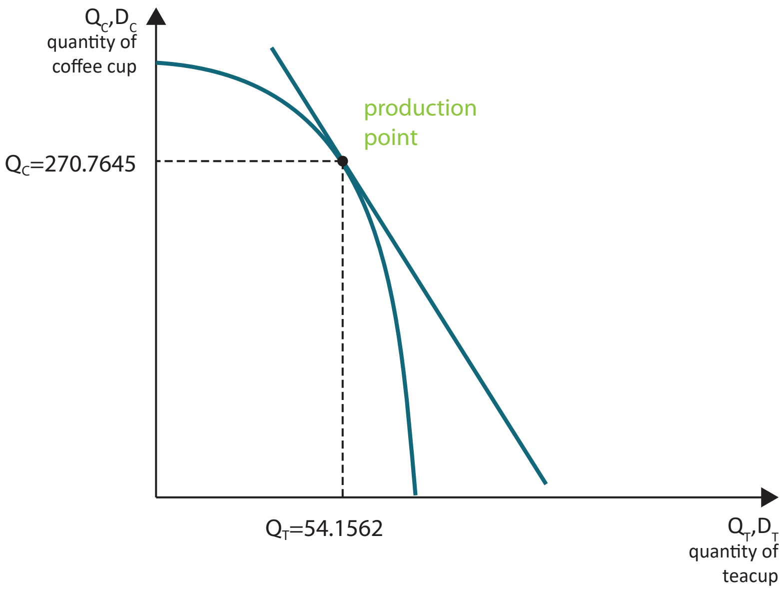
$$U = 1.75 \cdot \ln D_{\text{teacup}} + 0.24 \cdot \ln D_{\text{coffee cup}}$$
$$Q_{\text{teacup}} = 0.28 \cdot K^{0.64} L_{\text{teacup}}^{0.36}$$
$$Q_{\text{coffee cup}} = 1.34 \cdot T^{0.64} L_{\text{coffee cup}}^{0.36}$$
$$L = 543$$
$$K = 182$$
$$T = 154$$
$$P = P_{\text{teacup}}^{0.23} P_{\text{coffee cup}}^{0.77}$$
$$\frac{P_{\text{teacup}}^{\text{world}}}{P_{\text{coffee cup}}^{\text{world}}} = 3.29$$

4.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:



71. Problem

Consider a model of specific factors with two goods bookshelf and broccoli. bookshelf is produced with labor and capital, broccoli is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 521$$
$$K = 142$$
$$T = 88$$

The production functions for tablets and oranges are:

$$Q_{\text{bookshelf}} = 1.14 \cdot K^{0.17} L_{\text{bookshelf}}^{0.83}$$
$$Q_{\text{broccoli}} = 0.46 \cdot T^{0.17} L_{\text{broccoli}}^{0.83}$$

The utility function of the representative consumer is written as $U = 0.84 \cdot \ln D_{\text{bookshelf}} + 0.87 \cdot \ln D_{\text{broccoli}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{bookshelf}}^{0.79} P_{\text{broccoli}}^{0.21}$.

The country faces $\frac{P_{\text{bookshelf}}^{\text{world}}}{P_{\text{broccoli}}^{\text{world}}} = 4.26$ relative world price.

What is the optimal amount of bookshelf consumed?

Solution: In optimum 233.9119 is the amount of .bookshelf consumed.

72. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$U = 0.61 \cdot \ln D_{\text{cappuccino}} + 0.61 \cdot \ln D_{\text{salad}}$$
$$Q_{\text{cappuccino}} = 1.06 \cdot K^{0.66} L_{\text{cappuccino}}^{0.34}$$
$$Q_{\text{salad}} = 1.28 \cdot T^{0.66} L_{\text{salad}}^{0.34}$$
$$L = 491$$
$$K = 90$$
$$T = 160$$
$$P = P_{\text{cappuccino}}^{0.52} P_{\text{salad}}^{0.48}$$
$$\frac{P_{\text{cappuccino}}^{\text{world}}}{P_{\text{salad}}^{\text{world}}} = 4.53$$

Which good does the economy export and what is the amount of export?

Solution: The economy exports cappuccino and the amount of export is $EX = 60.0092$.

73. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{teapot}	85.949005	126.397882
Q_{pizza}	228.116000	173.059909
D_{teapot}	85.949005	50.458320
D_{pizza}	228.116000	334.051782
L_{teapot}	58.940426	147.645522
L_{pizza}	184.059574	95.354478

The two production functions are given by

$$Q_{\text{teapot}} = 0.72 \cdot K^{0.58} L_{\text{teapot}}^{0.42}$$
$$Q_{\text{pizza}} = 1.53 \cdot T^{0.58} L_{\text{pizza}}^{0.42}$$

The maximum amount of capital is 199 units and the land endowment is 128 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{teapot}}^{0.75} \cdot P_{\text{pizza}}^{0.25}$.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by 84.8164 percent.

74. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in chicken burger industry and land is specific to napkin industry.

The relative price of chicken burger in terms of napkin is 3.17 in the rest of the world. The relative price of chicken burger in terms of napkin would have been 4.12 in the small open economy in autarky.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing napkin, under free trade it exports napkin. Land is specific to napkin industry, thus land owners are better off with free trade.

75. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods aubergine and jigsaw, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned}
U &= 0.98 \cdot \ln D_{\text{aubergine}} + 1.92 \cdot \ln D_{\text{jigsaw}} \\
Q_{\text{aubergine}} &= 2.06 \cdot K^{0.73} L_{\text{aubergine}}^{0.27} \\
Q_{\text{jigsaw}} &= 0.24 \cdot T^{0.73} L_{\text{jigsaw}}^{0.27} \\
L &= 333 \\
K &= 203 \\
T &= 75 \\
P &= P_{\text{aubergine}}^{0.56} P_{\text{jigsaw}}^{0.44} \\
\frac{P_{\text{aubergine}}^{\text{world}}}{P_{\text{jigsaw}}^{\text{world}}} &= 2.76
\end{aligned}$$

Determine the real GDP of this small open economy under free trade.

Solution: The real GDP in this small open economy is 749.7719 units.

76. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$\begin{aligned}
Q_{\text{onion}} &= 0.46 \cdot K^{0.79} L_{\text{onion}}^{0.21} \\
Q_{\text{paper clip}} &= 0.13 \cdot T^{0.79} L_{\text{paper clip}}^{0.21}
\end{aligned}$$

Firms are able to use 310 units of labor, 107 units of capital and 155 units of land to produce their output, and under free trade they produce 60.634455 of onion and 13.259321 of paper clip. The statistical office determines the price level by using the formula of $P = P_{\text{onion}}^{0.57} \cdot P_{\text{paper clip}}^{0.43}$.

Find the real rental rate of land under free trade.

Solution: In this small open economy the real rental rate of land is 0.0362 units.

77. Problem

A small open economy uses labor, capital and land to produce two goods teapot and cauliflower. The production functions are written as:

$$Q_{\text{teapot}} = 1.83 \cdot K^{0.27} L_{\text{teapot}}^{0.73}$$
$$Q_{\text{cauliflower}} = 1.55 \cdot T^{0.27} L_{\text{cauliflower}}^{0.73}$$

4.

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 265$, $K = 225$ and $T = 135$.

The utility function of the representative consumer is given by $U = 2.02 \cdot D_{\text{teapot}}^{0.55} D_{\text{cauliflower}}^{0.45}$. The statistical office determines the price level by using the formula of $P = P_{\text{teapot}}^{0.51} P_{\text{cauliflower}}^{0.49}$.

The small open economy trades actively with the rest of the world, where the price of teapot in terms of cauliflower is 6.27.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by 329.7747 percent.

78. Problem

Consider a model of specific factors with two goods lemonade and soup. lemonade is produced with labor and capital, soup is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 622$$
$$K = 224$$
$$T = 187$$

The production functions for tablets and oranges are:

$$Q_{\text{lemonade}} = 0.60 \cdot K^{0.63} L_{\text{lemonade}}^{0.37}$$
$$Q_{\text{soup}} = 1.47 \cdot T^{0.63} L_{\text{soup}}^{0.37}$$

The utility function of the representative consumer is written as $U = 0.70 \cdot \ln D_{\text{lemonade}} + 1.51 \cdot \ln D_{\text{soup}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{lemonade}}^{0.81} P_{\text{soup}}^{0.19}$.

The country faces $\frac{P^{\text{world}}_{\text{lemonade}}}{P^{\text{world}}_{\text{soup}}} = 4.18$ relative world price.

What is the optimal amount of lemonade consumed?

Solution: In optimum 75.3095 is the amount of .lemonade consumed.

79. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{wooden spoon}}$	212.964045	349.797893
Q_{pizza}	32.790911	6.215349
$D_{\text{wooden spoon}}$	212.964045	63.194044
D_{pizza}	32.790911	1923.595101
$L_{\text{wooden spoon}}$	32.432432	179.523193
L_{pizza}	147.567568	0.476807

The two production functions are given by

$$Q_{\text{wooden spoon}} = 1.72 \cdot K^{0.71} L^{0.29}_{\text{wooden spoon}}$$
$$Q_{\text{pizza}} = 0.25 \cdot T^{0.71} L^{0.29}_{\text{pizza}}$$

The maximum amount of capital is 214 units and the land endowment is 125 units.

The statistical office calculates the price level by using the formula of $P = P^{0.51}_{\text{wooden spoon}} \cdot P^{0.49}_{\text{pizza}}$.

By what percentage does free trade change the relative price (price of wooden spoon in terms of pizza)?

Solution: Free trade changes the relative price by 19669.2556 percent.

4.

80. Problem

Consider a model of specific factors with two goods hot dog and napkin. hot dog is produced with labor and capital, napkin is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 447$$
$$K = 72$$
$$T = 140$$

The production functions for tablets and oranges are:

$$Q_{\text{hot dog}} = 1.37 \cdot K^{0.42} L_{\text{hot dog}}^{0.58}$$
$$Q_{\text{napkin}} = 2.37 \cdot T^{0.42} L_{\text{napkin}}^{0.58}$$

The utility function of the representative consumer is written as $U = 1.27 \cdot \ln D_{\text{hot dog}} + 0.94 \cdot \ln D_{\text{napkin}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{hot dog}}^{0.37} P_{\text{napkin}}^{0.63}$.

The country faces $\frac{P_{\text{hot dog}}^{\text{world}}}{P_{\text{napkin}}^{\text{world}}} = 5.76$ relative world price.

What is the optimal amount of hot dog consumed?

Solution: In optimum 170.8348 is the amount of .hot dog consumed.

81. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods scarf and lemonade, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$U = 0.85 \cdot \ln D_{\text{scarf}} + 0.21 \cdot \ln D_{\text{lemonade}}$$
$$Q_{\text{scarf}} = 1.78 \cdot K^{0.37} L_{\text{scarf}}^{0.63}$$
$$Q_{\text{lemonade}} = 0.81 \cdot T^{0.37} L_{\text{lemonade}}^{0.63}$$
$$L = 562$$
$$K = 206$$
$$T = 148$$
$$P = P_{\text{scarf}}^{0.78} P_{\text{lemonade}}^{0.22}$$
$$\frac{P_{\text{scarf}}^{\text{world}}}{P_{\text{lemonade}}^{\text{world}}} = 6.51$$

What is the real wage in this economy under free trade?

Solution: The real wage in this small open economy is 1.1683 units.

82. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{onion}} = 0.14 \cdot K^{0.78} L_{\text{onion}}^{0.22}$$
$$Q_{\text{peach}} = 0.64 \cdot T^{0.78} L_{\text{peach}}^{0.22}$$

Firms are able to use 219 units of labor, 207 units of capital and 165 units of land to produce their output, and under free trade they produce 26.834794 of onion and 88.274841 of peach. The statistical office determines the price level by using the formula of $P = P_{\text{onion}}^{0.59} \cdot P_{\text{peach}}^{0.41}$.

Find the real rental rate of land under free trade.

Solution: In this small open economy the real rental rate of land is 0.1374 units.

83. Problem

A small open economy uses labor, capital and land to produce two goods wooden spoon and pushchair. The production functions are written as:

$$Q_{\text{wooden spoon}} = 1.02 \cdot K^{0.31} L_{\text{wooden spoon}}^{0.69}$$
$$Q_{\text{pushchair}} = 1.59 \cdot T^{0.31} L_{\text{pushchair}}^{0.69}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 102$, $K = 114$ and $T = 167$.

The utility function of the representative consumer is given by $U = 0.32 \cdot D_{\text{wooden spoon}}^{0.38} D_{\text{pushchair}}^{0.62}$. The statistical office determines the price level by using the formula of $P = P_{\text{wooden spoon}}^{0.71} P_{\text{pushchair}}^{0.29}$.

The small open economy trades actively with the rest of the world, where the price of wooden spoon in terms of pushchair is 6.38.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by 13.1106 percent.

84. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{pie}	255.178025	328.791469
Q_{cabbage}	25.584295	6.839878
D_{pie}	255.178025	128.595849
D_{cabbage}	25.584295	905.718213
L_{pie}	168.183206	430.007686
L_{cabbage}	263.816794	1.992314

The two production functions are given by

$$Q_{\text{pie}} = 2.14 \cdot K^{0.73} L_{\text{pie}}^{0.27}$$
$$Q_{\text{cabbage}} = 0.19 \cdot T^{0.73} L_{\text{cabbage}}^{0.27}$$

The maximum amount of capital is 105 units and the land endowment is 105 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{pie}}^{0.32} \cdot P_{\text{cabbage}}^{0.68}$.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by 808.0215 percent.

85. Problem

Consider a model of specific factors with two goods cauliflower and onion. cauliflower is produced with labor and capital, onion is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 112$$
$$K = 135$$

$$T = 75$$

The production functions for tablets and oranges are:

$$Q_{\text{cauliflower}} = 1.86 \cdot K^{0.82} L_{\text{cauliflower}}^{0.18}$$
$$Q_{\text{onion}} = 1.92 \cdot T^{0.82} L_{\text{onion}}^{0.18}$$

The utility function of the representative consumer is written as $U = 0.26 \cdot \ln D_{\text{cauliflower}} + 2.05 \cdot \ln D_{\text{onion}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{cauliflower}}^{0.64} P_{\text{onion}}^{0.36}$.

The country faces $\frac{P_{\text{cauliflower}}^{\text{world}}}{P_{\text{onion}}^{\text{world}}} = 3.92$ relative world price.

Calculate the amount of cauliflower produced by the economy.

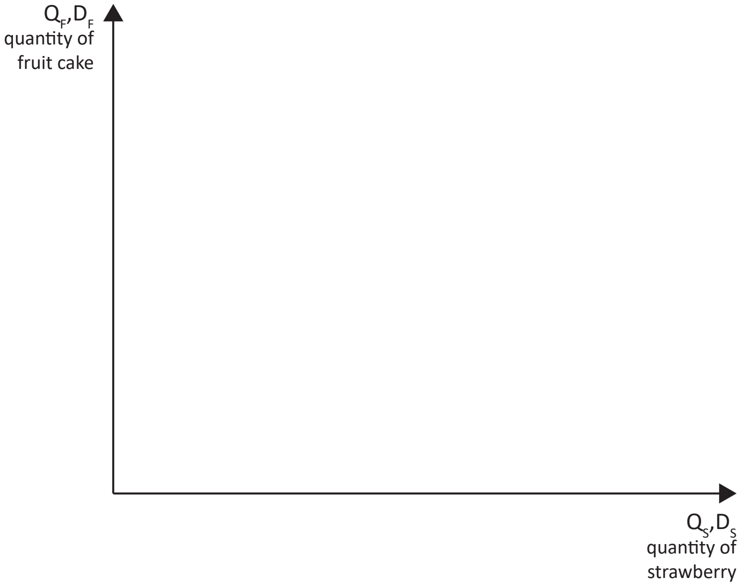
Solution: In optimum 238.3129 is the amount of .cauliflower produced.

86. Problem

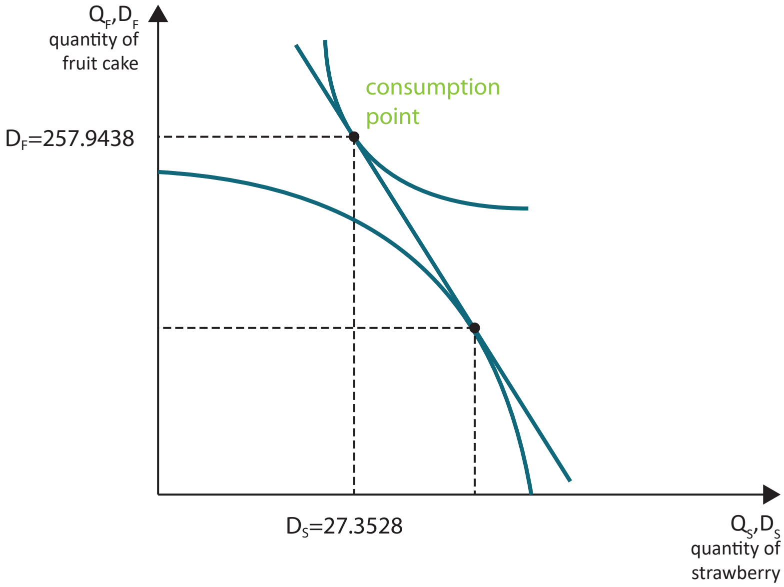
The functioning of a small open economy can be characterized by the following formulas:

$$U = 0.39 \cdot \ln D_{\text{strawberry}} + 0.74 \cdot \ln D_{\text{fruit cake}}$$
$$Q_{\text{strawberry}} = 0.41 \cdot K^{0.49} L_{\text{strawberry}}^{0.51}$$
$$Q_{\text{fruit cake}} = 2.22 \cdot T^{0.49} L_{\text{fruit cake}}^{0.51}$$
$$L = 106$$
$$K = 154$$
$$T = 174$$
$$P = P_{\text{strawberry}}^{0.15} P_{\text{fruit cake}}^{0.85}$$
$$\frac{P_{\text{strawberry}}^{\text{world}}}{P_{\text{fruit cake}}^{\text{world}}} = 4.97$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:



87. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{coffee}	291.948809	323.278411
Q_{lime}	72.089586	20.770083
D_{coffee}	291.948809	252.116405
D_{lime}	72.089586	432.086476
L_{coffee}	317.004484	406.481704
L_{lime}	93.995516	4.518296

The two production functions are given by

$$Q_{\text{coffee}} = 1.61 \cdot K^{0.59} L_{\text{coffee}}^{0.41}$$
$$Q_{\text{lime}} = 0.48 \cdot T^{0.59} L_{\text{lime}}^{0.41}$$

The maximum amount of capital is 123 units and the land endowment is 208 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{coffee}}^{0.56} \cdot P_{\text{lime}}^{0.44}$.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -90.2640 percent.

88. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$U = 2.17 \cdot \ln D_{\text{chicken burger}} + 1.55 \cdot \ln D_{\text{painting}}$$
$$Q_{\text{chicken burger}} = 0.49 \cdot K^{0.49} L_{\text{chicken burger}}^{0.51}$$
$$Q_{\text{painting}} = 0.19 \cdot T^{0.49} L_{\text{painting}}^{0.51}$$
$$L = 119$$

$$K = 103$$
$$T = 134$$
$$P = P_{\text{chicken burger}}^{0.19} P_{\text{painting}}^{0.81}$$
$$\frac{P_{\text{chicken burger}}^{\text{world}}}{P_{\text{painting}}^{\text{world}}} = 4.56$$

Which good does the economy export and what is the amount of export?

Solution: The economy exports chicken burger and the amount of export is $EX = 22.2702$.

4.

89. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{aubergine}} = 2.11 \cdot K^{0.66} L_{\text{aubergine}}^{0.34}$$
$$Q_{\text{pushchair}} = 2.39 \cdot T^{0.66} L_{\text{pushchair}}^{0.34}$$

Firms are able to use 152 units of labor, 108 units of capital and 192 units of land to produce their output, and under free trade they produce 176.865528 of aubergine and 368.533874 of pushchair. The statistical office determines the price level by using the formula of $P = P_{\text{aubergine}}^{0.64} \cdot P_{\text{pushchair}}^{0.36}$.

Calculate the real rental rate of capital under free trade?

Solution: In this small open economy the real rental rate of capital is 1.1038 units.

90. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{food processor}}$	356.434708	355.107163
Q_{pizza}	130.866021	135.307890
$D_{\text{food processor}}$	356.434708	361.794707
D_{pizza}	130.866021	114.509626
$L_{\text{food processor}}$	237.799197	233.403630
L_{pizza}	24.200803	28.596370

The two production functions are given by

$$Q_{\text{food processor}} = 2.29 \cdot K^{0.80} L_{\text{food processor}}^{0.20}$$
$$Q_{\text{pizza}} = 1.17 \cdot T^{0.80} L_{\text{pizza}}^{0.20}$$

The maximum amount of capital is 140 units and the land endowment is 164 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{food processor}}^{0.45} \cdot P_{\text{pizza}}^{0.55}$.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by -8.1831 percent.

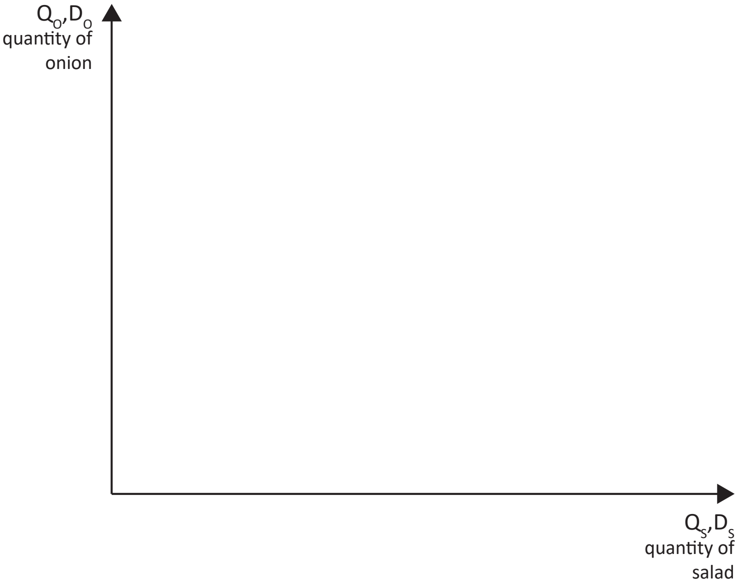
91. Problem

The functioning of a small open economy can be characterized by the following formulas:

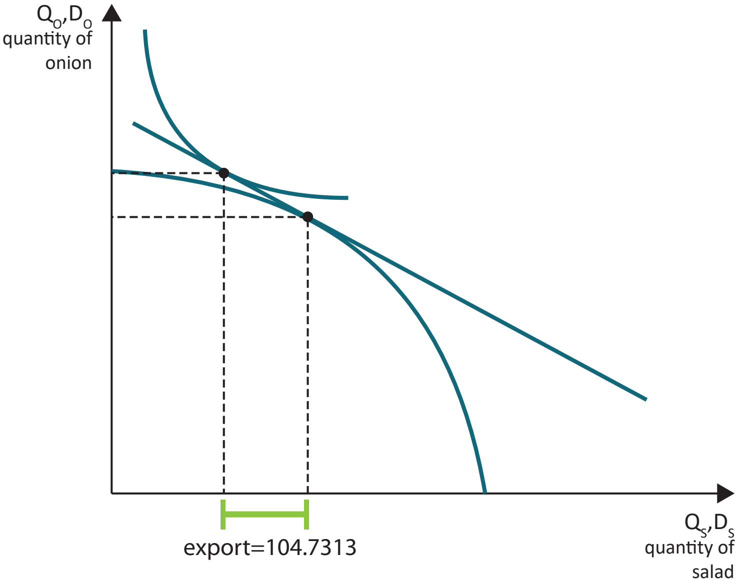
$$U = 0.33 \cdot \ln D_{\text{salad}} + 1.55 \cdot \ln D_{\text{onion}}$$
$$Q_{\text{salad}} = 0.80 \cdot K^{0.84} L_{\text{salad}}^{0.16}$$
$$Q_{\text{onion}} = 1.06 \cdot T^{0.84} L_{\text{onion}}^{0.16}$$
$$L = 401$$
$$K = 145$$
$$T = 164$$
$$P = P_{\text{salad}}^{0.36} P_{\text{onion}}^{0.64}$$
$$\frac{P_{\text{salad}}^{\text{world}}}{P_{\text{onion}}^{\text{world}}} = 5.73$$

4.

On the following graph illustrate the curves that characterize the functioning of the economy. Label the export, and calculate the amount of export.



Solution: The correct graph is the following:

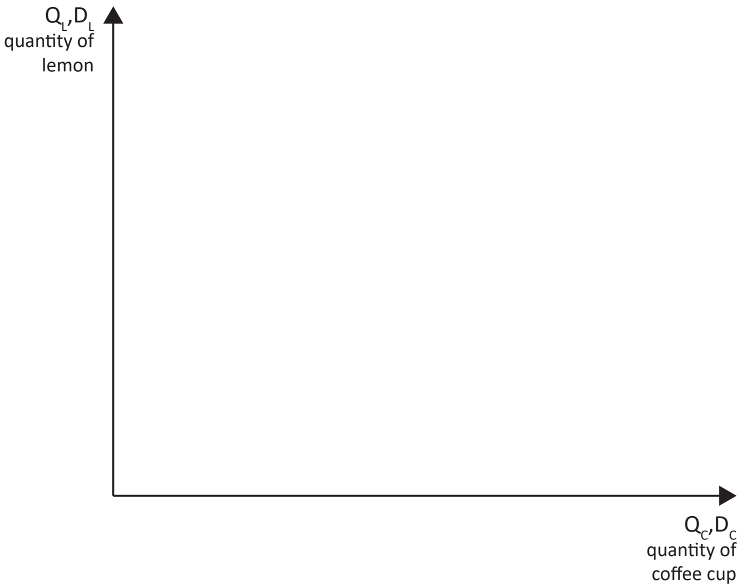


92. Problem

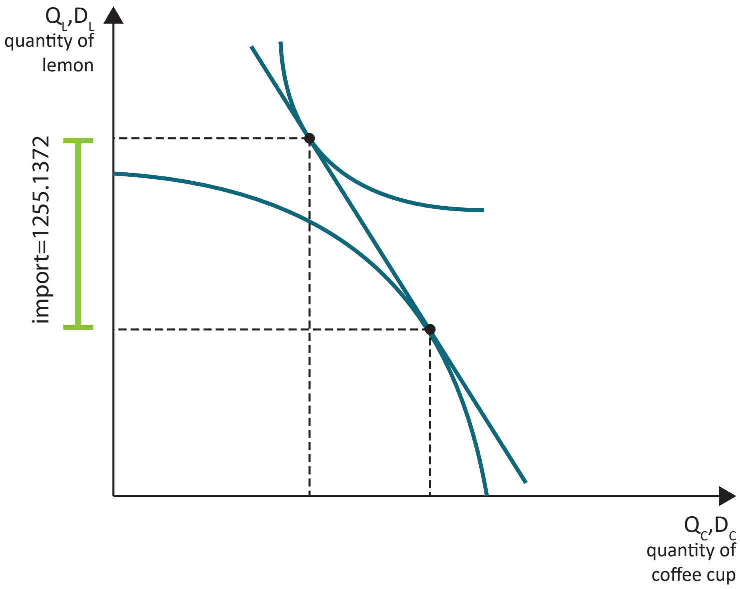
The functioning of a small open economy can be characterized by the following formulas:

$$
\begin{aligned}
U &= 1.58 \cdot \ln D_{\text{coffee cup}} + 1.71 \cdot \ln D_{\text{lemon}} \\
Q_{\text{coffee cup}} &= 1.23 \cdot K^{0.45} L_{\text{coffee cup}}^{0.55} \\
Q_{\text{lemon}} &= 0.81 \cdot T^{0.45} L_{\text{lemon}}^{0.55} \\
L &= 401 \\
K &= 213 \\
T &= 188 \\
P &= P_{\text{coffee cup}}^{0.43} P_{\text{lemon}}^{0.57} \\
\frac{P_{\text{coffee cup}}^{\text{world}}}{P_{\text{lemon}}^{\text{world}}} &= 6.56
\end{aligned}
$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the import, and calculate the amount of import.



Solution: The correct graph is the following:



93. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods almond and platform shoe, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$U = 1.06 \cdot \ln D_{\text{almond}} + 1.69 \cdot \ln D_{\text{platform shoe}}$$
$$Q_{\text{almond}} = 0.82 \cdot K^{0.28} L_{\text{almond}}^{0.72}$$
$$Q_{\text{platform shoe}} = 0.84 \cdot T^{0.28} L_{\text{platform shoe}}^{0.72}$$
$$L = 558$$
$$K = 175$$
$$T = 186$$
$$P = P_{\text{almond}}^{0.18} P_{\text{platform shoe}}^{0.82}$$
$$\frac{P_{\text{almond}}^{\text{world}}}{P_{\text{platform shoe}}^{\text{world}}} = 1.07$$

Find the real rental rate of land under free trade.

Solution: The real rental rate of land in this small open economy is 418.9938 units.

94. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{muffin}	118.659637	132.341262
Q_{cola}	209.239461	182.634333
D_{muffin}	118.659637	69.649384
D_{cola}	209.239461	406.444338
L_{muffin}	106.277372	201.938349
L_{cola}	173.722628	78.061651

The two production functions are given by

$$Q_{\text{muffin}} = 1.27 \cdot K^{0.83} L_{\text{muffin}}^{0.17}$$
$$Q_{\text{cola}} = 1.31 \cdot T^{0.83} L_{\text{cola}}^{0.17}$$

The maximum amount of capital is 91 units and the land endowment is 157 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{muffin}}^{0.67} \cdot P_{\text{cola}}^{0.33}$.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by -12.8777 percent.

95. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

4.

	In Autarky	Under Free Trade
$Q_{\text{fruit cake}}$	101.283530	133.906103
$Q_{\text{naan bread}}$	88.072347	8.867356
$D_{\text{fruit cake}}$	101.283530	86.562384
$D_{\text{naan bread}}$	88.072347	320.389024
$L_{\text{fruit cake}}$	42.880000	66.332435
$L_{\text{naan bread}}$	24.120000	0.667565

The two production functions are given by

$$Q_{\text{fruit cake}} = 1.96 \cdot K^{0.36} L_{\text{fruit cake}}^{0.64}$$
$$Q_{\text{naan bread}} = 1.69 \cdot T^{0.36} L_{\text{naan bread}}^{0.64}$$

The maximum amount of capital is 72 units and the land endowment is 205 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{fruit cake}}^{0.22} \cdot P_{\text{naan bread}}^{0.78}$.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -92.6791 percent.

96. Problem

A small open economy uses labor, capital and land to produce two goods handbag and tea. The production functions are written as:

$$Q_{\text{handbag}} = 2.20 \cdot K^{0.73} L_{\text{handbag}}^{0.27}$$
$$Q_{\text{tea}} = 2.16 \cdot T^{0.73} L_{\text{tea}}^{0.27}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 226$, $K = 134$ and $T = 116$.

The utility function of the representative consumer is given by $U = 2.25 \cdot D_{\text{handbag}}^{2.14} D_{\text{tea}}^{-1.14}$. The statistical office determines the price level by using the formula of $P = P_{\text{handbag}}^{0.81} P_{\text{tea}}^{0.19}$.

The small open economy trades actively with the rest of the world, where the price of handbag in terms of tea is 4.74.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by 113.5636 percent.

97. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in mint tea industry and land is specific to hot dog industry.

The relative price of mint tea in terms of hot dog is 6.02 in the rest of the world. The relative price of mint tea in terms of hot dog would have been 10.19 in the small open economy in autarky.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing hot dog, under free trade it exports hot dog. Land is specific to hot dog industry, thus land owners are better off with free trade.

98. Problem

A small open economy uses labor, capital and land to produce two goods platform shoe and shampoo. The production functions are written as:

$$Q_{\text{platform shoe}} = 1.10 \cdot K^{0.62} L_{\text{platform shoe}}^{0.38}$$
$$Q_{\text{shampoo}} = 2.40 \cdot T^{0.62} L_{\text{shampoo}}^{0.38}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 152$, $K = 201$ and $T = 177$.

The utility function of the representative consumer is given by $U = 0.60 \cdot D_{\text{platform shoe}}^{2.17} D_{\text{shampoo}}^{-1.17}$. The statistical office determines the price level by using the formula of $P = P_{\text{platform shoe}}^{0.81} P_{\text{shampoo}}^{0.19}$.

The small open economy trades actively with the rest of the world, where the price of platform shoe in terms of shampoo is 0.93.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -303.6894 percent.

4.

99. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{almond}} = 1.19 \cdot K^{0.77} L_{\text{almond}}^{0.23}$$
$$Q_{\text{lemon}} = 2.26 \cdot T^{0.77} L_{\text{lemon}}^{0.23}$$

Firms are able to use 317 units of labor, 145 units of capital and 131 units of land to produce their output, and under free trade they produce 153.389951 of almond and 337.007709 of lemon. The statistical office determines the price level by using the formula of $P = P_{\text{almond}}^{0.55} \cdot P_{\text{lemon}}^{0.45}$.

4.

What is the real wage in this economy under free trade?

Solution: In this small open economy the real wage is 0.3732 units.

100. Problem

A small open economy uses labor, capital and land to produce two goods backpack and chicken burger. The production functions are written as:

$$Q_{\text{backpack}} = 2.21 \cdot K^{0.42} L_{\text{backpack}}^{0.58}$$
$$Q_{\text{chicken burger}} = 1.65 \cdot T^{0.42} L_{\text{chicken burger}}^{0.58}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 230$, $K = 223$ and $T = 88$.

The utility function of the representative consumer is given by $U = 1.10 \cdot D_{\text{backpack}}^{1.07} D_{\text{chicken burger}}^{-0.07}$. The statistical office determines the price level by using the formula of $P = P_{\text{backpack}}^{0.13} P_{\text{chicken burger}}^{0.87}$.

The small open economy trades actively with the rest of the world, where the price of backpack in terms of chicken burger is 1.18.

By what percentage does free trade change the real rental rate of capital?

Solution: Free trade changes the real rental rate of capital by -71.6527 percent.

101. Problem

A small open economy uses labor, capital and land to produce two goods milkshake and wooden spoon. The production functions are written as:

$$Q_{\text{milkshake}} = 1.80 \cdot K^{0.34} L_{\text{milkshake}}^{0.66}$$

$$Q_{\text{wooden spoon}} = 0.27 \cdot T^{0.34} L_{\text{wooden spoon}}^{0.66}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 382$, $K = 181$ and $T = 95$.

The utility function of the representative consumer is given by $U = 0.94 \cdot D_{\text{milkshake}}^{1.14} D_{\text{wooden spoon}}^{-0.14}$. The statistical office determines the price level by using the formula of $P = P_{\text{milkshake}}^{0.17} P_{\text{wooden spoon}}^{0.83}$.

The small open economy trades actively with the rest of the world, where the price of milkshake in terms of wooden spoon is 0.90.

By what percentage does free trade change the relative price (price of milkshake in terms of wooden spoon)?

Solution: Free trade changes the relative price by 76.3993 percent.

4.

102. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{teacup}} = 1.80 \cdot K^{0.38} L_{\text{teacup}}^{0.62}$$
$$Q_{\text{lemon}} = 0.51 \cdot T^{0.38} L_{\text{lemon}}^{0.62}$$

Firms are able to use 519 units of labor, 95 units of capital and 99 units of land to produce their output, and under free trade they produce 489.940926 of teacup and 0.825686 of lemon. The statistical office determines the price level by using the formula of $P = P_{\text{teacup}}^{0.18} \cdot P_{\text{lemon}}^{0.82}$.

Calculate the real rental rate of capital under free trade?

Solution: In this small open economy the real rental rate of capital is 9.3464 units.

103. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{peach}} = 2.01 \cdot K^{0.58} L_{\text{peach}}^{0.42}$$
$$Q_{\text{broccoli}} = 1.26 \cdot T^{0.58} L_{\text{broccoli}}^{0.42}$$

Firms are able to use 384 units of labor, 171 units of capital and 137 units of land to produce their output, and under free trade they produce 479.096381 of peach and 49.342250 of broccoli. The statistical office determines the price level by using the formula of $P = P_{\text{peach}}^{0.80} \cdot P_{\text{broccoli}}^{0.20}$.

Find the real rental rate of land under free trade.

Solution: In this small open economy the real rental rate of land is 0.0527 units.

104. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{bagel}	407.340362	426.663278
Q_{muffin}	51.177516	19.606310
D_{bagel}	407.340362	384.907857
D_{muffin}	51.177516	165.332729
L_{bagel}	370.410959	410.593733
L_{muffin}	45.589041	5.406267

The two production functions are given by

$$Q_{\text{bagel}} = 2.38 \cdot K^{0.55} L_{\text{bagel}}^{0.45}$$
$$Q_{\text{muffin}} = 0.47 \cdot T^{0.55} L_{\text{muffin}}^{0.45}$$

The maximum amount of capital is 91 units and the land endowment is 222 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{bagel}}^{0.46} \cdot P_{\text{muffin}}^{0.54}$.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by 83.5248 percent.

105. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in yoghurt industry and land is specific to coffee industry.

The relative price of yoghurt in terms of coffee is 3.46 in the rest of the world. The relative price of yoghurt in terms of coffee would have been 8.52 in the small open economy in autarky.

Solution: The small open economy has comparative advantage in producing coffee, under free trade it exports coffee and imports yoghurt. Capital is specific to yoghurt industry, thus capital owners are worse off with free trade.

106. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{pushchair}} = 0.42 \cdot K^{0.19} L_{\text{pushchair}}^{0.81}$$
$$Q_{\text{pastry}} = 2.29 \cdot T^{0.19} L_{\text{pastry}}^{0.81}$$

Firms are able to use 241 units of labor, 125 units of capital and 82 units of land to produce their output, and under free trade they produce 2.092298 of pushchair and 446.131239 of pastry. In autarky the relative price of pushchair in terms of pastry would have been 5.3412253.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing pastry, under free trade it exports pastry. Land is specific to pastry industry, thus land owners are better off with free trade.

107. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods hairdryer and backpack, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$U = 0.89 \cdot \ln D_{\text{hairdryer}} + 1.06 \cdot \ln D_{\text{backpack}}$$
$$Q_{\text{hairdryer}} = 1.75 \cdot K^{0.29} L_{\text{hairdryer}}^{0.71}$$
$$Q_{\text{backpack}} = 0.69 \cdot T^{0.29} L_{\text{backpack}}^{0.71}$$
$$L = 515$$

$$
\begin{aligned}
K &= 179 \\
T &= 80 \\
P &= P_{\text{hairdryer}}^{0.80} P_{\text{backpack}}^{0.20} \\
\frac{P_{\text{hairdryer}}^{\text{world}}}{P_{\text{backpack}}^{\text{world}}} &= 7.03
\end{aligned}
$$

Calculate the real rental rate of capital under free trade?

Solution: The real rental rate of capital in this small open economy is 1.5874 units.

4.

108. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$
\begin{aligned}
U &= 1.78 \cdot \ln D_{\text{tea}} + 2.24 \cdot \ln D_{\text{hairdryer}} \\
Q_{\text{tea}} &= 0.41 \cdot K^{0.81} L_{\text{tea}}^{0.19} \\
Q_{\text{hairdryer}} &= 0.53 \cdot T^{0.81} L_{\text{hairdryer}}^{0.19} \\
L &= 304 \\
K &= 210 \\
T &= 88 \\
P &= P_{\text{tea}}^{0.12} P_{\text{hairdryer}}^{0.88} \\
\frac{P_{\text{tea}}^{\text{world}}}{P_{\text{hairdryer}}^{\text{world}}} &= 1.80
\end{aligned}
$$

Which good does the economy import and what is the amount of import?

Solution: The economy imports hairdryer and the amount of import is $IM = 68.8552$.

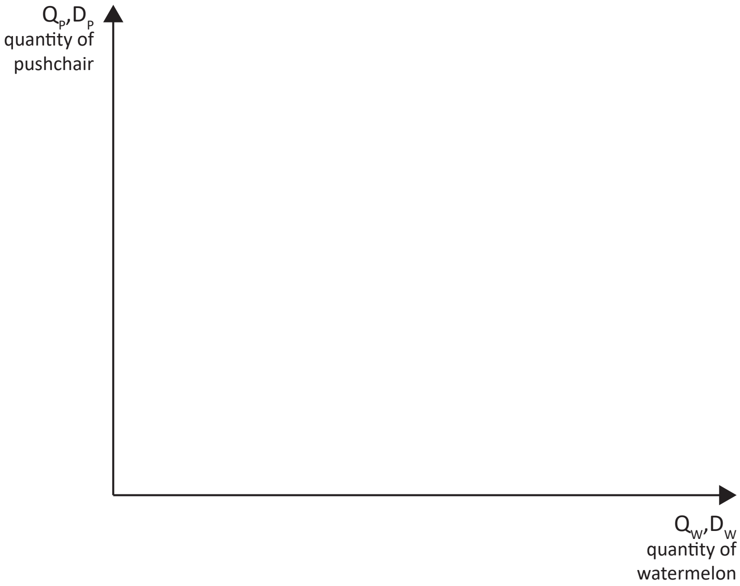
109. Problem

The functioning of a small open economy can be characterized by the following formulas:

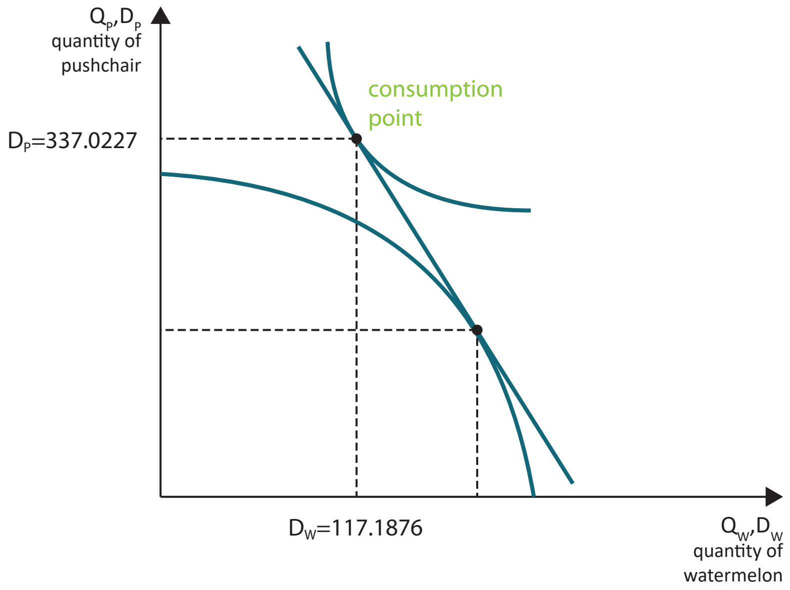
$$
\begin{aligned}
U &= 1.57 \cdot \ln D_{\text{watermelon}} + 1.66 \cdot \ln D_{\text{pushchair}} \\
Q_{\text{watermelon}} &= 2.36 \cdot K^{0.36} L_{\text{watermelon}}^{0.64} \\
Q_{\text{pushchair}} &= 0.40 \cdot T^{0.36} L_{\text{pushchair}}^{0.64} \\
L &= 92
\end{aligned}
$$

$$K = 123$$
$$T = 145$$
$$P = P_{\text{watermelon}}^{0.67} P_{\text{pushchair}}^{0.33}$$
$$\frac{P_{\text{watermelon}}^{\text{world}}}{P_{\text{pushchair}}^{\text{world}}} = 2.72$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:



110. Problem

Consider a model of specific factors with two goods paper clip and pistachio. paper clip is produced with labor and capital, pistachio is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 306$$
$$K = 213$$
$$T = 207$$

The production functions for tablets and oranges are:

$$Q_{\text{paper clip}} = 0.58 \cdot K^{0.33} L_{\text{paper clip}}^{0.67}$$
$$Q_{\text{pistachio}} = 1.00 \cdot T^{0.33} L_{\text{pistachio}}^{0.67}$$

The utility function of the representative consumer is written as $U = 1.94 \cdot \ln D_{\text{paper clip}} + 1.56 \cdot \ln D_{\text{pistachio}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{paper clip}}^{0.15} P_{\text{pistachio}}^{0.85}$.

The country faces $\frac{P_{\text{paper clip}}^{\text{world}}}{P_{\text{pistachio}}^{\text{world}}} = 4.94$ relative world price.

Determine the amount of pistachio bought by the utility maximizing consumer.

Solution: In optimum 351.2641 is the amount of .pistachio consumed.

111. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{coffee cup}} = 1.91 \cdot K^{0.24} L_{\text{coffee cup}}^{0.76}$$
$$Q_{\text{lime}} = 1.29 \cdot T^{0.24} L_{\text{lime}}^{0.76}$$

Firms are able to use 391 units of labor, 151 units of capital and 184 units of land to produce their output, and under free trade they produce 594.297022 of coffee cup and 0.432507 of lime. The statistical office determines the price level by using the formula of $P = P_{\text{coffee cup}}^{0.15} \cdot P_{\text{lime}}^{0.85}$.

What is the real wage in this economy under free trade?

Solution: In this small open economy the real wage is 5.4628 units.

112. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$U = 0.90 \cdot \ln D_{\text{muffin}} + 0.24 \cdot \ln D_{\text{food processor}}$$
$$Q_{\text{muffin}} = 0.38 \cdot K^{0.43} L_{\text{muffin}}^{0.57}$$
$$Q_{\text{food processor}} = 0.76 \cdot T^{0.43} L_{\text{food processor}}^{0.57}$$
$$L = 217$$
$$K = 185$$
$$T = 123$$
$$P = P_{\text{muffin}}^{0.33} P_{\text{food processor}}^{0.67}$$
$$\frac{P_{\text{muffin}}^{\text{world}}}{P_{\text{food processor}}^{\text{world}}} = 3.55$$

Which good does the economy import and what is the amount of import?

Solution: The economy imports food processor and the amount of import is $IM = 18.0292$.

4.

113. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{pushchair}} = 2.38 \cdot K^{0.50} L_{\text{pushchair}}^{0.50}$$
$$Q_{\text{painting}} = 0.32 \cdot T^{0.50} L_{\text{painting}}^{0.50}$$

Firms are able to use 83 units of labor, 140 units of capital and 78 units of land to produce their output, and under free trade they produce 256.522489 of pushchair and 0.408164 of painting. In autarky the relative price of pushchair in terms of painting would have been 0.400470.

Solution: The small open economy has comparative advantage in producing pushchair, under free trade it exports pushchair and imports painting. Land is specific to painting industry, thus land owners are worse off with free trade.

114. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{lime}} = 1.69 \cdot K^{0.82} L_{\text{lime}}^{0.18}$$
$$Q_{\text{wallet}} = 0.27 \cdot T^{0.82} L_{\text{wallet}}^{0.18}$$

Firms are able to use 86 units of labor, 94 units of capital and 113 units of land to produce their output, and under free trade they produce 155.842917 of lime and 14.012331 of wallet. The statistical office determines the price level by using the formula of $P = P_{\text{lime}}^{0.53} \cdot P_{\text{wallet}}^{0.47}$.

Calculate the real rental rate of capital under free trade?

Solution: In this small open economy the real rental rate of capital is 2.9156 units.

115. Problem

Consider a model of specific factors with two goods napkin and banana. napkin is produced with labor and capital, banana is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 436$$
$$K = 71$$

$$T = 179$$

The production functions for tablets and oranges are:

$$Q_{\text{napkin}} = 1.13 \cdot K^{0.69} L_{\text{napkin}}^{0.31}$$
$$Q_{\text{banana}} = 2.10 \cdot T^{0.69} L_{\text{banana}}^{0.31}$$

The utility function of the representative consumer is written as $U = 1.11 \cdot \ln D_{\text{napkin}} + 0.14 \cdot \ln D_{\text{banana}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{napkin}}^{0.73} P_{\text{banana}}^{0.27}$.

The country faces $\frac{P_{\text{napkin}}^{\text{world}}}{P_{\text{banana}}^{\text{world}}} = 1.55$ relative world price.

What is the optimal amount of napkin consumed?

Solution: In optimum 341.0071 is the amount of .napkin consumed.

116. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{coffee}	316.529365	428.287880
$Q_{\text{coffee cup}}$	233.710428	129.355905
D_{coffee}	316.529365	193.264532
$D_{\text{coffee cup}}$	233.710428	613.504000
L_{coffee}	165.683871	367.167183
$L_{\text{coffee cup}}$	255.316129	53.832817

The two production functions are given by

$$Q_{\text{coffee}} = 1.70 \cdot K^{0.62} L_{\text{coffee}}^{0.38}$$
$$Q_{\text{coffee cup}} = 0.99 \cdot T^{0.62} L_{\text{coffee cup}}^{0.38}$$

The maximum amount of capital is 200 units and the land endowment is 225 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{coffee}}^{0.59} \cdot P_{\text{coffee cup}}^{0.41}$.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by 11.0280 percent.

117. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods hot dog and brioche, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$U = 1.32 \cdot \ln D_{\text{hot dog}} + 0.26 \cdot \ln D_{\text{brioche}}$$
$$Q_{\text{hot dog}} = 1.46 \cdot K^{0.59} L_{\text{hot dog}}^{0.41}$$
$$Q_{\text{brioche}} = 1.43 \cdot T^{0.59} L_{\text{brioche}}^{0.41}$$
$$L = 455$$
$$K = 181$$
$$T = 180$$
$$P = P_{\text{hot dog}}^{0.39} P_{\text{brioche}}^{0.61}$$
$$\frac{P_{\text{hot dog}}^{\text{world}}}{P_{\text{brioche}}^{\text{world}}} = 4.41$$

Determine the real GDP of this small open economy under free trade.

Solution: The real GDP in this small open economy is 996.3985 units.

118. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{porridge}} = 1.94 \cdot K^{0.69} L_{\text{porridge}}^{0.31}$$
$$Q_{\text{fruit cake}} = 1.81 \cdot T^{0.69} L_{\text{fruit cake}}^{0.31}$$

Firms are able to use 491 units of labor, 123 units of capital and 124 units of land to produce their output, and under free trade they produce 351.785362 of porridge and 179.938293 of fruit cake. The statistical office determines the price level by using the formula of $P = P_{\text{porridge}}^{0.47} \cdot P_{\text{fruit cake}}^{0.53}$.

Determine the real GDP of this small open economy under free trade.

Solution: In this small open economy the real GDP is 793.9488 units.

119. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{blackcurrant}} = 0.57 \cdot K^{0.72} L_{\text{blackcurrant}}^{0.28}$$
$$Q_{\text{rug}} = 1.84 \cdot T^{0.72} L_{\text{rug}}^{0.28}$$

Firms are able to use 123 units of labor, 118 units of capital and 102 units of land to produce their output, and under free trade they produce 63.087037 of blackcurrant and 132.134586 of rug. In autarky the relative price of blackcurrant in terms of rug would have been 2.791524.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing blackcurrant, under free trade it exports blackcurrant. Capital is specific to blackcurrant industry, thus capital owners are better off with free trade.

120. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in brioche industry and land is specific to lemonade industry.

The relative price of brioche in terms of lemonade is 5.59 in the rest of the world. The relative price of brioche in terms of lemonade would have been 1.02 in the small open economy in autarky.

Solution: The small open economy has comparative advantage in producing brioche, under free trade it exports brioche and imports lemonade. Land is specific to lemonade industry, thus land owners are worse off with free trade.

121. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in shampoo industry and land is specific to hairdryer industry.

The relative price of shampoo in terms of hairdryer is 5.46 in the rest of the world. The relative price of shampoo in terms of hairdryer would have been 6.57 in the small open economy in autarky.

Solution: The small open economy has comparative advantage in producing hairdryer, under free trade it exports hairdryer and imports shampoo. Capital is specific to shampoo industry, thus capital owners are worse off with free trade.

122. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

4.

	In Autarky	Under Free Trade
$Q_{\text{food processor}}$	96.147455	90.869949
Q_{lime}	13.561961	19.718809
$D_{\text{food processor}}$	96.147455	104.643933
D_{lime}	13.561961	7.735444
$L_{\text{food processor}}$	514.301205	446.605199
L_{lime}	43.698795	111.394801

The two production functions are given by

$$Q_{\text{food processor}} = 0.39 \cdot K^{0.60} L_{\text{food processor}}^{0.40}$$
$$Q_{\text{lime}} = 0.19 \cdot T^{0.60} L_{\text{lime}}^{0.40}$$

The maximum amount of capital is 151 units and the land endowment is 99 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{food processor}}^{0.48} \cdot P_{\text{lime}}^{0.52}$.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by -22.2219 percent.

123. Problem

A small open economy uses labor, capital and land to produce two goods painting and almond. The production functions are written as:

$$Q_{\text{painting}} = 0.76 \cdot K^{0.55} L_{\text{painting}}^{0.45}$$
$$Q_{\text{almond}} = 0.94 \cdot T^{0.55} L_{\text{almond}}^{0.45}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 199$, $K = 86$ and $T = 195$.

The utility function of the representative consumer is given by $U = 2.34 \cdot D_{\text{painting}}^{1.13} D_{\text{almond}}^{-0.13}$. The statistical office determines the price level by using the formula of $P = P_{\text{painting}}^{0.57} P_{\text{almond}}^{0.43}$.

The small open economy trades actively with the rest of the world, where the price of painting in terms of almond is 5.14.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by -21.7129 percent.

124. Problem

A small open economy uses labor, capital and land to produce two goods milkshake and jigsaw. The production functions are written as:

$$Q_{\text{milkshake}} = 1.90 \cdot K^{0.21} L_{\text{milkshake}}^{0.79}$$
$$Q_{\text{jigsaw}} = 0.30 \cdot T^{0.21} L_{\text{jigsaw}}^{0.79}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 281$, $K = 171$ and $T = 194$.

The utility function of the representative consumer is given by $U = 1.34 \cdot D_{\text{milkshake}}^{0.48} D_{\text{jigsaw}}^{0.52}$. The statistical office determines the price level by using the formula of $P = P_{\text{milkshake}}^{0.20} P_{\text{jigsaw}}^{0.80}$.

The small open economy trades actively with the rest of the world, where the price of milkshake in terms of jigsaw is 7.02.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -99.9999 percent.

4.

125. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods naan bread and painting, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned}
U &= 2.34 \cdot \ln D_{\text{naan bread}} + 0.84 \cdot \ln D_{\text{painting}} \\
Q_{\text{naan bread}} &= 1.44 \cdot K^{0.62} L_{\text{naan bread}}^{0.38} \\
Q_{\text{painting}} &= 2.35 \cdot T^{0.62} L_{\text{painting}}^{0.38} \\
L &= 460 \\
K &= 222 \\
T &= 176 \\
P &= P_{\text{naan bread}}^{0.54} P_{\text{painting}}^{0.46} \\
\frac{P_{\text{naan bread}}^{\text{world}}}{P_{\text{painting}}^{\text{world}}} &= 3.81
\end{aligned}$$

Find the real rental rate of land under free trade.

Solution: The real rental rate of land in this small open economy is 874.3911 units.

126. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{coffee}	209.719081	194.256575
Q_{tomato}	177.215063	234.404727
D_{coffee}	209.719081	245.002395
D_{tomato}	177.215063	100.435764
L_{coffee}	273.526882	216.872963
L_{tomato}	42.473118	99.127037

The two production functions are given by

$$Q_{\text{coffee}} = 1.00 \cdot K^{0.67} L_{\text{coffee}}^{0.33}$$
$$Q_{\text{tomato}} = 1.43 \cdot T^{0.67} L_{\text{tomato}}^{0.33}$$

The maximum amount of capital is 184 units and the land endowment is 210 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{coffee}}^{0.61} \cdot P_{\text{tomato}}^{0.39}$.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by 105.6335 percent.

127. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{blackcurrant}}$	120.859474	127.035802
Q_{onion}	175.974914	139.395782
$D_{\text{blackcurrant}}$	120.859474	113.716942
D_{onion}	175.974914	233.959686
$L_{\text{blackcurrant}}$	164.370044	183.621543
L_{onion}	47.629956	28.378457

The two production functions are given by

$$Q_{\text{blackcurrant}} = 0.80 \cdot K^{0.55} L_{\text{blackcurrant}}^{0.45}$$
$$Q_{\text{onion}} = 1.66 \cdot T^{0.55} L_{\text{onion}}^{0.45}$$

The maximum amount of capital is 141 units and the land endowment is 204 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{blackcurrant}}^{0.14} \cdot P_{\text{onion}}^{0.86}$.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by 26.6689 percent.

4.

128. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$\begin{aligned}
U &= 0.74 \cdot \ln D_{\text{painting}} + 1.46 \cdot \ln D_{\text{wooden spoon}} \\
Q_{\text{painting}} &= 0.84 \cdot K^{0.46} L_{\text{painting}}^{0.54} \\
Q_{\text{wooden spoon}} &= 0.52 \cdot T^{0.46} L_{\text{wooden spoon}}^{0.54} \\
L &= 575 \\
K &= 164 \\
T &= 181 \\
P &= P_{\text{painting}}^{0.69} P_{\text{wooden spoon}}^{0.31} \\
\frac{P_{\text{painting}}^{\text{world}}}{P_{\text{wooden spoon}}^{\text{world}}} &= 6.11
\end{aligned}$$

Which good does the economy import and what is the amount of import?

Solution: The economy imports wooden spoon and the amount of import is $IM = 1091.0485$.

129. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{spring onion}}$	92.090104	240.777558
Q_{pastry}	299.455299	86.141213
$D_{\text{spring onion}}$	92.090104	67.983180
D_{pastry}	299.455299	443.825575
$L_{\text{spring onion}}$	46.462963	164.558921
L_{pastry}	146.537037	28.441079

4.

The two production functions are given by

$$Q_{\text{spring onion}} = 1.38 \cdot K^{0.24} L_{\text{spring onion}}^{0.76}$$
$$Q_{\text{pastry}} = 2.01 \cdot T^{0.24} L_{\text{pastry}}^{0.76}$$

The maximum amount of capital is 210 units and the land endowment is 157 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{spring onion}}^{0.26} \cdot P_{\text{pastry}}^{0.74}$.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by 23.6461 percent.

130. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{banana}} = 0.49 \cdot K^{0.70} L_{\text{banana}}^{0.30}$$
$$Q_{\text{spring onion}} = 1.01 \cdot T^{0.70} L_{\text{spring onion}}^{0.30}$$

Firms are able to use 406 units of labor, 127 units of capital and 178 units of land to produce their output, and under free trade they produce 77.926053 of banana and 166.276539 of spring onion. The statistical office determines the price level by using the formula of $P = P_{\text{banana}}^{0.48} \cdot P_{\text{spring onion}}^{0.52}$.

Find the real rental rate of land under free trade.

Solution: In this small open economy the real rental rate of land is 0.3291 units.

131. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
Q_{plate}	230.360418	297.244288
Q_{napkin}	325.987793	182.305736
D_{plate}	230.360418	134.016517
D_{napkin}	325.987793	1120.865418
L_{plate}	194.740741	431.928646
L_{napkin}	283.259259	46.071354

The two production functions are given by

$$Q_{\text{plate}} = 1.40 \cdot K^{0.68} L_{\text{plate}}^{0.32}$$
$$Q_{\text{napkin}} = 1.35 \cdot T^{0.68} L_{\text{napkin}}^{0.32}$$

The maximum amount of capital is 152 units and the land endowment is 224 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{plate}}^{0.66} \cdot P_{\text{napkin}}^{0.34}$.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by 6.4376 percent.

132. Problem

Consider a model of specific factors with two goods pie and coffee. pie is produced with labor and capital, coffee is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 551$$
$$K = 67$$
$$T = 94$$

The production functions for tablets and oranges are:

$$Q_{\text{pie}} = 0.44 \cdot K^{0.76} L_{\text{pie}}^{0.24}$$
$$Q_{\text{coffee}} = 1.05 \cdot T^{0.76} L_{\text{coffee}}^{0.24}$$

The utility function of the representative consumer is written as $U = 0.76 \cdot \ln D_{\text{pie}} + 1.49 \cdot \ln D_{\text{coffee}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{pie}}^{0.58} P_{\text{coffee}}^{0.42}$.

The country faces $\frac{P_{\text{pie}}^{\text{world}}}{P_{\text{coffee}}^{\text{world}}} = 1.79$ relative world price.

Find the amount of coffee produced by the firms in coffee sector.

Solution: In optimum 137.1519 is the amount of .coffee produced.

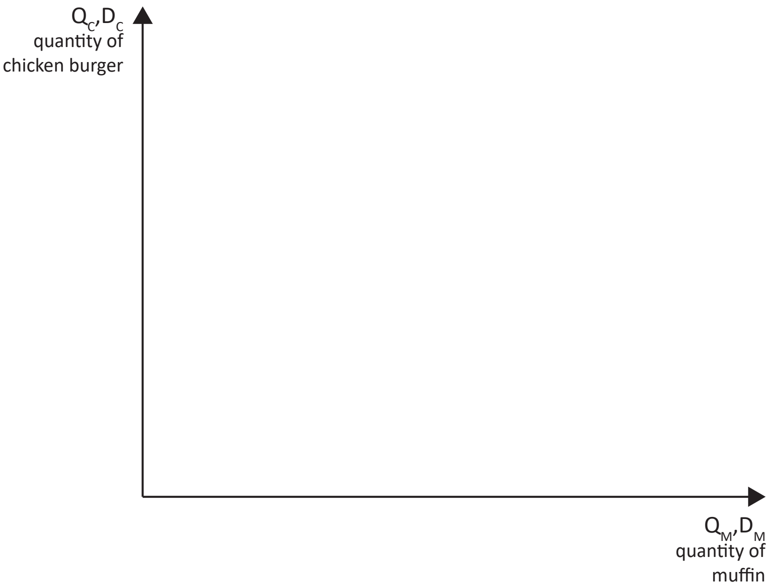
133. Problem

The functioning of a small open economy can be characterized by the following formulas:

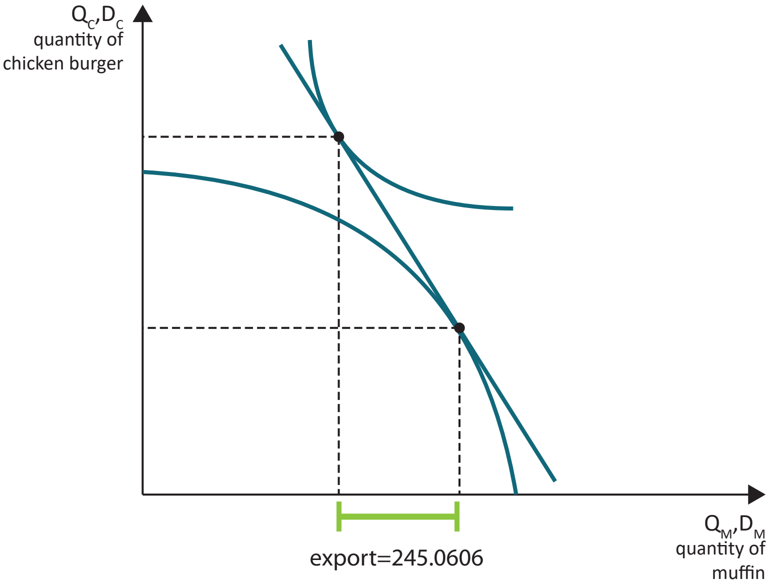
$$
\begin{aligned}
U &= 2.38 \cdot \ln D_{\text{muffin}} + 1.89 \cdot \ln D_{\text{chicken burger}} \\
Q_{\text{muffin}} &= 2.24 \cdot K^{0.41} L_{\text{muffin}}^{0.59} \\
Q_{\text{chicken burger}} &= 1.73 \cdot T^{0.41} L_{\text{chicken burger}}^{0.59} \\
L &= 365 \\
K &= 146 \\
T &= 223 \\
P &= P_{\text{muffin}}^{0.16} P_{\text{chicken burger}}^{0.84} \\
\frac{P_{\text{muffin}}^{\text{world}}}{P_{\text{chicken burger}}^{\text{world}}} &= 6.78
\end{aligned}
$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the export, and calculate the amount of export.

4.



Solution: The correct graph is the following:

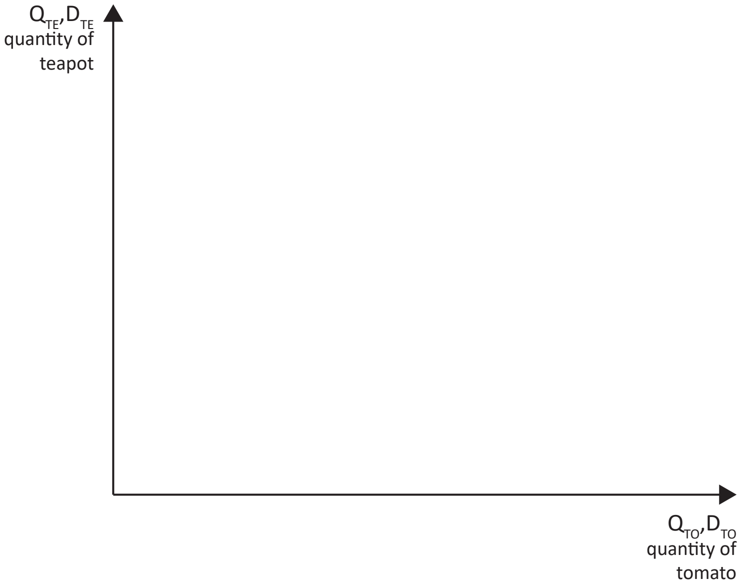


134. Problem

The functioning of a small open economy can be characterized by the following formulas:

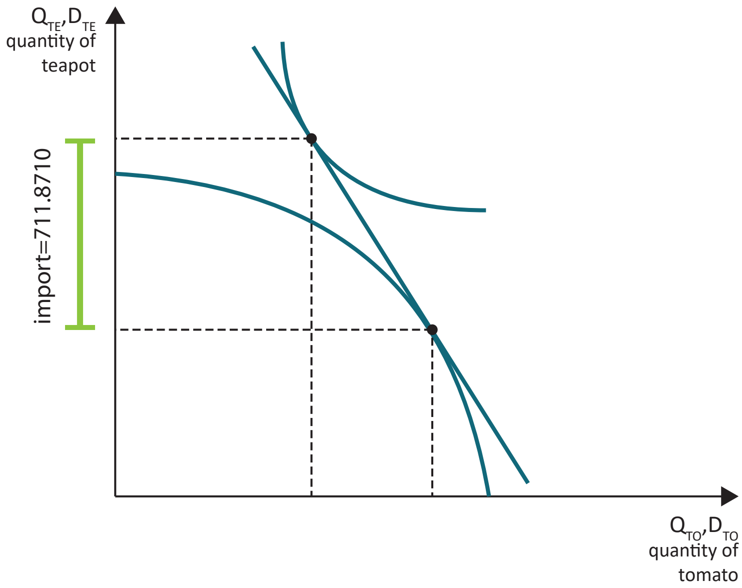
$$
\begin{aligned}
U &= 0.48 \cdot \ln D_{\text{tomato}} + 2.09 \cdot \ln D_{\text{teapot}} \\
Q_{\text{tomato}} &= 1.92 \cdot K^{0.14} L_{\text{tomato}}^{0.86} \\
Q_{\text{teapot}} &= 2.34 \cdot T^{0.14} L_{\text{teapot}}^{0.86} \\
L &= 371 \\
K &= 210 \\
T &= 95 \\
P &= P_{\text{tomato}}^{0.29} P_{\text{teapot}}^{0.71} \\
\frac{P_{\text{tomato}}^{\text{world}}}{P_{\text{teapot}}^{\text{world}}} &= 1.49
\end{aligned}
$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the import, and calculate the amount of import.



Solution: The correct graph is the following:

4.



4.

135. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{food processor}} = 1.17 \cdot K^{0.22} L_{\text{food processor}}^{0.78}$$
$$Q_{\text{lemon}} = 0.26 \cdot T^{0.22} L_{\text{lemon}}^{0.78}$$

Firms are able to use 171 units of labor, 135 units of capital and 113 units of land to produce their output, and under free trade they produce 189.931037 of food processor and 0.000805 of lemon. In autarky the relative price of food processor in terms of lemon would have been 0.181728.

Solution: The small open economy has comparative advantage in producing food processor, under free trade it exports food processor and imports lemon. Land is specific to lemon industry, thus land owners are worse off with free trade.

136. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{jigsaw}} = 1.62 \cdot K^{0.47} L_{\text{jigsaw}}^{0.53}$$

$$Q_{\text{bookshelf}} = 0.84 \cdot T^{0.47} L_{\text{bookshelf}}^{0.53}$$

Firms are able to use 190 units of labor, 111 units of capital and 185 units of land to produce their output, and under free trade they produce 225.942225 of jigsaw and 46.809852 of bookshelf. In autarky the relative price of jigsaw in terms of bookshelf would have been 0.329630.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing jigsaw, under free trade it exports jigsaw. Capital is specific to jigsaw industry, thus capital owners are better off with free trade.

137. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods spring onion and wine glass, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned}
U &= 2.24 \cdot \ln D_{\text{spring onion}} + 2.20 \cdot \ln D_{\text{wine glass}} \\
Q_{\text{spring onion}} &= 2.36 \cdot K^{0.27} L_{\text{spring onion}}^{0.73} \\
Q_{\text{wine glass}} &= 0.24 \cdot T^{0.27} L_{\text{wine glass}}^{0.73} \\
L &= 398 \\
K &= 126 \\
T &= 133 \\
P &= P_{\text{spring onion}}^{0.22} P_{\text{wine glass}}^{0.78} \\
\frac{P_{\text{spring onion}}^{\text{world}}}{P_{\text{wine glass}}^{\text{world}}} &= 2.72
\end{aligned}$$

Calculate the real rental rate of capital under free trade?

Solution: The real rental rate of capital in this small open economy is 3.2202 units.

138. Problem

A small open economy uses labor, capital and land to produce two goods tea and milkshake. The production functions are written as:

$$Q_{\text{tea}} = 1.81 \cdot K^{0.81} L_{\text{tea}}^{0.19}$$
$$Q_{\text{milkshake}} = 0.21 \cdot T^{0.81} L_{\text{milkshake}}^{0.19}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 163$, $K = 123$ and $T = 139$.

The utility function of the representative consumer is given by $U = 1.36 \cdot D_{\text{tea}}^{1.47} D_{\text{milkshake}}^{-0.47}$. The statistical office determines the price level by using the formula of $P = P_{\text{tea}}^{0.72} P_{\text{milkshake}}^{0.28}$.

The small open economy trades actively with the rest of the world, where the price of tea in terms of milkshake is 5.58.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -104.6202 percent.

4.

139. Problem

Consider a model of specific factors with two goods backpack and aubergine. backpack is produced with labor and capital, aubergine is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 126$$
$$K = 216$$
$$T = 188$$

The production functions for tablets and oranges are:

$$Q_{\text{backpack}} = 0.87 \cdot K^{0.63} L_{\text{backpack}}^{0.37}$$
$$Q_{\text{aubergine}} = 0.74 \cdot T^{0.63} L_{\text{aubergine}}^{0.37}$$

The utility function of the representative consumer is written as $U = 1.85 \cdot \ln D_{\text{backpack}} + 1.88 \cdot \ln D_{\text{aubergine}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{backpack}}^{0.59} P_{\text{aubergine}}^{0.41}$.

The country faces $\frac{P_{\text{backpack}}^{\text{world}}}{P_{\text{aubergine}}^{\text{world}}} = 3.12$ relative world price.

Calculate the amount of backpack produced by the economy.

Solution: In optimum 148.0831 is the amount of .backpack produced.

140. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods watch and pizza, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$\begin{aligned} U &= 1.03 \cdot \ln D_{\text{watch}} + 1.12 \cdot \ln D_{\text{pizza}} \\ Q_{\text{watch}} &= 0.33 \cdot K^{0.83} L_{\text{watch}}^{0.17} \\ Q_{\text{pizza}} &= 0.32 \cdot T^{0.83} L_{\text{pizza}}^{0.17} \\ L &= 308 \\ K &= 183 \\ T &= 140 \\ P &= P_{\text{watch}}^{0.30} P_{\text{pizza}}^{0.70} \\ \frac{P_{\text{watch}}^{\text{world}}}{P_{\text{pizza}}^{\text{world}}} &= 3.00 \end{aligned}$$

What is the real wage in this economy under free trade?

Solution: The real wage in this small open economy is 0.0912 units.

141. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{coffee cup}}$	274.502647	466.094020
Q_{shampoo}	64.766767	4.905387
$D_{\text{coffee cup}}$	274.502647	158.210305
D_{shampoo}	64.766767	950.108393
$L_{\text{coffee cup}}$	206.688427	608.912549
L_{shampoo}	404.311573	2.087451

The two production functions are given by

$$Q_{\text{coffee cup}} = 1.76 \cdot K^{0.51} L_{\text{coffee cup}}^{0.49}$$

$$Q_{\text{shampoo}} = 0.24 \cdot T^{0.51} L_{\text{shampoo}}^{0.49}$$

The maximum amount of capital is 119 units and the land endowment is 183 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{coffee cup}}^{0.32} \cdot P_{\text{shampoo}}^{0.68}$.

By what percentage does free trade change the relative price (price of coffee cup in terms of shampoo)?

Solution: Free trade changes the relative price by 2445.2632 percent.

142. Problem

4.

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{scarf}} = 1.16 \cdot K^{0.45} L_{\text{scarf}}^{0.55}$$
$$Q_{\text{onion}} = 0.58 \cdot T^{0.45} L_{\text{onion}}^{0.55}$$

Firms are able to use 106 units of labor, 77 units of capital and 178 units of land to produce their output, and under free trade they produce 103.140494 of scarf and 15.968304 of onion. In autarky the relative price of scarf in terms of onion would have been 0.449037.

Solution: The small open economy has comparative advantage in producing scarf, under free trade it exports scarf and imports onion. Land is specific to onion industry, thus land owners are worse off with free trade.

143. Problem

In a small open economy labor is a mobile factor, but capital is specific factor in painting industry and land is specific to napkin industry.

The relative price of painting in terms of napkin is 4.95 in the rest of the world. The relative price of painting in terms of napkin would have been 7.83 in the small open economy in autarky.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing napkin, under free trade it exports napkin. Land is specific to napkin industry, thus land owners are better off with free trade.

144. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{banana}} = 2.25 \cdot K^{0.61} L_{\text{banana}}^{0.39}$$
$$Q_{\text{trifle}} = 0.60 \cdot T^{0.61} L_{\text{trifle}}^{0.39}$$

Firms are able to use 315 units of labor, 83 units of capital and 76 units of land to produce their output, and under free trade they produce 312.884665 of banana and 13.397609 of trifle. In autarky the relative price of banana in terms of trifle would have been 1.041235.

Which specific factor owners are better off with free trade?

Solution: The small open economy has comparative advantage in producing banana, under free trade it exports banana. Capital is specific to banana industry, thus capital owners are better off with free trade.

4.

145. Problem

Consider a model of specific factors with two goods lemon and watch. lemon is produced with labor and capital, watch is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 171$$
$$K = 192$$
$$T = 177$$

The production functions for tablets and oranges are:

$$Q_{\text{lemon}} = 2.10 \cdot K^{0.64} L_{\text{lemon}}^{0.36}$$
$$Q_{\text{watch}} = 0.38 \cdot T^{0.64} L_{\text{watch}}^{0.36}$$

The utility function of the representative consumer is written as $U = 1.75 \cdot \ln D_{\text{lemon}} + 0.16 \cdot \ln D_{\text{watch}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{lemon}}^{0.49} P_{\text{watch}}^{0.51}$.

The country faces $\frac{P_{\text{lemon}}^{\text{world}}}{P_{\text{watch}}^{\text{world}}} = 5.23$ relative world price.

Determine the amount of watch bought by the utility maximizing consumer.

Solution: In optimum 169.9543 is the amount of .watch consumed.

146. Problem

A small open economy uses labor, capital and land to produce two goods blackcurrant and jigsaw. The production functions are written as:

$$Q_{\text{blackcurrant}} = 0.30 \cdot K^{0.52} L_{\text{blackcurrant}}^{0.48}$$
$$Q_{\text{jigsaw}} = 0.13 \cdot T^{0.52} L_{\text{jigsaw}}^{0.48}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 351$, $K = 149$ and $T = 225$.

The utility function of the representative consumer is given by $U = 0.68 \cdot D_{\text{blackcurrant}}^{2.38} D_{\text{jigsaw}}^{-1.38}$. The statistical office determines the price level by using the formula of $P = P_{\text{blackcurrant}}^{0.55} P_{\text{jigsaw}}^{0.45}$.

4.

The small open economy trades actively with the rest of the world, where the price of blackcurrant in terms of jigsaw is 2.08.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

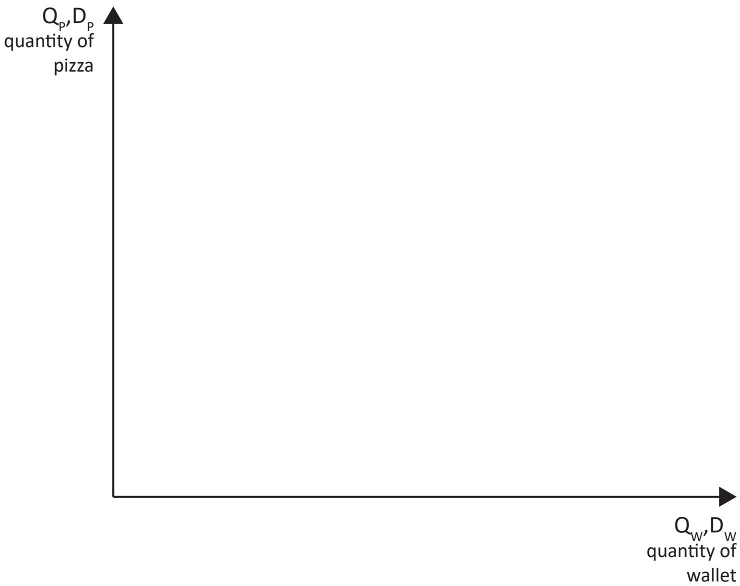
Solution: Free trade changes the real GDP by 95.6455 percent.

147. Problem

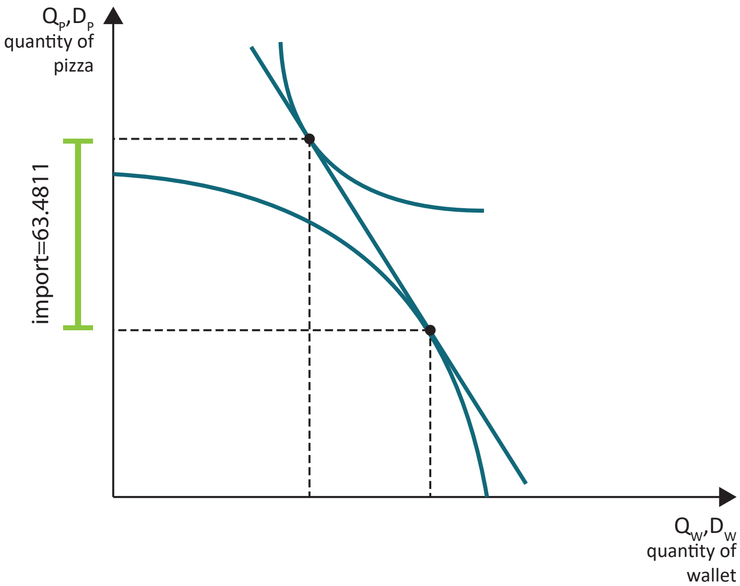
The functioning of a small open economy can be characterized by the following formulas:

$$U = 1.55 \cdot \ln D_{\text{wallet}} + 0.12 \cdot \ln D_{\text{pizza}}$$
$$Q_{\text{wallet}} = 0.91 \cdot K^{0.42} L_{\text{wallet}}^{0.58}$$
$$Q_{\text{pizza}} = 0.64 \cdot T^{0.42} L_{\text{pizza}}^{0.58}$$
$$L = 564$$
$$K = 175$$
$$T = 161$$
$$P = P_{\text{wallet}}^{0.14} P_{\text{pizza}}^{0.86}$$
$$\frac{P_{\text{wallet}}^{\text{world}}}{P_{\text{pizza}}^{\text{world}}} = 3.69$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the import, and calculate the amount of import.



Solution: The correct graph is the following:



148. Problem

The following table displays information about the operating of a small open economy in autarky and under free trade

	In Autarky	Under Free Trade
$Q_{\text{naan bread}}$	129.513211	151.716363
$Q_{\text{pistachio}}$	57.187343	28.765930
$D_{\text{naan bread}}$	129.513211	107.558491
$D_{\text{pistachio}}$	57.187343	128.121144
$L_{\text{naan bread}}$	217.730769	307.119598
$L_{\text{pistachio}}$	115.269231	25.880402

The two production functions are given by

$$Q_{\text{naan bread}} = 0.77 \cdot K^{0.54} L_{\text{naan bread}}^{0.46}$$
$$Q_{\text{pistachio}} = 0.39 \cdot T^{0.54} L_{\text{pistachio}}^{0.46}$$

The maximum amount of capital is 135 units and the land endowment is 180 units.

The statistical office calculates the price level by using the formula of $P = P_{\text{naan bread}}^{0.13} \cdot P_{\text{pistachio}}^{0.87}$.

By what percentage does free trade change the real wage of workers?

Solution: Free trade changes the reál wage by 96.9211 percent.

149. Problem

A small open economy uses labor, capital and land to produce two goods wallet and coffee cup. The production functions are written as:

$$Q_{\text{wallet}} = 2.22 \cdot K^{0.44} L_{\text{wallet}}^{0.56}$$
$$Q_{\text{coffee cup}} = 0.65 \cdot T^{0.44} L_{\text{coffee cup}}^{0.56}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 194$, $K = 218$ and $T = 219$.

The utility function of the representative consumer is given by $U = 2.01 \cdot D_{\text{wallet}}^{2.28} D_{\text{coffee cup}}^{-1.28}$. The statistical office determines the price level by using the formula of $P = P_{\text{wallet}}^{0.78} P_{\text{coffee cup}}^{0.22}$.

The small open economy trades actively with the rest of the world, where the price of wallet in terms of coffee cup is 4.32.

By what percentage does free trade change the relative price (price of wallet in terms of coffee cup)?

Solution: Free trade changes the relative price by 114.0209 percent.

150. Problem

A small open economy uses labor, capital and land to produce two goods rug and shampoo. The production functions are written as:

$$Q_{\text{rug}} = 1.94 \cdot K^{0.40} L_{\text{rug}}^{0.60}$$
$$Q_{\text{shampoo}} = 2.34 \cdot T^{0.40} L_{\text{shampoo}}^{0.60}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 373$, $K = 208$ and $T = 219$.

The utility function of the representative consumer is given by $U = 0.66 \cdot D_{\text{rug}}^{0.39} D_{\text{shampoo}}^{0.61}$. The statistical office determines the price level by using the formula of $P = P_{\text{rug}}^{0.57} P_{\text{shampoo}}^{0.43}$.

The small open economy trades actively with the rest of the world, where the price of rug in terms of shampoo is 2.62.

By what percentage does free trade change the real rental rate of land?

Solution: Free trade changes the real rental rate of land by -76.6145 percent.

151. Problem

The production functions of firms in a small open economy – that operates under the assumptions of the specific factors model – are given by

$$Q_{\text{cauliflower}} = 1.59 \cdot K^{0.70} L_{\text{cauliflower}}^{0.30}$$
$$Q_{\text{bagel}} = 1.48 \cdot T^{0.70} L_{\text{bagel}}^{0.30}$$

Firms are able to use 70 units of labor, 180 units of capital and 121 units of land to produce their output, and under free trade they produce 212.993342 of cauliflower and 57.640999 of bagel. The statistical office determines the price level by using the formula of $P = P_{\text{cauliflower}}^{0.73} \cdot P_{\text{bagel}}^{0.27}$.

Determine the real GDP of this small open economy under free trade.

Solution: In this small open economy the real GDP is 368.8003 units.

152. Problem

A small open economy uses labor, capital and land to produce two goods lemon and spring onion. The production functions are written as:

$$Q_{\text{lemon}} = 0.43 \cdot K^{0.64} L_{\text{lemon}}^{0.36}$$
$$Q_{\text{spring onion}} = 0.83 \cdot T^{0.64} L_{\text{spring onion}}^{0.36}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 476$, $K = 193$ and $T = 153$.

The utility function of the representative consumer is given by $U = 1.52 \cdot D_{\text{lemon}}^{0.55} D_{\text{spring onion}}^{0.45}$. The statistical office determines the price level by using the formula of $P = P_{\text{lemon}}^{0.21} P_{\text{spring onion}}^{0.79}$.

The small open economy trades actively with the rest of the world, where the price of lemon in terms of spring onion is 4.75.

By what percentage does free trade change the real wage of workers?

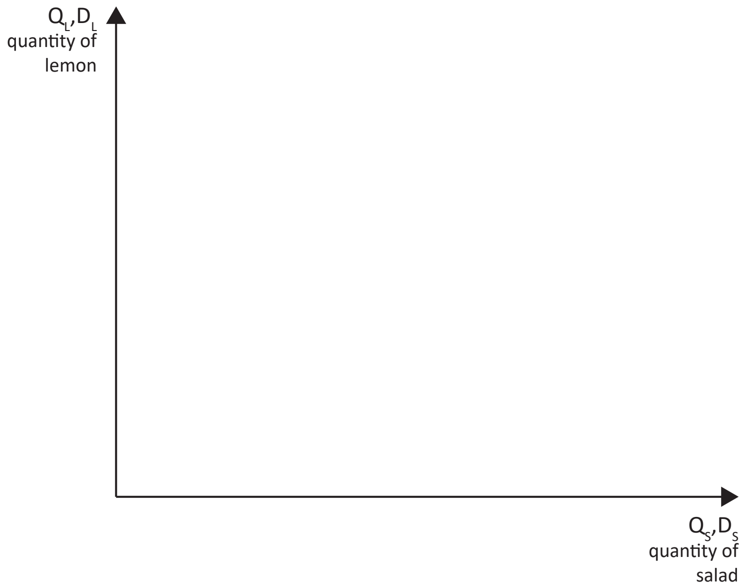
Solution: Free trade changes the real wage by 58.1369 percent.

153. Problem

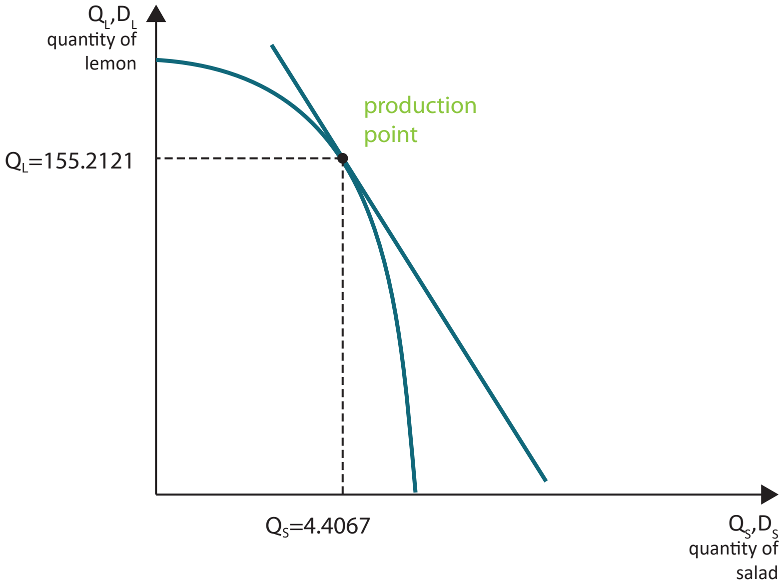
The functioning of a small open economy can be characterized by the following formulas:

$$U = 1.67 \cdot \ln D_{\text{salad}} + 1.32 \cdot \ln D_{\text{lemon}}$$
$$Q_{\text{salad}} = 0.13 \cdot K^{0.52} L_{\text{salad}}^{0.48}$$
$$Q_{\text{lemon}} = 1.97 \cdot T^{0.52} L_{\text{lemon}}^{0.48}$$
$$L = 87$$
$$K = 139$$
$$T = 78$$
$$P = P_{\text{salad}}^{0.38} P_{\text{lemon}}^{0.62}$$
$$\frac{P_{\text{salad}}^{\text{world}}}{P_{\text{lemon}}^{\text{world}}} = 3.25$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the consumption point. Calculate the elements of the consumption bundle.



Solution: The correct graph is the following:



4.

154. Problem

Consider a model of specific factors with two goods pie and watermelon. pie is produced with labor and capital, watermelon is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 375$$
$$K = 193$$
$$T = 79$$

The production functions for tablets and oranges are:

$$Q_{\text{pie}} = 1.80 \cdot K^{0.38} L_{\text{pie}}^{0.62}$$
$$Q_{\text{watermelon}} = 1.36 \cdot T^{0.38} L_{\text{watermelon}}^{0.62}$$

The utility function of the representative consumer is written as $U = 1.81 \cdot \ln D_{\text{pie}} + 1.89 \cdot \ln D_{\text{watermelon}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{pie}}^{0.50} P_{\text{watermelon}}^{0.50}$.

The country faces $\frac{P_{\text{pie}}^{\text{world}}}{P_{\text{watermelon}}^{\text{world}}} = 4.42$ relative world price.

Calculate the amount of pie produced by the economy.

Solution: In optimum 523.1549 is the amount of .pie produced.

155. Problem

A small open economy uses labor, capital and land to produce two goods banana and cabbage. The production functions are written as:

$$Q_{\text{banana}} = 2.35 \cdot K^{0.59} L_{\text{banana}}^{0.41}$$
$$Q_{\text{cabbage}} = 0.67 \cdot T^{0.59} L_{\text{cabbage}}^{0.41}$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 243$, $K = 105$ and $T = 155$.

The utility function of the representative consumer is given by $U = 1.03 \cdot D_{\text{banana}}^{1.29} D_{\text{cabbage}}^{-0.29}$. The statistical office determines the price level by using the formula of $P = P_{\text{banana}}^{0.50} P_{\text{cabbage}}^{0.50}$.

The small open economy trades actively with the rest of the world, where the price of banana in terms of cabbage is 3.78.

By what percentage does the real GDP of this small open economy differs from the real GDP that would have arisen in autarky?

Solution: Free trade changes the real GDP by 47.4088 percent.

156. Problem

The functioning of a small open economy can be characterized by the following formulas:

$$\begin{aligned} U &= 0.90 \cdot \ln D_{\text{sweetcorn}} + 2.39 \cdot \ln D_{\text{rug}} \\ Q_{\text{sweetcorn}} &= 2.42 \cdot K^{0.24} L_{\text{sweetcorn}}^{0.76} \\ Q_{\text{rug}} &= 0.79 \cdot T^{0.24} L_{\text{rug}}^{0.76} \\ L &= 101 \\ K &= 99 \\ T &= 207 \\ P &= P_{\text{sweetcorn}}^{0.55} P_{\text{rug}}^{0.45} \\ \frac{P_{\text{sweetcorn}}^{\text{world}}}{P_{\text{rug}}^{\text{world}}} &= 2.06 \end{aligned}$$

Which good does the economy export and what is the amount of export?

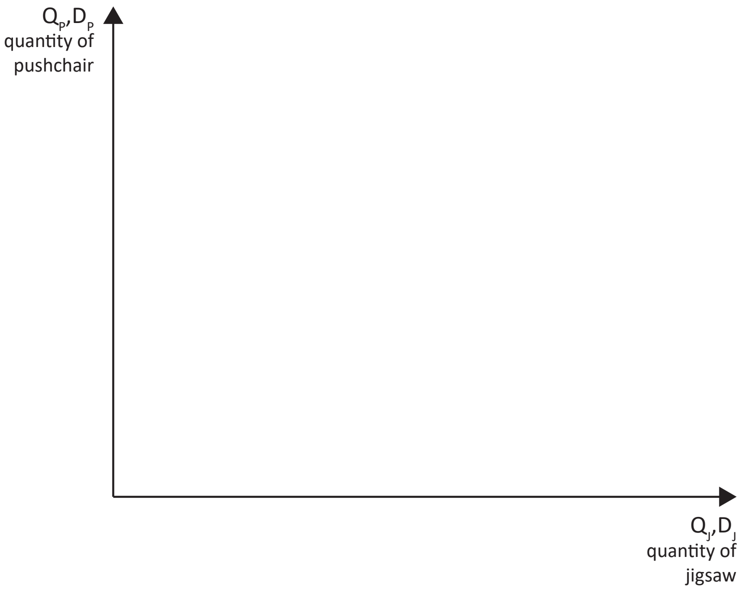
Solution: The economy exports sweetcorn and the amount of export is $EX = 176.5125$.

157. Problem

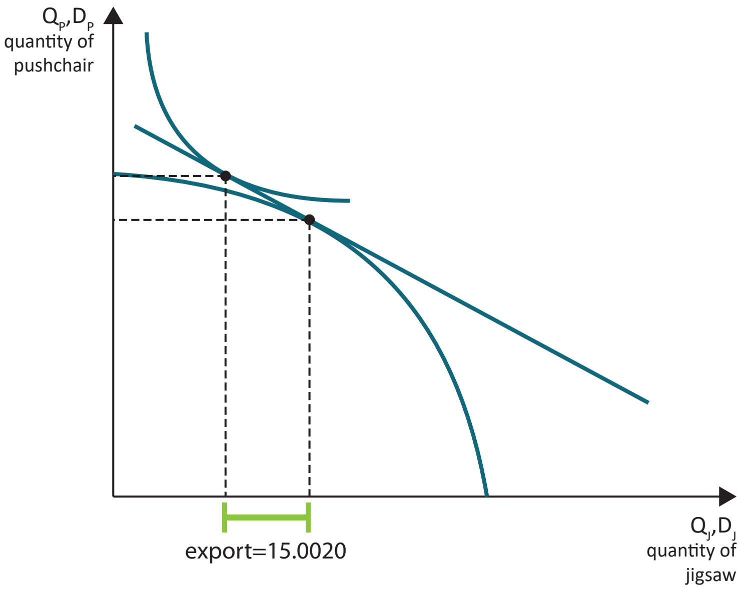
The functioning of a small open economy can be characterized by the following formulas:

$$\begin{aligned} U &= 0.98 \cdot \ln D_{\text{jigsaw}} + 2.35 \cdot \ln D_{\text{pushchair}} \\ Q_{\text{jigsaw}} &= 0.48 \cdot K^{0.51} L_{\text{jigsaw}}^{0.49} \\ Q_{\text{pushchair}} &= 0.84 \cdot T^{0.51} L_{\text{pushchair}}^{0.49} \\ L &= 256 \\ K &= 66 \\ T &= 79 \\ P &= P_{\text{jigsaw}}^{0.64} P_{\text{pushchair}}^{0.36} \\ \frac{P_{\text{jigsaw}}^{\text{world}}}{P_{\text{pushchair}}^{\text{world}}} &= 1.76 \end{aligned}$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the export, and calculate the amount of export.



Solution: The correct graph is the following:



158. Problem

The functioning of a small open economy displays a strong resemblance to the specific factors model. Is produces only two goods pistachio and orange, it uses three factors: labor (L), capital (K) and land (T), in addition, from these three factors only labor is used in both sectors, capital and land are so called industry specific factors. The functioning of the economy can be described by the following formulas:

$$
\begin{aligned}
U &= 0.99 \cdot \ln D_{\text{pistachio}} + 1.44 \cdot \ln D_{\text{orange}} \\
Q_{\text{pistachio}} &= 2.30 \cdot K^{0.48} L_{\text{pistachio}}^{0.52} \\
Q_{\text{orange}} &= 1.00 \cdot T^{0.48} L_{\text{orange}}^{0.52} \\
L &= 163 \\
K &= 208 \\
T &= 137 \\
P &= P_{\text{pistachio}}^{0.54} P_{\text{orange}}^{0.46} \\
\frac{P_{\text{pistachio}}^{\text{world}}}{P_{\text{orange}}^{\text{world}}} &= 1.66
\end{aligned}
$$

Calculate the real rental rate of capital under free trade?

Solution: The real rental rate of capital in this small open economy is 1.2029 units.

159. Problem

A small open economy uses labor, capital and land to produce two goods peach and pizza. The production functions are written as:

$$
\begin{aligned}
Q_{\text{peach}} &= 1.48 \cdot K^{0.68} L_{\text{peach}}^{0.32} \\
Q_{\text{pizza}} &= 2.12 \cdot T^{0.68} L_{\text{pizza}}^{0.32}
\end{aligned}
$$

Labor moves freely between the two sectors but the other two factors are industry specific. The factor endowments in the economy are $L = 174$, $K = 94$ and $T = 167$.

The utility function of the representative consumer is given by $U = 0.28 \cdot D_{\text{peach}}^{1.22} D_{\text{pizza}}^{-0.22}$. The statistical office determines the price level by using the formula of $P = P_{\text{peach}}^{0.72} P_{\text{pizza}}^{0.28}$.

The small open economy trades actively with the rest of the world, where the price of peach in terms of pizza is 1.90.

By what percentage does free trade change the real rental rate of capital?

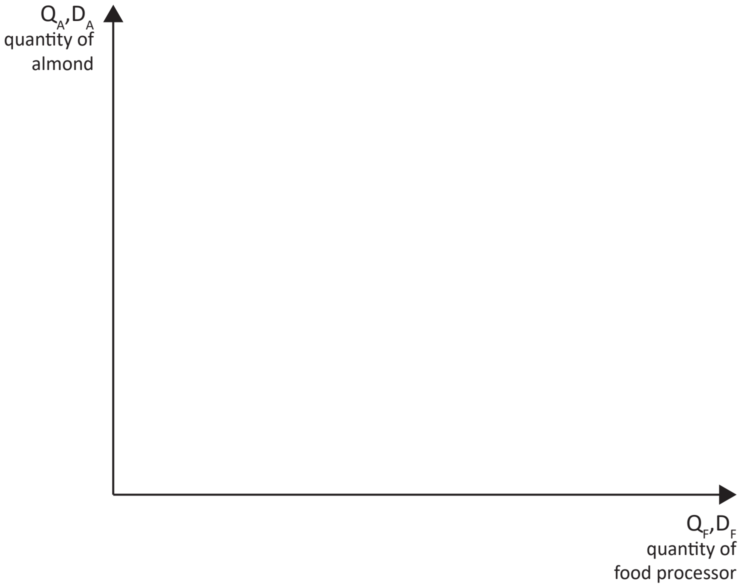
Solution: Free trade changes the real rental rate of capital by -57.6468 percent.

160. Problem

The functioning of a small open economy can be characterized by the following formulas:

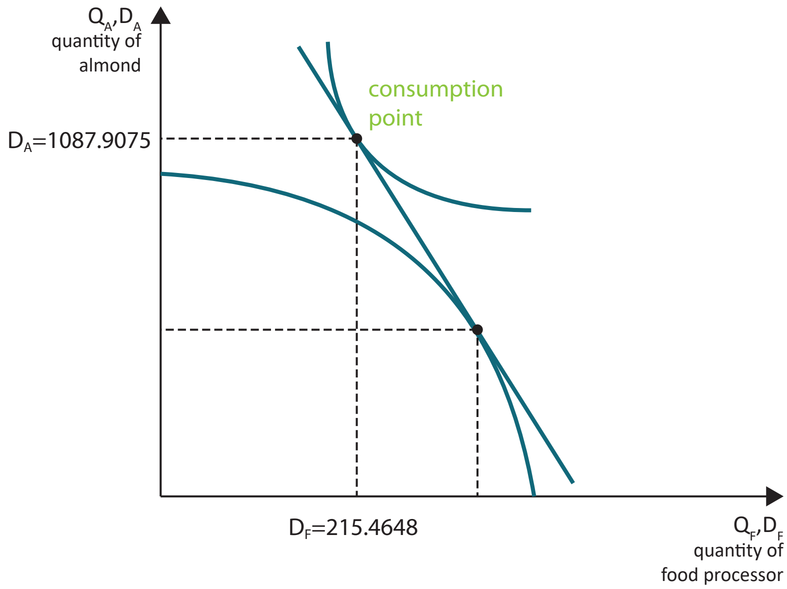
$$
\begin{aligned}
U &= 1.25 \cdot \ln D_{\text{food processor}} + 1.34 \cdot \ln D_{\text{almond}} \\
Q_{\text{food processor}} &= 1.61 \cdot K^{0.21} L_{\text{food processor}}^{0.79} \\
Q_{\text{almond}} &= 1.79 \cdot T^{0.21} L_{\text{almond}}^{0.79} \\
L &= 307 \\
K &= 189 \\
T &= 88 \\
P &= P_{\text{food processor}}^{0.70} P_{\text{almond}}^{0.30} \\
\frac{P_{\text{food processor}}^{\text{world}}}{P_{\text{almond}}^{\text{world}}} &= 4.71
\end{aligned}
$$

On the following graph illustrate the curves that characterize the functioning of the economy. Label the production point point. Calculate the elements of the production bundle.



Solution: The correct graph is the following:

4.


Q_A, D_A
quantity of
almond
consumption
point
D_A=1087.9075
D_F=215.4648
Q_F, D_F
quantity of
food processor

4.

Ricardian Model
Large Open Economy

1. Problem

4.

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods ice cream and lime. ice cream is produced with labor and capital, lime is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 553$$
$$K = 144$$
$$T = 199$$

The production functions for ice cream and lime are:

$$Q_{\text{ice cream}} = 1.88 \cdot K^{0.66} L_{\text{ice cream}}^{0.34}$$
$$Q_{\text{lime}} = 1.10 \cdot T^{0.66} L_{\text{lime}}^{0.34}$$

The utility function of the representative consumer is written as $U = 1.86 \cdot \ln D_{\text{ice cream}} + 0.77 \cdot \ln D_{\text{lime}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{ice cream}}^{0.17} P_{\text{lime}}^{0.83}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 1.23 \cdot \ln D_{\text{ice cream,world}} + 1.07 \cdot \ln D_{\text{lime,world}}$$
$$Q_{\text{ice cream,world}} = 1.80 \cdot K_{\text{world}}^{0.66} L_{\text{ice cream,world}}^{0.34}$$
$$Q_{\text{lime,world}} = 2.26 \cdot T_{\text{world}}^{0.66} L_{\text{lime,world}}^{0.34}$$
$$L_{\text{world}} = 263$$
$$K_{\text{world}} = 129$$
$$T_{\text{world}} = 225$$
$$P_{\text{world}} = P_{\text{ice cream,world}}^{0.20} \cdot P_{\text{lime,world}}^{0.80}$$

Determine the real wage in the large open economy.

Solution: The real wage for the large open economy is 0.4702 units.

2. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods trifle and onion. trifle is produced with labor and capital, onion is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 601$$
$$K = 165$$
$$T = 190$$

The production functions for trifle and onion are:

$$Q_{\text{trifle}} = 0.54 \cdot K^{0.48} L_{\text{trifle}}^{0.52}$$
$$Q_{\text{onion}} = 2.28 \cdot T^{0.48} L_{\text{onion}}^{0.52}$$

The utility function of the representative consumer is written as $U = 2.23 \cdot \ln D_{\text{trifle}} + 0.63 \cdot \ln D_{\text{onion}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{trifle}}^{0.14} P_{\text{onion}}^{0.86}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 0.32 \cdot \ln D_{\text{trifle,world}} + 0.77 \cdot \ln D_{\text{onion,world}}$$
$$Q_{\text{trifle,world}} = 0.91 \cdot K_{\text{world}}^{0.48} L_{\text{trifle,world}}^{0.52}$$
$$Q_{\text{onion,world}} = 1.86 \cdot T_{\text{world}}^{0.48} L_{\text{onion,world}}^{0.52}$$
$$L_{\text{world}} = 598$$
$$K_{\text{world}} = 190$$
$$T_{\text{world}} = 219$$
$$P_{\text{world}} = P_{\text{trifle,world}}^{0.25} \cdot P_{\text{onion,world}}^{0.75}$$

Determine the real wage in the large open economy.

Solution: The real wage for the large open economy is 0.6966 units.

3. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$U_A = 1.58 \cdot \ln D_{\text{banana},A} + 1.82 \cdot \ln D_{\text{peach},A}$$
$$Q_{\text{banana},A} = 0.65 \cdot K_A^{0.20} L_{\text{banana},A}^{0.80}$$
$$Q_{\text{peach},A} = 2.19 \cdot T_A^{0.20} L_{\text{peach},A}^{0.80}$$

$$
\begin{aligned}
L_A &= 400 \\
K_A &= 86 \\
T_A &= 107
\end{aligned}
$$

Economy B operates as follows:

$$
\begin{aligned}
U_B &= 1.05 \cdot \ln D_{\text{banana},B} + 0.70 \cdot \ln D_{\text{peach},B} \\
Q_{\text{banana},B} &= 0.83 \cdot K_B^{0.20} L_{\text{banana},B}^{0.80} \\
Q_{\text{peach},B} &= 2.05 \cdot T_B^{0.20} L_{\text{peach},B}^{0.80} \\
L_B &= 544 \\
K_B &= 97 \\
T_B &= 130
\end{aligned}
$$

4.

The two economies trade with each other without any restrictions.

Which economy exports banana and what is the amount of export?

Solution: Economy B exports banana and the amount of export is 30.6834 units.

4. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$
\begin{aligned}
U_A &= 1.19 \cdot \ln D_{\text{coffee},A} + 0.55 \cdot \ln D_{\text{cabbage},A} \\
Q_{\text{coffee},A} &= 0.12 \cdot K_A^{0.59} L_{\text{coffee},A}^{0.41} \\
Q_{\text{cabbage},A} &= 1.91 \cdot T_A^{0.59} L_{\text{cabbage},A}^{0.41} \\
L_A &= 363 \\
K_A &= 211 \\
T_A &= 134
\end{aligned}
$$

Economy B operates as follows:

$$
\begin{aligned}
U_B &= 0.20 \cdot \ln D_{\text{coffee},B} + 0.19 \cdot \ln D_{\text{cabbage},B} \\
Q_{\text{coffee},B} &= 2.08 \cdot K_B^{0.59} L_{\text{coffee},B}^{0.41} \\
Q_{\text{cabbage},B} &= 1.13 \cdot T_B^{0.59} L_{\text{cabbage},B}^{0.41} \\
L_B &= 342 \\
K_B &= 107 \\
T_B &= 203
\end{aligned}
$$

The two economies trade with each other without any restrictions.

Which economy imports coffee and what is the amount of import?

Solution: Economy A imports coffee and the amount of import is 126.2447 units.

5. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods pie and aubergine. pie is produced with labor and capital, aubergine is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 197$$
$$K = 211$$
$$T = 96$$

The production functions for pie and aubergine are:

$$Q_{\text{pie}} = 1.19 \cdot K^{0.83} L_{\text{pie}}^{0.17}$$
$$Q_{\text{aubergine}} = 0.39 \cdot T^{0.83} L_{\text{aubergine}}^{0.17}$$

The utility function of the representative consumer is written as $U = 0.63 \cdot \ln D_{\text{pie}} + 1.23 \cdot \ln D_{\text{aubergine}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{pie}}^{0.57} P_{\text{aubergine}}^{0.43}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 2.33 \cdot \ln D_{\text{pie,world}} + 0.27 \cdot \ln D_{\text{aubergine,world}}$$
$$Q_{\text{pie,world}} = 1.06 \cdot K_{\text{world}}^{0.83} L_{\text{pie,world}}^{0.17}$$
$$Q_{\text{aubergine,world}} = 1.35 \cdot T_{\text{world}}^{0.83} L_{\text{aubergine,world}}^{0.17}$$
$$L_{\text{world}} = 344$$
$$K_{\text{world}} = 90$$
$$T_{\text{world}} = 123$$
$$P_{\text{world}} = P_{\text{pie,world}}^{0.42} \cdot P_{\text{aubergine,world}}^{0.58}$$

Determine the real wage in the large open economy.

Solution: The real wage for the large open economy is 0.2362 units.

6. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods tea and shampoo. tea is produced with labor and capital, shampoo is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 221$$
$$K = 165$$
$$T = 144$$

The production functions for tea and shampoo are:

$$Q_{\text{tea}} = 0.48 \cdot K^{0.37} L_{\text{tea}}^{0.63}$$
$$Q_{\text{shampoo}} = 2.38 \cdot T^{0.37} L_{\text{shampoo}}^{0.63}$$

4.

The utility function of the representative consumer is written as $U = 1.49 \cdot \ln D_{\text{tea}} + 0.56 \cdot \ln D_{\text{shampoo}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{tea}}^{0.13} P_{\text{shampoo}}^{0.87}$.

The functioning of the rest of the world can be described by the following function:

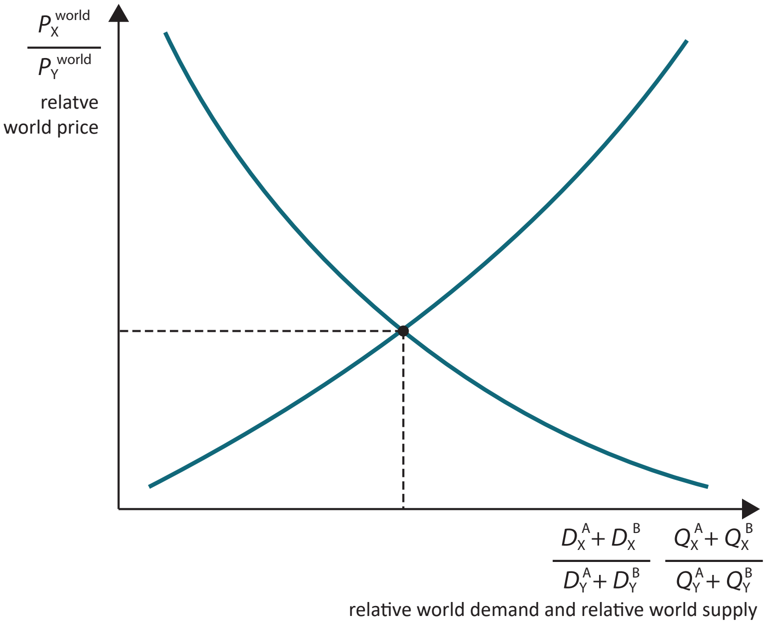
$$U_{\text{world}} = 0.48 \cdot \ln D_{\text{tea,world}} + 0.65 \cdot \ln D_{\text{shampoo,world}}$$
$$Q_{\text{tea,world}} = 1.20 \cdot K_{\text{world}}^{0.37} L_{\text{tea,world}}^{0.63}$$
$$Q_{\text{shampoo,world}} = 1.78 \cdot T_{\text{world}}^{0.37} L_{\text{shampoo,world}}^{0.63}$$
$$L_{\text{world}} = 178$$
$$K_{\text{world}} = 199$$
$$T_{\text{world}} = 112$$
$$P_{\text{world}} = P_{\text{tea,world}}^{0.48} \cdot P_{\text{shampoo,world}}^{0.52}$$

What is the real GDP in the large open economy?

Solution: The real GDP for the large open economy is 423.8291 units.

7. Problem

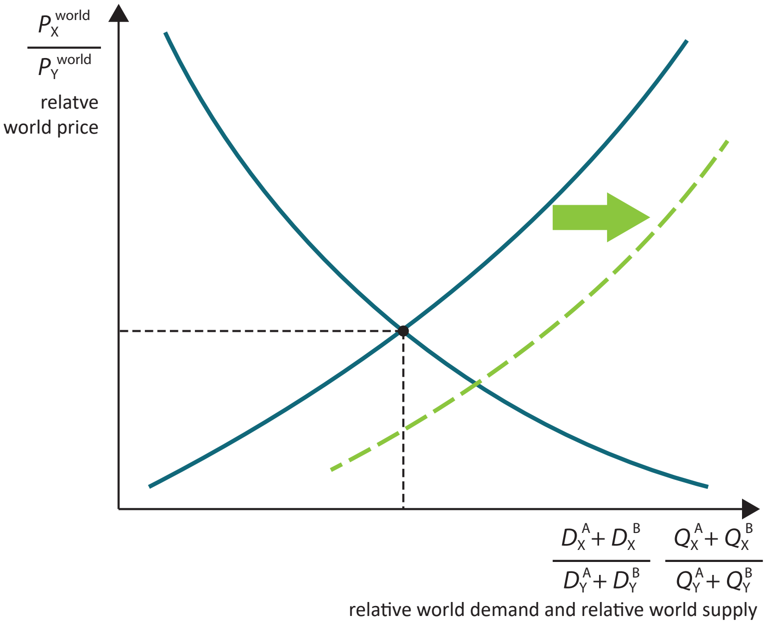
The following graph shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B.



Suppose, that economy A has comparative advantage in producing X.

What happens to the relative world supply and/or the relative world demand curves if economy B experiences an import biased growth?

Solution: The correct graph is the following:



4.

8. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods hairspray and lemon. hairspray is produced with labor and capital, lemon is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 509$$
$$K = 132$$
$$T = 68$$

The production functions for hairspray and lemon are:

$$Q_{\text{hairspray}} = 0.37 \cdot K^{0.48} L_{\text{hairspray}}^{0.52}$$
$$Q_{\text{lemon}} = 1.55 \cdot T^{0.48} L_{\text{lemon}}^{0.52}$$

The utility function of the representative consumer is written as $U = 0.90 \cdot \ln D_{\text{hairspray}} + 1.90 \cdot \ln D_{\text{lemon}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{hairspray}}^{0.31} P_{\text{lemon}}^{0.69}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 1.59 \cdot \ln D_{\text{hairspray,world}} + 1.66 \cdot \ln D_{\text{lemon,world}}$$
$$Q_{\text{hairspray,world}} = 0.13 \cdot K_{\text{world}}^{0.48} L_{\text{hairspray,world}}^{0.52}$$

$$
\begin{aligned}
Q_{\text{lemon,world}} &= 0.94 \cdot T_{\text{world}}^{0.48} L_{\text{lemon,world}}^{0.52} \\
L_{\text{world}} &= 116 \\
K_{\text{world}} &= 138 \\
T_{\text{world}} &= 183 \\
P_{\text{world}} &= P_{\text{hairspray,world}}^{0.35} \cdot P_{\text{lemon,world}}^{0.65}
\end{aligned}
$$

What is the real GDP in the large open economy?

Solution: The real GDP for the large open economy is 292.5985 units.

9. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods rug and onion. rug is produced with labor and capital, onion is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$
\begin{aligned}
L &= 184 \\
K &= 167 \\
T &= 68
\end{aligned}
$$

The production functions for rug and onion are:

$$
\begin{aligned}
Q_{\text{rug}} &= 1.16 \cdot K^{0.27} L_{\text{rug}}^{0.73} \\
Q_{\text{onion}} &= 2.39 \cdot T^{0.27} L_{\text{onion}}^{0.73}
\end{aligned}
$$

The utility function of the representative consumer is written as $U = 1.34 \cdot \ln D_{\text{rug}} + 1.14 \cdot \ln D_{\text{onion}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{rug}}^{0.29} P_{\text{onion}}^{0.71}$.

The functioning of the rest of the world can be described by the following function:

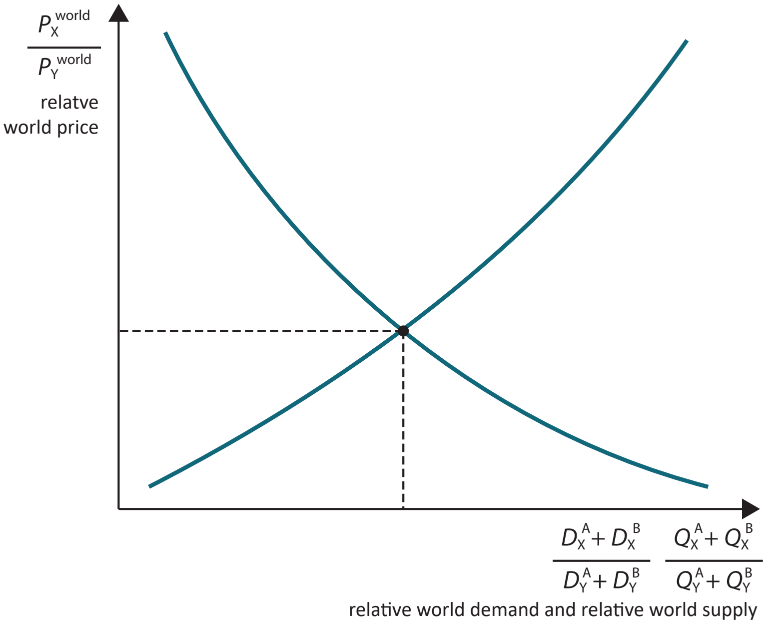
$$
\begin{aligned}
U_{\text{world}} &= 0.95 \cdot \ln D_{\text{rug,world}} + 0.15 \cdot \ln D_{\text{onion,world}} \\
Q_{\text{rug,world}} &= 0.58 \cdot K_{\text{world}}^{0.27} L_{\text{rug,world}}^{0.73} \\
Q_{\text{onion,world}} &= 1.43 \cdot T_{\text{world}}^{0.27} L_{\text{onion,world}}^{0.73} \\
L_{\text{world}} &= 502 \\
K_{\text{world}} &= 80 \\
T_{\text{world}} &= 73 \\
P_{\text{world}} &= P_{\text{rug,world}}^{0.25} \cdot P_{\text{onion,world}}^{0.75}
\end{aligned}
$$

Calculate the real GDP for the rest of the world.

Solution: The real GDP for the rest of the world is 419.0526 units.

10. Problem

The following graph shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B.

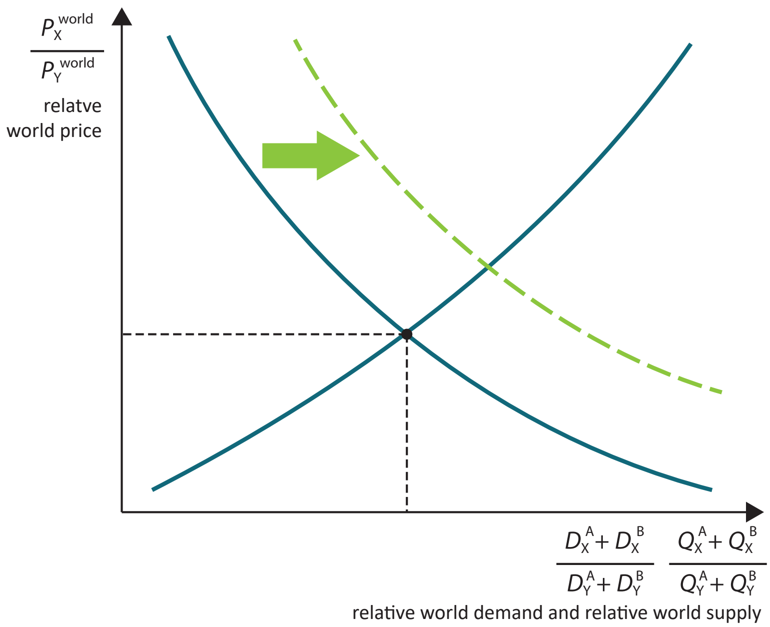


Suppose, that economy A has comparative advantage in producing X.

What happens to the relative world supply and/or the relative world demand curves if economy A receives transfers from economy B and both economies can be characterized by the so called home bias?

Solution: The correct graph is the following:

4.



11. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods spring onion and blackcurrant. spring onion is produced with labor and capital, blackcurrant is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 322$$
$$K = 161$$
$$T = 139$$

The production functions for spring onion and blackcurrant are:

$$Q_{\text{spring onion}} = 1.14 \cdot K^{0.39} L_{\text{spring onion}}^{0.61}$$
$$Q_{\text{blackcurrant}} = 2.27 \cdot T^{0.39} L_{\text{blackcurrant}}^{0.61}$$

The utility function of the representative consumer is written as $U = 1.42 \cdot \ln D_{\text{spring onion}} + 2.22 \cdot \ln D_{\text{blackcurrant}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{spring onion}}^{0.56} P_{\text{blackcurrant}}^{0.44}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 1.74 \cdot \ln D_{\text{spring onion,world}} + 2.37 \cdot \ln D_{\text{blackcurrant,world}}$$

$$Q_{\text{spring onion,world}} = 1.32 \cdot K_{\text{world}}^{0.39} L_{\text{spring onion,world}}^{0.61}$$
$$Q_{\text{blackcurrant,world}} = 0.52 \cdot T_{\text{world}}^{0.39} L_{\text{blackcurrant,world}}^{0.61}$$
$$L_{\text{world}} = 229$$
$$K_{\text{world}} = 75$$
$$T_{\text{world}} = 123$$
$$P_{\text{world}} = P_{\text{spring onion,world}}^{0.56} \cdot P_{\text{blackcurrant,world}}^{0.44}$$

Find the real wage for the rest of the world.

Solution: The real wage for the rest of the world is 0.5687 units.

4.

12. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods broccoli and paper clip. broccoli is produced with labor and capital, paper clip is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 549$$
$$K = 201$$
$$T = 216$$

The production functions for broccoli and paper clip are:

$$Q_{\text{broccoli}} = 0.93 \cdot K^{0.46} L_{\text{broccoli}}^{0.54}$$
$$Q_{\text{paper clip}} = 0.48 \cdot T^{0.46} L_{\text{paper clip}}^{0.54}$$

The utility function of the representative consumer is written as $U = 2.25 \cdot \ln D_{\text{broccoli}} + 0.66 \cdot \ln D_{\text{paper clip}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{broccoli}}^{0.18} P_{\text{paper clip}}^{0.82}$.

The functioning of the rest of the world can be described by the following function:

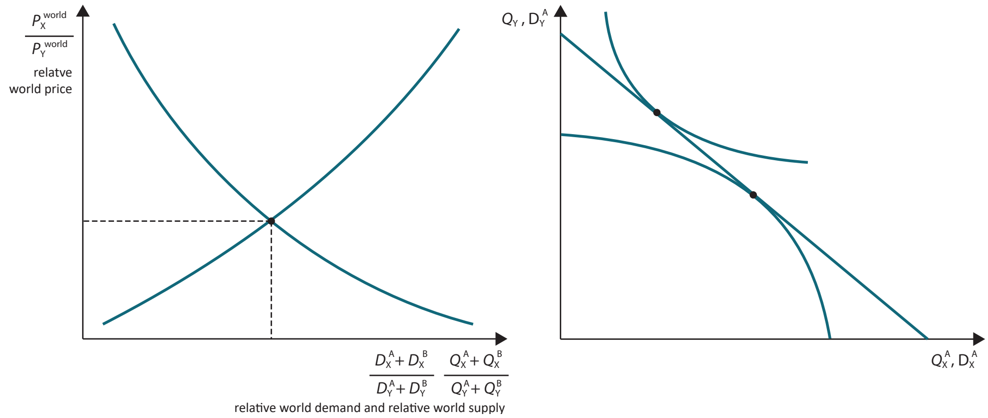
$$U_{\text{world}} = 2.17 \cdot \ln D_{\text{broccoli,world}} + 0.93 \cdot \ln D_{\text{paper clip,world}}$$
$$Q_{\text{broccoli,world}} = 0.36 \cdot K_{\text{world}}^{0.46} L_{\text{broccoli,world}}^{0.54}$$
$$Q_{\text{paper clip,world}} = 2.39 \cdot T_{\text{world}}^{0.46} L_{\text{paper clip,world}}^{0.54}$$
$$L_{\text{world}} = 443$$
$$K_{\text{world}} = 113$$
$$T_{\text{world}} = 121$$
$$P_{\text{world}} = P_{\text{broccoli,world}}^{0.61} \cdot P_{\text{paper clip,world}}^{0.39}$$

What is the real GDP in the large open economy?

Solution: The real GDP for the large open economy is 1054.1266 units.

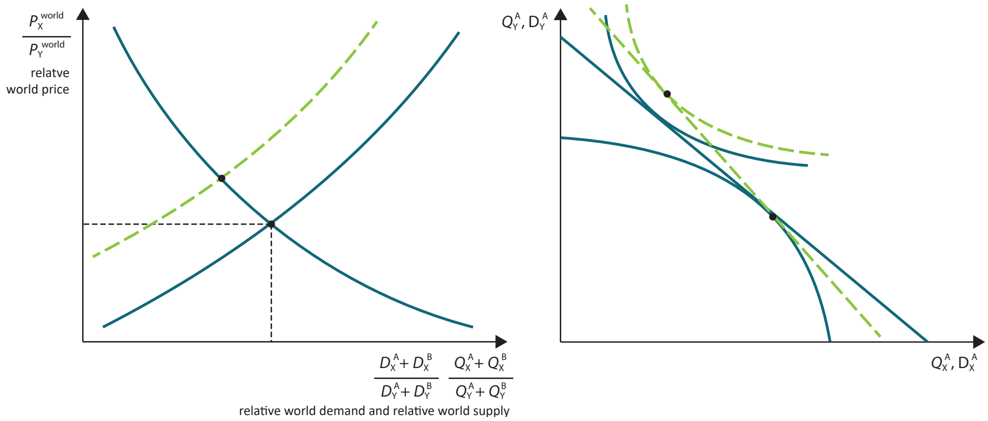
13. Problem

The graph on the left hand side of the following figure shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B. The right hand side graph illustrates the set of curves that represents the functioning of economy A.



What happens to the relative world supply and/or the relative world demand curves and the functions on the right hand side graph, if economy B experiences an export biased growth?

Solution: The correct graph is the following:



4.

14. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$U_A = 1.34 \cdot \ln D_{\text{spring onion},A} + 2.06 \cdot \ln D_{\text{strawberry},A}$$
$$Q_{\text{spring onion},A} = 0.32 \cdot K_A^{0.16} L_{\text{spring onion},A}^{0.84}$$
$$Q_{\text{strawberry},A} = 0.63 \cdot T_A^{0.16} L_{\text{strawberry},A}^{0.84}$$
$$L_A = 522$$
$$K_A = 192$$
$$T_A = 176$$

4.

Economy B operates as follows:

$$U_B = 0.69 \cdot \ln D_{\text{spring onion},B} + 0.17 \cdot \ln D_{\text{strawberry},B}$$
$$Q_{\text{spring onion},B} = 1.01 \cdot K_B^{0.16} L_{\text{spring onion},B}^{0.84}$$
$$Q_{\text{strawberry},B} = 0.41 \cdot T_B^{0.16} L_{\text{strawberry},B}^{0.84}$$
$$L_B = 95$$
$$K_B = 153$$
$$T_B = 114$$

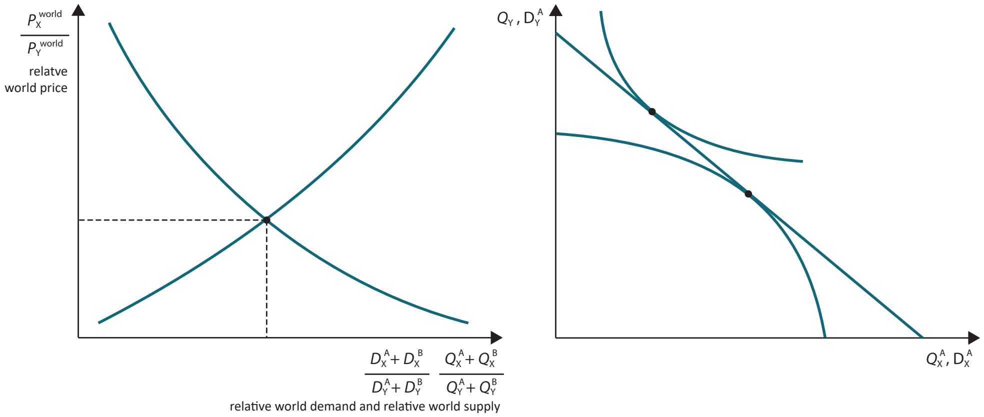
The two economies trade with each other without any restrictions.

Calculate the relative world price of spring onion in terms of strawberry.

Solution: The relative world price of spring onion in terms of strawberry is 1.6653 units.

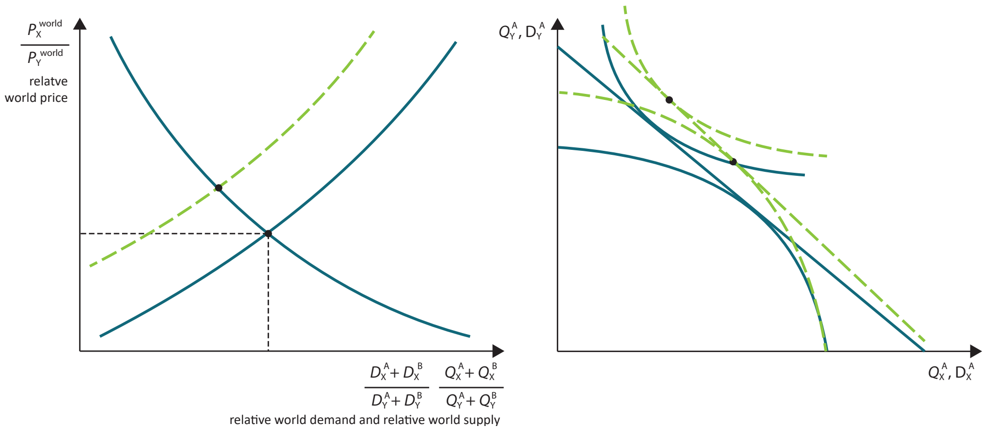
15. Problem

The graph on the left hand side of the following figure shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B. The right hand side graph illustrates the set of curves that represents the functioning of economy A.



What happens to the relative world supply and/or the relative world demand curves and the functions on the right hand side graph, if economy A experiences an import biased growth?

Solution: The correct graph is the following:



16. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods almond and coffee cup. almond is produced with labor and capital, coffee cup is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 92$$
$$K = 175$$

$$T = 166$$

The production functions for almond and coffee cup are:

$$Q_{\text{almond}} = 0.75 \cdot K^{0.54} L_{\text{almond}}^{0.46}$$
$$Q_{\text{coffee cup}} = 1.54 \cdot T^{0.54} L_{\text{coffee cup}}^{0.46}$$

The utility function of the representative consumer is written as $U = 1.28 \cdot \ln D_{\text{almond}} + 0.95 \cdot \ln D_{\text{coffee cup}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{almond}}^{0.15} P_{\text{coffee cup}}^{0.85}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 0.92 \cdot \ln D_{\text{almond,world}} + 0.44 \cdot \ln D_{\text{coffee cup,world}}$$
$$Q_{\text{almond,world}} = 1.97 \cdot K_{\text{world}}^{0.54} L_{\text{almond,world}}^{0.46}$$
$$Q_{\text{coffee cup,world}} = 2.39 \cdot T_{\text{world}}^{0.54} L_{\text{coffee cup,world}}^{0.46}$$
$$L_{\text{world}} = 370$$
$$K_{\text{world}} = 117$$
$$T_{\text{world}} = 119$$
$$P_{\text{world}} = P_{\text{almond,world}}^{0.20} \cdot P_{\text{coffee cup,world}}^{0.80}$$

Find the real wage for the rest of the world.

Solution: The real wage for the rest of the world is 1.0035 units.

17. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods pizza and hot dog. pizza is produced with labor and capital, hot dog is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 246$$
$$K = 188$$
$$T = 203$$

The production functions for pizza and hot dog are:

$$Q_{\text{pizza}} = 1.14 \cdot K^{0.46} L_{\text{pizza}}^{0.54}$$
$$Q_{\text{hot dog}} = 1.29 \cdot T^{0.46} L_{\text{hot dog}}^{0.54}$$

The utility function of the representative consumer is written as $U = 1.23 \cdot \ln D_{\text{pizza}} + 0.38 \cdot \ln D_{\text{hot dog}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{pizza}}^{0.16} P_{\text{hot dog}}^{0.84}$.

The functioning of the rest of the world can be described by the following function:

$$
\begin{aligned}
U_{\text{world}} &= 1.73 \cdot \ln D_{\text{pizza,world}} + 1.23 \cdot \ln D_{\text{hot dog,world}} \\
Q_{\text{pizza,world}} &= 1.47 \cdot K_{\text{world}}^{0.46} L_{\text{pizza,world}}^{0.54} \\
Q_{\text{hot dog,world}} &= 1.59 \cdot T_{\text{world}}^{0.46} L_{\text{hot dog,world}}^{0.54} \\
L_{\text{world}} &= 322 \\
K_{\text{world}} &= 190 \\
T_{\text{world}} &= 186 \\
P_{\text{world}} &= P_{\text{pizza,world}}^{0.34} \cdot P_{\text{hot dog,world}}^{0.66}
\end{aligned}
$$

Find the real wage for the rest of the world.

Solution: The real wage for the rest of the world is 0.9753 units.

4.

18. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$
\begin{aligned}
U_A &= 2.11 \cdot \ln D_{\text{banana},A} + 2.31 \cdot \ln D_{\text{napkin},A} \\
Q_{\text{banana},A} &= 0.94 \cdot K_A^{0.83} L_{\text{banana},A}^{0.17} \\
Q_{\text{napkin},A} &= 1.51 \cdot T_A^{0.83} L_{\text{napkin},A}^{0.17} \\
L_A &= 545 \\
K_A &= 144 \\
T_A &= 99
\end{aligned}
$$

Economy B operates as follows:

$$
\begin{aligned}
U_B &= 0.58 \cdot \ln D_{\text{banana},B} + 1.28 \cdot \ln D_{\text{napkin},B} \\
Q_{\text{banana},B} &= 0.56 \cdot K_B^{0.83} L_{\text{banana},B}^{0.17} \\
Q_{\text{napkin},B} &= 1.94 \cdot T_B^{0.83} L_{\text{napkin},B}^{0.17} \\
L_B &= 417 \\
K_B &= 189 \\
T_B &= 168
\end{aligned}
$$

The two economies trade with each other without any restrictions.

Calculate the relative world price of banana in terms of napkin.

Solution: The relative world price of banana in terms of napkin is 1.3410 units.

19. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$U_A = 1.58 \cdot \ln D_{\text{aubergine},A} + 1.37 \cdot \ln D_{\text{naan bread},A}$$
$$Q_{\text{aubergine},A} = 1.34 \cdot K_A^{0.58} L_{\text{aubergine},A}^{0.42}$$
$$Q_{\text{naan bread},A} = 2.02 \cdot T_A^{0.58} L_{\text{naan bread},A}^{0.42}$$
$$L_A = 420$$
$$K_A = 173$$
$$T_A = 162$$

Economy B operates as follows:

$$U_B = 2.10 \cdot \ln D_{\text{aubergine},B} + 0.76 \cdot \ln D_{\text{naan bread},B}$$
$$Q_{\text{aubergine},B} = 1.69 \cdot K_B^{0.58} L_{\text{aubergine},B}^{0.42}$$
$$Q_{\text{naan bread},B} = 0.13 \cdot T_B^{0.58} L_{\text{naan bread},B}^{0.42}$$
$$L_B = 262$$
$$K_B = 70$$
$$T_B = 101$$

The two economies trade with each other without any restrictions.

Which economy imports aubergine and what is the amount of import?

Solution: Economy A imports aubergine and the amount of import is 52.7011 units.

20. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$U_A = 1.65 \cdot \ln D_{\text{tomato},A} + 0.27 \cdot \ln D_{\text{plate},A}$$
$$Q_{\text{tomato},A} = 1.20 \cdot K_A^{0.47} L_{\text{tomato},A}^{0.53}$$
$$Q_{\text{plate},A} = 0.64 \cdot T_A^{0.47} L_{\text{plate},A}^{0.53}$$
$$L_A = 521$$
$$K_A = 174$$
$$T_A = 111$$

Economy B operates as follows:

$$U_B = 2.05 \cdot \ln D_{\text{tomato},B} + 1.38 \cdot \ln D_{\text{plate},B}$$

$$
\begin{aligned}
Q_{\text{tomato},B} &= 0.29 \cdot K_B^{0.47} L_{\text{tomato},B}^{0.53} \\
Q_{\text{plate},B} &= 2.22 \cdot T_B^{0.47} L_{\text{plate},B}^{0.53} \\
L_B &= 557 \\
K_B &= 160 \\
T_B &= 157
\end{aligned}
$$

The two economies trade with each other without any restrictions.

Which economy exports tomato and what is the amount of export?

Solution: Economy A exports tomato and the amount of export is 50.5547 units.

4.

21. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$
\begin{aligned}
U_A &= 0.59 \cdot \ln D_{\text{scarf},A} + 2.39 \cdot \ln D_{\text{hot dog},A} \\
Q_{\text{scarf},A} &= 1.78 \cdot K_A^{0.64} L_{\text{scarf},A}^{0.36} \\
Q_{\text{hot dog},A} &= 1.18 \cdot T_A^{0.64} L_{\text{hot dog},A}^{0.36} \\
L_A &= 457 \\
K_A &= 193 \\
T_A &= 147
\end{aligned}
$$

Economy B operates as follows:

$$
\begin{aligned}
U_B &= 0.20 \cdot \ln D_{\text{scarf},B} + 1.07 \cdot \ln D_{\text{hot dog},B} \\
Q_{\text{scarf},B} &= 0.57 \cdot K_B^{0.64} L_{\text{scarf},B}^{0.36} \\
Q_{\text{hot dog},B} &= 1.14 \cdot T_B^{0.64} L_{\text{hot dog},B}^{0.36} \\
L_B &= 586 \\
K_B &= 101 \\
T_B &= 170
\end{aligned}
$$

The two economies trade with each other without any restrictions.

Which economy exports scarf and what is the amount of export?

Solution: Economy A exports scarf and the amount of export is 112.6588 units.

22. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$
\begin{aligned}
U_A &= 2.27 \cdot \ln D_{\text{hairspray},A} + 0.17 \cdot \ln D_{\text{painting},A} \\
Q_{\text{hairspray},A} &= 0.79 \cdot K_A^{0.83} L_{\text{hairspray},A}^{0.17} \\
Q_{\text{painting},A} &= 0.46 \cdot T_A^{0.83} L_{\text{painting},A}^{0.17} \\
L_A &= 623 \\
K_A &= 95 \\
T_A &= 148
\end{aligned}
$$

4.

Economy B operates as follows:

$$
\begin{aligned}
U_B &= 0.67 \cdot \ln D_{\text{hairspray},B} + 1.83 \cdot \ln D_{\text{painting},B} \\
Q_{\text{hairspray},B} &= 0.27 \cdot K_B^{0.83} L_{\text{hairspray},B}^{0.17} \\
Q_{\text{painting},B} &= 1.13 \cdot T_B^{0.83} L_{\text{painting},B}^{0.17} \\
L_B &= 625 \\
K_B &= 85 \\
T_B &= 97
\end{aligned}
$$

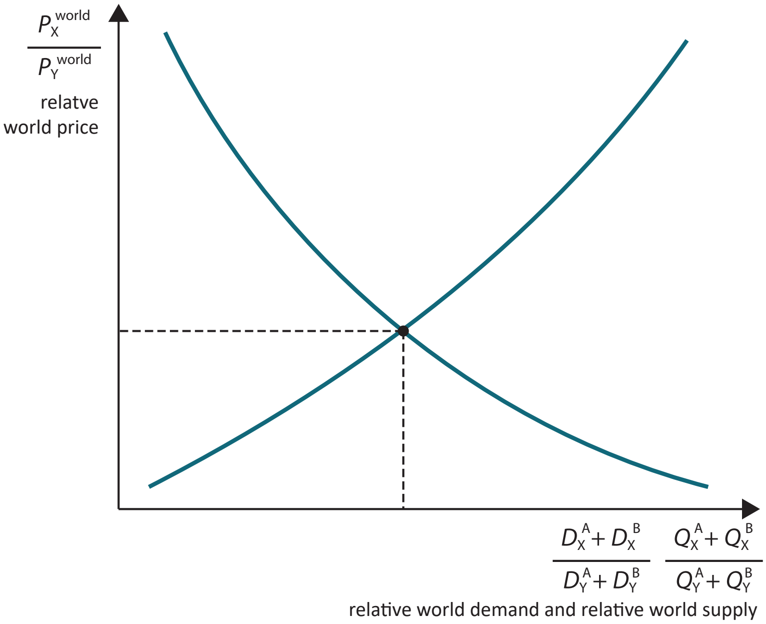
The two economies trade with each other without any restrictions.

Which economy exports hairspray and what is the amount of export?

Solution: Economy B exports hairspray and the amount of export is 9.7785 units.

23. Problem

The following graph shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B.

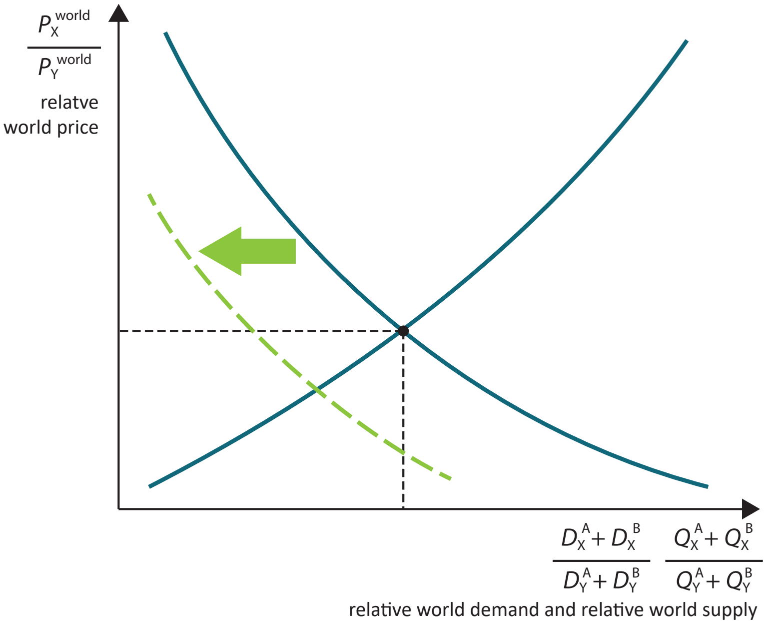


Suppose, that economy A has comparative advantage in producing X.

What happens to the relative world supply and/or the relative world demand curves if economy A sends transfers to economy B and both economies can be characterized by the so called home bias?

Solution: The correct graph is the following:

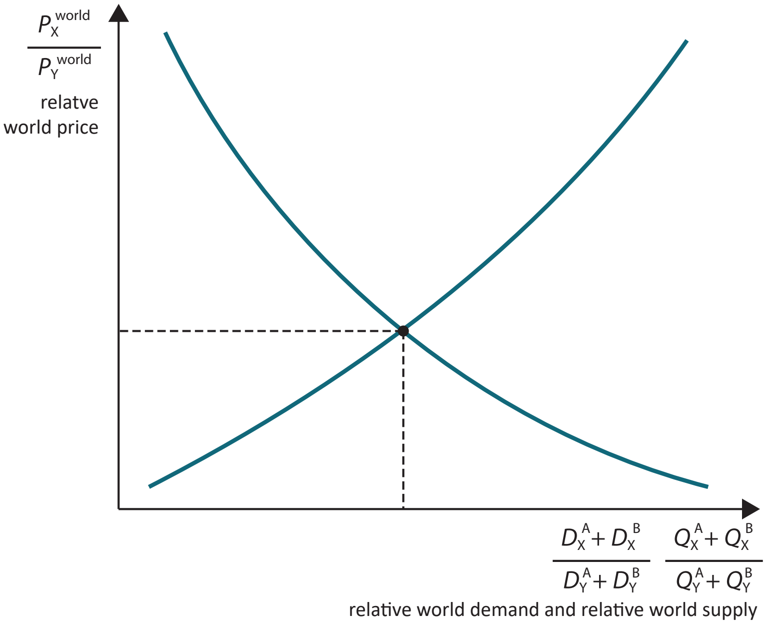
4.



4.

24. Problem

The following graph shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B.

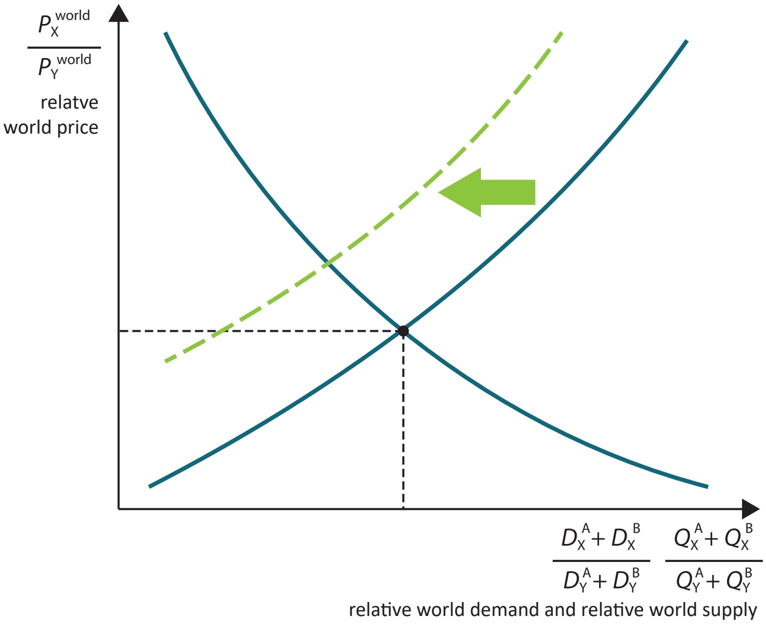


Suppose, that economy A has comparative advantage in producing X.

What happens to the relative world supply and/or the relative world demand curves if economy A experiences an import biased growth?

Solution: The correct graph is the following:

4.



25. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods tea and spring onion. tea is produced with labor and capital, spring onion is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 612$$
$$K = 223$$
$$T = 97$$

The production functions for tea and spring onion are:

$$Q_{\text{tea}} = 1.26 \cdot K^{0.36} L_{\text{tea}}^{0.64}$$
$$Q_{\text{spring onion}} = 2.05 \cdot T^{0.36} L_{\text{spring onion}}^{0.64}$$

The utility function of the representative consumer is written as $U = 1.08 \cdot \ln D_{\text{tea}} + 0.16 \cdot \ln D_{\text{spring onion}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{tea}}^{0.47} P_{\text{spring onion}}^{0.53}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 0.18 \cdot \ln D_{\text{tea,world}} + 0.62 \cdot \ln D_{\text{spring onion,world}}$$
$$Q_{\text{tea,world}} = 0.13 \cdot K_{\text{world}}^{0.36} L_{\text{tea,world}}^{0.64}$$

$$Q_{\text{spring onion,world}} = 2.00 \cdot T_{\text{world}}^{0.36} L_{\text{spring onion,world}}^{0.64}$$
$$L_{\text{world}} = 155$$
$$K_{\text{world}} = 206$$
$$T_{\text{world}} = 147$$
$$P_{\text{world}} = P_{\text{tea,world}}^{0.54} \cdot P_{\text{spring onion,world}}^{0.46}$$

Calculate the real GDP for the rest of the world.

Solution: The real GDP for the rest of the world is 174.9583 units.

26. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods ice cream and food processor. ice cream is produced with labor and capital, food processor is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 462$$
$$K = 170$$
$$T = 79$$

The production functions for ice cream and food processor are:

$$Q_{\text{ice cream}} = 0.51 \cdot K^{0.15} L_{\text{ice cream}}^{0.85}$$
$$Q_{\text{food processor}} = 1.65 \cdot T^{0.15} L_{\text{food processor}}^{0.85}$$

The utility function of the representative consumer is written as $U = 0.45 \cdot \ln D_{\text{ice cream}} + 2.08 \cdot \ln D_{\text{food processor}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{ice cream}}^{0.13} P_{\text{food processor}}^{0.87}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 2.38 \cdot \ln D_{\text{ice cream,world}} + 0.53 \cdot \ln D_{\text{food processor,world}}$$
$$Q_{\text{ice cream,world}} = 0.37 \cdot K_{\text{world}}^{0.15} L_{\text{ice cream,world}}^{0.85}$$
$$Q_{\text{food processor,world}} = 0.86 \cdot T_{\text{world}}^{0.15} L_{\text{food processor,world}}^{0.85}$$
$$L_{\text{world}} = 157$$
$$K_{\text{world}} = 186$$
$$T_{\text{world}} = 227$$
$$P_{\text{world}} = P_{\text{ice cream,world}}^{0.50} \cdot P_{\text{food processor,world}}^{0.50}$$

Determine the real wage in the large open economy.

Solution: The real wage for the large open economy is 1.0004 units.

27. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$\begin{aligned} U_A &= 2.14 \cdot \ln D_{\text{strawberry},A} + 1.41 \cdot \ln D_{\text{cappuccino},A} \\ Q_{\text{strawberry},A} &= 0.50 \cdot K_A^{0.67} L_{\text{strawberry},A}^{0.33} \\ Q_{\text{cappuccino},A} &= 1.28 \cdot T_A^{0.67} L_{\text{cappuccino},A}^{0.33} \\ L_A &= 168 \\ K_A &= 218 \\ T_A &= 117 \end{aligned}$$

4.

Economy B operates as follows:

$$\begin{aligned} U_B &= 0.50 \cdot \ln D_{\text{strawberry},B} + 0.39 \cdot \ln D_{\text{cappuccino},B} \\ Q_{\text{strawberry},B} &= 1.24 \cdot K_B^{0.67} L_{\text{strawberry},B}^{0.33} \\ Q_{\text{cappuccino},B} &= 1.93 \cdot T_B^{0.67} L_{\text{cappuccino},B}^{0.33} \\ L_B &= 561 \\ K_B &= 213 \\ T_B &= 112 \end{aligned}$$

The two economies trade with each other without any restrictions.

Which economy imports strawberry and what is the amount of import?

Solution: Economy A imports strawberry and the amount of import is 29.7033 units.

28. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$\begin{aligned} U_A &= 1.94 \cdot \ln D_{\text{coffee},A} + 1.61 \cdot \ln D_{\text{bookshelf},A} \\ Q_{\text{coffee},A} &= 1.71 \cdot K_A^{0.64} L_{\text{coffee},A}^{0.36} \\ Q_{\text{bookshelf},A} &= 1.42 \cdot T_A^{0.64} L_{\text{bookshelf},A}^{0.36} \\ L_A &= 109 \\ K_A &= 109 \\ T_A &= 119 \end{aligned}$$

Economy B operates as follows:

$$U_B = 0.19 \cdot \ln D_{\text{coffee},B} + 1.65 \cdot \ln D_{\text{bookshelf},B}$$

$$
\begin{aligned}
Q_{\text{coffee},B} &= 0.37 \cdot K_B^{0.64} L_{\text{coffee},B}^{0.36} \\
Q_{\text{bookshelf},B} &= 1.63 \cdot T_B^{0.64} L_{\text{bookshelf},B}^{0.36} \\
L_B &= 444 \\
K_B &= 115 \\
T_B &= 110
\end{aligned}
$$

The two economies trade with each other without any restrictions.

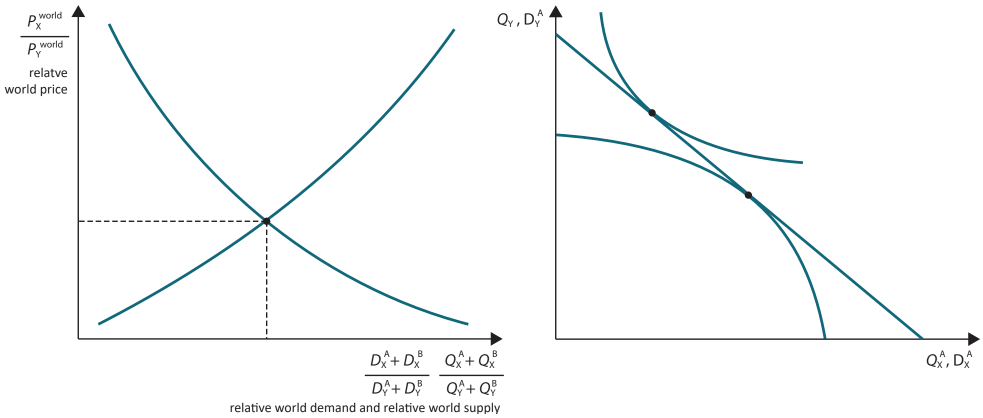
Calculate the relative world price of coffee in terms of bookshelf.

Solution: The relative world price of coffee in terms of bookshelf is 1.0136 units.

4.

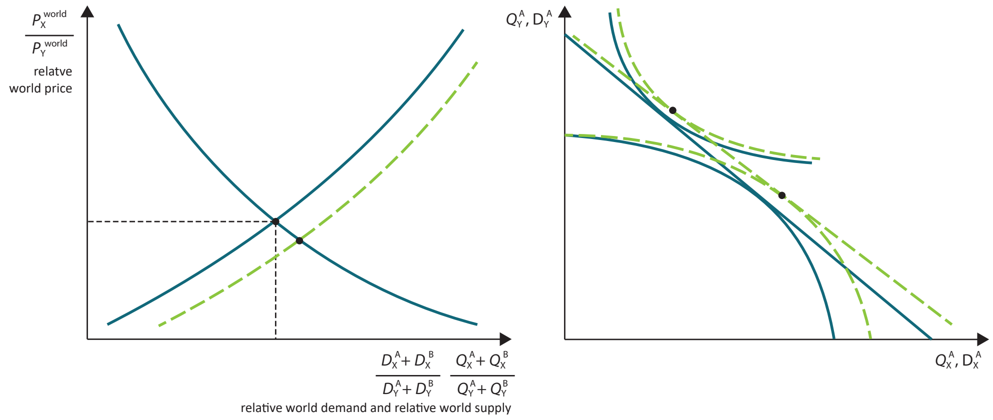
29. Problem

The graph on the left hand side of the following figure shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B. The right hand side graph illustrates the set of curves that represents the functioning of economy A.



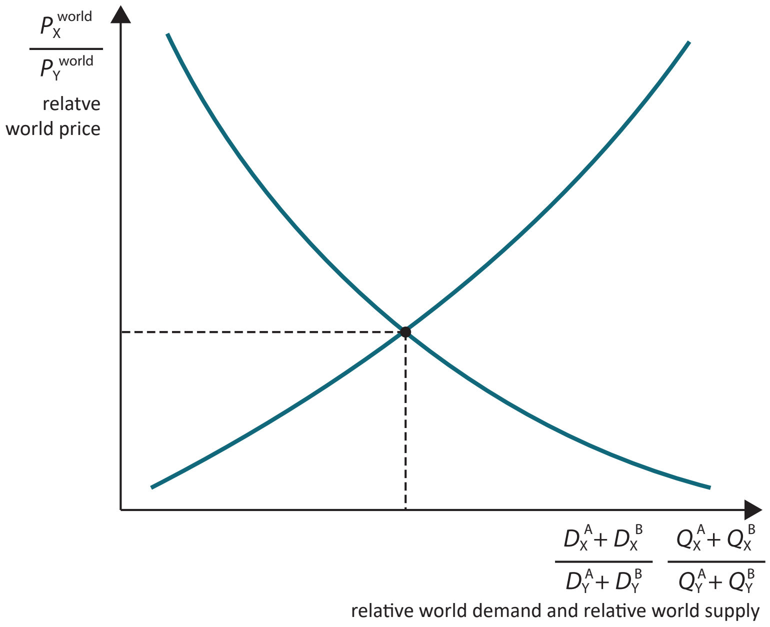
What happens to the relative world supply and/or the relative world demand curves and the functions on the right hand side graph, if economy A experiences an export biased growth?

Solution: The correct graph is the following:



30. Problem

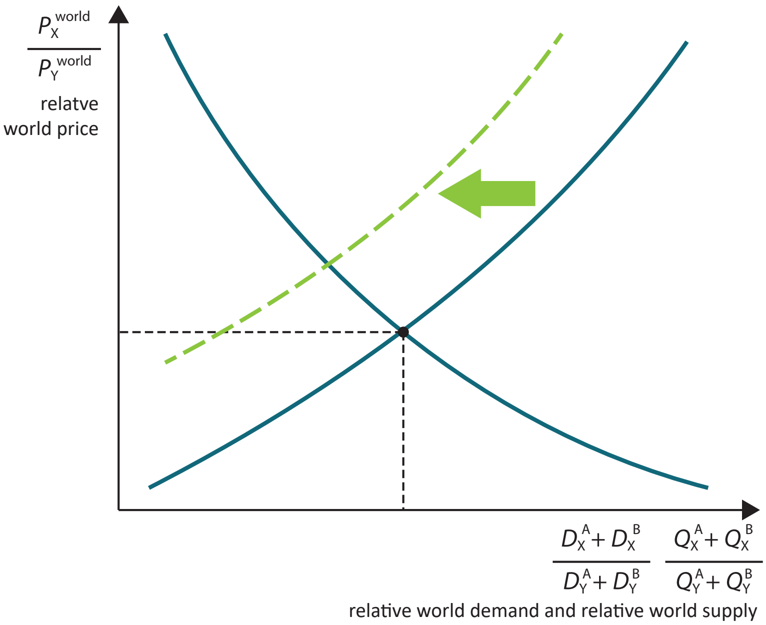
The following graph shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B.



Suppose, that economy A has comparative advantage in producing X.

What happens to the relative world supply and/or the relative world demand curves if economy B experiences an export biased growth?

Solution: The correct graph is the following:



31. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$\begin{aligned} U_A &= 1.07 \cdot \ln D_{\text{napkin},A} + 1.86 \cdot \ln D_{\text{salad},A} \\ Q_{\text{napkin},A} &= 0.74 \cdot K_A^{0.47} L_{\text{napkin},A}^{0.53} \\ Q_{\text{salad},A} &= 2.28 \cdot T_A^{0.47} L_{\text{salad},A}^{0.53} \\ L_A &= 276 \\ K_A &= 138 \\ T_A &= 87 \end{aligned}$$

Economy B operates as follows:

$$\begin{aligned} U_B &= 1.31 \cdot \ln D_{\text{napkin},B} + 1.51 \cdot \ln D_{\text{salad},B} \\ Q_{\text{napkin},B} &= 1.27 \cdot K_B^{0.47} L_{\text{napkin},B}^{0.53} \\ Q_{\text{salad},B} &= 1.00 \cdot T_B^{0.47} L_{\text{salad},B}^{0.53} \end{aligned}$$

$$L_B = 229$$
$$K_B = 151$$
$$T_B = 77$$

The two economies trade with each other without any restrictions.

Which economy imports napkin and what is the amount of import?

Solution: Economy A imports napkin and the amount of import is 85.2785 units.

4.

32. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods wooden spoon and broccoli. wooden spoon is produced with labor and capital, broccoli is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 556$$
$$K = 99$$
$$T = 148$$

The production functions for wooden spoon and broccoli are:

$$Q_{\text{wooden spoon}} = 0.45 \cdot K^{0.52} L_{\text{wooden spoon}}^{0.48}$$
$$Q_{\text{broccoli}} = 1.91 \cdot T^{0.52} L_{\text{broccoli}}^{0.48}$$

The utility function of the representative consumer is written as $U = 1.44 \cdot \ln D_{\text{wooden spoon}} + 0.14 \cdot \ln D_{\text{broccoli}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{wooden spoon}}^{0.26} P_{\text{broccoli}}^{0.74}$.

The functioning of the rest of the world can be described by the following function:

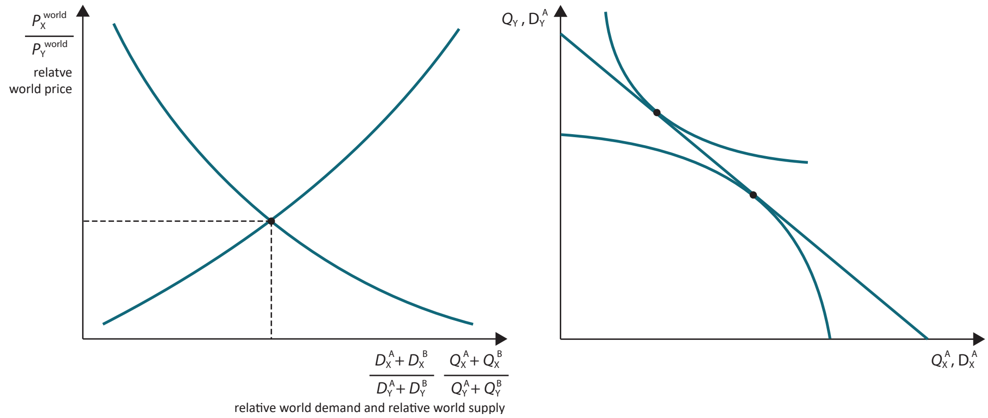
$$U_{\text{world}} = 2.21 \cdot \ln D_{\text{wooden spoon,world}} + 1.04 \cdot \ln D_{\text{broccoli,world}}$$
$$Q_{\text{wooden spoon,world}} = 0.16 \cdot K_{\text{world}}^{0.52} L_{\text{wooden spoon,world}}^{0.48}$$
$$Q_{\text{broccoli,world}} = 0.87 \cdot T_{\text{world}}^{0.52} L_{\text{broccoli,world}}^{0.48}$$
$$L_{\text{world}} = 342$$
$$K_{\text{world}} = 154$$
$$T_{\text{world}} = 153$$
$$P_{\text{world}} = P_{\text{wooden spoon,world}}^{0.16} \cdot P_{\text{broccoli,world}}^{0.84}$$

Calculate the real GDP for the rest of the world.

Solution: The real GDP for the rest of the world is 341.4031 units.

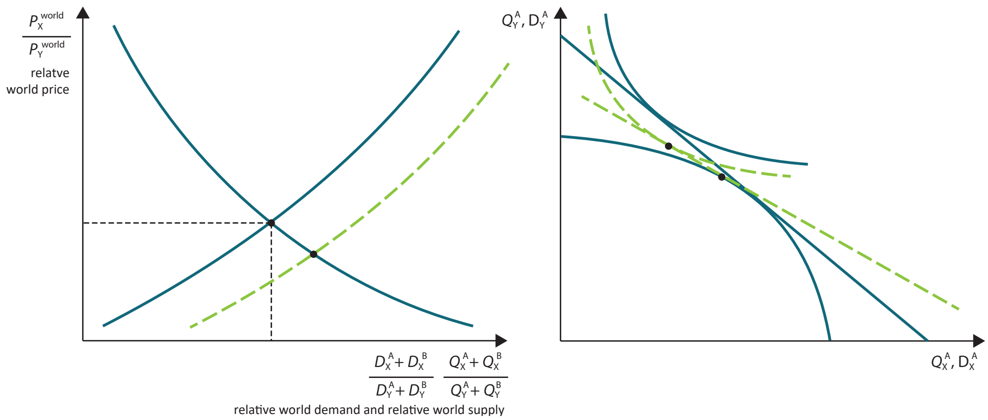
33. Problem

The graph on the left hand side of the following figure shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B. The right hand side graph illustrates the set of curves that represents the functioning of economy A.



What happens to the relative world supply and/or the relative world demand curves and the functions on the right hand side graph, if economy B experiences an import biased growth?

Solution: The correct graph is the following:



34. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods watch and strawberry. watch is produced with labor and capital, strawberry is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 365$$
$$K = 225$$
$$T = 121$$

The production functions for watch and strawberry are:

$$Q_{\text{watch}} = 0.47 \cdot K^{0.26} L_{\text{watch}}^{0.74}$$
$$Q_{\text{strawberry}} = 2.37 \cdot T^{0.26} L_{\text{strawberry}}^{0.74}$$

The utility function of the representative consumer is written as $U = 2.21 \cdot \ln D_{\text{watch}} + 1.82 \cdot \ln D_{\text{strawberry}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{watch}}^{0.61} P_{\text{strawberry}}^{0.39}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 1.02 \cdot \ln D_{\text{watch,world}} + 1.28 \cdot \ln D_{\text{strawberry,world}}$$
$$Q_{\text{watch,world}} = 1.77 \cdot K_{\text{world}}^{0.26} L_{\text{watch,world}}^{0.74}$$
$$Q_{\text{strawberry,world}} = 0.51 \cdot T_{\text{world}}^{0.26} L_{\text{strawberry,world}}^{0.74}$$
$$L_{\text{world}} = 79$$
$$K_{\text{world}} = 140$$
$$T_{\text{world}} = 149$$
$$P_{\text{world}} = P_{\text{watch,world}}^{0.35} \cdot P_{\text{strawberry,world}}^{0.65}$$

Calculate the real GDP for the rest of the world.

Solution: The real GDP for the rest of the world is 320.3859 units.

35. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods bookshelf and milkshake. bookshelf is produced with labor and capital, milkshake is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 545$$

$$K = 126$$
$$T = 155$$

The production functions for bookshelf and milkshake are:

$$Q_{\text{bookshelf}} = 1.89 \cdot K^{0.67} L_{\text{bookshelf}}^{0.33}$$
$$Q_{\text{milkshake}} = 0.77 \cdot T^{0.67} L_{\text{milkshake}}^{0.33}$$

The utility function of the representative consumer is written as $U = 1.51 \cdot \ln D_{\text{bookshelf}} + 1.11 \cdot \ln D_{\text{milkshake}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{bookshelf}}^{0.47} P_{\text{milkshake}}^{0.53}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 1.93 \cdot \ln D_{\text{bookshelf,world}} + 1.96 \cdot \ln D_{\text{milkshake,world}}$$
$$Q_{\text{bookshelf,world}} = 2.13 \cdot K_{\text{world}}^{0.67} L_{\text{bookshelf,world}}^{0.33}$$
$$Q_{\text{milkshake,world}} = 2.26 \cdot T_{\text{world}}^{0.67} L_{\text{milkshake,world}}^{0.33}$$
$$L_{\text{world}} = 182$$
$$K_{\text{world}} = 90$$
$$T_{\text{world}} = 201$$
$$P_{\text{world}} = P_{\text{bookshelf,world}}^{0.68} \cdot P_{\text{milkshake,world}}^{0.32}$$

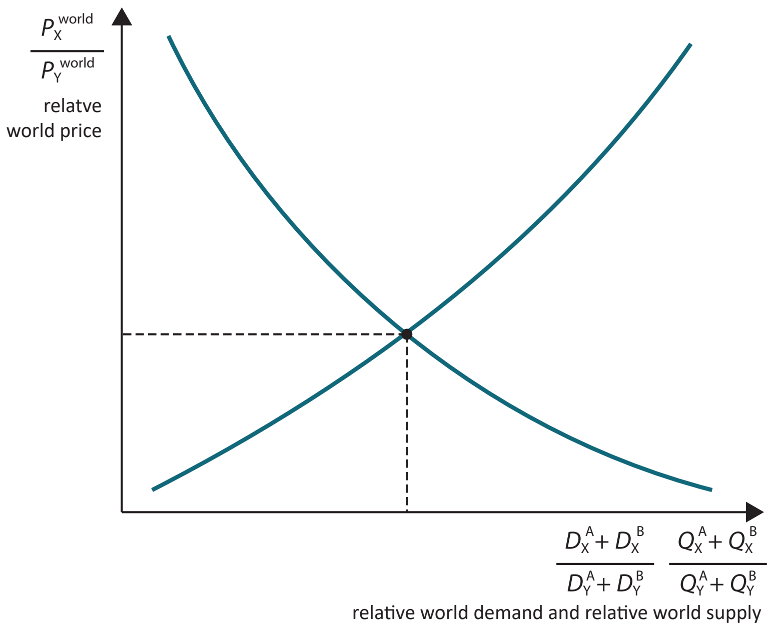
What is the real GDP in the large open economy?

Solution: The real GDP for the large open economy is 477.7630 units.

36. Problem

The following graph shows the relative world supply and relative world demand curves in a world, that consists of only two large economies: A and B.

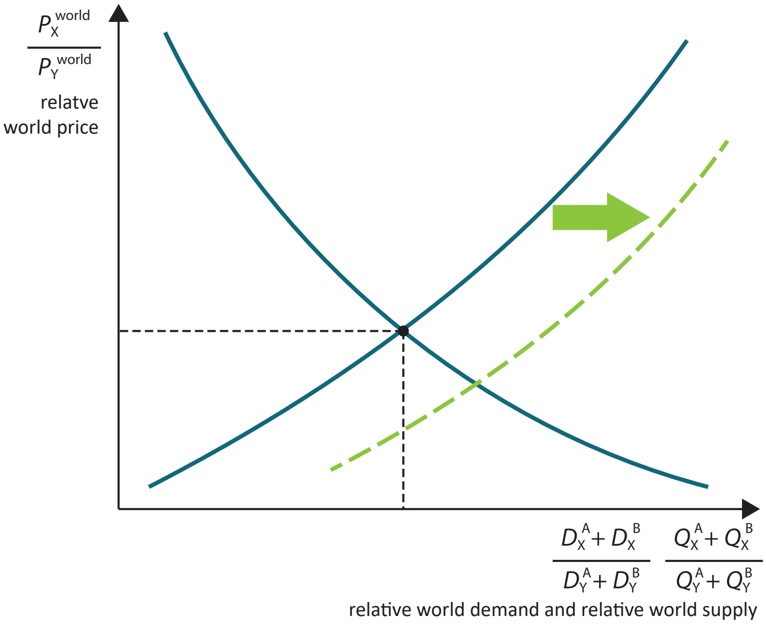
4.



Suppose, that economy A has comparative advantage in producing X.

What happens to the relative world supply and/or the relative world demand curves if economy A experiences an export biased growth?

Solution: The correct graph is the following:



37. Problem

Consider large open economy that operates under the assumptions of the specific factors model and produces two goods muffin and hairspray. muffin is produced with labor and capital, hairspray is produced with labor and land. Labor is mobile between the sectors but the other factors can only be used in the production of one of the two goods. The endowment of all factors are fixed:

$$L = 119$$
$$K = 80$$
$$T = 93$$

The production functions for muffin and hairspray are:

$$Q_{\text{muffin}} = 1.92 \cdot K^{0.22} L_{\text{muffin}}^{0.78}$$
$$Q_{\text{hairspray}} = 0.45 \cdot T^{0.22} L_{\text{hairspray}}^{0.78}$$

The utility function of the representative consumer is written as $U = 0.54 \cdot \ln D_{\text{muffin}} + 1.93 \cdot \ln D_{\text{hairspray}}$.

The statistical office determines the price level by using the following expression: $P = P_{\text{muffin}}^{0.65} P_{\text{hairspray}}^{0.35}$.

The functioning of the rest of the world can be described by the following function:

$$U_{\text{world}} = 2.23 \cdot \ln D_{\text{muffin,world}} + 0.29 \cdot \ln D_{\text{hairspray,world}}$$
$$Q_{\text{muffin,world}} = 0.56 \cdot K_{\text{world}}^{0.22} L_{\text{muffin,world}}^{0.78}$$

$$
\begin{aligned}
Q_{\text{hairspray,world}} &= 1.26 \cdot T_{\text{world}}^{0.22} L_{\text{hairspray,world}}^{0.78} \\
L_{\text{world}} &= 151 \\
K_{\text{world}} &= 136 \\
T_{\text{world}} &= 149 \\
P_{\text{world}} &= P_{\text{muffin,world}}^{0.50} \cdot P_{\text{hairspray,world}}^{0.50}
\end{aligned}
$$

Find the real wage for the rest of the world.

Solution: The real wage for the rest of the world is 0.9819 units.

4.

38. Problem

Suppose that the world consists of only two economies A and B. The functioning of economy A can be described by the following equations:

$$
\begin{aligned}
U_A &= 2.19 \cdot \ln D_{\text{cappuccino},A} + 1.06 \cdot \ln D_{\text{coffee cup},A} \\
Q_{\text{cappuccino},A} &= 0.70 \cdot K_A^{0.76} L_{\text{cappuccino},A}^{0.24} \\
Q_{\text{coffee cup},A} &= 1.34 \cdot T_A^{0.76} L_{\text{coffee cup},A}^{0.24} \\
L_A &= 564 \\
K_A &= 88 \\
T_A &= 176
\end{aligned}
$$

Economy B operates as follows:

$$
\begin{aligned}
U_B &= 2.05 \cdot \ln D_{\text{cappuccino},B} + 0.92 \cdot \ln D_{\text{coffee cup},B} \\
Q_{\text{cappuccino},B} &= 0.74 \cdot K_B^{0.76} L_{\text{cappuccino},B}^{0.24} \\
Q_{\text{coffee cup},B} &= 1.58 \cdot T_B^{0.76} L_{\text{coffee cup},B}^{0.24} \\
L_B &= 585 \\
K_B &= 136 \\
T_B &= 116
\end{aligned}
$$

The two economies trade with each other without any restrictions.

Calculate the relative world price of cappuccino in terms of coffee cup.

Solution: The relative world price of cappuccino in terms of coffee cup is 4.3812 units.

5. BARRIERS TO TRADE TARIFF

Tariff
Small Open Economy

1. Problem

In a small open economy the demand for brioche is written as $Q_{\text{brioche}} = 681 - 8 \cdot P_{\text{brioche}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{brioche}} = 291 + 7 \cdot P_{\text{brioche}}$. The world price of X is $P^{\text{world}}_{\text{brioche}} = 13.26$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.49 percent ad-valorem tariff on the imported goods.

Determine the effect of tariff on the tariff revenue.

Solution: The imposition of tariff leads to a tariff revenue of 2.8032.

2. Problem

In a small open economy the following formulas represent the behavior of agents in the orange market.

$$Q_{\text{orange}} = 941 - 18 \cdot P_{\text{orange}}$$
$$Q_{\text{orange}} = 143 + 3 \cdot P_{\text{orange}}$$

The world price of orange is $P^{\text{world}}_{\text{orange}} = 14.82$.

How does free trade change the producer surplus (compared to the producer surplus in autarky)?

Solution: Free trade changes producer surplus by 5151.2914.

3. Problem

In a small open economy the behavior of consumers and firms in the chicken burger market can be described by the following functions:

$$Q_{\text{chicken burger}} = 655 - 9 \cdot P_{\text{chicken burger}}$$

$$Q_{\text{chicken burger}} = 72 + 2 \cdot P_{\text{chicken burger}}$$

The world price of the product is $P^{\text{world}}_{\text{chicken burger}} = 12.19$, but the government imposes a specific tariff on import.

What specific tariff causes the welfare to change by -484.9465?

Solution: The given change in welfare occurs if the government imposes 9.39 units of specific tariff on imported goods.

5.

4. Problem

In a small open economy the behavior of consumers and firms in the painting market can be described by the following functions:

$$Q_{\text{painting}} = 753 - 9 \cdot P_{\text{painting}}$$
$$Q_{\text{painting}} = 69 + 10 \cdot P_{\text{painting}}$$

The world price of the product is $P^{\text{world}}_{\text{painting}} = 16.20$, but the government imposes a specific tariff on import.

What specific tariff causes the welfare to change by -754.1870?

Solution: The given change in welfare occurs if the government imposes 8.91 units of specific tariff on imported goods.

5. Problem

In a small open economy the demand for banana is written as $Q_{\text{banana}} = 824 - 9 \cdot P_{\text{banana}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{banana}} = 312 + 7 \cdot P_{\text{banana}}$. The world price of X is $P^{\text{world}}_{\text{banana}} = 16.96$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.47 percent ad-valorem tariff on the imported goods.

Calculate how consumer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the consumer surplus by -167.0984.

6. Problem

In a small open economy the behavior of consumers and firms in the aubergine market can be described by the following functions:

$$Q_{\text{aubergine}} = 374 - 9 \cdot P_{\text{aubergine}}$$
$$Q_{\text{aubergine}} = -172 + 17 \cdot P_{\text{aubergine}}$$

The world price of the product is $P^{\text{world}}_{\text{aubergine}} = 14.70$, but the government imposes a specific tariff on import.

What specific tariff causes the tariff revenue to increase by 216.7074?

Solution: The given change in tariff revenue occurs if the government imposes 4.41 units of specific tariff on imported goods.

7. Problem

In a small open economy the behavior of consumers and firms in the cappuccino market can be described by the following functions:

$$Q_{\text{cappuccino}} = 1230 - 18 \cdot P_{\text{cappuccino}}$$
$$Q_{\text{cappuccino}} = 222 + 3 \cdot P_{\text{cappuccino}}$$

The world price of the product is $P^{\text{world}}_{\text{cappuccino}} = 32.16$, but the government imposes a specific tariff on import.

What specific tariff leads to a 3547.9309 change in producer surplus?

Solution: The given change in producer surplus occurs if the government imposes 10.61 units of specific tariff on imported goods.

8. Problem

In a small open economy the demand for rug is written as $Q_{\text{rug}} = 763 - 11 \cdot P_{\text{rug}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{rug}} = -70 + 6 \cdot P_{\text{rug}}$. The world price of X is $P^{\text{world}}_{\text{rug}} = 24.99$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.49 percent ad-valorem tariff on the imported goods.

What will be the domestic price of the good?

Solution: The domestic price is 25.3624.

9. Problem

In a small open economy the demand for blackcurrant is written as $Q_{\text{blackcurrant}} = 405 - 9 \cdot P_{\text{blackcurrant}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{blackcurrant}} = -57 + 12 \cdot P_{\text{blackcurrant}}$. The world price of X is $P^{\text{world}}_{\text{blackcurrant}} = 15.40$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.30 percent ad-valorem tariff on the imported goods.

Calculate how consumer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the consumer surplus by -53.1529.

5.

10. Problem

The demand and supply curves in market for lemon can be written as

$$Q_{\text{lemon}} = 1249 - 14 \cdot P_{\text{lemon}}$$
$$Q_{\text{lemon}} = -543 + 18 \cdot P_{\text{lemon}}$$

The economy is a small open economy. The producers of lemon, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 13.86 on the imported lemons.

The world price of lemon is $P^{\text{world}}_{\text{lemon}} = 30.80$.

Determine the tariff revenue of the fiscal policy decision maker.

Solution: The tariff revenue is 5029.5168.

11. Problem

In a small open economy the demand for scarf is written as $Q_{\text{scarf}} = 982 - 19 \cdot P_{\text{scarf}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{scarf}} = 182 + 13 \cdot P_{\text{scarf}}$. The world price of X is $P^{\text{world}}_{\text{scarf}} = 16.75$.

Determine the specific tariff that maximizes the tariff revenue of the fiscal policy decision maker.

Solution: The specific tariff that maximizes the tariff revenue is 4.1250.

12. Problem

In a small open economy the behavior of consumers and firms in the aubergine market can be described by the following functions:

$$Q_{\text{aubergine}} = 821 - 18 \cdot P_{\text{aubergine}}$$
$$Q_{\text{aubergine}} = -78 + 13 \cdot P_{\text{aubergine}}$$

The world price of the product is $P^{\text{world}}_{\text{aubergine}} = 8.41$, but the government imposes a specific tariff on import.

What specific tariff causes the tariff revenue to increase by 2705.7234?

Solution: The given change in tariff revenue occurs if the government imposes 5.97 units of specific tariff on imported goods.

13. Problem

The demand and supply curves in market for porridge can be written as

$$Q_{\text{porridge}} = 695 - 9 \cdot P_{\text{porridge}}$$
$$Q_{\text{porridge}} = 195 + 16 \cdot P_{\text{porridge}}$$

The economy is a small open economy. The producers of porridge, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 4.80 on the imported porridges.

The world price of porridge is $P^{\text{world}}_{\text{porridge}} = 12.00$.

Calculate the amount of import.

Solution: The amount of import is 80.0000 in this economy.

14. Problem

The demand and supply curves in market for lime can be written as

$$Q_{\text{lime}} = 1096 - 15 \cdot P_{\text{lime}}$$
$$Q_{\text{lime}} = -284 + 15 \cdot P_{\text{lime}}$$

The economy is a small open economy. The producers of lime, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 9.66 on the imported limes.

The world price of lime is $P_{\text{lime}}^{\text{world}} = 13.80$.

How does the imposition of tariff affect the welfare of the economy?

Solution: The imposition of tariff changes the welfare by 7887.8730.

15. Problem

In a small open economy the behavior of consumers and firms in the teapot market can be described by the following functions:

$$Q_{\text{teapot}} = 1197 - 19 \cdot P_{\text{teapot}}$$
$$Q_{\text{teapot}} = 93 + 4 \cdot P_{\text{teapot}}$$

The world price of the product is $P_{\text{teapot}}^{\text{world}} = 9.12$, but the government imposes a specific tariff on import.

What specific tariff causes the tariff revenue to increase by 5352.3553?

Solution: The given change in tariff revenue occurs if the government imposes 7.39 units of specific tariff on imported goods.

16. Problem

In a small open economy the following formulas represent the behavior of agents in the banana market.

$$Q_{\text{banana}} = 879 - 11 \cdot P_{\text{banana}}$$
$$Q_{\text{banana}} = 179 + 17 \cdot P_{\text{banana}}$$

The world price of banana is $P_{\text{banana}}^{\text{world}} = 14.00$.

By what amount does free trade change the comsumer surplus (compared to the consumer surplus in autarky)?

Solution: Free trade changes consumer surplus by 7309.5000.

17. Problem

In a small open economy the behavior of consumers and firms in the wooden spoon market can be described by the following functions:

$$Q_{\text{wooden spoon}} = 751 - 12 \cdot P_{\text{wooden spoon}}$$

$$Q_{\text{wooden spoon}} = -437 + 15 \cdot P_{\text{wooden spoon}}$$

The world price of the product is $P^{\text{world}}_{\text{wooden spoon}} = 30.36$, but the government imposes a specific tariff on import.

What specific tariff causes the welfare to change by -1195.3993?

Solution: The given change in welfare occurs if the government imposes 9.41 units of specific tariff on imported goods.

18. Problem

In a small open economy the demand for soup is written as $Q_{\text{soup}} = 458 - 10 \cdot P_{\text{soup}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{soup}} = 118 + 7 \cdot P_{\text{soup}}$. The world price of X is $P^{\text{world}}_{\text{soup}} = 9.40$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.53 percent ad-valorem tariff on the imported goods.

Determine the effect of tariff on the tariff revenue.

Solution: The imposition of tariff leads to a tariff revenue of 2.7197.

19. Problem

In a small open economy the behavior of consumers and firms in the yoghurt market can be described by the following functions:

$$Q_{\text{yoghurt}} = 886 - 13 \cdot P_{\text{yoghurt}}$$
$$Q_{\text{yoghurt}} = 69 + 6 \cdot P_{\text{yoghurt}}$$

The world price of the product is $P^{\text{world}}_{\text{yoghurt}} = 15.91$, but the government imposes a specific tariff on import.

What specific tariff causes the tariff revenue to increase by 3249.7866?

Solution: The given change in tariff revenue occurs if the government imposes 10.02 units of specific tariff on imported goods.

20. Problem

The demand and supply curves in market for banana can be written as

$$Q_{\text{banana}} = 1474 - 15 \cdot P_{\text{banana}}$$

$$Q_{\text{banana}} = -396 + 19 \cdot P_{\text{banana}}$$

The economy is a small open economy. The producers of banana, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 10.31 on the imported bananas.

The world price of banana is $P_{\text{banana}}^{\text{world}} = 13.75$.

How does the imposition of tariff affect the welfare of the economy?

Solution: The imposition of tariff changes the welfare by 12273.2818.

5.

21. Problem

In a small open economy the behavior of consumers and firms in the porridge market can be described by the following functions:

$$Q_{\text{porridge}} = 887 - 14 \cdot P_{\text{porridge}}$$
$$Q_{\text{porridge}} = -31 + 20 \cdot P_{\text{porridge}}$$

The world price of the product is $P_{\text{porridge}}^{\text{world}} = 9.18$, but the government imposes a specific tariff on import.

What specific tariff causes the welfare to change by -624.3012?

Solution: The given change in welfare occurs if the government imposes 6.06 units of specific tariff on imported goods.

22. Problem

In a small open economy the demand for salad is written as $Q_{\text{salad}} = 993 - 18 \cdot P_{\text{salad}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{salad}} = -177 + 12 \cdot P_{\text{salad}}$. The world price of X is $P_{\text{salad}}^{\text{world}} = 21.45$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.45 percent ad-valorem tariff on the imported goods.

Determine the effect of tariff on the tariff revenue.

Solution: The imposition of tariff leads to a tariff revenue of 7.4990.

23. Problem

In a small open economy the behavior of consumers and firms in the almond market can be described by the following functions:

$$Q_{\text{almond}} = 1366 - 18 \cdot P_{\text{almond}}$$
$$Q_{\text{almond}} = 70 + 18 \cdot P_{\text{almond}}$$

The world price of the product is $P^{\text{world}}_{\text{almond}} = 19.80$, but the government imposes a specific tariff on import.

What specific tariff leads to a -8281.0431 change in consumer surplus?

Solution: The given change in consumer surplus occurs if the government imposes 8.91 units of specific tariff on imported goods.

5.

24. Problem

The demand and supply curves in market for peach can be written as

$$Q_{\text{peach}} = 1073 - 18 \cdot P_{\text{peach}}$$
$$Q_{\text{peach}} = -257 + 20 \cdot P_{\text{peach}}$$

The economy is a small open economy. The producers of peach, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 8.25 on the imported peachs.

The world price of peach is $P^{\text{world}}_{\text{peach}} = 13.30$.

What will be the domestic price of peach after the imposition of tariff?

Solution: The domestic price is 21.55 after the imposition of tariff.

25. Problem

The demand and supply curves in market for muffin can be written as

$$Q_{\text{muffin}} = 876 - 15 \cdot P_{\text{muffin}}$$
$$Q_{\text{muffin}} = 249 + 4 \cdot P_{\text{muffin}}$$

The economy is a small open economy. The producers of muffin, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 7.69 on the imported muffins.

The world price of muffin is $P_{\text{muffin}}^{\text{world}} = 12.21$.

What will be the domestic price of muffin after the imposition of tariff?

Solution: The domestic price is 19.90 after the imposition of tariff.

26. Problem

The demand and supply curves in market for spring onion can be written as

$$Q_{\text{spring onion}} = 1262 - 14 \cdot P_{\text{spring onion}}$$
$$Q_{\text{spring onion}} = 312 + 5 \cdot P_{\text{spring onion}}$$

5.

The economy is a small open economy. The producers of spring onion, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 11.38 on the imported spring onions.

The world price of spring onion is $P_{\text{spring onion}}^{\text{world}} = 17.50$.

What effect does the imposition of tariff have on producer surplus?

Solution: The imposition of tariff changes the producer surplus by 4870.0710.

27. Problem

In a small open economy the demand for yoghurt is written as $Q_{\text{yoghurt}} = 1074 - 19 \cdot P_{\text{yoghurt}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{yoghurt}} = 282 + 14 \cdot P_{\text{yoghurt}}$. The world price of X is $P_{\text{yoghurt}}^{\text{world}} = 12.24$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.49 percent ad-valorem tariff on the imported goods.

Determine the amount of goods imported.

Solution: The amount of import is 382.0616.

28. Problem

In a small open economy the demand for lemonade is written as $Q_{\text{lemonade}} = 415 - 8 \cdot P_{\text{lemonade}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{lemonade}} = 207 + 5 \cdot P_{\text{lemonade}}$. The world price of X is $P^{\text{world}}_{\text{lemonade}} = 6.88$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.57 percent ad-valorem tariff on the imported goods.

What will be the domestic price of the good?

Solution: The domestic price is 6.9880.

29. Problem

In a small open economy the demand for tea is written as $Q_{\text{tea}} = 1419 - 18 \cdot P_{\text{tea}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{tea}} = -101 + 20 \cdot P_{\text{tea}}$. The world price of X is $P^{\text{world}}_{\text{tea}} = 27.60$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.31 percent ad-valorem tariff on the imported goods.

What is the welfare effect of the imposition of the tariff?

Solution: The imposition of tariff changes the welfare by -161.8905.

30. Problem

In a small open economy the behavior of consumers and firms in the cauliflower market can be described by the following functions:

$$Q_{\text{cauliflower}} = 800 - 11 \cdot P_{\text{cauliflower}}$$
$$Q_{\text{cauliflower}} = -120 + 9 \cdot P_{\text{cauliflower}}$$

The world price of the product is $P^{\text{world}}_{\text{cauliflower}} = 31.74$, but the government imposes a specific tariff on import.

What specific tariff leads to a -3903.9216 change in consumer surplus?

Solution: The given change in consumer surplus occurs if the government imposes 9.84 units of specific tariff on imported goods.

31. Problem

In a small open economy the demand for pushchair is written as $Q_{\text{pushchair}} = 1430 - 17 \cdot P_{\text{pushchair}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{pushchair}} = 110 + 13 \cdot P_{\text{pushchair}}$. The world price of X is $P^{\text{world}}_{\text{pushchair}} = 14.08$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.68 percent ad-valorem tariff on the imported goods.

What is the welfare effect of the imposition of the tariff?

Solution: The imposition of tariff changes the welfare by -196.5221.

32. Problem

In a small open economy the following formulas represent the behavior of agents in the cauliflower market.

$$Q_{\text{cauliflower}} = 686 - 15 \cdot P_{\text{cauliflower}}$$
$$Q_{\text{cauliflower}} = -10 + 9 \cdot P_{\text{cauliflower}}$$

5.

The world price of cauliflower is $P^{\text{world}}_{\text{cauliflower}} = 8.41$.

What is the amount of import under free trade?

Solution: The amount of import under free trade is 494.1600.

33. Problem

In a small open economy the following formulas represent the behavior of agents in the watermelon market.

$$Q_{\text{watermelon}} = 1314 - 14 \cdot P_{\text{watermelon}}$$
$$Q_{\text{watermelon}} = 434 + 6 \cdot P_{\text{watermelon}}$$

The world price of watermelon is $P^{\text{world}}_{\text{watermelon}} = 25.52$.

How does free trade change the producer surplus (compared to the producer surplus in autarky)?

Solution: Free trade changes producer surplus by 11874.5088.

34. Problem

In a small open economy the demand for naan bread is written as $Q_{\text{naan bread}} = 942 - 11 \cdot P_{\text{naan bread}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{naan bread}} = 150 + 13 \cdot P_{\text{naan bread}}$. The world price of X is $P^{\text{world}}_{\text{naan bread}} = 10.56$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.68 percent ad-valorem tariff on the imported goods.

Calculate how consumer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the consumer surplus by -146.3375.

35. Problem

In a small open economy the following formulas represent the behavior of agents in the onion market.

$$Q_{\text{onion}} = 631 - 14 \cdot P_{\text{onion}}$$
$$Q_{\text{onion}} = 22 + 15 \cdot P_{\text{onion}}$$

The world price of onion is $P^{\text{world}}_{\text{onion}} = 13.44$.

What is the amount of import under free trade?

Solution: The amount of import under free trade is 219.2400.

5.

36. Problem

In a small open economy the demand for wine glass is written as $Q_{\text{wine glass}} = 1264 - 13 \cdot P_{\text{wine glass}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{wine glass}} = 256 + 8 \cdot P_{\text{wine glass}}$. The world price of X is $P^{\text{world}}_{\text{wine glass}} = 27.36$.

What is the prohibitive specific tariff in this economy?

Solution: The prohibitive specific tariff in this economy is 20.64.

37. Problem

In a small open economy the demand for handbag is written as $Q_{\text{handbag}} = 1244 - 14 \cdot P_{\text{handbag}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{handbag}} = 389 + 5 \cdot P_{\text{handbag}}$. The world price of X is $P^{\text{world}}_{\text{handbag}} = 24.75$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.45 percent ad-valorem tariff on the imported goods.

What will be the domestic price of the good?

Solution: The domestic price is 25.1089.

38. Problem

In a small open economy the demand for salad is written as $Q_{\text{salad}} = 1231 - 10 \cdot P_{\text{salad}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{salad}} = 87 + 12 \cdot P_{\text{salad}}$. The world price of X is $P^{\text{world}}_{\text{salad}} = 12.48$.

Calculate the optimal tariff.

Solution: In a small open economy the optimal tariff is always zero.

39. Problem

In a small open economy the demand for necklace is written as $Q_{\text{necklace}} = 941 - 17 \cdot P_{\text{necklace}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{necklace}} = -175 + 19 \cdot P_{\text{necklace}}$. The world price of X is $P^{\text{world}}_{\text{necklace}} = 15.81$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.49 percent ad-valorem tariff on the imported goods.

5.

Determine the effect of tariff on the tariff revenue.

Solution: The imposition of tariff leads to a tariff revenue of 8.0216.

40. Problem

In a small open economy the following formulas represent the behavior of agents in the paper clip market.

$$Q_{\text{paper clip}} = 883 - 19 \cdot P_{\text{paper clip}}$$
$$Q_{\text{paper clip}} = 223 + 14 \cdot P_{\text{paper clip}}$$

The world price of paper clip is $P^{\text{world}}_{\text{paper clip}} = 5.60$.

How does free trade change the producer surplus (compared to the producer surplus in autarky)?

Solution: Free trade changes producer surplus by 5791.6800.

41. Problem

In a small open economy the demand for bagel is written as $Q_{\text{bagel}} = 539 - 16 \cdot P_{\text{bagel}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{bagel}} = 59 + 8 \cdot P_{\text{bagel}}$. The world price of X is $P^{\text{world}}_{\text{bagel}} = 8.00$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.60 percent ad-valorem tariff on the imported goods.

Determine the effect of tariff on the tariff revenue.

Solution: The imposition of tariff leads to a tariff revenue of 4.5588.

42. Problem

The demand and supply curves in market for shampoo can be written as

$$Q_{\text{shampoo}} = 583 - 16 \cdot P_{\text{shampoo}}$$
$$Q_{\text{shampoo}} = -11 + 11 \cdot P_{\text{shampoo}}$$

The economy is a small open economy. The producers of shampoo, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 4.94 on the imported shampoos.

The world price of shampoo is $P^{\text{world}}_{\text{shampoo}} = 14.52$.

How does the imposition of tariff change the consumer surplus?

Solution: The imposition of tariff changes the consumer surplus by 1537.1304.

43. Problem

In a small open economy the demand for pizza is written as $Q_{\text{pizza}} = 520 - 7 \cdot P_{\text{pizza}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{pizza}} = -216 + 16 \cdot P_{\text{pizza}}$. The world price of X is $P^{\text{world}}_{\text{pizza}} = 16.32$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.49 percent ad-valorem tariff on the imported goods.

What is the welfare effect of the imposition of the tariff?

Solution: The imposition of tariff changes the welfare by -81.7259.

44. Problem

The demand and supply curves in market for tomato can be written as

$$Q_{\text{tomato}} = 915 - 11 \cdot P_{\text{tomato}}$$
$$Q_{\text{tomato}} = 167 + 11 \cdot P_{\text{tomato}}$$

The economy is a small open economy. The producers of tomato, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 8.01 on the imported tomatos.

The world price of tomato is $P^{\text{world}}_{\text{tomato}} = 12.92$.

How does the imposition of tariff change the consumer surplus?

Solution: The imposition of tariff changes the consumer surplus by 5837.8882.

45. Problem

In a small open economy the following formulas represent the behavior of agents in the jigsaw market.

$$Q_{\text{jigsaw}} = 698 - 8 \cdot P_{\text{jigsaw}}$$
$$Q_{\text{jigsaw}} = 106 + 8 \cdot P_{\text{jigsaw}}$$

The world price of jigsaw is $P_{\text{jigsaw}}^{\text{world}} = 17.76$.

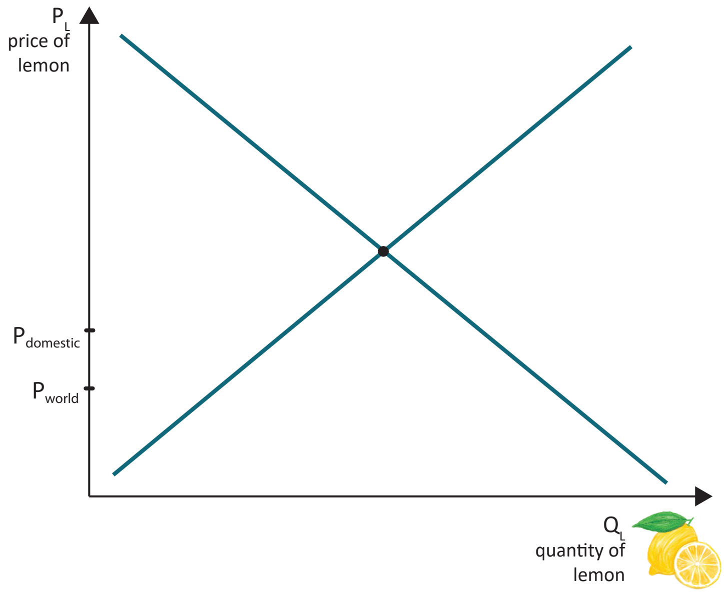
5.

By what amount does free trade change the comsumer surplus (compared to the consumer surplus in autarky)?

Solution: Free trade changes consumer surplus by 9215.1904.

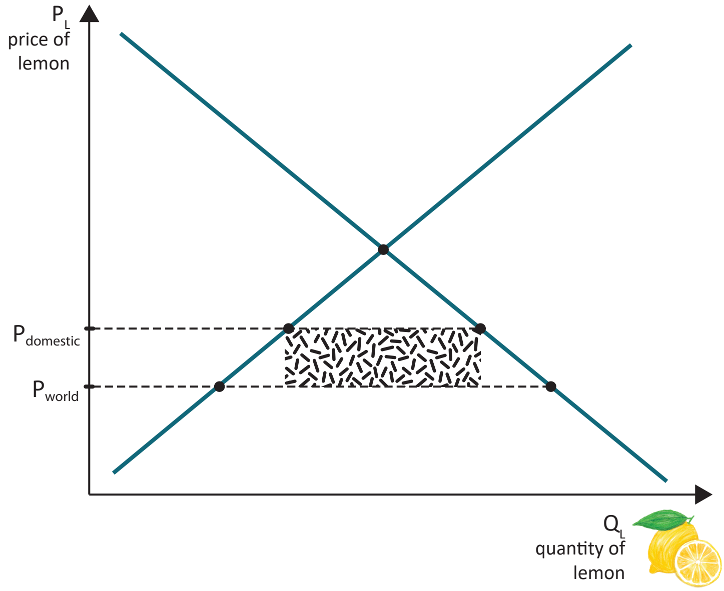
46. Problem

The following graph illustrates the curves that represent the behavior of consumers and producers in the lemon market of a small open economy. The world price of the product is P_{world}. To protect domestic producers, the fiscal policy decision maker imposes tariff on imported goods. The domestic price after the imposition of tariff is P_{domestic}. Shade the area that shows the tariff revenue of the fiscal policy decision maker.



5.

Solution: The correct graph is:



47. Problem

In a small open economy the behavior of consumers and firms in the wooden spoon market can be described by the following functions:

$$Q_{\text{wooden spoon}} = 740 - 8 \cdot P_{\text{wooden spoon}}$$
$$Q_{\text{wooden spoon}} = 420 + 8 \cdot P_{\text{wooden spoon}}$$

The world price of the product is $P^{\text{world}}_{\text{wooden spoon}} = 12.20$, but the government imposes a specific tariff on import.

What specific tariff leads to a 2554.4064 change in producer surplus?

5.

Solution: The given change in producer surplus occurs if the government imposes 4.76 units of specific tariff on imported goods.

48. Problem

In a small open economy the demand for wallet is written as $Q_{\text{wallet}} = 1046 - 13 \cdot P_{\text{wallet}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{wallet}} = -4 + 17 \cdot P_{\text{wallet}}$. The world price of X is $P^{\text{world}}_{\text{wallet}} = 12.25$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.65 percent ad-valorem tariff on the imported goods.

Determine the amount of goods imported.

Solution: The amount of import is 676.4363.

49. Problem

In a small open economy the following formulas represent the behavior of agents in the tea market.

$$Q_{\text{tea}} = 825 - 9 \cdot P_{\text{tea}}$$
$$Q_{\text{tea}} = 465 + 15 \cdot P_{\text{tea}}$$

The world price of tea is $P^{\text{world}}_{\text{tea}} = 3.45$.

How does free trade change the welfare on this market?

Solution: Free trade changes welfare by 1600.8300.

50. Problem

The demand and supply curves in market for napkin can be written as

$$Q_{\text{napkin}} = 793 - 18 \cdot P_{\text{napkin}}$$
$$Q_{\text{napkin}} = -57 + 16 \cdot P_{\text{napkin}}$$

The economy is a small open economy. The producers of napkin, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 4.81 on the imported napkins.

The world price of napkin is $P_{\text{napkin}}^{\text{world}} = 6.50$.

What effect does the imposition of tariff have on producer surplus?

Solution: The imposition of tariff changes the producer surplus by 411.1588.

51. Problem

In a small open economy the following formulas represent the behavior of agents in the pizza market.

$$Q_{\text{pizza}} = 816 - 12 \cdot P_{\text{pizza}}$$
$$Q_{\text{pizza}} = 375 + 9 \cdot P_{\text{pizza}}$$

The world price of pizza is $P_{\text{pizza}}^{\text{world}} = 12.39$.

What is the amount of import under free trade?

Solution: The amount of import under free trade is 180.8100.

52. Problem

In a small open economy the following formulas represent the behavior of agents in the bookshelf market.

$$Q_{\text{bookshelf}} = 1083 - 12 \cdot P_{\text{bookshelf}}$$
$$Q_{\text{bookshelf}} = 49 + 10 \cdot P_{\text{bookshelf}}$$

The world price of bookshelf is $P_{\text{bookshelf}}^{\text{world}} = 14.10$.

How does free trade change the welfare on this market?

Solution: Free trade changes welfare by 11906.5100.

53. Problem

In a small open economy the demand for plate is written as $Q_{\text{plate}} = 530 - 8 \cdot P_{\text{plate}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{plate}} = 131 + 13 \cdot P_{\text{plate}}$. The world price of X is $P^{\text{world}}_{\text{plate}} = 10.45$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.45 percent ad-valorem tariff on the imported goods.

Calculate how producer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the producer surplus by 40.5837.

5.

54. Problem

In a small open economy the demand for lemonade is written as $Q_{\text{lemonade}} = 873 - 16 \cdot P_{\text{lemonade}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{lemonade}} = -51 + 5 \cdot P_{\text{lemonade}}$. The world price of X is $P^{\text{world}}_{\text{lemonade}} = 31.24$.

What is the prohibitive specific tariff in this economy?

Solution: The prohibitive specific tariff in this economy is 12.76.

55. Problem

The demand and supply curves in market for peach can be written as

$$Q_{\text{peach}} = 856 - 14 \cdot P_{\text{peach}}$$
$$Q_{\text{peach}} = -449 + 15 \cdot P_{\text{peach}}$$

The economy is a small open economy. The producers of peach, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 8.44 on the imported peachs.

The world price of peach is $P^{\text{world}}_{\text{peach}} = 33.75$.

Determine the tariff revenue of the fiscal policy decision maker.

Solution: The tariff revenue is 687.7756.

56. Problem

The demand and supply curves in market for pistachio can be written as

$$Q_{\text{pistachio}} = 1384 - 16 \cdot P_{\text{pistachio}}$$
$$Q_{\text{pistachio}} = 130 + 6 \cdot P_{\text{pistachio}}$$

The economy is a small open economy. The producers of pistachio, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 12.97 on the imported pistachios.

The world price of pistachio is $P^{\text{world}}_{\text{pistachio}} = 19.95$.

Calculate the amount of import.

Solution: The amount of import is 529.7600 in this economy.

57. Problem

In a small open economy the behavior of consumers and firms in the watch market can be described by the following functions:

$$Q_{\text{watch}} = 970 - 18 \cdot P_{\text{watch}}$$
$$Q_{\text{watch}} = 82 + 6 \cdot P_{\text{watch}}$$

The world price of the product is $P^{\text{world}}_{\text{watch}} = 8.88$, but the government imposes a specific tariff on import.

What specific tariff leads to a -5058.5175 change in consumer surplus?

Solution: The given change in consumer surplus occurs if the government imposes 6.75 units of specific tariff on imported goods.

58. Problem

In a small open economy the behavior of consumers and firms in the yoghurt market can be described by the following functions:

$$Q_{\text{yoghurt}} = 465 - 7 \cdot P_{\text{yoghurt}}$$
$$Q_{\text{yoghurt}} = -19 + 15 \cdot P_{\text{yoghurt}}$$

The world price of the product is $P^{\text{world}}_{\text{yoghurt}} = 12.76$, but the government imposes a specific tariff on import.

What specific tariff causes the welfare to change by -316.0256?

Solution: The given change in welfare occurs if the government imposes 5.36 units of specific tariff on imported goods.

59. Problem

The demand and supply curves in market for watch can be written as

$$Q_{\text{watch}} = 1300 - 17 \cdot P_{\text{watch}}$$
$$Q_{\text{watch}} = 325 + 8 \cdot P_{\text{watch}}$$

The economy is a small open economy. The producers of watch, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 7.11 on the imported watchs.

The world price of watch is $P_{\text{watch}}^{\text{world}} = 9.36$.

What effect does the imposition of tariff have on producer surplus?

Solution: The imposition of tariff changes the producer surplus by 3045.3552.

60. Problem

In a small open economy the following formulas represent the behavior of agents in the cola market.

$$Q_{\text{cola}} = 734 - 7 \cdot P_{\text{cola}}$$
$$Q_{\text{cola}} = 162 + 6 \cdot P_{\text{cola}}$$

The world price of cola is $P_{\text{cola}}^{\text{world}} = 22.44$.

What is the amount of import under free trade?

Solution: The amount of import under free trade is 280.2800.

61. Problem

In a small open economy the following formulas represent the behavior of agents in the fruit cake market.

$$Q_{\text{fruit cake}} = 791 - 13 \cdot P_{\text{fruit cake}}$$

$$Q_{\text{fruit cake}} = -41 + 19 \cdot P_{\text{fruit cake}}$$

The world price of fruit cake is $P^{\text{world}}_{\text{fruit cake}} = 16.12$.

How does free trade change the welfare on this market?

Solution: Free trade changes welfare by 1561.8304.

62. Problem

In a small open economy the demand for orange is written as $Q_{\text{orange}} = 1254 - 19 \cdot P_{\text{orange}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{orange}} = 229 + 6 \cdot P_{\text{orange}}$. The world price of X is $P^{\text{world}}_{\text{orange}} = 15.99$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.61 percent ad-valorem tariff on the imported goods.

Determine the amount of goods imported.

Solution: The amount of import is 618.8140.

63. Problem

The demand and supply curves in market for watermelon can be written as

$$Q_{\text{watermelon}} = 1030 - 10 \cdot P_{\text{watermelon}}$$
$$Q_{\text{watermelon}} = 78 + 18 \cdot P_{\text{watermelon}}$$

The economy is a small open economy. The producers of watermelon, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 7.63 on the imported watermelons.

The world price of watermelon is $P^{\text{world}}_{\text{watermelon}} = 22.44$.

Determine the tariff revenue of the fiscal policy decision maker.

Solution: The tariff revenue is 839.6052.

64. Problem

In a small open economy the demand for cola is written as $Q_{\text{cola}} = 735 - 9 \cdot P_{\text{cola}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{cola}} = 367 + 14 \cdot P_{\text{cola}}$. The world price of X is $P^{\text{world}}_{\text{cola}} = 3.36$.

Calculate the optimal tariff.

Solution: In a small open economy the optimal tariff is always zero.

65. Problem

The demand and supply curves in market for backpack can be written as

$$Q_{\text{backpack}} = 916 - 9 \cdot P_{\text{backpack}}$$
$$Q_{\text{backpack}} = 322 + 9 \cdot P_{\text{backpack}}$$

The economy is a small open economy. The producers of backpack, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 8.09 on the imported backpacks.

The world price of backpack is $P^{\text{world}}_{\text{backpack}} = 14.19$.

What will be the domestic price of backpack after the imposition of tariff?

Solution: The domestic price is 22.28 after the imposition of tariff.

66. Problem

In a small open economy the demand for bagel is written as $Q_{\text{bagel}} = 742 - 9 \cdot P_{\text{bagel}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{bagel}} = -41 + 18 \cdot P_{\text{bagel}}$. The world price of X is $P^{\text{world}}_{\text{bagel}} = 16.82$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.42 percent ad-valorem tariff on the imported goods.

Calculate how producer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the producer surplus by 63.0332.

67. Problem

In a small open economy the behavior of consumers and firms in the necklace market can be described by the following functions:

$$Q_{\text{necklace}} = 543 - 9 \cdot P_{\text{necklace}}$$
$$Q_{\text{necklace}} = 11 + 5 \cdot P_{\text{necklace}}$$

The world price of the product is $P^{\text{world}}_{\text{necklace}} = 15.20$, but the government imposes a specific tariff on import.

What specific tariff causes the tariff revenue to increase by 1746.6624?

Solution: The given change in tariff revenue occurs if the government imposes 9.12 units of specific tariff on imported goods.

68. Problem

The demand and supply curves in market for orange can be written as

$$Q_{\text{orange}} = 425 - 10 \cdot P_{\text{orange}}$$
$$Q_{\text{orange}} = 34 + 7 \cdot P_{\text{orange}}$$

The economy is a small open economy. The producers of orange, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 5.09 on the imported oranges.

The world price of orange is $P^{\text{world}}_{\text{orange}} = 15.41$.

What will be the domestic price of orange after the imposition of tariff?

Solution: The domestic price is 20.50 after the imposition of tariff.

69. Problem

In a small open economy the demand for scarf is written as $Q_{\text{scarf}} = 1012 - 16 \cdot P_{\text{scarf}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{scarf}} = -108 + 16 \cdot P_{\text{scarf}}$. The world price of X is $P^{\text{world}}_{\text{scarf}} = 6.65$.

Determine the specific tariff that maximizes the tariff revenue of the fiscal policy decision maker.

Solution: The specific tariff that maximizes the tariff revenue is 14.1750.

70. Problem

In a small open economy the following formulas represent the behavior of agents in the trifle market.

$$Q_{\text{trifle}} = 360 - 7 \cdot P_{\text{trifle}}$$

$$Q_{\text{trifle}} = 56 + 12 \cdot P_{\text{trifle}}$$

The world price of trifle is $P^{\text{world}}_{\text{trifle}} = 11.04$.

How does free trade change the producer surplus (compared to the producer surplus in autarky)?

Solution: Free trade changes producer surplus by 1082.4704.

71. Problem

5.

In a small open economy the demand for coffee cup is written as $Q_{\text{coffee cup}} = 787 - 14 \cdot P_{\text{coffee cup}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{coffee cup}} = 143 + 9 \cdot P_{\text{coffee cup}}$. The world price of X is $P^{\text{world}}_{\text{coffee cup}} = 6.44$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.77 percent ad-valorem tariff on the imported goods.

What will be the domestic price of the good?

Solution: The domestic price is 6.5540.

72. Problem

In a small open economy the behavior of consumers and firms in the handbag market can be described by the following functions:

$$Q_{\text{handbag}} = 958 - 17 \cdot P_{\text{handbag}}$$
$$Q_{\text{handbag}} = -82 + 9 \cdot P_{\text{handbag}}$$

The world price of the product is $P^{\text{world}}_{\text{handbag}} = 16.80$, but the government imposes a specific tariff on import.

What specific tariff leads to a 1100.9122 change in producer surplus?

Solution: The given change in producer surplus occurs if the government imposes 9.74 units of specific tariff on imported goods.

73. Problem

In a small open economy the demand for wine glass is written as $Q_{\text{wine glass}} = 1175 - 15 \cdot P_{\text{wine glass}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{wine glass}} = 125 + 6 \cdot P_{\text{wine glass}}$. The world price of X is $P^{\text{world}}_{\text{wine glass}} = 38.00$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.24 percent ad-valorem tariff on the imported goods.

Determine the amount of goods imported.

Solution: The amount of import is 242.1048.

74. Problem

In a small open economy the demand for wooden spoon is written as $Q_{\text{wooden spoon}} = 813 - 10 \cdot P_{\text{wooden spoon}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{wooden spoon}} = 7 + 16 \cdot P_{\text{wooden spoon}}$. The world price of X is $P^{\text{world}}_{\text{wooden spoon}} = 15.19$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.51 percent ad-valorem tariff on the imported goods.

Calculate how producer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the producer surplus by 57.7723.

75. Problem

In a small open economy the demand for wallet is written as $Q_{\text{wallet}} = 1174 - 13 \cdot P_{\text{wallet}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{wallet}} = -146 + 11 \cdot P_{\text{wallet}}$. The world price of X is $P^{\text{world}}_{\text{wallet}} = 35.75$.

Calculate the optimal tariff.

Solution: In a small open economy the optimal tariff is always zero.

76. Problem

In a small open economy the following formulas represent the behavior of agents in the cappuccino market.

$$Q_{\text{cappuccino}} = 861 - 9 \cdot P_{\text{cappuccino}}$$
$$Q_{\text{cappuccino}} = -3 + 9 \cdot P_{\text{cappuccino}}$$

The world price of cappuccino is $P^{\text{world}}_{\text{cappuccino}} = 29.76$.

By what amount does free trade change the comsumer surplus (compared to the consumer surplus in autarky)?

Solution: Free trade changes consumer surplus by 9322.0992.

77. Problem

The demand and supply curves in market for food processor can be written as

$$Q_{\text{food processor}} = 965 - 12 \cdot P_{\text{food processor}}$$
$$Q_{\text{food processor}} = 65 + 13 \cdot P_{\text{food processor}}$$

The economy is a small open economy. The producers of food processor, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 5.08 on the imported food processors.

5.

The world price of food processor is $P^{\text{world}}_{\text{food processor}} = 6.12$.

What effect does the imposition of tariff have on producer surplus?

Solution: The imposition of tariff changes the producer surplus by 902.1064.

78. Problem

In a small open economy the demand for cabbage is written as $Q_{\text{cabbage}} = 1018 - 15 \cdot P_{\text{cabbage}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{cabbage}} = -408 + 16 \cdot P_{\text{cabbage}}$. The world price of X is $P^{\text{world}}_{\text{cabbage}} = 32.66$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.29 percent ad-valorem tariff on the imported goods.

Calculate how producer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the producer surplus by 49.6858.

79. Problem

The demand and supply curves in market for wooden spoon can be written as

$$Q_{\text{wooden spoon}} = 881 - 12 \cdot P_{\text{wooden spoon}}$$
$$Q_{\text{wooden spoon}} = 26 + 7 \cdot P_{\text{wooden spoon}}$$

The economy is a small open economy. The producers of wooden spoon, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 11.21 on the imported wooden spoons.

The world price of wooden spoon is $P^{\text{world}}_{\text{wooden spoon}} = 23.85$.

How does the imposition of tariff affect the welfare of the economy?

Solution: The imposition of tariff changes the welfare by 5913.7234.

80. Problem

In a small open economy the demand for wine glass is written as $Q_{\text{wine glass}} = 929 - 13 \cdot P_{\text{wine glass}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{wine glass}} = 402 + 4 \cdot P_{\text{wine glass}}$. The world price of X is $P^{\text{world}}_{\text{wine glass}} = 15.81$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.49 percent ad-valorem tariff on the imported goods.

What will be the domestic price of the good?

Solution: The domestic price is 16.0456.

81. Problem

The demand and supply curves in market for strawberry can be written as

$$Q_{\text{strawberry}} = 453 - 16 \cdot P_{\text{strawberry}}$$
$$Q_{\text{strawberry}} = -23 + 12 \cdot P_{\text{strawberry}}$$

The economy is a small open economy. The producers of strawberry, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 4.17 on the imported strawberrys.

The world price of strawberry is $P^{\text{world}}_{\text{strawberry}} = 9.69$.

Determine the tariff revenue of the fiscal policy decision maker.

Solution: The tariff revenue is 366.6264.

82. Problem

In a small open economy the demand for tomato is written as $Q_{\text{tomato}} = 1122 - 9 \cdot P_{\text{tomato}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{tomato}} = 524 + 4 \cdot P_{\text{tomato}}$. The world price of X is $P^{\text{world}}_{\text{tomato}} = 19.78$.

Calculate the optimal tariff.

Solution: In a small open economy the optimal tariff is always zero.

83. Problem

In a small open economy the demand for lemonade is written as $Q_{\text{lemonade}} = 1237 - 12 \cdot P_{\text{lemonade}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{lemonade}} = 117 + 8 \cdot P_{\text{lemonade}}$. The world price of X is $P^{\text{world}}_{\text{lemonade}} = 25.76$.

5.

Determine the specific tariff that maximizes the tariff revenue of the fiscal policy decision maker.

Solution: The specific tariff that maximizes the tariff revenue is 15.1200.

84. Problem

In a small open economy the following formulas represent the behavior of agents in the pistachio market.

$$Q_{\text{pistachio}} = 1333 - 15 \cdot P_{\text{pistachio}}$$
$$Q_{\text{pistachio}} = 431 + 7 \cdot P_{\text{pistachio}}$$

The world price of pistachio is $P^{\text{world}}_{\text{pistachio}} = 18.45$.

What is the amount of import under free trade?

Solution: The amount of import under free trade is 496.1000.

85. Problem

In a small open economy the following formulas represent the behavior of agents in the pistachio market.

$$Q_{\text{pistachio}} = 909 - 17 \cdot P_{\text{pistachio}}$$
$$Q_{\text{pistachio}} = 557 + 5 \cdot P_{\text{pistachio}}$$

The world price of pistachio is $P^{\text{world}}_{\text{pistachio}} = 6.24$.

How does free trade change the producer surplus (compared to the producer surplus in autarky)?

Solution: Free trade changes producer surplus by 5978.9760.

86. Problem

In a small open economy the behavior of consumers and firms in the teapot market can be described by the following functions:

$$Q_{\text{teapot}} = 1235 - 15 \cdot P_{\text{teapot}}$$
$$Q_{\text{teapot}} = -431 + 19 \cdot P_{\text{teapot}}$$

The world price of the product is $P^{\text{world}}_{\text{teapot}} = 28.42$, but the government imposes a specific tariff on import.

What specific tariff leads to a 2655.5754 change in producer surplus?

Solution: The given change in producer surplus occurs if the government imposes 11.94 units of specific tariff on imported goods.

5.

87. Problem

In a small open economy the demand for fruit cake is written as $Q_{\text{fruit cake}} = 649 - 16 \cdot P_{\text{fruit cake}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{fruit cake}} = 124 + 5 \cdot P_{\text{fruit cake}}$. The world price of X is $P^{\text{world}}_{\text{fruit cake}} = 11.25$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.55 percent ad-valorem tariff on the imported goods.

Calculate how producer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the producer surplus by 31.5071.

88. Problem

In a small open economy the demand for wine glass is written as $Q_{\text{wine glass}} = 878 - 13 \cdot P_{\text{wine glass}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{wine glass}} = 124 + 16 \cdot P_{\text{wine glass}}$. The world price of X is $P^{\text{world}}_{\text{wine glass}} = 7.80$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.70 percent ad-valorem tariff on the imported goods.

Calculate how consumer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the consumer surplus by -102.8629.

89. Problem

The demand and supply curves in market for pie can be written as

$$Q_{\text{pie}} = 1093 - 13 \cdot P_{\text{pie}}$$
$$Q_{\text{pie}} = 515 + 4 \cdot P_{\text{pie}}$$

The economy is a small open economy. The producers of pie, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 7.27 on the imported pies.

The world price of pie is $P^{\text{world}}_{\text{pie}} = 10.54$.

5.

Determine the tariff revenue of the fiscal policy decision maker.

Solution: The tariff revenue is 2000.9221.

90. Problem

In a small open economy the demand for jigsaw is written as $Q_{\text{jigsaw}} = 1143 - 11 \cdot P_{\text{jigsaw}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{jigsaw}} = 87 + 11 \cdot P_{\text{jigsaw}}$. The world price of X is $P^{\text{world}}_{\text{jigsaw}} = 11.04$.

Determine the specific tariff that maximizes the tariff revenue of the fiscal policy decision maker.

Solution: The specific tariff that maximizes the tariff revenue is 18.4800.

91. Problem

In a small open economy the behavior of consumers and firms in the blackcurrant market can be described by the following functions:

$$Q_{\text{blackcurrant}} = 914 - 8 \cdot P_{\text{blackcurrant}}$$
$$Q_{\text{blackcurrant}} = 386 + 3 \cdot P_{\text{blackcurrant}}$$

The world price of the product is $P^{\text{world}}_{\text{blackcurrant}} = 12.00$, but the government imposes a specific tariff on import.

What specific tariff leads to a -7038.0000 change in consumer surplus?

Solution: The given change in consumer surplus occurs if the government imposes 9.00 units of specific tariff on imported goods.

92. Problem

The demand and supply curves in market for hairdryer can be written as

$$Q_{\text{hairdryer}} = 1161 - 9 \cdot P_{\text{hairdryer}}$$
$$Q_{\text{hairdryer}} = 472 + 4 \cdot P_{\text{hairdryer}}$$

The economy is a small open economy. The producers of hairdryer, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 10.68 on the imported hairdryers.

The world price of hairdryer is $P^{\text{world}}_{\text{hairdryer}} = 38.16$.

What will be the domestic price of hairdryer after the imposition of tariff?

5.

Solution: The domestic price is 48.84 after the imposition of tariff.

93. Problem

In a small open economy the demand for broccoli is written as $Q_{\text{broccoli}} = 801 - 16 \cdot P_{\text{broccoli}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{broccoli}} = 181 + 4 \cdot P_{\text{broccoli}}$. The world price of X is $P^{\text{world}}_{\text{broccoli}} = 22.94$.

What is the prohibitive specific tariff in this economy?

Solution: The prohibitive specific tariff in this economy is 8.06.

94. Problem

In a small open economy the behavior of consumers and firms in the pistachio market can be described by the following functions:

$$Q_{\text{pistachio}} = 842 - 15 \cdot P_{\text{pistachio}}$$
$$Q_{\text{pistachio}} = 402 + 5 \cdot P_{\text{pistachio}}$$

The world price of the product is $P^{\text{world}}_{\text{pistachio}} = 13.64$, but the government imposes a specific tariff on import.

What specific tariff leads to a -3100.4890 change in consumer surplus?

Solution: The given change in consumer surplus occurs if the government imposes 5.18 units of specific tariff on imported goods.

95. Problem

The demand and supply curves in market for blackcurrant can be written as

$$Q_{\text{blackcurrant}} = 1038 - 13 \cdot P_{\text{blackcurrant}}$$
$$Q_{\text{blackcurrant}} = -512 + 18 \cdot P_{\text{blackcurrant}}$$

The economy is a small open economy. The producers of blackcurrant, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 12.32 on the imported blackcurrants.

The world price of blackcurrant is $P^{\text{world}}_{\text{blackcurrant}} = 28.00$.

5.

Calculate the amount of import.

Solution: The amount of import is 300.0800 in this economy.

96. Problem

The demand and supply curves in market for cola can be written as

$$Q_{\text{cola}} = 1517 - 19 \cdot P_{\text{cola}}$$
$$Q_{\text{cola}} = -115 + 15 \cdot P_{\text{cola}}$$

The economy is a small open economy. The producers of cola, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 11.69 on the imported colas.

The world price of cola is $P^{\text{world}}_{\text{cola}} = 20.16$.

How does the imposition of tariff change the consumer surplus?

Solution: The imposition of tariff changes the consumer surplus by 11957.7595.

97. Problem

In a small open economy the following formulas represent the behavior of agents in the watch market.

$$Q_{\text{watch}} = 874 - 10 \cdot P_{\text{watch}}$$
$$Q_{\text{watch}} = 234 + 10 \cdot P_{\text{watch}}$$

The world price of watch is $P^{\text{world}}_{\text{watch}} = 17.28$.

How does free trade change the welfare on this market?

Solution: Free trade changes welfare by 2166.7840.

98. Problem

The demand and supply curves in market for platform shoe can be written as

$$Q_{\text{platform shoe}} = 1340 - 14 \cdot P_{\text{platform shoe}}$$
$$Q_{\text{platform shoe}} = -508 + 19 \cdot P_{\text{platform shoe}}$$

The economy is a small open economy. The producers of platform shoe, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 13.98 on the imported platform shoes.

The world price of platform shoe is $P^{\text{world}}_{\text{platform shoe}} = 29.12$.

What effect does the imposition of tariff have on producer surplus?

Solution: The imposition of tariff changes the producer surplus by 2489.6982.

99. Problem

In a small open economy the demand for naan bread is written as $Q_{\text{naan bread}} = 1529 - 17 \cdot P_{\text{naan bread}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{naan bread}} = -415 + 19 \cdot P_{\text{naan bread}}$. The world price of X is $P^{\text{world}}_{\text{naan bread}} = 25.38$.

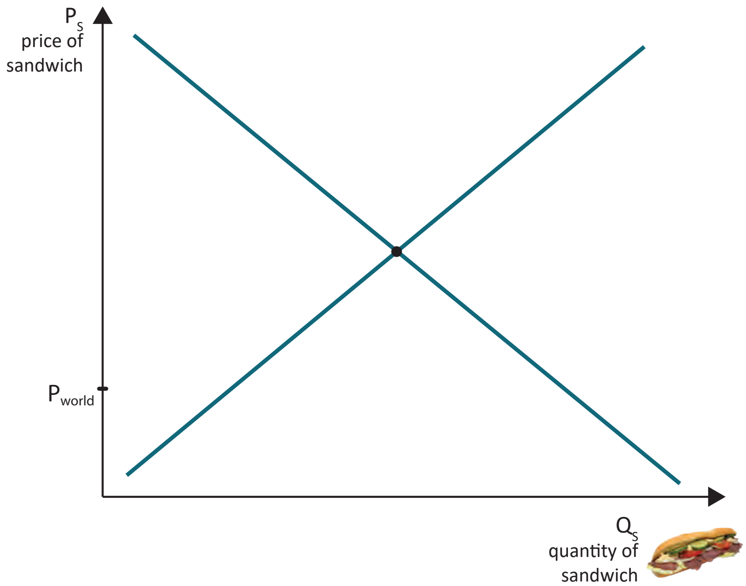
Determine the specific tariff that maximizes the tariff revenue of the fiscal policy decision maker.

Solution: The specific tariff that maximizes the tariff revenue is 14.3100.

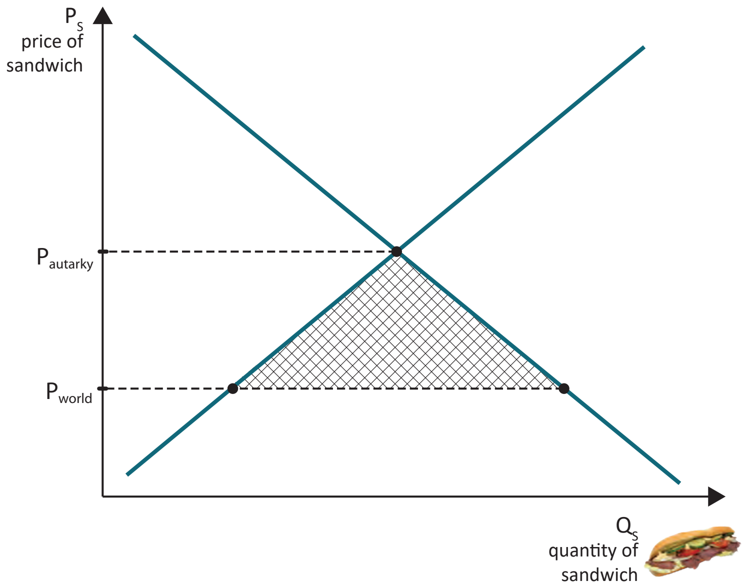
100. Problem

The following graph illustrates the curves that represent the behavior of consumers and producers in the sandwich market of a small open economy. The world price of the product is P_{world}. Shade the area that shows how free trade changes the welfare of the economy. Does free trade have a negative or positive effect on welfare?

5.

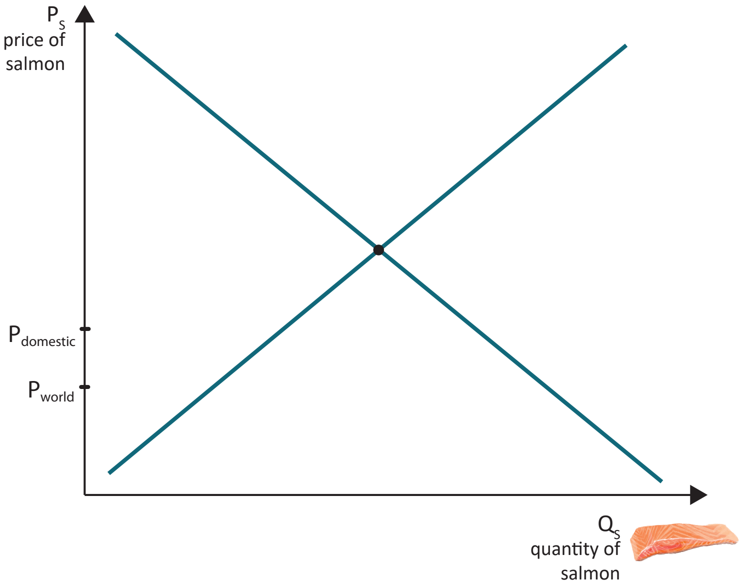


Solution: Free trade positively affects the welfare. The correct graph is:

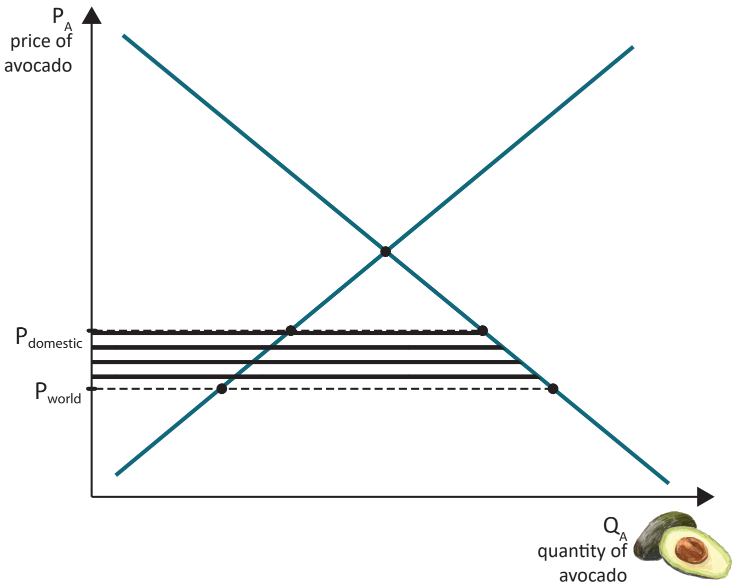


101. Problem

The following graph illustrates the curves that represent the behavior of consumers and producers in the salmon market of a small open economy. The world price of the product is P_{world}. To protect domestic producers, the fiscal policy decision maker imposes tariff on imported goods. The domestic price after the imposition of tariff is P_{domestic}. Shade the area that shows how the imposition of tariff changes the producer surplus in this market. Does the imposition of tariff have a negative or positive effect on producer surplus?



Solution: The imposition of tariff positively affects the producer surplus. The correct graph is:



5.

102. Problem

The demand and supply curves in market for rug can be written as

$$Q_{\text{rug}} = 851 - 8 \cdot P_{\text{rug}}$$
$$Q_{\text{rug}} = 318 + 5 \cdot P_{\text{rug}}$$

The economy is a small open economy. The producers of rug, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 9.92 on the imported rugs.

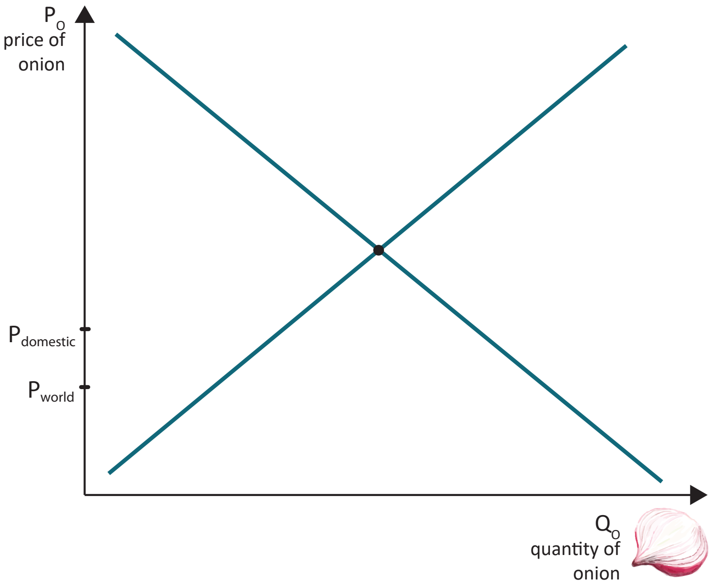
The world price of rug is $P_{\text{rug}}^{\text{world}} = 24.19$.

How does the imposition of tariff change the consumer surplus?

Solution: The imposition of tariff changes the consumer surplus by 6128.5760.

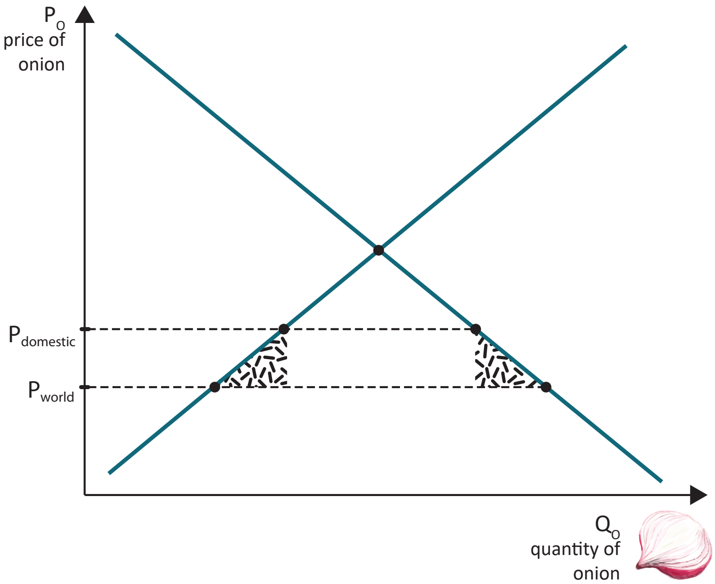
103. Problem

The following graph illustrates the curves that represent the behavior of consumers and producers in the onion market of a small open economy. The world price of the product is P_{world}. To protect domestic producers, the fiscal policy decision maker imposes tariff on imported goods. The domestic price after the imposition of tariff is P_{domestic}. Shade the area that shows how the imposition of tariff changes the welfare of the economy. Does the imposition of tariff have a negative or positive effect on welfare?



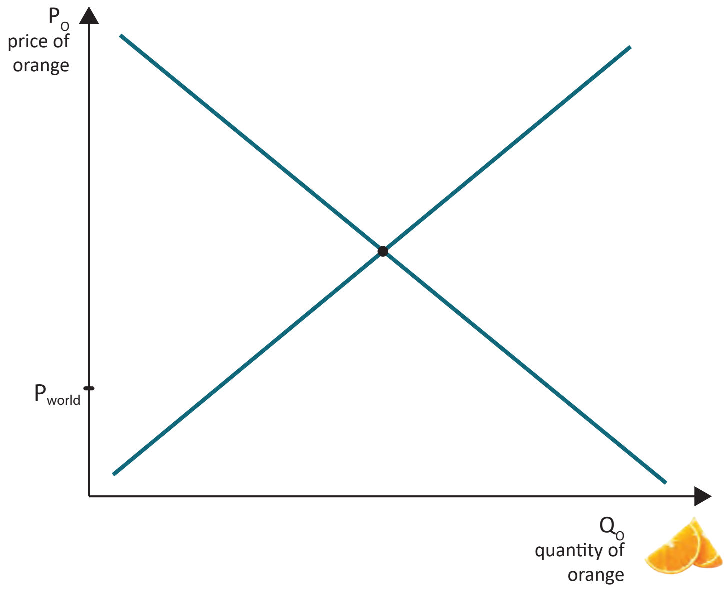
5.

Solution: The imposition of tariff negatively affects the welfare. The correct graph is:

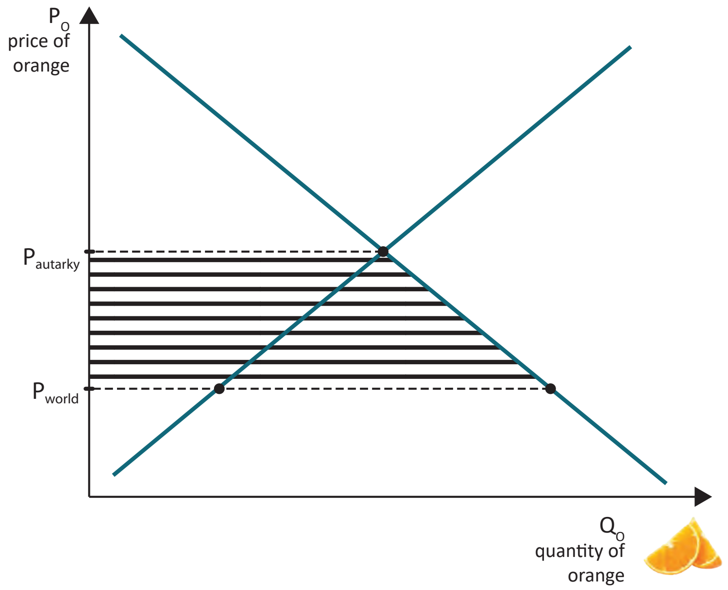


104. Problem

The following graph illustrates the curves that represent the behavior of consumers and producers in the orange market of a small open economy. The world price of the product is P_{world}. Shade the area that shows how free trade changes the consumer surplus in this market. Does free trade have a negative or positive effect on consumer surplus?



Solution: Free trade positively affects the consumer surplus. The correct graph is:



105. Problem

In a small open economy the following formulas represent the behavior of agents in the yoghurt market.

$$Q_{\text{yoghurt}} = 1070 - 13 \cdot P_{\text{yoghurt}}$$
$$Q_{\text{yoghurt}} = 63 + 6 \cdot P_{\text{yoghurt}}$$

The world price of yoghurt is $P_{\text{yoghurt}}^{\text{world}} = 30.21$.

How does free trade change the welfare on this market?

Solution: Free trade changes welfare by 4934.1489.

106. Problem

The demand and supply curves in market for watermelon can be written as

$$Q_{\text{watermelon}} = 943 - 7 \cdot P_{\text{watermelon}}$$
$$Q_{\text{watermelon}} = -185 + 17 \cdot P_{\text{watermelon}}$$

The economy is a small open economy. The producers of watermelon, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 11.73 on the imported watermelons.

The world price of watermelon is $P^{\text{world}}_{\text{watermelon}} = 24.44$.

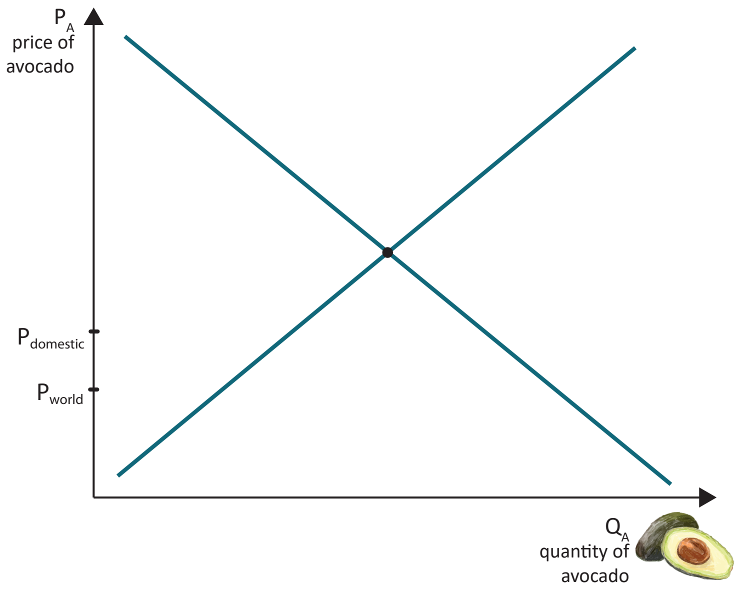
How does the imposition of tariff affect the welfare of the economy?

Solution: The imposition of tariff changes the welfare by 8573.0464.

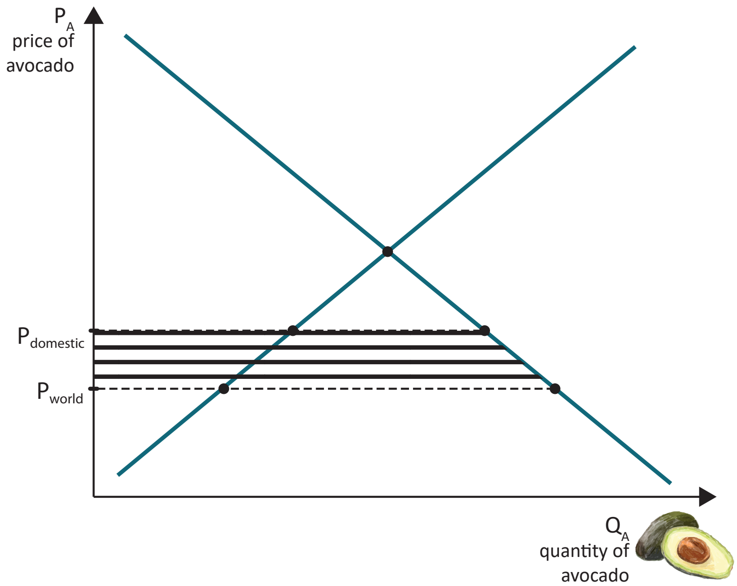
107. Problem

5.

The following graph illustrates the curves that represent the behavior of consumers and producers in the avocado market of a small open economy. The world price of the product is P_{world}. To protect domestic producers the fiscal policy decision maker imposes tariff on imported goods. The domestic price after the imposition of tariff is P_{domestic}. Shade the area that shows how the imposition of tariff changes the consumer surplus in this market. Does the imposition of tariff have a negative or positive effect on consumer surplus?



Solution: The imposition of tariff negatively affects the consumer surplus. The correct graph is:



108. Problem

The demand and supply curves in market for handbag can be written as

$$Q_{\text{handbag}} = 918 - 11 \cdot P_{\text{handbag}}$$
$$Q_{\text{handbag}} = 138 + 19 \cdot P_{\text{handbag}}$$

The economy is a small open economy. The producers of handbag, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 6.06 on the imported handbags.

The world price of handbag is $P_{\text{handbag}}^{\text{world}} = 16.38$.

Calculate the amount of import.

Solution: The amount of import is 106.8000 in this economy.

109. Problem

In a small open economy the demand for aubergine is written as $Q_{\text{aubergine}} = 690 - 7 \cdot P_{\text{aubergine}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{aubergine}} = 226 + 9 \cdot P_{\text{aubergine}}$. The world price of X is $P^{\text{world}}_{\text{aubergine}} = 10.73$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.63 percent ad-valorem tariff on the imported goods.

What is the welfare effect of the imposition of the tariff?

Solution: The imposition of tariff changes the welfare by -46.1626.

110. Problem

5.

In a small open economy the following formulas represent the behavior of agents in the aubergine market.

$$Q_{\text{aubergine}} = 881 - 13 \cdot P_{\text{aubergine}}$$
$$Q_{\text{aubergine}} = 305 + 19 \cdot P_{\text{aubergine}}$$

The world price of aubergine is $P^{\text{world}}_{\text{aubergine}} = 9.36$.

By what amount does free trade change the comsumer surplus (compared to the consumer surplus in autarky)?

Solution: Free trade changes consumer surplus by 6075.3024.

111. Problem

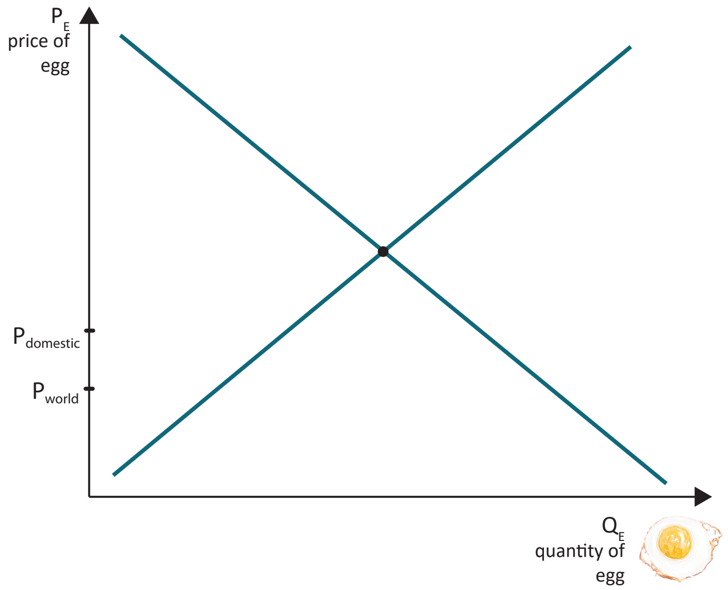
In a small open economy the demand for jigsaw is written as $Q_{\text{jigsaw}} = 581 - 10 \cdot P_{\text{jigsaw}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{jigsaw}} = -103 + 9 \cdot P_{\text{jigsaw}}$. The world price of X is $P^{\text{world}}_{\text{jigsaw}} = 23.04$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.36 percent ad-valorem tariff on the imported goods.

What is the welfare effect of the imposition of the tariff?

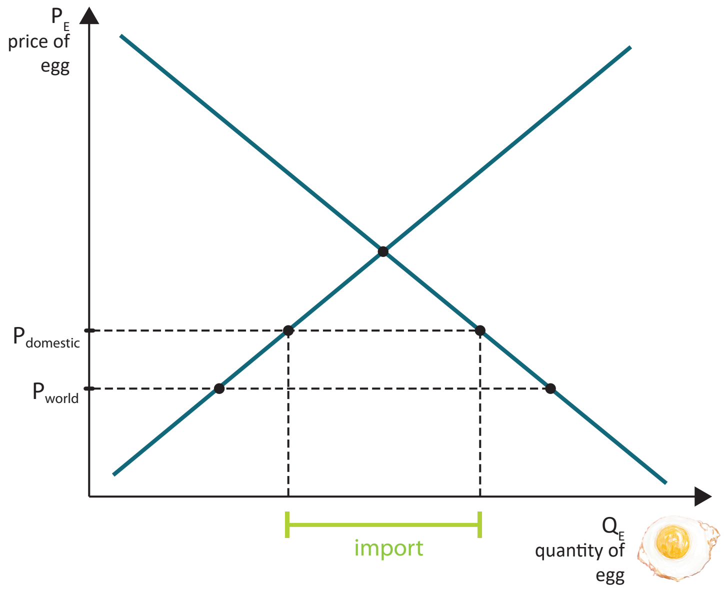
Solution: The imposition of tariff changes the welfare by -72.9572.

112. Problem

The following graph illustrates the curves that represent the behavior of consumers and producers in the egg market of a small open economy. The world price of the product is P_{world}. To protect domestic producers, the fiscal policy decision maker imposes tariff on imported goods. The domestic price after the imposition of tariff is P_{domestic}. Label the amount of import on the graph.



Solution: The correct graph is:



113. Problem

In a small open economy the demand for orange is written as $Q_{\text{orange}} = 1068 - 19 \cdot P_{\text{orange}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{orange}} = 430 + 3 \cdot P_{\text{orange}}$. The world price of X is $P^{\text{world}}_{\text{orange}} = 8.99$.

What is the prohibitive specific tariff in this economy?

Solution: The prohibitive specific tariff in this economy is 20.01.

5.

114. Problem

The demand and supply curves in market for tea can be written as

$$Q_{\text{tea}} = 765 - 15 \cdot P_{\text{tea}}$$
$$Q_{\text{tea}} = 117 + 3 \cdot P_{\text{tea}}$$

The economy is a small open economy. The producers of tea, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 8.39 on the imported teas.

The world price of tea is $P^{\text{world}}_{\text{tea}} = 22.68$.

How does the imposition of tariff change the consumer surplus?

Solution: The imposition of tariff changes the consumer surplus by 3036.1313.

115. Problem

In a small open economy the demand for teapot is written as $Q_{\text{teapot}} = 829 - 16 \cdot P_{\text{teapot}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{teapot}} = 169 + 14 \cdot P_{\text{teapot}}$. The world price of X is $P^{\text{world}}_{\text{teapot}} = 11.66$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.47 percent ad-valorem tariff on the imported goods.

Determine the amount of goods imported.

Solution: The amount of import is 305.0579.

116. Problem

In a small open economy the demand for muffin is written as $Q_{\text{muffin}} = 921 - 12 \cdot P_{\text{muffin}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{muffin}} = -183 + 12 \cdot P_{\text{muffin}}$. The world price of X is $P^{\text{world}}_{\text{muffin}} = 21.62$.

Calculate the optimal tariff.

Solution: In a small open economy the optimal tariff is always zero.

117. Problem

In a small open economy the demand for salad is written as $Q_{\text{salad}} = 828 - 16 \cdot P_{\text{salad}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{salad}} = -72 + 9 \cdot P_{\text{salad}}$. The world price of X is $P^{\text{world}}_{\text{salad}} = 20.52$.

What is the prohibitive specific tariff in this economy?

Solution: The prohibitive specific tariff in this economy is 15.48.

118. Problem

In a small open economy the behavior of consumers and firms in the pushchair market can be described by the following functions:

$$Q_{\text{pushchair}} = 989 - 11 \cdot P_{\text{pushchair}}$$
$$Q_{\text{pushchair}} = 653 + 3 \cdot P_{\text{pushchair}}$$

The world price of the product is $P^{\text{world}}_{\text{pushchair}} = 6.96$, but the government imposes a specific tariff on import.

What specific tariff leads to a 3365.5726 change in producer surplus?

Solution: The given change in producer surplus occurs if the government imposes 4.94 units of specific tariff on imported goods.

5.

119. Problem

The demand and supply curves in market for trifle can be written as

$$Q_{\text{trifle}} = 635 - 16 \cdot P_{\text{trifle}}$$
$$Q_{\text{trifle}} = 59 + 16 \cdot P_{\text{trifle}}$$

The economy is a small open economy. The producers of trifle, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 2.99 on the imported trifles.

The world price of trifle is $P_{\text{trifle}}^{\text{world}} = 3.78$.

5.

How does the imposition of tariff affect the welfare of the economy?

Solution: The imposition of tariff changes the welfare by 1646.2940.

120. Problem

In a small open economy the following formulas represent the behavior of agents in the lemonade market.

$$Q_{\text{lemonade}} = 1019 - 12 \cdot P_{\text{lemonade}}$$
$$Q_{\text{lemonade}} = 475 + 4 \cdot P_{\text{lemonade}}$$

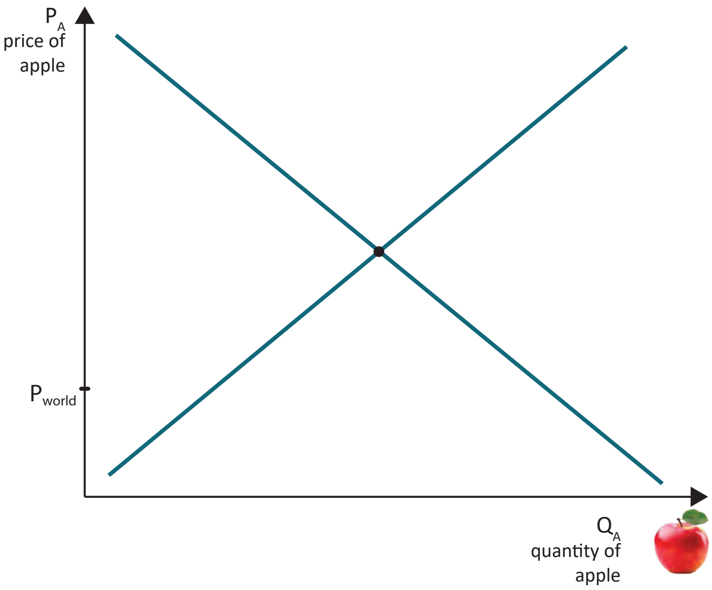
The world price of lemonade is $P_{\text{lemonade}}^{\text{world}} = 5.78$.

By what amount does free trade change the comsumer surplus (compared to the consumer surplus in autarky)?

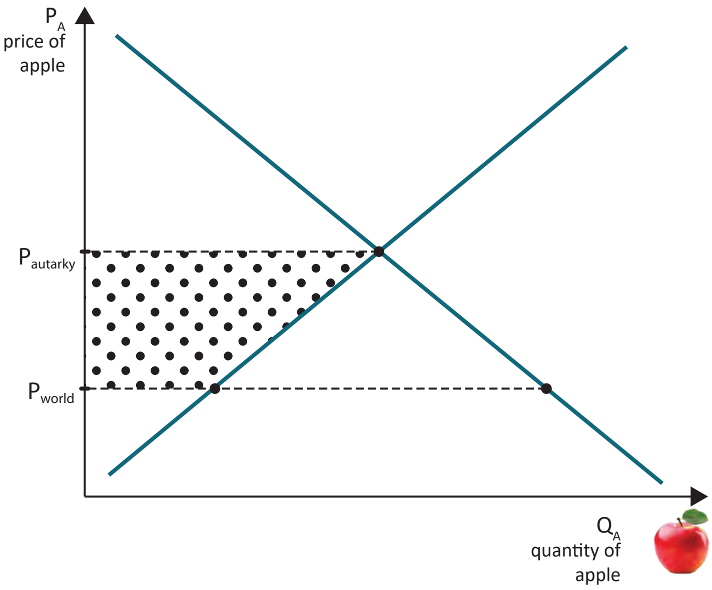
Solution: Free trade changes consumer surplus by 22020.6304.

121. Problem

The following graph illustrates the curves that represent the behavior of consumers and producers in the apple market of a small open economy. The world price of the product is P_{world}. Shade the area that shows how free trade changes the producer surplus in this market. Does free trade have a negative or positive effect on producer surplus?



Solution: Free trade negatively affects the producer surplus. The correct graph is:



122. Problem

The demand and supply curves in market for handbag can be written as

$$Q_{\text{handbag}} = 778 - 12 \cdot P_{\text{handbag}}$$
$$Q_{\text{handbag}} = 154 + 14 \cdot P_{\text{handbag}}$$

The economy is a small open economy. The producers of handbag, referring to the negative change in their producer surplus, demand some fiscal policy actions. The fiscal policy decision maker imposes a specific tariff of 4.84 on the imported handbags.

The world price of handbag is $P^{\text{world}}_{\text{handbag}} = 17.28$.

Calculate the amount of import.

Solution: The amount of import is 48.8800 in this economy.

123. Problem

In a small open economy the demand for fruit cake is written as $Q_{\text{fruit cake}} = 910 - 16 \cdot P_{\text{fruit cake}}$ and the behavior of firms can be characterized by the following formula: $Q_{\text{fruit cake}} = -80 + 17 \cdot P_{\text{fruit cake}}$. The world price of X is $P^{\text{world}}_{\text{fruit cake}} = 13.50$, but to protect the domestic producers the fiscal policy decision maker imposes a 1.55 percent ad-valorem tariff on the imported goods.

Calculate how consumer surplus changes due to the imposition of tariff.

Solution: The imposition of tariff changes the consumer surplus by -144.8692.

Tariff
Large Open Economy

1. Problem

In a LARGE open economy the following functions describe the demand and supply of plate:

$$Q^A_{\text{plate}} = 694 - 42 \cdot P^A_{\text{plate}}$$
$$Q^A_{\text{plate}} = 31 + 70 \cdot P^A_{\text{plate}}$$

In the rest of the world the demand for plate can be witten as $Q^{\text{world}}_{\text{plate}} = 796 - 34 \cdot P^{\text{world}}_{\text{plate}}$ and the supply of plate is given by $Q^{\text{world}}_{\text{plate}} = 17 + 41 \cdot P^{\text{vilĂAg}}_{\text{plate}}$. The two regions of the world trade actively but the importing region imposes 1.23 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the large open economy?

Solution: The change in the consumer surplus is 187.7006 units.

2. Problem

In country A $Q^A_{\text{bookshelf}} = 651 - 16 \cdot P^A_{\text{bookshelf}}$ describes the demand for bookshelf and the supply of bookshelf is given by $Q^A_{\text{bookshelf}} = 11 + 82 \cdot P^A_{\text{bookshelf}}$. In country B the following function characterizes the behavior of consumers in bookshelf market $Q^B_{\text{bookshelf}} = 681 - 35 \cdot P^B_{\text{bookshelf}}$ and the supply of bookshelf is written as $Q^B_{\text{bookshelf}} = 24 + 7 \cdot P^B_{\text{bookshelf}}$. The two regions of the world trade actively but the importing region imposes 1.15 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in country B?

Solution: The imposition of tariff changes the welfare in country B by 471.2545 units.

3. Problem

The world consists of two economies A and B. Both countries produce bagel. The market for bagel can be represented by the following functions:

$$Q^A_{\text{bagel}} = 504 - 24 \cdot P^A_{\text{bagel}}$$
$$Q^A_{\text{bagel}} = 28 + 10 \cdot P^A_{\text{bagel}}$$
$$Q^B_{\text{bagel}} = 603 - 35 \cdot P^B_{\text{bagel}}$$
$$Q^B_{\text{bagel}} = 5 + 7 \cdot P^B_{\text{bagel}}$$

How does free trade change the producer surplus in country A?

Solution: Free trade changes producer surplus by -22.1918 in country A.

4. Problem

The world consists of two economies A and B. Both countries produce wooden spoon. The market for wooden spoon can be represented by the following functions:

$$Q^A_{\text{wooden spoon}} = 894 - 14 \cdot P^A_{\text{wooden spoon}}$$
$$Q^A_{\text{wooden spoon}} = 3 + 72 \cdot P^A_{\text{wooden spoon}}$$
$$Q^B_{\text{wooden spoon}} = 495 - 43 \cdot P^B_{\text{wooden spoon}}$$
$$Q^B_{\text{wooden spoon}} = 13 + 9 \cdot P^B_{\text{wooden spoon}}$$

What is the effect of free trade on consumer surplus in country A?

Solution: Free trade changes consumer surplus by 309.1455 in country A.

5. Problem

The world consists of two economies A and B. Both countries produce bagel. The market for bagel can be represented by the following functions:

$$Q^A_{\text{bagel}} = 510 - 42 \cdot P^A_{\text{bagel}}$$
$$Q^A_{\text{bagel}} = 25 + 27 \cdot P^A_{\text{bagel}}$$
$$Q^B_{\text{bagel}} = 724 - 8 \cdot P^B_{\text{bagel}}$$

$$Q^B_{\text{bagel}} = 13 + 73 \cdot P^B_{\text{bagel}}$$

How does free trade change the producer surplus in country B?

Solution: Free trade changes producer surplus by -502.3076 in country B.

6. Problem

The world consists of two economies A and B. Both countries produce almond. The market for almond can be represented by the following functions:

$$Q^A_{\text{almond}} = 739 - 35 \cdot P^A_{\text{almond}}$$
$$Q^A_{\text{almond}} = 1 + 78 \cdot P^A_{\text{almond}}$$
$$Q^B_{\text{almond}} = 558 - 22 \cdot P^B_{\text{almond}}$$
$$Q^B_{\text{almond}} = 30 + 34 \cdot P^B_{\text{almond}}$$

What effect does free trade have on the welfare of the world.

Solution: The welfare effect of free trade in the world is 53.0169.

7. Problem

The world consists of two economies A and B. Both countries produce brioche. The market for brioche can be represented by the following functions:

$$Q^A_{\text{brioche}} = 614 - 5 \cdot P^A_{\text{brioche}}$$
$$Q^A_{\text{brioche}} = 18 + 54 \cdot P^A_{\text{brioche}}$$
$$Q^B_{\text{brioche}} = 709 - 19 \cdot P^B_{\text{brioche}}$$
$$Q^B_{\text{brioche}} = 32 + 23 \cdot P^B_{\text{brioche}}$$

Which economy exports the good and what is the amount of export?

Solution: Country A exports the good and the amount of export is 147.6337.

8. Problem

In a LARGE open economy the following functions describe the demand and supply of lemon:

$$Q^A_{\text{lemon}} = 792 - 44 \cdot P^A_{\text{lemon}}$$
$$Q^A_{\text{lemon}} = 19 + 30 \cdot P^A_{\text{lemon}}$$

In the rest of the world the demand for lemon can be witten as $Q^{\text{world}}_{\text{lemon}} = 821 - 26 \cdot P^{\text{world}}_{\text{lemon}}$ and the supply of lemon is given by $Q^{\text{world}}_{\text{lemon}} = 24 + 62 \cdot P^{\text{vilĂĄg}}_{\text{lemon}}$. The two regions of the world trade actively but the importing region imposes 0.48 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the rest of the world?

Solution: The change in the welfare is -10.1280 units.

9. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{cauliflower}} = 575 - 43 \cdot P^A_{\text{cauliflower}}$ describes the demand for cauliflower, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{cauliflower}} = 19 + 65 \cdot P^A_{\text{cauliflower}}$. In country B the functioning of cauliflower market can be described by the following formulas

$$Q^B_{\text{cauliflower}} = 888 - 30 \cdot P^B_{\text{cauliflower}}$$
$$Q^B_{\text{cauliflower}} = 24 + 64 \cdot P^B_{\text{cauliflower}}$$

The two economies trade with each other but the importing country imposes 0.54 units of specific tariff on the imported goods.

Which country exports cauliflower and what is the amount of export?

Solution: Country A exports the good and the amount of export is 176.0689.

10. Problem

The world consists of two economies A and B. Both countries produce muffin. The market for muffin can be represented by the following functions:

$$Q^A_{\text{muffin}} = 887 - 39 \cdot P^A_{\text{muffin}}$$
$$Q^A_{\text{muffin}} = 27 + 34 \cdot P^A_{\text{muffin}}$$
$$Q^B_{\text{muffin}} = 787 - 44 \cdot P^B_{\text{muffin}}$$

$$Q^B_{\text{muffin}} = 26 + 78 \cdot P^B_{\text{muffin}}$$

Calculate the welfare effect of free trade in economy A.

Solution: The welfare effect of free trade in country A is 438.9867.

11. Problem

In country A $Q^A_{\text{jigsaw}} = 520 - 39 \cdot P^A_{\text{jigsaw}}$ describes the demand for jigsaw and the supply of jigsaw is given by $Q^A_{\text{jigsaw}} = 3 + 57 \cdot P^A_{\text{jigsaw}}$. In country B the following function characterizes the behavior of consumers in jigsaw market $Q^B_{\text{jigsaw}} = 866 - 12 \cdot P^B_{\text{jigsaw}}$ and the supply of jigsaw is written as $Q^B_{\text{jigsaw}} = 20 + 7 \cdot P^B_{\text{jigsaw}}$. The two regions of the world trade actively but the importing region imposes 20.58 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in country B?

Solution: The imposition of tariff changes the welfare in country B by 13920.0818 units.

12. Problem

In a LARGE open economy the following functions describe the demand and supply of plate:

$$Q^A_{\text{plate}} = 828 - 39 \cdot P^A_{\text{plate}}$$
$$Q^A_{\text{plate}} = 24 + 29 \cdot P^A_{\text{plate}}$$

In the rest of the world the demand for plate can be witten as $Q^{\text{world}}_{\text{plate}} = 509 - 9 \cdot P^{\text{world}}_{\text{plate}}$ and the supply of plate is given by $Q^{\text{world}}_{\text{plate}} = 31 + 51 \cdot P^{\text{vilĂĄg}}_{\text{plate}}$. The two regions of the world trade actively but the importing region imposes 0.61 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the rest of the world?

Solution: The change in the producer surplus is -172.8981 units.

13. Problem

The world consists of two economies A and B. Both countries produce plate. The market for plate can be represented by the following functions:

$$Q^A_{\text{plate}} = 368 - 34 \cdot P^A_{\text{plate}}$$

$$Q^A_{\text{plate}} = 10 + 73 \cdot P^A_{\text{plate}}$$
$$Q^B_{\text{plate}} = 604 - 45 \cdot P^B_{\text{plate}}$$
$$Q^B_{\text{plate}} = 19 + 73 \cdot P^B_{\text{plate}}$$

Which economy imports the good and what is the amount of import?

Solution: Country B imports the good and the amount of import is 90.4489.

14. Problem

In a LARGE open economy the following functions describe the demand and supply of jigsaw:

$$Q^A_{\text{jigsaw}} = 598 - 41 \cdot P^A_{\text{jigsaw}}$$
$$Q^A_{\text{jigsaw}} = 4 + 50 \cdot P^A_{\text{jigsaw}}$$

In the rest of the world the demand for jigsaw can be witten as $Q^{\text{world}}_{\text{jigsaw}} = 674 - 24 \cdot P^{\text{world}}_{\text{jigsaw}}$ and the supply of jigsaw is given by $Q^{\text{world}}_{\text{jigsaw}} = 15 + 42 \cdot P^{\text{vilĂAg}}_{\text{jigsaw}}$. The two regions of the world trade actively but the importing region imposes 1.50 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the large open economy?

Solution: The change in the consumer surplus is 178.9001 units.

15. Problem

In country A $Q^A_{\text{blackcurrant}} = 437 - 9 \cdot P^A_{\text{blackcurrant}}$ describes the demand for blackcurrant and the supply of blackcurrant is given by $Q^A_{\text{blackcurrant}} = 11 + 7 \cdot P^A_{\text{blackcurrant}}$. In country B the following function characterizes the behavior of consumers in blackcurrant market $Q^B_{\text{blackcurrant}} = 752 - 20 \cdot P^B_{\text{blackcurrant}}$ and the supply of blackcurrant is written as $Q^B_{\text{blackcurrant}} = 17 + 6 \cdot P^B_{\text{blackcurrant}}$. The two regions of the world trade actively but the importing region imposes 0.31 units of specific tariff on the imported goods.

What is the welfare effect of the imposition of tariff in country A?

Solution: The imposition of tariff changes the welfare in country A by -2.8307 units.

16. Problem

The world consists of two economies A and B. Both countries produce scarf. The market for scarf can be represented by the following functions:

$$Q^A_{\text{scarf}} = 823 - 19 \cdot P^A_{\text{scarf}}$$
$$Q^A_{\text{scarf}} = 5 + 9 \cdot P^A_{\text{scarf}}$$
$$Q^B_{\text{scarf}} = 620 - 38 \cdot P^B_{\text{scarf}}$$
$$Q^B_{\text{scarf}} = 19 + 9 \cdot P^B_{\text{scarf}}$$

Determine the welfare effect of free trade in economy B.

Solution: The welfare effect of free trade in country B is -883.8542.

5.

17. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{backpack}} = 883 - 23 \cdot P^A_{\text{backpack}}$ describes the demand for backpack, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{backpack}} = 25 + 48 \cdot P^A_{\text{backpack}}$. In country B the functioning of backpack market can be described by the following formulas

$$Q^B_{\text{backpack}} = 453 - 34 \cdot P^B_{\text{backpack}}$$
$$Q^B_{\text{backpack}} = 22 + 71 \cdot P^B_{\text{backpack}}$$

The two economies trade with each other but the importing country imposes 0.95 units of specific tariff on the imported goods.

Which country exports backpack and what is the amount of export?

Solution: Country B exports the good and the amount of export is 297.7656.

18. Problem

In a LARGE open economy the following functions describe the demand and supply of tomato:

$$Q^A_{\text{tomato}} = 636 - 38 \cdot P^A_{\text{tomato}}$$
$$Q^A_{\text{tomato}} = 26 + 76 \cdot P^A_{\text{tomato}}$$

In the rest of the world the demand for tomato can be witten as $Q^{\text{world}}_{\text{tomato}} = 845 - 25 \cdot P^{\text{world}}_{\text{tomato}}$ and the supply of tomato is given by $Q^{\text{world}}_{\text{tomato}} = 21 + 12 \cdot P^{\text{vilĂAg}}_{\text{tomato}}$. The two regions of the world trade actively but the importing region imposes 3.83 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the large open economy?

Solution: The change in the welfare is -393.3432 units.

19. Problem

The world consists of two economies A and B. Both countries produce yoghurt. The market for yoghurt can be represented by the following functions:

$$Q^A_{\text{yoghurt}} = 502 - 22 \cdot P^A_{\text{yoghurt}}$$
$$Q^A_{\text{yoghurt}} = 22 + 68 \cdot P^A_{\text{yoghurt}}$$
$$Q^B_{\text{yoghurt}} = 876 - 35 \cdot P^B_{\text{yoghurt}}$$
$$Q^B_{\text{yoghurt}} = 24 + 13 \cdot P^B_{\text{yoghurt}}$$

Calculate the welfare effect of free trade in economy A.

Solution: The welfare effect of free trade in country A is -839.3573.

20. Problem

In a LARGE open economy the following functions describe the demand and supply of handbag:

$$Q^A_{\text{handbag}} = 535 - 21 \cdot P^A_{\text{handbag}}$$
$$Q^A_{\text{handbag}} = 24 + 68 \cdot P^A_{\text{handbag}}$$

In the rest of the world the demand for handbag can be witten as $Q^{\text{world}}_{\text{handbag}} = 510 - 38 \cdot P^{\text{world}}_{\text{handbag}}$ and the supply of handbag is given by $Q^{\text{world}}_{\text{handbag}} = 23 + 80 \cdot P^{\text{vilĂAg}}_{\text{handbag}}$. The two regions of the world trade actively but the importing region imposes 0.25 units of specific tariff on the imported goods.

Which region receives tariff revenue and what is the amount of this tariff revenue?

Solution: The large open economy imports the good thus the fiscal policy decision maker of the large open economy receives tariff revenue. The amount of tariff revenue is 17.3062 units.

In a LARGE open economy the following functions describe the demand and supply of necklace:

$$Q^A_{\text{necklace}} = 745 - 20 \cdot P^A_{\text{necklace}}$$
$$Q^A_{\text{necklace}} = 14 + 5 \cdot P^A_{\text{necklace}}$$

In the rest of the world the demand for necklace can be witten as $Q^{\text{world}}_{\text{necklace}} = 501 - 33 \cdot P^{\text{world}}_{\text{necklace}}$ and the supply of necklace is given by $Q^{\text{world}}_{\text{necklace}} = 21 + 38 \cdot P^{\text{vilĂĄg}}_{\text{necklace}}$. The two regions of the world trade actively but the importing region imposes 7.32 units of specific tariff on the imported goods.

Which region receives tariff revenue and what is the amount of this tariff revenue?

21. Problem

The world consists of two economies A and B. Both countries produce cappuccino. The market for cappuccino can be represented by the following functions:

$$Q^{A}_{\text{cappuccino}} = 660 - 27 \cdot P^{A}_{\text{cappuccino}}$$
$$Q^{A}_{\text{cappuccino}} = 28 + 39 \cdot P^{A}_{\text{cappuccino}}$$
$$Q^{B}_{\text{cappuccino}} = 475 - 34 \cdot P^{B}_{\text{cappuccino}}$$
$$Q^{B}_{\text{cappuccino}} = 4 + 33 \cdot P^{B}_{\text{cappuccino}}$$

What is the effect of free trade on consumer surplus in country B?

Solution: Free trade changes consumer surplus by 271.0051 in country B.

22. Problem

The world consists of two economies A and B. In country A $Q^{A}_{\text{aubergine}} = 622 - 29 \cdot P^{A}_{\text{aubergine}}$ describes the demand for aubergine, and the behavior of firms can be characterized by the following supply function $Q^{A}_{\text{aubergine}} = 2 + 10 \cdot P^{A}_{\text{aubergine}}$. In country B the functioning of aubergine market can be described by the following formulas

$$Q^{B}_{\text{aubergine}} = 457 - 13 \cdot P^{B}_{\text{aubergine}}$$
$$Q^{B}_{\text{aubergine}} = 9 + 10 \cdot P^{B}_{\text{aubergine}}$$

The two economies trade with each other but the importing country imposes 1.10 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country B relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by 4.0169 percent in country B.

23. Problem

The world consists of two economies A and B. Both countries produce pistachio. The market for pistachio can be represented by the following functions:

$$Q^A_{\text{pistachio}} = 558 - 22 \cdot P^A_{\text{pistachio}}$$
$$Q^A_{\text{pistachio}} = 7 + 60 \cdot P^A_{\text{pistachio}}$$
$$Q^B_{\text{pistachio}} = 734 - 33 \cdot P^B_{\text{pistachio}}$$
$$Q^B_{\text{pistachio}} = 17 + 54 \cdot P^B_{\text{pistachio}}$$

What effect does free trade have on the welfare of the world.

Solution: The welfare effect of free trade in the world is -1.4463.

24. Problem

In a LARGE open economy the following functions describe the demand and supply of bookshelf:

$$Q^A_{\text{bookshelf}} = 863 - 24 \cdot P^A_{\text{bookshelf}}$$
$$Q^A_{\text{bookshelf}} = 23 + 55 \cdot P^A_{\text{bookshelf}}$$

In the rest of the world the demand for bookshelf can be witten as $Q^{\text{world}}_{\text{bookshelf}} = 522 - 28 \cdot P^{\text{world}}_{\text{bookshelf}}$ and the supply of bookshelf is given by $Q^{\text{world}}_{\text{bookshelf}} = 4 + 47 \cdot P^{\text{vilĂAg}}_{\text{bookshelf}}$. The two regions of the world trade actively but the importing region imposes 0.51 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the rest of the world?

Solution: The change in the welfare is -34.9405 units.

25. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{almond}} = 653 - 5 \cdot P^A_{\text{almond}}$ describes the demand for almond, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{almond}} = 16 + 13 \cdot P^A_{\text{almond}}$. In country B the functioning of almond market can be described by the following formulas

$$Q^B_{\text{almond}} = 750 - 40 \cdot P^B_{\text{almond}}$$
$$Q^B_{\text{almond}} = 26 + 47 \cdot P^B_{\text{almond}}$$

The two economies trade with each other but the importing country imposes 6.28 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country A relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by 40.1440 percent in country A.

26. Problem

In a LARGE open economy the following functions describe the demand and supply of salad:

$$Q^A_{\text{salad}} = 726 - 21 \cdot P^A_{\text{salad}}$$
$$Q^A_{\text{salad}} = 22 + 81 \cdot P^A_{\text{salad}}$$

In the rest of the world the demand for salad can be witten as $Q^{\text{world}}_{\text{salad}} = 694 - 5 \cdot P^{\text{world}}_{\text{salad}}$ and the supply of salad is given by $Q^{\text{world}}_{\text{salad}} = 33 + 23 \cdot P^{\text{vilĂAg}}_{\text{salad}}$. The two regions of the world trade actively but the importing region imposes 7.60 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the large open economy?

Solution: The change in the welfare is -464.0954 units.

27. Problem

In a LARGE open economy the following functions describe the demand and supply of plate:

$$Q^A_{\text{plate}} = 880 - 45 \cdot P^A_{\text{plate}}$$
$$Q^A_{\text{plate}} = 6 + 63 \cdot P^A_{\text{plate}}$$

In the rest of the world the demand for plate can be witten as $Q^{\text{world}}_{\text{plate}} = 433 - 10 \cdot P^{\text{world}}_{\text{plate}}$ and the supply of plate is given by $Q^{\text{world}}_{\text{plate}} = 29 + 28 \cdot P^{\text{vilĂAg}}_{\text{plate}}$. The two regions of the world trade actively but the importing region imposes 0.90 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the large open economy?

Solution: The change in the consumer surplus is 115.1009 units.

28. Problem

The world consists of two economies A and B. Both countries produce orange. The market for orange can be represented by the following functions:

$$Q^A_{\text{orange}} = 709 - 6 \cdot P^A_{\text{orange}}$$
$$Q^A_{\text{orange}} = 31 + 64 \cdot P^A_{\text{orange}}$$
$$Q^B_{\text{orange}} = 596 - 15 \cdot P^B_{\text{orange}}$$
$$Q^B_{\text{orange}} = 28 + 78 \cdot P^B_{\text{orange}}$$

How does free trade change the producer surplus in country A?

5.

Solution: Free trade changes producer surplus by -1195.4382 in country A.

29. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{napkin}} = 381 - 9 \cdot P^A_{\text{napkin}}$ describes the demand for napkin, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{napkin}} = 31 + 8 \cdot P^A_{\text{napkin}}$. In country B the functioning of napkin market can be described by the following formulas

$$Q^B_{\text{napkin}} = 433 - 27 \cdot P^B_{\text{napkin}}$$
$$Q^B_{\text{napkin}} = 5 + 24 \cdot P^B_{\text{napkin}}$$

The two economies trade with each other but the importing country imposes 1.56 units of specific tariff on the imported goods.

What would have been the world price of X under free trade?

Solution: Under free trade the price of the good would have been 11.4412.

30. Problem

In a LARGE open economy the following functions describe the demand and supply of yoghurt:

$$Q^A_{\text{yoghurt}} = 464 - 15 \cdot P^A_{\text{yoghurt}}$$
$$Q^A_{\text{yoghurt}} = 15 + 35 \cdot P^A_{\text{yoghurt}}$$

In the rest of the world the demand for yoghurt can be witten as $Q^{\text{world}}_{\text{yoghurt}} = 533 - 30 \cdot P^{\text{world}}_{\text{yoghurt}}$ and the supply of yoghurt is given by $Q^{\text{world}}_{\text{yoghurt}} = 27 + 38 \cdot P^{\text{vilĂAg}}_{\text{yoghurt}}$. The two regions of the world trade actively but the importing region imposes 0.40 units of specific tariff on the imported goods.

Which region receives tariff revenue and what is the amount of this tariff revenue?

Solution: The large open economy imports the good thus the fiscal policy decision maker of the large open economy receives tariff revenue. The amount of tariff revenue is 13.1254 units.

31. Problem

The world consists of two economies A and B. Both countries produce necklace. The market for necklace can be represented by the following functions:

$$Q^A_{\text{necklace}} = 532 - 10 \cdot P^A_{\text{necklace}}$$
$$Q^A_{\text{necklace}} = 3 + 16 \cdot P^A_{\text{necklace}}$$
$$Q^B_{\text{necklace}} = 636 - 37 \cdot P^B_{\text{necklace}}$$
$$Q^B_{\text{necklace}} = 2 + 49 \cdot P^B_{\text{necklace}}$$

How does free trade change the producer surplus in country B?

Solution: Free trade changes producer surplus by -1316.2400 in country B.

32. Problem

In country A $Q^A_{\text{platform shoe}} = 757 - 42 \cdot P^A_{\text{platform shoe}}$ describes the demand for platform shoe and the supply of platform shoe is given by $Q^A_{\text{platform shoe}} = 23 + 48 \cdot P^A_{\text{platform shoe}}$. In country B the following function characterizes the behavior of consumers in platform shoe market $Q^B_{\text{platform shoe}} = 603 - 22 \cdot P^B_{\text{platform shoe}}$ and the supply of platform shoe is written as $Q^B_{\text{platform shoe}} = 17 + 31 \cdot P^B_{\text{platform shoe}}$. The two regions of the world trade actively but the importing region imposes 0.42 units of specific tariff on the imported goods.

How much does the imposition of tariff change the welfare of the world?

Solution: The imposition of tariff changes the welfare in the world by 44.5138 units.

33. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{pastry}} = 907 - 22 \cdot P^A_{\text{pastry}}$ describes the demand for pastry, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{pastry}} =$

$33 + 44 \cdot P^A_{\text{pastry}}$. In country B the functioning of pastry market can be described by the following formulas

$$Q^B_{\text{pastry}} = 858 - 29 \cdot P^B_{\text{pastry}}$$
$$Q^B_{\text{pastry}} = 32 + 54 \cdot P^B_{\text{pastry}}$$

The two economies trade with each other but the importing country imposes 0.70 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country B relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by -2.7176 percent in country B.

5.

34. Problem

The world consists of two economies A and B. Both countries produce coffee. The market for coffee can be represented by the following functions:

$$Q^A_{\text{coffee}} = 821 - 16 \cdot P^A_{\text{coffee}}$$
$$Q^A_{\text{coffee}} = 20 + 72 \cdot P^A_{\text{coffee}}$$
$$Q^B_{\text{coffee}} = 549 - 16 \cdot P^B_{\text{coffee}}$$
$$Q^B_{\text{coffee}} = 25 + 57 \cdot P^B_{\text{coffee}}$$

What is the world price of the good under free trade?

Solution: The world price under free trade is 8.2298.

35. Problem

In a LARGE open economy the following functions describe the demand and supply of platform shoe:

$$Q^A_{\text{platform shoe}} = 445 - 36 \cdot P^A_{\text{platform shoe}}$$
$$Q^A_{\text{platform shoe}} = 17 + 50 \cdot P^A_{\text{platform shoe}}$$

In the rest of the world the demand for platform shoe can be witten as $Q^{\text{world}}_{\text{platform shoe}} = 531 - 14 \cdot P^{\text{world}}_{\text{platform shoe}}$ and the supply of platform shoe is given by $Q^{\text{world}}_{\text{platform shoe}} = 26 + 9 \cdot P^{\text{vilĂAg}}_{\text{platform shoe}}$. The two regions of the world trade actively but the importing region imposes 8.17 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the large open economy?

Solution: The change in the producer surplus is -692.8242 units.

36. Problem

The world consists of two economies A and B. Both countries produce backpack. The market for backpack can be represented by the following functions:

$$Q^A_{\text{backpack}} = 423 - 40 \cdot P^A_{\text{backpack}}$$
$$Q^A_{\text{backpack}} = 26 + 68 \cdot P^A_{\text{backpack}}$$
$$Q^B_{\text{backpack}} = 473 - 36 \cdot P^B_{\text{backpack}}$$
$$Q^B_{\text{backpack}} = 10 + 22 \cdot P^B_{\text{backpack}}$$

What is the effect of free trade on consumer surplus in country A?

Solution: Free trade changes consumer surplus by 369.9800 in country A.

5.

37. Problem

In a LARGE open economy the following functions describe the demand and supply of cauliflower:

$$Q^A_{\text{cauliflower}} = 422 - 42 \cdot P^A_{\text{cauliflower}}$$
$$Q^A_{\text{cauliflower}} = 14 + 2 \cdot P^A_{\text{cauliflower}}$$

In the rest of the world the demand for cauliflower can be witten as $Q^{\text{world}}_{\text{cauliflower}} = 762 - 34 \cdot P^{\text{world}}_{\text{cauliflower}}$ and the supply of cauliflower is given by $Q^{\text{world}}_{\text{cauliflower}} = 2 + 17 \cdot P^{\text{vilĂAg}}_{\text{cauliflower}}$. The two regions of the world trade actively but the importing region imposes 1.25 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the rest of the world?

Solution: The change in the welfare is 197.7373 units.

38. Problem

The world consists of two economies A and B. Both countries produce onion. The market for onion can be represented by the following functions:

$$Q^A_{\text{onion}} = 897 - 45 \cdot P^A_{\text{onion}}$$
$$Q^A_{\text{onion}} = 31 + 20 \cdot P^A_{\text{onion}}$$
$$Q^B_{\text{onion}} = 537 - 42 \cdot P^B_{\text{onion}}$$
$$Q^B_{\text{onion}} = 14 + 56 \cdot P^B_{\text{onion}}$$

What is the effect of free trade on consumer surplus in country A?

Solution: Free trade changes consumer surplus by 1947.0393 in country A.

39. Problem

In a LARGE open economy the following functions describe the demand and supply of necklace:

$$Q^A_{\text{necklace}} = 496 - 16 \cdot P^A_{\text{necklace}}$$
$$Q^A_{\text{necklace}} = 31 + 79 \cdot P^A_{\text{necklace}}$$

In the rest of the world the demand for necklace can be witten as $Q^{\text{world}}_{\text{necklace}} = 851 - 11 \cdot P^{\text{world}}_{\text{necklace}}$ and the supply of necklace is given by $Q^{\text{world}}_{\text{necklace}} = 32 + 75 \cdot P^{\text{vilĂAg}}_{\text{necklace}}$. The two regions of the world trade actively but the importing region imposes 1.55 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the rest of the world?

Solution: The change in the welfare is 356.8927 units.

40. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{orange}} = 453 - 35 \cdot P^A_{\text{orange}}$ describes the demand for orange, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{orange}} = 6 + 13 \cdot P^A_{\text{orange}}$. In country B the functioning of orange market can be described by the following formulas

$$Q^B_{\text{orange}} = 764 - 42 \cdot P^B_{\text{orange}}$$
$$Q^B_{\text{orange}} = 26 + 4 \cdot P^B_{\text{orange}}$$

The two economies trade with each other but the importing country imposes 1.51 units of specific tariff on the imported goods.

Find the price of the good in country B.

Solution: The price of the good in country B is 13.3774.

41. Problem

The world consists of two economies A and B. Both countries produce fruit cake. The market for fruit cake can be represented by the following functions:

$$Q^A_{\text{fruit cake}} = 864 - 35 \cdot P^A_{\text{fruit cake}}$$
$$Q^A_{\text{fruit cake}} = 14 + 48 \cdot P^A_{\text{fruit cake}}$$
$$Q^B_{\text{fruit cake}} = 385 - 29 \cdot P^B_{\text{fruit cake}}$$
$$Q^B_{\text{fruit cake}} = 19 + 78 \cdot P^B_{\text{fruit cake}}$$

How does free trade change the producer surplus in country A?

5.

Solution: Free trade changes producer surplus by -1587.7897 in country A.

42. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{milkshake}} = 448 - 17 \cdot P^A_{\text{milkshake}}$ describes the demand for milkshake, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{milkshake}} = 29 + 46 \cdot P^A_{\text{milkshake}}$. In country B the functioning of milkshake market can be described by the following formulas

$$Q^B_{\text{milkshake}} = 801 - 13 \cdot P^B_{\text{milkshake}}$$
$$Q^B_{\text{milkshake}} = 15 + 68 \cdot P^B_{\text{milkshake}}$$

The two economies trade with each other but the importing country imposes 0.96 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country B relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by 5.0191 percent in country B.

43. Problem

In country A $Q^A_{\text{tea}} = 728 - 25 \cdot P^A_{\text{tea}}$ describes the demand for tea and the supply of tea is given by $Q^A_{\text{tea}} = 25 + 78 \cdot P^A_{\text{tea}}$. In country B the following function characterizes the behavior of consumers in tea market $Q^B_{\text{tea}} = 806 - 11 \cdot P^B_{\text{tea}}$ and the supply of tea is written as $Q^B_{\text{tea}} = 9 + 46 \cdot P^B_{\text{tea}}$. The two regions of the world trade actively but the importing region imposes 1.47 units of specific tariff on the imported goods.

How much does the imposition of tariff change the welfare of the world?

Solution: The imposition of tariff changes the welfare in the world by 406.3610 units.

44. Problem

The world consists of two economies A and B. Both countries produce pizza. The market for pizza can be represented by the following functions:

$$Q^A_{\text{pizza}} = 675 - 45 \cdot P^A_{\text{pizza}}$$
$$Q^A_{\text{pizza}} = 11 + 68 \cdot P^A_{\text{pizza}}$$
$$Q^B_{\text{pizza}} = 794 - 41 \cdot P^B_{\text{pizza}}$$
$$Q^B_{\text{pizza}} = 18 + 51 \cdot P^B_{\text{pizza}}$$

Which economy exports the good and what is the amount of export?

Solution: Country A exports the good and the amount of export is 129.7561.

45. Problem

In country A $Q^A_{\text{watermelon}} = 693 - 29 \cdot P^A_{\text{watermelon}}$ describes the demand for watermelon and the supply of watermelon is given by $Q^A_{\text{watermelon}} = 2 + 59 \cdot P^A_{\text{watermelon}}$. In country B the following function characterizes the behavior of consumers in watermelon market $Q^B_{\text{watermelon}} = 375 - 46 \cdot P^B_{\text{watermelon}}$ and the supply of watermelon is written as $Q^B_{\text{watermelon}} = 23 + 11 \cdot P^B_{\text{watermelon}}$. The two regions of the world trade actively but the importing region imposes 0.48 units of specific tariff on the imported goods.

How much does the imposition of tariff change the welfare of the world?

Solution: The imposition of tariff changes the welfare in the world by 14.7723 units.

46. Problem

In country A $Q^A_{\text{porridge}} = 881 - 20 \cdot P^A_{\text{porridge}}$ describes the demand for porridge and the supply of porridge is given by $Q^A_{\text{porridge}} = 32 + 7 \cdot P^A_{\text{porridge}}$. In country B the following function characterizes the behavior of consumers in porridge market $Q^B_{\text{porridge}} = 510 - 18 \cdot P^B_{\text{porridge}}$ and the supply of porridge is written as $Q^B_{\text{porridge}} = 8 + 52 \cdot P^B_{\text{porridge}}$. The two regions of the world trade actively but the importing region imposes 9.46 units of specific tariff on the imported goods.

What is the welfare effect of the imposition of tariff in country A?

Solution: The imposition of tariff changes the welfare in country A by 5329.9456 units.

47. Problem

The world consists of two economies A and B. Both countries produce peach. The market for peach can be represented by the following functions:

$$Q^A_{\text{peach}} = 789 - 22 \cdot P^A_{\text{peach}}$$
$$Q^A_{\text{peach}} = 19 + 30 \cdot P^A_{\text{peach}}$$
$$Q^B_{\text{peach}} = 452 - 45 \cdot P^B_{\text{peach}}$$
$$Q^B_{\text{peach}} = 25 + 52 \cdot P^B_{\text{peach}}$$

Calculate the welfare effect of free trade in economy A.

Solution: The welfare effect of free trade in country A is 1193.1116.

48. Problem

In country A $Q^A_{\text{milkshake}} = 793 - 15 \cdot P^A_{\text{milkshake}}$ describes the demand for milkshake and the supply of milkshake is given by $Q^A_{\text{milkshake}} = 2 + 69 \cdot P^A_{\text{milkshake}}$. In country B the following function characterizes the behavior of consumers in milkshake market $Q^B_{\text{milkshake}} = 623 - 29 \cdot P^B_{\text{milkshake}}$ and the supply of milkshake is written as $Q^B_{\text{milkshake}} = 25 + 78 \cdot P^B_{\text{milkshake}}$. The two regions of the world trade actively but the importing region imposes 1.14 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in country B?

Solution: The imposition of tariff changes the welfare in country B by -76.8627 units.

49. Problem

The world consists of two economies A and B. Both countries produce pistachio. The market for pistachio can be represented by the following functions:

$$Q^A_{\text{pistachio}} = 745 - 6 \cdot P^A_{\text{pistachio}}$$
$$Q^A_{\text{pistachio}} = 26 + 81 \cdot P^A_{\text{pistachio}}$$
$$Q^B_{\text{pistachio}} = 387 - 14 \cdot P^B_{\text{pistachio}}$$

$$Q^B_{\text{pistachio}} = 4 + 79 \cdot P^B_{\text{pistachio}}$$

How does free trade change the producer surplus in country B?

Solution: Free trade changes producer surplus by -818.6102 in country B.

50. Problem

5.

The world consists of two economies A and B. In country A $Q^A_{\text{jigsaw}} = 412 - 21 \cdot P^A_{\text{jigsaw}}$ describes the demand for jigsaw, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{jigsaw}} = 29 + 21 \cdot P^A_{\text{jigsaw}}$. In country B the functioning of jigsaw market can be described by the following formulas

$$Q^B_{\text{jigsaw}} = 815 - 6 \cdot P^B_{\text{jigsaw}}$$
$$Q^B_{\text{jigsaw}} = 17 + 79 \cdot P^B_{\text{jigsaw}}$$

The two economies trade with each other but the importing country imposes 0.06 units of specific tariff on the imported goods.

Determine the price of jigsaw in country A.

Solution: The price of the good in country A is 9.2591.

51. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{cappuccino}} = 386 - 41 \cdot P^A_{\text{cappuccino}}$ describes the demand for cappuccino, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{cappuccino}} = 30 + 58 \cdot P^A_{\text{cappuccino}}$. In country B the functioning of cappuccino market can be described by the following formulas

$$Q^B_{\text{cappuccino}} = 916 - 37 \cdot P^B_{\text{cappuccino}}$$
$$Q^B_{\text{cappuccino}} = 24 + 59 \cdot P^B_{\text{cappuccino}}$$

The two economies trade with each other but the importing country imposes 1.04 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country A relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by -8.0000 percent in country A.

52. Problem

In a LARGE open economy the following functions describe the demand and supply of blackcurrant:

$$Q^A_{\text{blackcurrant}} = 709 - 6 \cdot P^A_{\text{blackcurrant}}$$
$$Q^A_{\text{blackcurrant}} = 14 + 60 \cdot P^A_{\text{blackcurrant}}$$

In the rest of the world the demand for blackcurrant can be witten as $Q^{\text{world}}_{\text{blackcurrant}} = 408 - 34 \cdot P^{\text{world}}_{\text{blackcurrant}}$ and the supply of blackcurrant is given by $Q^{\text{world}}_{\text{blackcurrant}} = 5 + 36 \cdot P^{\text{vilĂĄg}}_{\text{blackcurrant}}$. The two regions of the world trade actively but the importing region imposes 1.79 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the large open economy?

Solution: The change in the producer surplus is -484.6636 units.

5.

53. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{milkshake}} = 720 - 16 \cdot P^A_{\text{milkshake}}$ describes the demand for milkshake, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{milkshake}} = 10 + 10 \cdot P^A_{\text{milkshake}}$. In country B the functioning of milkshake market can be described by the following formulas

$$Q^B_{\text{milkshake}} = 433 - 37 \cdot P^B_{\text{milkshake}}$$
$$Q^B_{\text{milkshake}} = 16 + 81 \cdot P^B_{\text{milkshake}}$$

The two economies trade with each other but the importing country imposes 8.77 units of specific tariff on the imported goods.

Find the price of the good in country B.

Solution: The price of the good in country B is 6.2429.

54. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{lime}} = 422 - 28 \cdot P^A_{\text{lime}}$ describes the demand for lime, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{lime}} = 14 + 70 \cdot P^A_{\text{lime}}$. In country B the functioning of lime market can be described by the following formulas

$$Q^B_{\text{lime}} = 722 - 8 \cdot P^B_{\text{lime}}$$
$$Q^B_{\text{lime}} = 23 + 75 \cdot P^B_{\text{lime}}$$

The two economies trade with each other but the importing country imposes 1.08 units of specific tariff on the imported goods.

Find the price of the good in country B.

Solution: The price of the good in country B is 6.7008.

55. Problem

5.

In country A $Q^A_{\text{necklace}} = 590 - 17 \cdot P^A_{\text{necklace}}$ describes the demand for necklace and the supply of necklace is given by $Q^A_{\text{necklace}} = 23 + 70 \cdot P^A_{\text{necklace}}$. In country B the following function characterizes the behavior of consumers in necklace market $Q^B_{\text{necklace}} = 672 - 43 \cdot P^B_{\text{necklace}}$ and the supply of necklace is written as $Q^B_{\text{necklace}} = 12 + 23 \cdot P^B_{\text{necklace}}$. The two regions of the world trade actively but the importing region imposes 0.79 units of specific tariff on the imported goods.

How much does the imposition of tariff change the welfare of the world?

Solution: The imposition of tariff changes the welfare in the world by 92.4008 units.

56. Problem

In a LARGE open economy the following functions describe the demand and supply of milkshake:

$$Q^A_{\text{milkshake}} = 455 - 31 \cdot P^A_{\text{milkshake}}$$
$$Q^A_{\text{milkshake}} = 15 + 15 \cdot P^A_{\text{milkshake}}$$

In the rest of the world the demand for milkshake can be witten as $Q^{\text{world}}_{\text{milkshake}} = 875 - 17 \cdot P^{\text{world}}_{\text{milkshake}}$ and the supply of milkshake is given by $Q^{\text{world}}_{\text{milkshake}} = 7 + 6 \cdot P^{\text{vilĂAg}}_{\text{milkshake}}$. The two regions of the world trade actively but the importing region imposes 8.26 units of specific tariff on the imported goods.

Which region receives tariff revenue and what is the amount of this tariff revenue?

Solution: The rest of the world imports the good thus the fiscal policy decision maker of the rest of the world receives tariff revenue. The amount of tariff revenue is 2522.1635 units.

57. Problem

The world consists of two economies A and B. Both countries produce ice cream. The market for ice cream can be represented by the following functions:

$$Q^A_{\text{ice cream}} = 747 - 43 \cdot P^A_{\text{ice cream}}$$
$$Q^A_{\text{ice cream}} = 2 + 8 \cdot P^A_{\text{ice cream}}$$
$$Q^B_{\text{ice cream}} = 856 - 30 \cdot P^B_{\text{ice cream}}$$
$$Q^B_{\text{ice cream}} = 17 + 11 \cdot P^B_{\text{ice cream}}$$

Which economy exports the good and what is the amount of export?

Solution: Country A exports the good and the amount of export is 133.0870.

58. Problem

The world consists of two economies A and B. Both countries produce milkshake. The market for milkshake can be represented by the following functions:

$$Q^A_{\text{milkshake}} = 393 - 7 \cdot P^A_{\text{milkshake}}$$
$$Q^A_{\text{milkshake}} = 30 + 81 \cdot P^A_{\text{milkshake}}$$
$$Q^B_{\text{milkshake}} = 670 - 12 \cdot P^B_{\text{milkshake}}$$
$$Q^B_{\text{milkshake}} = 2 + 41 \cdot P^B_{\text{milkshake}}$$

Determine the welfare effect of free trade in economy B.

Solution: The welfare effect of free trade in country B is 742.0601.

59. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{cauliflower}} = 385 - 46 \cdot P^A_{\text{cauliflower}}$ describes the demand for cauliflower, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{cauliflower}} = 30 + 39 \cdot P^A_{\text{cauliflower}}$. In country B the functioning of cauliflower market can be described by the following formulas

$$Q^B_{\text{cauliflower}} = 858 - 32 \cdot P^B_{\text{cauliflower}}$$
$$Q^B_{\text{cauliflower}} = 17 + 73 \cdot P^B_{\text{cauliflower}}$$

The two economies trade with each other but the importing country imposes 0.79 units of specific tariff on the imported goods.

What would have been the world price of X under free trade?

Solution: Under free trade the price of the good would have been 6.2947.

60. Problem

The world consists of two economies A and B. Both countries produce cabbage. The market for cabbage can be represented by the following functions:

$$Q^A_{\text{cabbage}} = 725 - 15 \cdot P^A_{\text{cabbage}}$$
$$Q^A_{\text{cabbage}} = 17 + 72 \cdot P^A_{\text{cabbage}}$$
$$Q^B_{\text{cabbage}} = 507 - 47 \cdot P^B_{\text{cabbage}}$$
$$Q^B_{\text{cabbage}} = 33 + 24 \cdot P^B_{\text{cabbage}}$$

What is the effect of free trade on consumer surplus in country B?

Solution: Free trade changes consumer surplus by 140.3110 in country B.

61. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{handbag}} = 709 - 11 \cdot P^A_{\text{handbag}}$ describes the demand for handbag, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{handbag}} = 14 + 33 \cdot P^A_{\text{handbag}}$. In country B the functioning of handbag market can be described by the following formulas

$$Q^B_{\text{handbag}} = 798 - 38 \cdot P^B_{\text{handbag}}$$
$$Q^B_{\text{handbag}} = 26 + 18 \cdot P^B_{\text{handbag}}$$

The two economies trade with each other but the importing country imposes 0.59 units of specific tariff on the imported goods.

Which country imports handbag and what is the amount of import?

Solution: Country A imports the good and the amount of import is 34.9824.

62. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{pastry}} = 844 - 26 \cdot P^A_{\text{pastry}}$ describes the demand for pastry, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{pastry}} = 16 + 41 \cdot P^A_{\text{pastry}}$. In country B the functioning of pastry market can be described by the following formulas

$$Q^B_{\text{pastry}} = 736 - 13 \cdot P^B_{\text{pastry}}$$
$$Q^B_{\text{pastry}} = 15 + 15 \cdot P^B_{\text{pastry}}$$

The two economies trade with each other but the importing country imposes 2.08 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country B relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

5.

Solution: The imposition of tariff changes the price of the good by 8.9968 percent in country B.

63. Problem

The world consists of two economies A and B. Both countries produce mint tea. The market for mint tea can be represented by the following functions:

$$Q^A_{\text{mint tea}} = 614 - 17 \cdot P^A_{\text{mint tea}}$$
$$Q^A_{\text{mint tea}} = 9 + 5 \cdot P^A_{\text{mint tea}}$$
$$Q^B_{\text{mint tea}} = 535 - 11 \cdot P^B_{\text{mint tea}}$$
$$Q^B_{\text{mint tea}} = 18 + 23 \cdot P^B_{\text{mint tea}}$$

Calculate the welfare effect of free trade in economy A.

Solution: The welfare effect of free trade in country A is 612.8712.

64. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{onion}} = 843 - 16 \cdot P^A_{\text{onion}}$ describes the demand for onion, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{onion}} = 8 + 76 \cdot P^A_{\text{onion}}$. In country B the functioning of onion market can be described by the following formulas

$$Q^B_{\text{onion}} = 590 - 27 \cdot P^B_{\text{onion}}$$
$$Q^B_{\text{onion}} = 20 + 47 \cdot P^B_{\text{onion}}$$

The two economies trade with each other but the importing country imposes 0.34 units of specific tariff on the imported goods.

Find the price of the good in country B.

Solution: The price of the good in country B is 8.2754.

65. Problem

5.

The world consists of two economies A and B. In country A $Q^A_{\text{spring onion}} = 432 - 46 \cdot P^A_{\text{spring onion}}$ describes the demand for spring onion, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{spring onion}} = 24 + 53 \cdot P^A_{\text{spring onion}}$. In country B the functioning of spring onion market can be described by the following formulas

$$Q^B_{\text{spring onion}} = 566 - 46 \cdot P^B_{\text{spring onion}}$$
$$Q^B_{\text{spring onion}} = 14 + 81 \cdot P^B_{\text{spring onion}}$$

The two economies trade with each other but the importing country imposes 0.03 units of specific tariff on the imported goods.

Which country exports spring onion and what is the amount of export?

Solution: Country A exports the good and the amount of export is 10.8620.

66. Problem

In a LARGE open economy the following functions describe the demand and supply of food processor:

$$Q^A_{\text{food processor}} = 900 - 20 \cdot P^A_{\text{food processor}}$$
$$Q^A_{\text{food processor}} = 17 + 58 \cdot P^A_{\text{food processor}}$$

In the rest of the world the demand for food processor can be witten as $Q^{\text{world}}_{\text{food processor}} = 514 - 20 \cdot P^{\text{world}}_{\text{food processor}}$ and the supply of food processor is given by $Q^{\text{world}}_{\text{food processor}} = 13 + 58 \cdot P^{\text{vilÃĄg}}_{\text{food processor}}$. The two regions of the world trade actively but the importing region imposes 0.59 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the large open economy?

Solution: The change in the producer surplus is -159.3351 units.

67. Problem

In country A $Q^A_{\text{salad}} = 576 - 47 \cdot P^A_{\text{salad}}$ describes the demand for salad and the supply of salad is given by $Q^A_{\text{salad}} = 17 + 48 \cdot P^A_{\text{salad}}$. In country B the following function characterizes the behavior of consumers in salad market $Q^B_{\text{salad}} = 870 - 20 \cdot P^B_{\text{salad}}$ and the supply of salad is written as $Q^B_{\text{salad}} = 9 + 24 \cdot P^B_{\text{salad}}$. The two regions of the world trade actively but the importing region imposes 6.83 units of specific tariff on the imported goods.

How much does the imposition of tariff change the welfare of the world?

Solution: The imposition of tariff changes the welfare in the world by 2181.6103 units.

5.

68. Problem

The world consists of two economies A and B. Both countries produce cauliflower. The market for cauliflower can be represented by the following functions:

$$Q^A_{\text{cauliflower}} = 692 - 17 \cdot P^A_{\text{cauliflower}}$$
$$Q^A_{\text{cauliflower}} = 21 + 6 \cdot P^A_{\text{cauliflower}}$$
$$Q^B_{\text{cauliflower}} = 910 - 26 \cdot P^B_{\text{cauliflower}}$$
$$Q^B_{\text{cauliflower}} = 18 + 24 \cdot P^B_{\text{cauliflower}}$$

What is the effect of free trade on consumer surplus in country B?

Solution: Free trade changes consumer surplus by 1427.4463 in country B.

69. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{banana}} = 821 - 47 \cdot P^A_{\text{banana}}$ describes the demand for banana, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{banana}} = 13 + 43 \cdot P^A_{\text{banana}}$. In country B the functioning of banana market can be described by the following formulas

$$Q^B_{\text{banana}} = 830 - 8 \cdot P^B_{\text{banana}}$$
$$Q^B_{\text{banana}} = 8 + 23 \cdot P^B_{\text{banana}}$$

The two economies trade with each other but the importing country imposes 8.87 units of specific tariff on the imported goods.

Which country exports banana and what is the amount of export?

Solution: Country A exports the good and the amount of export is 199.8736.

70. Problem

The world consists of two economies A and B. Both countries produce shampoo. The market for shampoo can be represented by the following functions:

$$Q^A_{\text{shampoo}} = 396 - 39 \cdot P^A_{\text{shampoo}}$$
$$Q^A_{\text{shampoo}} = 14 + 8 \cdot P^A_{\text{shampoo}}$$
$$Q^B_{\text{shampoo}} = 882 - 36 \cdot P^B_{\text{shampoo}}$$
$$Q^B_{\text{shampoo}} = 24 + 34 \cdot P^B_{\text{shampoo}}$$

5.

Determine the welfare effect of free trade in economy B.

Solution: The welfare effect of free trade in country B is 96.3127.

71. Problem

The world consists of two economies A and B. Both countries produce handbag. The market for handbag can be represented by the following functions:

$$Q^A_{\text{handbag}} = 400 - 45 \cdot P^A_{\text{handbag}}$$
$$Q^A_{\text{handbag}} = 8 + 24 \cdot P^A_{\text{handbag}}$$
$$Q^B_{\text{handbag}} = 717 - 6 \cdot P^B_{\text{handbag}}$$
$$Q^B_{\text{handbag}} = 19 + 57 \cdot P^B_{\text{handbag}}$$

What effect does free trade have on the welfare of the world.

Solution: The welfare effect of free trade in the world is 21.8103.

72. Problem

The world consists of two economies A and B. Both countries produce food processor. The market for food processor can be represented by the following functions:

$$Q^A_{\text{food processor}} = 670 - 10 \cdot P^A_{\text{food processor}}$$

$$Q^A_{\text{food processor}} = 3 + 76 \cdot P^A_{\text{food processor}}$$
$$Q^B_{\text{food processor}} = 836 - 43 \cdot P^B_{\text{food processor}}$$
$$Q^B_{\text{food processor}} = 13 + 55 \cdot P^B_{\text{food processor}}$$

What effect does free trade have on the welfare of the world.

Solution: The welfare effect of free trade in the world is -0.6159.

The world consists of two economies A and B. Both countries produce lemonade. The market for lemonade can be represented by the following functions:

$$Q^A_{\text{lemonade}} = 429 - 46 \cdot P^A_{\text{lemonade}}$$
$$Q^A_{\text{lemonade}} = 12 + 56 \cdot P^A_{\text{lemonade}}$$
$$Q^B_{\text{lemonade}} = 909 - 11 \cdot P^B_{\text{lemonade}}$$
$$Q^B_{\text{lemonade}} = 14 + 78 \cdot P^B_{\text{lemonade}}$$

What effect does free trade have on the welfare of the world.

Solution: The welfare effect of free trade in the world is

73. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{mint tea}} = 773 - 7 \cdot P^A_{\text{mint tea}}$ describes the demand for mint tea, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{mint tea}} = 17 + 58 \cdot P^A_{\text{mint tea}}$. In country B the functioning of mint tea market can be described by the following formulas

$$Q^B_{\text{mint tea}} = 812 - 40 \cdot P^B_{\text{mint tea}}$$
$$Q^B_{\text{mint tea}} = 23 + 41 \cdot P^B_{\text{mint tea}}$$

The two economies trade with each other but the importing country imposes 0.25 units of specific tariff on the imported goods.

Which country exports mint tea and what is the amount of export?

Solution: Country B exports the good and the amount of export is 59.1421.

74. Problem

In country A $Q^A_{\text{soup}} = 401 - 19 \cdot P^A_{\text{soup}}$ describes the demand for soup and the supply of soup is given by $Q^A_{\text{soup}} = 9 + 46 \cdot P^A_{\text{soup}}$. In country B the following function characterizes the behavior of consumers in soup market $Q^B_{\text{soup}} = 770 - 27 \cdot P^B_{\text{soup}}$ and the supply of soup is written as $Q^B_{\text{soup}} = 25 + 65 \cdot P^B_{\text{soup}}$. The two regions of the world trade actively but the importing region imposes 0.57 units of specific tariff on the imported goods.

What is the welfare effect of the imposition of tariff in country A?

Solution: The imposition of tariff changes the welfare in country A by -22.6718 units.

75. Problem

5.

The world consists of two economies A and B. Both countries produce yoghurt. The market for yoghurt can be represented by the following functions:

$$Q^A_{\text{yoghurt}} = 645 - 24 \cdot P^A_{\text{yoghurt}}$$
$$Q^A_{\text{yoghurt}} = 13 + 47 \cdot P^A_{\text{yoghurt}}$$
$$Q^B_{\text{yoghurt}} = 582 - 33 \cdot P^B_{\text{yoghurt}}$$
$$Q^B_{\text{yoghurt}} = 3 + 46 \cdot P^B_{\text{yoghurt}}$$

What effect does free trade have on the welfare of the world.

Solution: The welfare effect of free trade in the world is 2.4651.

76. Problem

In a LARGE open economy the following functions describe the demand and supply of almond:

$$Q^A_{\text{almond}} = 649 - 18 \cdot P^A_{\text{almond}}$$
$$Q^A_{\text{almond}} = 2 + 57 \cdot P^A_{\text{almond}}$$

In the rest of the world the demand for almond can be witten as $Q^{\text{world}}_{\text{almond}} = 857 - 39 \cdot P^{\text{world}}_{\text{almond}}$ and the supply of almond is given by $Q^{\text{world}}_{\text{almond}} = 7 + 56 \cdot P^{\text{vilĂAg}}_{\text{almond}}$. The two regions of the world trade actively but the importing region imposes 0.09 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the large open economy?

Solution: The change in the welfare is -0.5812 units.

77. Problem

In a LARGE open economy the following functions describe the demand and supply of banana:

$$Q^A_{\text{banana}} = 835 - 19 \cdot P^A_{\text{banana}}$$
$$Q^A_{\text{banana}} = 3 + 58 \cdot P^A_{\text{banana}}$$

In the rest of the world the demand for banana can be witten as $Q^{\text{world}}_{\text{banana}} = 726 - 12 \cdot P^{\text{world}}_{\text{banana}}$ and the supply of banana is given by $Q^{\text{world}}_{\text{banana}} = 17 + 14 \cdot P^{\text{vilĂAg}}_{\text{banana}}$. The two regions of the world trade actively but the importing region imposes 4.06 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the rest of the world?

5.

Solution: The change in the producer surplus is -751.8126 units.

78. Problem

The world consists of two economies A and B. Both countries produce jigsaw. The market for jigsaw can be represented by the following functions:

$$Q^A_{\text{jigsaw}} = 441 - 43 \cdot P^A_{\text{jigsaw}}$$
$$Q^A_{\text{jigsaw}} = 17 + 11 \cdot P^A_{\text{jigsaw}}$$
$$Q^B_{\text{jigsaw}} = 628 - 20 \cdot P^B_{\text{jigsaw}}$$
$$Q^B_{\text{jigsaw}} = 8 + 65 \cdot P^B_{\text{jigsaw}}$$

How does free trade change the producer surplus in country B?

Solution: Free trade changes producer surplus by -105.9880 in country B.

79. Problem

In a LARGE open economy the following functions describe the demand and supply of blackcurrant:

$$Q^A_{\text{blackcurrant}} = 539 - 26 \cdot P^A_{\text{blackcurrant}}$$
$$Q^A_{\text{blackcurrant}} = 6 + 15 \cdot P^A_{\text{blackcurrant}}$$

In the rest of the world the demand for blackcurrant can be witten as $Q^{\text{world}}_{\text{blackcurrant}} = 922 - 34 \cdot P^{\text{world}}_{\text{blackcurrant}}$ and the supply of blackcurrant is given by $Q^{\text{world}}_{\text{blackcurrant}} = 3 + 24 \cdot P^{\text{vilĂAg}}_{\text{blackcurrant}}$. The two regions of the world trade actively but the importing region imposes 0.39 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the rest of the world?

Solution: The change in the consumer surplus is 67.9313 units.

80. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{watermelon}} = 525 - 5 \cdot P^A_{\text{watermelon}}$ describes the demand for watermelon, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{watermelon}} = 14 + 38 \cdot P^A_{\text{watermelon}}$. In country B the functioning of watermelon market can be described by the following formulas

$$Q^B_{\text{watermelon}} = 740 - 42 \cdot P^B_{\text{watermelon}}$$
$$Q^B_{\text{watermelon}} = 19 + 26 \cdot P^B_{\text{watermelon}}$$

The two economies trade with each other but the importing country imposes 0.30 units of specific tariff on the imported goods.

Which country imports watermelon and what is the amount of import?

Solution: Country A imports the good and the amount of import is 25.8360.

81. Problem

In a LARGE open economy the following functions describe the demand and supply of wine glass:

$$Q^A_{\text{wine glass}} = 486 - 18 \cdot P^A_{\text{wine glass}}$$
$$Q^A_{\text{wine glass}} = 2 + 61 \cdot P^A_{\text{wine glass}}$$

In the rest of the world the demand for wine glass can be witten as $Q^{\text{world}}_{\text{wine glass}} = 556 - 40 \cdot P^{\text{world}}_{\text{wine glass}}$ and the supply of wine glass is given by $Q^{\text{world}}_{\text{wine glass}} = 16 + 5 \cdot P^{\text{vilĂĄg}}_{\text{wine glass}}$. The two regions of the world trade actively but the importing region imposes 1.83 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the rest of the world?

Solution: The change in the consumer surplus is 235.9285 units.

82. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{brioche}} = 403 - 36 \cdot P^A_{\text{brioche}}$ describes the demand for brioche, and the behavior of firms can be characterized by the following supply function

$Q^A_{\text{brioche}} = 28 + 46 \cdot P^A_{\text{brioche}}$. In country B the functioning of brioche market can be described by the following formulas

$$Q^B_{\text{brioche}} = 682 - 25 \cdot P^B_{\text{brioche}}$$
$$Q^B_{\text{brioche}} = 18 + 29 \cdot P^B_{\text{brioche}}$$

The two economies trade with each other but the importing country imposes 1.68 units of specific tariff on the imported goods.

Determine the price of brioche in country A.

Solution: The price of the good in country A is 6.9726.

83. Problem

In a LARGE open economy the following functions describe the demand and supply of paper clip:

$$Q^A_{\text{paper clip}} = 801 - 34 \cdot P^A_{\text{paper clip}}$$
$$Q^A_{\text{paper clip}} = 9 + 30 \cdot P^A_{\text{paper clip}}$$

In the rest of the world the demand for paper clip can be witten as $Q^{\text{world}}_{\text{paper clip}} = 802 - 42 \cdot P^{\text{world}}_{\text{paper clip}}$ and the supply of paper clip is given by $Q^{\text{world}}_{\text{paper clip}} = 30 + 23 \cdot P^{\text{vilĂAg}}_{\text{paper clip}}$. The two regions of the world trade actively but the importing region imposes 0.11 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the large open economy?

Solution: The change in the consumer surplus is 21.4966 units.

84. Problem

In a LARGE open economy the following functions describe the demand and supply of backpack:

$$Q^A_{\text{backpack}} = 430 - 6 \cdot P^A_{\text{backpack}}$$
$$Q^A_{\text{backpack}} = 22 + 69 \cdot P^A_{\text{backpack}}$$

In the rest of the world the demand for backpack can be witten as $Q^{\text{world}}_{\text{backpack}} = 872 - 29 \cdot P^{\text{world}}_{\text{backpack}}$ and the supply of backpack is given by $Q^{\text{world}}_{\text{backpack}} = 18 + 44 \cdot P^{\text{vilĂAg}}_{\text{backpack}}$. The two regions of the world trade actively but the importing region imposes 2.35 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the rest of the world?

Solution: The change in the welfare is 563.7499 units.

85. Problem

The world consists of two economies A and B. Both countries produce aubergine. The market for aubergine can be represented by the following functions:

$$Q^A_{\text{aubergine}} = 816 - 21 \cdot P^A_{\text{aubergine}}$$
$$Q^A_{\text{aubergine}} = 22 + 10 \cdot P^A_{\text{aubergine}}$$
$$Q^B_{\text{aubergine}} = 694 - 16 \cdot P^B_{\text{aubergine}}$$
$$Q^B_{\text{aubergine}} = 8 + 6 \cdot P^B_{\text{aubergine}}$$

What is the world price of the good under free trade?

Solution: The world price under free trade is 27.9245.

86. Problem

The world consists of two economies A and B. Both countries produce peach. The market for peach can be represented by the following functions:

$$Q^A_{\text{peach}} = 461 - 42 \cdot P^A_{\text{peach}}$$
$$Q^A_{\text{peach}} = 27 + 44 \cdot P^A_{\text{peach}}$$
$$Q^B_{\text{peach}} = 457 - 8 \cdot P^B_{\text{peach}}$$
$$Q^B_{\text{peach}} = 19 + 51 \cdot P^B_{\text{peach}}$$

What is the world price of the good under free trade?

Solution: The world price under free trade is 6.0138.

87. Problem

The world consists of two economies A and B. Both countries produce fruit cake. The market for fruit cake can be represented by the following functions:

$$Q^A_{\text{fruit cake}} = 725 - 12 \cdot P^A_{\text{fruit cake}}$$
$$Q^A_{\text{fruit cake}} = 20 + 24 \cdot P^A_{\text{fruit cake}}$$
$$Q^B_{\text{fruit cake}} = 728 - 23 \cdot P^B_{\text{fruit cake}}$$

$$Q^B_{\text{fruit cake}} = 9 + 7 \cdot P^B_{\text{fruit cake}}$$

How does free trade change the producer surplus in country B?

Solution: Free trade changes producer surplus by -402.6255 in country B.

88. Problem

The world consists of two economies A and B. Both countries produce necklace. The market for necklace can be represented by the following functions:

$$Q^A_{\text{necklace}} = 442 - 20 \cdot P^A_{\text{necklace}}$$
$$Q^A_{\text{necklace}} = 14 + 60 \cdot P^A_{\text{necklace}}$$
$$Q^B_{\text{necklace}} = 530 - 31 \cdot P^B_{\text{necklace}}$$
$$Q^B_{\text{necklace}} = 21 + 79 \cdot P^B_{\text{necklace}}$$

What is the world price of the good under free trade?

Solution: The world price under free trade is 4.9316.

89. Problem

In a LARGE open economy the following functions describe the demand and supply of hairdryer:

$$Q^A_{\text{hairdryer}} = 905 - 30 \cdot P^A_{\text{hairdryer}}$$
$$Q^A_{\text{hairdryer}} = 11 + 75 \cdot P^A_{\text{hairdryer}}$$

In the rest of the world the demand for hairdryer can be witten as $Q^{\text{world}}_{\text{hairdryer}} = 742 - 20 \cdot P^{\text{world}}_{\text{hairdryer}}$ and the supply of hairdryer is given by $Q^{\text{world}}_{\text{hairdryer}} = 13 + 37 \cdot P^{\text{vilĂAg}}_{\text{hairdryer}}$. The two regions of the world trade actively but the importing region imposes 1.77 units of specific tariff on the imported goods.

Which region receives tariff revenue and what is the amount of this tariff revenue?

Solution: The rest of the world imports the good thus the fiscal policy decision maker of the rest of the world receives tariff revenue. The amount of tariff revenue is 163.8184 units.

5.

90. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{coffee cup}} = 509 - 37 \cdot P^A_{\text{coffee cup}}$ describes the demand for coffee cup, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{coffee cup}} = 16 + 26 \cdot P^A_{\text{coffee cup}}$. In country B the functioning of coffee cup market can be described by the following formulas

$$Q^B_{\text{coffee cup}} = 788 - 12 \cdot P^B_{\text{coffee cup}}$$
$$Q^B_{\text{coffee cup}} = 5 + 9 \cdot P^B_{\text{coffee cup}}$$

The two economies trade with each other but the importing country imposes 6.85 units of specific tariff on the imported goods.

5.

Which country imports coffee cup and what is the amount of import?

Solution: Country B imports the good and the amount of import is 356.1125.

91. Problem

The world consists of two economies A and B. Both countries produce teapot. The market for teapot can be represented by the following functions:

$$Q^A_{\text{teapot}} = 817 - 38 \cdot P^A_{\text{teapot}}$$
$$Q^A_{\text{teapot}} = 7 + 64 \cdot P^A_{\text{teapot}}$$
$$Q^B_{\text{teapot}} = 731 - 24 \cdot P^B_{\text{teapot}}$$
$$Q^B_{\text{teapot}} = 2 + 19 \cdot P^B_{\text{teapot}}$$

Which economy imports the good and what is the amount of import?

Solution: Country B imports the good and the amount of import is 272.6069.

92. Problem

In a LARGE open economy the following functions describe the demand and supply of sweetcorn:

$$Q^A_{\text{sweetcorn}} = 497 - 46 \cdot P^A_{\text{sweetcorn}}$$
$$Q^A_{\text{sweetcorn}} = 9 + 5 \cdot P^A_{\text{sweetcorn}}$$

In the rest of the world the demand for sweetcorn can be witten as $Q^{\text{world}}_{\text{sweetcorn}} = 903 - 44 \cdot P^{\text{world}}_{\text{sweetcorn}}$ and the supply of sweetcorn is given by $Q^{\text{world}}_{\text{sweetcorn}} = 29 + 15 \cdot P^{\text{vilĂAg}}_{\text{sweetcorn}}$. The two regions of the world trade actively but the importing region imposes 1.80 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the large open economy?

Solution: The change in the producer surplus is -66.1292 units.

93. Problem

The world consists of two economies A and B. Both countries produce necklace. The market for necklace can be represented by the following functions:

$$Q^{A}_{\text{necklace}} = 891 - 39 \cdot P^{A}_{\text{necklace}}$$
$$Q^{A}_{\text{necklace}} = 29 + 51 \cdot P^{A}_{\text{necklace}}$$
$$Q^{B}_{\text{necklace}} = 459 - 26 \cdot P^{B}_{\text{necklace}}$$
$$Q^{B}_{\text{necklace}} = 1 + 53 \cdot P^{B}_{\text{necklace}}$$

Determine the welfare effect of free trade in economy B.

Solution: The welfare effect of free trade in country B is -160.0897.

94. Problem

The world consists of two economies A and B. Both countries produce hairspray. The market for hairspray can be represented by the following functions:

$$Q^{A}_{\text{hairspray}} = 912 - 22 \cdot P^{A}_{\text{hairspray}}$$
$$Q^{A}_{\text{hairspray}} = 17 + 77 \cdot P^{A}_{\text{hairspray}}$$
$$Q^{B}_{\text{hairspray}} = 765 - 9 \cdot P^{B}_{\text{hairspray}}$$
$$Q^{B}_{\text{hairspray}} = 11 + 18 \cdot P^{B}_{\text{hairspray}}$$

What is the world price of the good under free trade?

Solution: The world price under free trade is 13.0873.

95. Problem

The world consists of two economies A and B. Both countries produce wooden spoon. The market for wooden spoon can be represented by the following functions:

$$Q^A_{\text{wooden spoon}} = 673 - 33 \cdot P^A_{\text{wooden spoon}}$$
$$Q^A_{\text{wooden spoon}} = 8 + 61 \cdot P^A_{\text{wooden spoon}}$$
$$Q^B_{\text{wooden spoon}} = 702 - 23 \cdot P^B_{\text{wooden spoon}}$$
$$Q^B_{\text{wooden spoon}} = 20 + 74 \cdot P^B_{\text{wooden spoon}}$$

5.

What is the effect of free trade on consumer surplus in country B?

Solution: Free trade changes consumer surplus by 11.5721 in country B.

96. Problem

In country A $Q^A_{\text{muffin}} = 904 - 28 \cdot P^A_{\text{muffin}}$ describes the demand for muffin and the supply of muffin is given by $Q^A_{\text{muffin}} = 23 + 76 \cdot P^A_{\text{muffin}}$. In country B the following function characterizes the behavior of consumers in muffin market $Q^B_{\text{muffin}} = 382 - 22 \cdot P^B_{\text{muffin}}$ and the supply of muffin is written as $Q^B_{\text{muffin}} = 29 + 14 \cdot P^B_{\text{muffin}}$. The two regions of the world trade actively but the importing region imposes 0.73 units of specific tariff on the imported goods.

What is the welfare effect of the imposition of tariff in country A?

Solution: The imposition of tariff changes the welfare in country A by -4.8664 units.

97. Problem

The world consists of two economies A and B. Both countries produce hot chocolate. The market for hot chocolate can be represented by the following functions:

$$Q^A_{\text{hot chocolate}} = 494 - 31 \cdot P^A_{\text{hot chocolate}}$$
$$Q^A_{\text{hot chocolate}} = 15 + 39 \cdot P^A_{\text{hot chocolate}}$$
$$Q^B_{\text{hot chocolate}} = 717 - 15 \cdot P^B_{\text{hot chocolate}}$$
$$Q^B_{\text{hot chocolate}} = 21 + 16 \cdot P^B_{\text{hot chocolate}}$$

Which economy imports the good and what is the amount of import?

Solution: Country B imports the good and the amount of import is 335.3564.

98. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{sweetcorn}} = 902 - 19 \cdot P^A_{\text{sweetcorn}}$ describes the demand for sweetcorn, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{sweetcorn}} = 18 + 3 \cdot P^A_{\text{sweetcorn}}$. In country B the functioning of sweetcorn market can be described by the following formulas

$$Q^B_{\text{sweetcorn}} = 903 - 30 \cdot P^B_{\text{sweetcorn}}$$
$$Q^B_{\text{sweetcorn}} = 27 + 78 \cdot P^B_{\text{sweetcorn}}$$

The two economies trade with each other but the importing country imposes 8.79 units of specific tariff on the imported goods.

Which country imports sweetcorn and what is the amount of import?

Solution: Country A imports the good and the amount of import is 425.4997.

99. Problem

In a LARGE open economy the following functions describe the demand and supply of watermelon:

$$Q^A_{\text{watermelon}} = 524 - 41 \cdot P^A_{\text{watermelon}}$$
$$Q^A_{\text{watermelon}} = 8 + 65 \cdot P^A_{\text{watermelon}}$$

In the rest of the world the demand for watermelon can be witten as $Q^{\text{world}}_{\text{watermelon}} = 775 - 8 \cdot P^{\text{world}}_{\text{watermelon}}$ and the supply of watermelon is given by $Q^{\text{world}}_{\text{watermelon}} = 9 + 17 \cdot P^{\text{vilĂAg}}_{\text{watermelon}}$. The two regions of the world trade actively but the importing region imposes 12.93 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the large open economy?

Solution: The change in the consumer surplus is 427.7468 units.

100. Problem

In a LARGE open economy the following functions describe the demand and supply of fruit cake:

$$Q^A_{\text{fruit cake}} = 379 - 46 \cdot P^A_{\text{fruit cake}}$$

$$Q^A_{\text{fruit cake}} = 25 + 12 \cdot P^A_{\text{fruit cake}}$$

In the rest of the world the demand for fruit cake can be witten as $Q^{\text{world}}_{\text{fruit cake}} = 489 - 33 \cdot P^{\text{world}}_{\text{fruit cake}}$ and the supply of fruit cake is given by $Q^{\text{world}}_{\text{fruit cake}} = 24 + 7 \cdot P^{\text{vilĂAg}}_{\text{fruit cake}}$. The two regions of the world trade actively but the importing region imposes 1.08 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the rest of the world?

Solution: The change in the producer surplus is -54.1626 units.

101. Problem

In a LARGE open economy the following functions describe the demand and supply of pie:

$$Q^A_{\text{pie}} = 668 - 20 \cdot P^A_{\text{pie}}$$
$$Q^A_{\text{pie}} = 29 + 55 \cdot P^A_{\text{pie}}$$

In the rest of the world the demand for pie can be witten as $Q^{\text{world}}_{\text{pie}} = 902 - 15 \cdot P^{\text{world}}_{\text{pie}}$ and the supply of pie is given by $Q^{\text{world}}_{\text{pie}} = 23 + 64 \cdot P^{\text{vilĂAg}}_{\text{pie}}$. The two regions of the world trade actively but the importing region imposes 0.55 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the rest of the world?

Solution: The change in the consumer surplus is 201.4644 units.

102. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{platform shoe}} = 444 - 40 \cdot P^A_{\text{platform shoe}}$ describes the demand for platform shoe, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{platform shoe}} = 31 + 44 \cdot P^A_{\text{platform shoe}}$. In country B the functioning of platform shoe market can be described by the following formulas

$$Q^B_{\text{platform shoe}} = 877 - 20 \cdot P^B_{\text{platform shoe}}$$
$$Q^B_{\text{platform shoe}} = 8 + 63 \cdot P^B_{\text{platform shoe}}$$

The two economies trade with each other but the importing country imposes 2.01 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country A relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by -13.0133 percent in country A.

103. Problem

In a LARGE open economy the following functions describe the demand and supply of platform shoe:

$$Q^A_{\text{platform shoe}} = 760 - 7 \cdot P^A_{\text{platform shoe}}$$
$$Q^A_{\text{platform shoe}} = 21 + 6 \cdot P^A_{\text{platform shoe}}$$

In the rest of the world the demand for platform shoe can be witten as $Q^{\text{world}}_{\text{platform shoe}} = 628 - 45 \cdot P^{\text{world}}_{\text{platform shoe}}$ and the supply of platform shoe is given by $Q^{\text{world}}_{\text{platform shoe}} = 10 + 13 \cdot P^{\text{vilĂAg}}_{\text{platform shoe}}$. The two regions of the world trade actively but the importing region imposes 27.92 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the rest of the world?

Solution: The change in the consumer surplus is -598.3620 units.

5.

104. Problem

The world consists of two economies A and B. Both countries produce watermelon. The market for watermelon can be represented by the following functions:

$$Q^A_{\text{watermelon}} = 850 - 31 \cdot P^A_{\text{watermelon}}$$
$$Q^A_{\text{watermelon}} = 17 + 11 \cdot P^A_{\text{watermelon}}$$
$$Q^B_{\text{watermelon}} = 773 - 22 \cdot P^B_{\text{watermelon}}$$
$$Q^B_{\text{watermelon}} = 23 + 62 \cdot P^B_{\text{watermelon}}$$

What is the effect of free trade on consumer surplus in country A?

Solution: Free trade changes consumer surplus by 2528.8085 in country A.

105. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{trifle}} = 692 - 31 \cdot P^A_{\text{trifle}}$ describes the demand for trifle, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{trifle}} = 25 + 2 \cdot P^A_{\text{trifle}}$. In country B the functioning of trifle market can be described by the following formulas

$$Q^B_{\text{trifle}} = 436 - 27 \cdot P^B_{\text{trifle}}$$
$$Q^B_{\text{trifle}} = 20 + 63 \cdot P^B_{\text{trifle}}$$

The two economies trade with each other but the importing country imposes 3.99 units of specific tariff on the imported goods.

Determine the price of trifle in country A.

Solution: The price of the good in country A is 11.7244.

106. Problem

5.

The world consists of two economies A and B. In country A $Q^A_{\text{food processor}} = 659 - 10 \cdot P^A_{\text{food processor}}$ describes the demand for food processor, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{food processor}} = 3 + 11 \cdot P^A_{\text{food processor}}$. In country B the functioning of food processor market can be described by the following formulas

$$Q^B_{\text{food processor}} = 501 - 36 \cdot P^B_{\text{food processor}}$$
$$Q^B_{\text{food processor}} = 31 + 45 \cdot P^B_{\text{food processor}}$$

The two economies trade with each other but the importing country imposes 3.64 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country A relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by 26.1847 percent in country A.

107. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{pie}} = 387 - 27 \cdot P^A_{\text{pie}}$ describes the demand for pie, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{pie}} = 12 + 26 \cdot P^A_{\text{pie}}$. In country B the functioning of pie market can be described by the following formulas

$$Q^B_{\text{pie}} = 539 - 42 \cdot P^B_{\text{pie}}$$
$$Q^B_{\text{pie}} = 5 + 80 \cdot P^B_{\text{pie}}$$

The two economies trade with each other but the importing country imposes 0.73 units of specific tariff on the imported goods.

Determine the price of pie in country A.

Solution: The price of the good in country A is 5.7032.

108. Problem

In a LARGE open economy the following functions describe the demand and supply of platform shoe:

$$Q^A_{\text{platform shoe}} = 447 - 45 \cdot P^A_{\text{platform shoe}}$$
$$Q^A_{\text{platform shoe}} = 5 + 21 \cdot P^A_{\text{platform shoe}}$$

In the rest of the world the demand for platform shoe can be witten as $Q^{\text{world}}_{\text{platform shoe}} = 703 - 44 \cdot P^{\text{world}}_{\text{platform shoe}}$ and the supply of platform shoe is given by $Q^{\text{world}}_{\text{platform shoe}} = 28 + 57 \cdot P^{\text{vilĂAg}}_{\text{platform shoe}}$. The two regions of the world trade actively but the importing region imposes 0.00 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the rest of the world?

Solution: The change in the producer surplus is 0.0000 units.

109. Problem

In a LARGE open economy the following functions describe the demand and supply of rug:

$$Q^A_{\text{rug}} = 433 - 25 \cdot P^A_{\text{rug}}$$
$$Q^A_{\text{rug}} = 25 + 19 \cdot P^A_{\text{rug}}$$

In the rest of the world the demand for rug can be witten as $Q^{\text{world}}_{\text{rug}} = 719 - 23 \cdot P^{\text{world}}_{\text{rug}}$ and the supply of rug is given by $Q^{\text{world}}_{\text{rug}} = 23 + 34 \cdot P^{\text{vilĂAg}}_{\text{rug}}$. The two regions of the world trade actively but the importing region imposes 0.27 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the rest of the world?

Solution: The change in the producer surplus is -46.6547 units.

110. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{broccoli}} = 905 - 16 \cdot P^A_{\text{broccoli}}$ describes the demand for broccoli, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{broccoli}} = 22 + 5 \cdot P^A_{\text{broccoli}}$. In country B the functioning of broccoli market can be described by the following formulas

$$Q^B_{\text{broccoli}} = 803 - 38 \cdot P^B_{\text{broccoli}}$$
$$Q^B_{\text{broccoli}} = 5 + 39 \cdot P^B_{\text{broccoli}}$$

5.

The two economies trade with each other but the importing country imposes 7.22 units of specific tariff on the imported goods.

What would have been the world price of X under free trade?

Solution: Under free trade the price of the good would have been 17.1531.

111. Problem

The world consists of two economies A and B. Both countries produce watermelon. The market for watermelon can be represented by the following functions:

$$Q^A_{\text{watermelon}} = 598 - 14 \cdot P^A_{\text{watermelon}}$$
$$Q^A_{\text{watermelon}} = 12 + 81 \cdot P^A_{\text{watermelon}}$$
$$Q^B_{\text{watermelon}} = 495 - 33 \cdot P^B_{\text{watermelon}}$$
$$Q^B_{\text{watermelon}} = 17 + 16 \cdot P^B_{\text{watermelon}}$$

How does free trade change the producer surplus in country A?

Solution: Free trade changes producer surplus by -684.7692 in country A.

112. Problem

The world consists of two economies A and B. Both countries produce pastry. The market for pastry can be represented by the following functions:

$$Q^A_{\text{pastry}} = 495 - 12 \cdot P^A_{\text{pastry}}$$
$$Q^A_{\text{pastry}} = 15 + 40 \cdot P^A_{\text{pastry}}$$
$$Q^B_{\text{pastry}} = 642 - 10 \cdot P^B_{\text{pastry}}$$
$$Q^B_{\text{pastry}} = 2 + 73 \cdot P^B_{\text{pastry}}$$

How does free trade change the producer surplus in country A?

Solution: Free trade changes producer surplus by -341.5885 in country A.

113. Problem

In a LARGE open economy the following functions describe the demand and supply of spring onion:

$$Q^A_{\text{spring onion}} = 626 - 34 \cdot P^A_{\text{spring onion}}$$
$$Q^A_{\text{spring onion}} = 25 + 56 \cdot P^A_{\text{spring onion}}$$

In the rest of the world the demand for spring onion can be witten as $Q^{\text{world}}_{\text{spring onion}} = 798 - 21 \cdot P^{\text{world}}_{\text{spring onion}}$ and the supply of spring onion is given by $Q^{\text{world}}_{\text{spring onion}} = 1 + 42 \cdot P^{\text{vilĂAg}}_{\text{spring onion}}$. The two regions of the world trade actively but the importing region imposes 1.48 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the large open economy?

Solution: The change in the welfare is -118.1829 units.

114. Problem

In a LARGE open economy the following functions describe the demand and supply of watermelon:

$$Q^A_{\text{watermelon}} = 602 - 28 \cdot P^A_{\text{watermelon}}$$
$$Q^A_{\text{watermelon}} = 2 + 58 \cdot P^A_{\text{watermelon}}$$

In the rest of the world the demand for watermelon can be witten as $Q^{\text{world}}_{\text{watermelon}} = 515 - 22 \cdot P^{\text{world}}_{\text{watermelon}}$ and the supply of watermelon is given by $Q^{\text{world}}_{\text{watermelon}} = 14 + 43 \cdot P^{\text{vilĂAg}}_{\text{watermelon}}$. The two regions of the world trade actively but the importing region imposes 0.20 units of specific tariff on the imported goods.

How does the imposition of tariff change the consumer surplus in the rest of the world?

Solution: The change in the consumer surplus is 40.2476 units.

115. Problem

In a LARGE open economy the following functions describe the demand and supply of porridge:

$$Q^A_{\text{porridge}} = 462 - 38 \cdot P^A_{\text{porridge}}$$
$$Q^A_{\text{porridge}} = 19 + 37 \cdot P^A_{\text{porridge}}$$

In the rest of the world the demand for porridge can be witten as $Q^{\text{world}}_{\text{porridge}} = 514 - 14 \cdot P^{\text{world}}_{\text{porridge}}$ and the supply of porridge is given by $Q^{\text{world}}_{\text{porridge}} = 28 + 7 \cdot P^{\text{vilĂAg}}_{\text{porridge}}$. The two regions of the world trade actively but the importing region imposes 6.60 units of specific tariff on the imported goods.

5.

Which region receives tariff revenue and what is the amount of this tariff revenue?

Solution: The rest of the world imports the good thus the fiscal policy decision maker of the rest of the world receives tariff revenue. The amount of tariff revenue is 1151.7000 units.

116. Problem

The world consists of two economies A and B. Both countries produce porridge. The market for porridge can be represented by the following functions:

$$Q^A_{\text{porridge}} = 731 - 15 \cdot P^A_{\text{porridge}}$$
$$Q^A_{\text{porridge}} = 20 + 7 \cdot P^A_{\text{porridge}}$$
$$Q^B_{\text{porridge}} = 655 - 7 \cdot P^B_{\text{porridge}}$$
$$Q^B_{\text{porridge}} = 16 + 24 \cdot P^B_{\text{porridge}}$$

Which economy exports the good and what is the amount of export?

Solution: Country B exports the good and the amount of export is 583.6415.

117. Problem

The world consists of two economies A and B. Both countries produce salad. The market for salad can be represented by the following functions:

$$Q^A_{\text{salad}} = 851 - 46 \cdot P^A_{\text{salad}}$$
$$Q^A_{\text{salad}} = 3 + 31 \cdot P^A_{\text{salad}}$$
$$Q^B_{\text{salad}} = 627 - 42 \cdot P^B_{\text{salad}}$$
$$Q^B_{\text{salad}} = 12 + 22 \cdot P^B_{\text{salad}}$$

What is the effect of free trade on consumer surplus in country A?

Solution: Free trade changes consumer surplus by 228.7547 in country A.

118. Problem

The world consists of two economies A and B. Both countries produce backpack. The market for backpack can be represented by the following functions:

$$Q^{A}_{\text{backpack}} = 810 - 45 \cdot P^{A}_{\text{backpack}}$$
$$Q^{A}_{\text{backpack}} = 2 + 29 \cdot P^{A}_{\text{backpack}}$$
$$Q^{B}_{\text{backpack}} = 379 - 42 \cdot P^{B}_{\text{backpack}}$$
$$Q^{B}_{\text{backpack}} = 28 + 36 \cdot P^{B}_{\text{backpack}}$$

Which economy exports the good and what is the amount of export?

Solution: Country B exports the good and the amount of export is 198.0000.

5.

119. Problem

In a LARGE open economy the following functions describe the demand and supply of strawberry:

$$Q^{A}_{\text{strawberry}} = 404 - 23 \cdot P^{A}_{\text{strawberry}}$$
$$Q^{A}_{\text{strawberry}} = 21 + 14 \cdot P^{A}_{\text{strawberry}}$$

In the rest of the world the demand for strawberry can be witten as $Q^{\text{world}}_{\text{strawberry}} = 887 - 9 \cdot P^{\text{world}}_{\text{strawberry}}$ and the supply of strawberry is given by $Q^{\text{world}}_{\text{strawberry}} = 31 + 83 \cdot P^{\text{vilĂAg}}_{\text{strawberry}}$. The two regions of the world trade actively but the importing region imposes 0.53 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in the large open economy?

Solution: The change in the welfare is 15.0303 units.

120. Problem

In a LARGE open economy the following functions describe the demand and supply of fruit cake:

$$Q^{A}_{\text{fruit cake}} = 709 - 41 \cdot P^{A}_{\text{fruit cake}}$$
$$Q^{A}_{\text{fruit cake}} = 29 + 47 \cdot P^{A}_{\text{fruit cake}}$$

In the rest of the world the demand for fruit cake can be witten as $Q^{\text{world}}_{\text{fruit cake}} = 380 - 10 \cdot P^{\text{world}}_{\text{fruit cake}}$ and the supply of fruit cake is given by $Q^{\text{world}}_{\text{fruit cake}} = 3 + 21 \cdot P^{\text{vilĂAg}}_{\text{fruit cake}}$. The two regions of the world trade actively but the importing region imposes 1.54 units of specific tariff on the imported goods.

How does the imposition of tariff change the producer surplus in the large open economy?

Solution: The change in the producer surplus is -175.3313 units.

121. Problem

The world consists of two economies A and B. Both countries produce watermelon. The market for watermelon can be represented by the following functions:

$$Q^A_{\text{watermelon}} = 742 - 6 \cdot P^A_{\text{watermelon}}$$
$$Q^A_{\text{watermelon}} = 31 + 64 \cdot P^A_{\text{watermelon}}$$
$$Q^B_{\text{watermelon}} = 559 - 8 \cdot P^B_{\text{watermelon}}$$
$$Q^B_{\text{watermelon}} = 12 + 73 \cdot P^B_{\text{watermelon}}$$

What is the effect of free trade on consumer surplus in country B?

Solution: Free trade changes consumer surplus by 786.9101 in country B.

122. Problem

The world consists of two economies A and B. Both countries produce porridge. The market for porridge can be represented by the following functions:

$$Q^A_{\text{porridge}} = 730 - 42 \cdot P^A_{\text{porridge}}$$
$$Q^A_{\text{porridge}} = 16 + 66 \cdot P^A_{\text{porridge}}$$
$$Q^B_{\text{porridge}} = 426 - 33 \cdot P^B_{\text{porridge}}$$
$$Q^B_{\text{porridge}} = 13 + 80 \cdot P^B_{\text{porridge}}$$

Which economy imports the good and what is the amount of import?

Solution: Country A imports the good and the amount of import is 163.2489.

123. Problem

In country A $Q^A_{\text{lemonade}} = 576 - 47 \cdot P^A_{\text{lemonade}}$ describes the demand for lemonade and the supply of lemonade is given by $Q^A_{\text{lemonade}} = 25 + 64 \cdot P^A_{\text{lemonade}}$. In country B the following function characterizes the behavior of consumers in lemonade market $Q^B_{\text{lemonade}} = 625 - 31 \cdot P^B_{\text{lemonade}}$ and the supply of lemonade is written as $Q^B_{\text{lemonade}} = 20 + 45 \cdot P^B_{\text{lemonade}}$. The two regions of the world trade actively but the importing region imposes 0.39 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in country B?

Solution: The imposition of tariff changes the welfare in country B by 75.1171 units.

124. Problem

The world consists of two economies A and B. Both countries produce onion. The market for onion can be represented by the following functions:

$$Q^A_{\text{onion}} = 671 - 21 \cdot P^A_{\text{onion}}$$
$$Q^A_{\text{onion}} = 8 + 59 \cdot P^A_{\text{onion}}$$
$$Q^B_{\text{onion}} = 525 - 28 \cdot P^B_{\text{onion}}$$
$$Q^B_{\text{onion}} = 16 + 74 \cdot P^B_{\text{onion}}$$

Which economy imports the good and what is the amount of import?

Solution: Country A imports the good and the amount of import is 147.8352.

125. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{paper clip}} = 424 - 16 \cdot P^A_{\text{paper clip}}$ describes the demand for paper clip, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{paper clip}} = 21 + 13 \cdot P^A_{\text{paper clip}}$. In country B the functioning of paper clip market can be described by the following formulas

$$Q^B_{\text{paper clip}} = 847 - 36 \cdot P^B_{\text{paper clip}}$$
$$Q^B_{\text{paper clip}} = 4 + 40 \cdot P^B_{\text{paper clip}}$$

The two economies trade with each other but the importing country imposes 0.39 units of specific tariff on the imported goods.

Which country imports paper clip and what is the amount of import?

Solution: Country A imports the good and the amount of import is 50.6804.

126. Problem

The world consists of two economies A and B. Both countries produce aubergine. The market for aubergine can be represented by the following functions:

$$Q^A_{\text{aubergine}} = 856 - 35 \cdot P^A_{\text{aubergine}}$$
$$Q^A_{\text{aubergine}} = 22 + 8 \cdot P^A_{\text{aubergine}}$$
$$Q^B_{\text{aubergine}} = 424 - 40 \cdot P^B_{\text{aubergine}}$$
$$Q^B_{\text{aubergine}} = 6 + 80 \cdot P^B_{\text{aubergine}}$$

Determine the welfare effect of free trade in economy B.

Solution: The welfare effect of free trade in country B is -1057.2151.

127. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{almond}} = 675 - 8 \cdot P^A_{\text{almond}}$ describes the demand for almond, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{almond}} = 16 + 45 \cdot P^A_{\text{almond}}$. In country B the functioning of almond market can be described by the following formulas

$$Q^B_{\text{almond}} = 505 - 16 \cdot P^B_{\text{almond}}$$
$$Q^B_{\text{almond}} = 22 + 14 \cdot P^B_{\text{almond}}$$

The two economies trade with each other but the importing country imposes 0.91 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country A relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by -2.3905 percent in country A.

128. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{brioche}} = 670 - 40 \cdot P^A_{\text{brioche}}$ describes the demand for brioche, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{brioche}} = 20 + 47 \cdot P^A_{\text{brioche}}$. In country B the functioning of brioche market can be described by the following formulas

$$Q^B_{\text{brioche}} = 616 - 41 \cdot P^B_{\text{brioche}}$$

$$Q^B_{\text{brioche}} = 16 + 28 \cdot P^B_{\text{brioche}}$$

The two economies trade with each other but the importing country imposes 0.37 units of specific tariff on the imported goods.

How much does the imposition of tariff change the price of the good in country B relative to the world price that would have occurred under free trade? Express the result as a percentage of the initial world price.

Solution: The imposition of tariff changes the price of the good by 2.5752 percent in country B.

129. Problem

In country A $Q^A_{\text{hairspray}} = 599 - 31 \cdot P^A_{\text{hairspray}}$ describes the demand for hairspray and the supply of hairspray is given by $Q^A_{\text{hairspray}} = 31 + 61 \cdot P^A_{\text{hairspray}}$. In country B the following function characterizes the behavior of consumers in hairspray market $Q^B_{\text{hairspray}} = 586 - 16 \cdot P^B_{\text{hairspray}}$ and the supply of hairspray is written as $Q^B_{\text{hairspray}} = 13 + 22 \cdot P^B_{\text{hairspray}}$. The two regions of the world trade actively but the importing region imposes 2.46 units of specific tariff on the imported goods.

What effect does the imposition of tariff have on welfare in country B?

Solution: The imposition of tariff changes the welfare in country B by 785.6972 units.

130. Problem

In country A $Q^A_{\text{wooden spoon}} = 530 - 19 \cdot P^A_{\text{wooden spoon}}$ describes the demand for wooden spoon and the supply of wooden spoon is given by $Q^A_{\text{wooden spoon}} = 4 + 39 \cdot P^A_{\text{wooden spoon}}$. In country B the following function characterizes the behavior of consumers in wooden spoon market $Q^B_{\text{wooden spoon}} = 459 - 8 \cdot P^B_{\text{wooden spoon}}$ and the supply of wooden spoon is written as $Q^B_{\text{wooden spoon}} = 9 + 70 \cdot P^B_{\text{wooden spoon}}$. The two regions of the world trade actively but the importing region imposes 0.97 units of specific tariff on the imported goods.

What is the welfare effect of the imposition of tariff in country A?

Solution: The imposition of tariff changes the welfare in country A by 127.2623 units.

131. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{strawberry}} = 899 - 34 \cdot P^A_{\text{strawberry}}$ describes the demand for strawberry, and the behavior of firms can be characterized by the following supply function

$Q^A_{\text{strawberry}} = 16 + 12 \cdot P^A_{\text{strawberry}}$. In country B the functioning of strawberry market can be described by the following formulas

$$Q^B_{\text{strawberry}} = 595 - 8 \cdot P^B_{\text{strawberry}}$$
$$Q^B_{\text{strawberry}} = 14 + 9 \cdot P^B_{\text{strawberry}}$$

The two economies trade with each other but the importing country imposes 2.84 units of specific tariff on the imported goods.

Determine the price of strawberry in country A.

Solution: The price of the good in country A is 22.4717.

132. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{peach}} = 641 - 8 \cdot P^A_{\text{peach}}$ describes the demand for peach, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{peach}} = 5 + 69 \cdot P^A_{\text{peach}}$. In country B the functioning of peach market can be described by the following formulas

$$Q^B_{\text{peach}} = 441 - 24 \cdot P^B_{\text{peach}}$$
$$Q^B_{\text{peach}} = 7 + 67 \cdot P^B_{\text{peach}}$$

The two economies trade with each other but the importing country imposes 0.40 units of specific tariff on the imported goods.

What would have been the world price of X under free trade?

Solution: Under free trade the price of the good would have been 6.3690.

133. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{hot dog}} = 820 - 20 \cdot P^A_{\text{hot dog}}$ describes the demand for hot dog, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{hot dog}} = 26 + 9 \cdot P^A_{\text{hot dog}}$. In country B the functioning of hot dog market can be described by the following formulas

$$Q^B_{\text{hot dog}} = 812 - 33 \cdot P^B_{\text{hot dog}}$$
$$Q^B_{\text{hot dog}} = 28 + 43 \cdot P^B_{\text{hot dog}}$$

The two economies trade with each other but the importing country imposes 6.92 units of specific tariff on the imported goods.

Find the price of the good in country B.

Solution: The price of the good in country B is 13.1173.

134. Problem

The world consists of two economies A and B. In country A $Q^A_{\text{porridge}} = 741 - 23 \cdot P^A_{\text{porridge}}$ describes the demand for porridge, and the behavior of firms can be characterized by the following supply function $Q^A_{\text{porridge}} = 29 + 12 \cdot P^A_{\text{porridge}}$. In country B the functioning of porridge market can be described by the following formulas

$$Q^B_{\text{porridge}} = 882 - 15 \cdot P^B_{\text{porridge}}$$
$$Q^B_{\text{porridge}} = 31 + 72 \cdot P^B_{\text{porridge}}$$

The two economies trade with each other but the importing country imposes 3.16 units of specific tariff on the imported goods.

What would have been the world price of X under free trade?

Solution: Under free trade the price of the good would have been 12.8115.

135. Problem

The world consists of two economies A and B. Both countries produce backpack. The market for backpack can be represented by the following functions:

$$Q^A_{\text{backpack}} = 657 - 26 \cdot P^A_{\text{backpack}}$$
$$Q^A_{\text{backpack}} = 9 + 48 \cdot P^A_{\text{backpack}}$$
$$Q^B_{\text{backpack}} = 867 - 28 \cdot P^B_{\text{backpack}}$$
$$Q^B_{\text{backpack}} = 20 + 12 \cdot P^B_{\text{backpack}}$$

Calculate the welfare effect of free trade in economy A.

Solution: The welfare effect of free trade in country A is -702.4774.

International Trade

Only a few students start their international trade studies because they desperately want to set up Lagrange functions, intend to solve a system of eight equations for eight unknown variables or desire to shift the budget constraint to the left or right. The desire for acquisition of knowledge is always led by relevant economic questions.

To answer relevant economic questions we need some expertise on using specific concepts accurately and on building, solving and analysing formal macroeconomic models. This problem set was written to develop this expertise.