TERMS OF TRADE SHOCKS AND MINIMUM WAGES FOR MALE AND FEMALE LABOUR: A CGE ANALYSIS

Rossana Patrón
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Abstract

The aim of this work is to analyse the general equilibrium effects of terms of trade shocks in exportable sectors under particular assumptions about the labour market. The model used is based on the Blake et al. (1995) model of the Mauritian economy, modelled as consisting of three productive sectors: traditional exportable, non traditional exportable and non-traded goods. In this work, two new features are introduced. Firstly, a dual labour market: female and male workers are perfectly mobile across sectors, participating in different proportions in each activity. Secondly, minimum wages, applying to the whole economy, for each type of labour. A series of experiments has been performed to evaluate the general equilibrium effects from favourable and unfavourable shocks in the terms of trade in the exportable sector, paying particular attention to the effects for each type of worker. An import result is that the type-labour intensity is a key to explaining the differences that appear in the effects between the two types of worker when a shock occurs. This work also discusses the alterations in the output-price responses economy wide when a minimum wage is imposed.

Resumen

El objetivo este documento es analizar los efectos de los shocks de términos de intercambio en el equilibrio general del modelo, considerando particulares características del mercado de trabajo. El modelo básico utilizado es el desarrollado para la economía de Mauricio por Blake et al. (1995), que consiste en tres sectores productivos: exportable tradicional, exportable no tradicional y no transable. En este trabajo, dos nuevos rasgos del mercado de trabajo son introducidos al modelo básico. En primer lugar, se considera que la fuerza de trabajo esta compuesta por dos tipos diferenciados de trabajadores -femenino y masculino-, perfectamente móvil entre sectores y que participan en distintas proporciones en cada actividad. La segunda característica que es introducida al modelo es la existencia de un salario mínimo efectivo para cada tipo de trabajadores. Se realizaron un serie de experimentos para evaluar los efectos sobre el equilibrio general de shocks externos favorables y desfavorables en los sectores exportadores. Un resultado importante que se deriva de estos experimentos es que la intensidad en el “tipo de trabajo” es explicativa de los diferentes efectos que resultan sobre los propietarios de los distintos tipos de trabajo ante un shock externo. Otro aspecto que se discute en el trabajo refiere a las alteraciones en la respuesta del output frente a cambios en los precios cuando en la economía rige un salario mínimo efectivo.

I- INTRODUCTION[1]

The effects of booming export sectors on output and employment in other activities have received great attention in the theoretical and applied literature. The interest in the topic stems from the fact that it has been observed that a boom in one sector may cause adverse general equilibrium effects on the rest of the economy ('Dutch disease'), as was first analysed for the case of natural resources discovery (e.g. Forsyth and Kay, 1980, Neary and van Wijnbergen, 1986). In particular, when there is more than one exportable sector, it has been observed that a boom in one exportable sector may affect negatively the other exportable sector(s), e.g. Blake et al. (1995), where an important channel for such effects is the transfer of mobile factors of production into the expanding sector with the associated changes in factor prices, particularly when those factors are in fixed supply in the economy.

However, Milner and Wright (1996) have pointed out that the expansion of export activities may be satisfied by drawing labour from a pool of unemployed or non-participating labour. They argue for example, that in many developing countries the expansion of some exportable activities may encourage increased female participation in the labour force, and this elastic labour supply might affect the magnitude and direction of wages and employment responses. There are other aspects of the labour market that might also be expected to influence the effects of a booming export sector. For example when several types of labour are considered then the sectoral effects of expansion in an export sector will depend on the intensity of use of each type among sectors. On the policy front it is noteworthy that small open economies often seek to protect the living standard of workers against external shocks by setting minimum wages, and in such cases the economy's response to such a shock will be affected by the introduction of domestic distortions.

The aim of this work is to analyse the general equilibrium effects of terms of trade shocks in exportable sectors under particular assumptions about the labour market. The model used is based on the Blake et al. (1995) model of the Mauritian economy, which uses a Social Accounting Matrix for 1987. The economy under analysis is modelled as consisting of three productive sectors: traditional exportable, non traditional exportable and non-traded goods. Production functions in all sectors are assumed to use labour, which is perfectly mobile across sectors, and capital, which is considered to be sector-specific in the short run. There is one importable good which is not produced domestically. In this work, two new features are introduced. Firstly, a dual labour market: female and male workers are perfectly mobile across sectors, participating in different proportions in each activity. Secondly, minimum wages, applying to the whole economy, for each type of labour.

The plan of this work is as follows. Chapter 2 summarises the main theoretical issues related to the reallocation of factors following a terms of trade shock, both with and without distortions, and in the short and the long run. Chapter 3 gives a brief introduction to the methodology used. Chapter 4 discusses the model, summarising the main features of the Blake et al. model and the modifications introduced to the model in the labour market. Chapter 5 reports the main results for the applied model. The model is run in two versions: model 1, in the absence of domestic distortions, and model 2 with a minimum wage law effective over the whole economy. In this chapter, terms of trade shocks are simulated for each exportable sector, and the effects on production, labour allocation, and welfare are analysed. Chapter 6 reports on the main conclusions of the work.

[1] This is a compact version of the Dissertation submitted by the author to the University of Nottingham, United Kingdom, for the Master degree, supervised by Geoffrey Reed.

II - THEORETICAL ASPECTS

This chapter focuses on resource reallocation following changes in the terms on trade, and is mainly based on standard trade theory (i.e. the Heckscher-Ohlin and Ricardo-Viner models). However, the analysis also takes into consideration the inclusion of a third sector, a non-traded good, using the same productive factors as the traded sectors.

Consider a small open economy that produces three goods, X, Y and Z, using capital and labour under constants returns to scale. Perfect competition is assumed in factor and goods markets. Initially, neither domestic distortions nor trade restrictions are assumed. Factor endowments are assumed to be fixed, and factors are fully employed at the initial equilibrium. Both factors are perfectly mobile in the long run, and capital is assumed to be sector-specific in the short run. It is assumed that X and Y are traded goods and Z non-traded. X is labour intensive, Y is capital intensive, and Z's intensity lies in between these. It is assumed that there is one typical household.

II.1 Resource reallocation in the absence of labour market distortions

Initially, the long run effects of an external shock are considered. In the long run the economy has two mobile factors, two tradable goods and one non-tradable, and tradable goods can be regarded as a standard H-O (sub)model of 2 goods and 2 factors. Prices for traded goods are exogenously determined in world markets, which in turn determines factor returns. As factors are perfectly mobile, returns are equalised in the three sectors, and factor returns then determine the non-tradable production cost which, considered along with demand, determines the quantity produced, and thus the factor employment in the non-traded sector. The rest of the factors are allocated between both traded sectors in the H-O (sub)model. In the (optimum) equilibrium, the marginal rate of transformation, the marginal rate of substitution and the terms of trade are equal, since:

- goods and factor prices determine input coefficients, according to which allocation between sectors is determined considering the (remaining) endowments of factors and goods demand. In perfect competition factor returns are determined according to the value of their marginal productivity, and in equilibrium factor returns are equalised across sectors. This implies that the ratio of marginal productivities of factors (identical to the marginal rate of transformation in the economy) is equal in both sectors and equal to the terms of trade.

- the consumers' utility maximisation condition implies that in the equilibrium the ratio of marginal utilities (identical to marginal rate of substitution) is equal to the terms of trade.

Consider now, the effect of a change in the terms of trade in the H-O submodel. Assume that the change in the terms of trades is originated by a reduction in the price of the capital intensive good Y. By the Stolper-Samuelson theorem, a change in prices is transmitted to factor returns; in Jones' (1965) notation:

$$\hat{w} > \hat{P}_X > \hat{P}_Y > \hat{r}$$

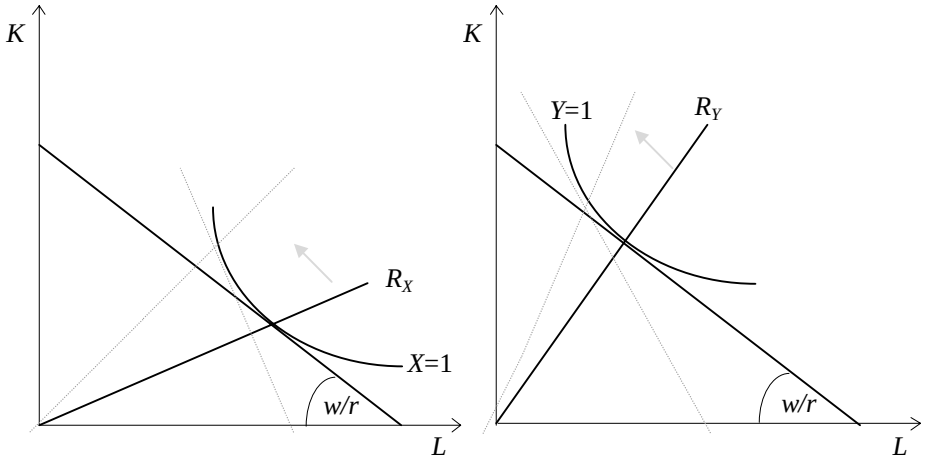
where $\hat{r}$, $\hat{P}_Y$, $\hat{P}_X$ and $\hat{w}$ are the proportionate changes in the return to capital, the price of good Y, the price of good X and the wage rate respectively.

The above inequality implies that the wage rate in terms of both goods increases, the return to capital in terms of both goods decreases, and the factor return ratio (w/r) increases. As a consequence of changes in

factor relative prices, resources are reallocated, and then both traded sectors become more capital intensive, as is shown with the help of figures 1 and 2.

In figure 1 are depicted the unit isoquants and the isocost lines for goods X and Y. Cost minimisation conditions implies that the optimum choice is at the tangency point between the isoquant and the isocost line, i.e. where the marginal rate of substitution (identical to the ratio of marginal productivity of factors) is equal to the factor return ratio. The slope of the ray from the origin through this tangency point measures the capital intensity of the production process. Then, when w/r increases the cost line becomes steeper, defining a new tangency point at which there is a higher capital intensity in both sectors.

FIGURE 1 Factor returns and factoral intensity



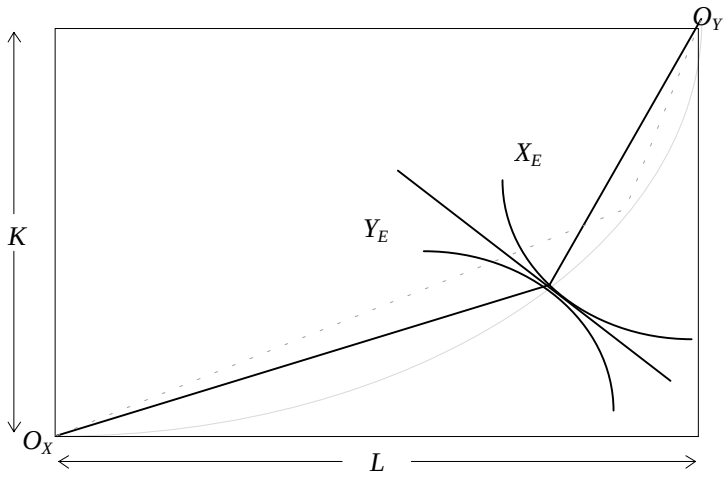
In figure 2 both elements of figure 1 are entered into an Edgeworth box. The height of the box corresponds to the capital endowment, and the length to the labour endowment, in the traded goods submodel. The contract curve in this diagram lies below the diagonal of the box reflecting the assumption that X good is labour intensive (factor intensities are shown by gradients of the rays from O_X and O_Y). The contract curve shows the locus of equilibrium points, i.e. where the ratio of marginal productivities of factors is equal across sectors. At the (optimum) equilibrium the ratio of marginal productivities of factors is equal to the ratio of factor returns. Therefore, a change in the factor price ratio implies a movement along the contract curve. Then, carrying on with the case analysed in figure 1, an increase in w/r implies a movement upwards along the contract curve, determining the reallocation of capital and labour after the shock; at the new equilibrium both sectors are more capital intensive.

Now consider the effect of a change in the terms of trade on the rest of the model, that is, on the non-traded sector. Perfect mobility of factors implies that factor prices are equalised across sectors, and thus a change in the terms of trade necessarily affects returns to factors in the non-traded sector. Assuming that the change in the terms of trade originated in a fall in P_Y, the following are the consequences:

- a fall in P_Y also pushes up w/r in the non-traded sector, inducing an increase in the capital intensity and a decrease in P_Z (reflected by a shift inwards of Z's unit cost curve in the factor returns plane, the dual of the cost minimisation problem: see Mussa, 1979, Corden and Neary, 1982, Edwards 1988, amongst others).

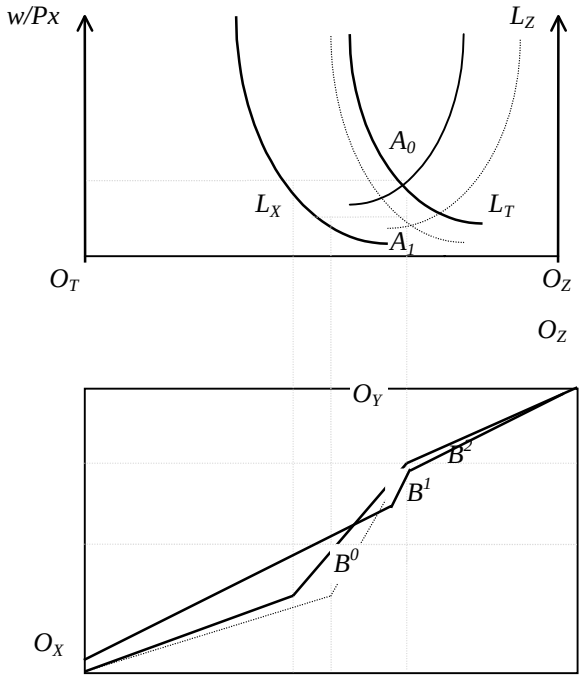
- a change in the terms of trade will also affect the demand for the non-tradable sector by income and substitution effects. Assuming that Y is an import sector, a terms of trade improvement will produce a positive income effect, increasing demand for Z (if Z is not an inferior good). Assuming substitutability between Y and Z, demand for Z falls as a consequence of the substitution effect.

FIGURE 2 Factoral intensities and factor allocation in the Edgeworth box



Accordingly, the total effect of a change in the terms of trade on the demand for the non-traded goods depends on the balance of the income and substitution effects and the elasticity to its own price change, and might be positive or negative. (For the sake of simplicity the lower part of figure 3 is shown on the assumption that the output of Z is constant.)

FIGURE 3 Labour allocation in the short and long run



It is useful to combine the Edgeworth box and the labour market demand diagram as in Neary (1978), while including the non-traded sector as in Edwards (1988), to compare short and long run equilibria, as shown in figure 3. In the lower part of the figure is depicted the Edgeworth box of figure 2, now extended by

the addition of the non-traded sector. This box then shows the factor allocation for the whole economy, where O_X and O_Y correspond to figure 2, and O_Z is the origin for the non-traded sector.

In the upper part of figure 3 is depicted the equilibrium in the labour market. The horizontal axis measures the total labour endowment in the economy and the vertical axis measures the wage rate (in terms of X, chosen arbitrarily as numeraire). In this diagram L_X represents the labour demand in the X sector given by the value of marginal productivity of labour, reflecting the fact that marginal productivity is decreasing as labour use increases while capital remains fixed. L_T is the horizontal addition of labour demand for both traded sectors, and employment for them is measured to the right from the O_T origin. Analogously for L_Z, where employment is measured to the left from the O_Z origin The equilibrium allocation of labour and the wage are determined by the intersection of the L_T and L_Z curves. Note that the location of these curves depends on the initial good prices and the initial allocation of capital, i.e. changes in prices cause them to shift, as does in the long run reallocation of capital.

Firstly, the short run effects of a change in the terms of trade are analysed in figure 3. In the short run the economy has four factors (labour and capital specific to each of the three sectors), two tradable goods and one non-tradable. Tradable goods could be regarded as before as a submodel formally identical to H-O model, but due to capital specificity the mechanism of price transmission central to the Stolper-Samuelson theorem does not hold. Therefore, in the short run we must consider a three goods and four factors model. In this model, wages are determined according to the value of labour's marginal productivity, and labour is allocated so as to equalise wages and hence the value of its marginal productivity across sectors. As capital is locked into each sector, capital returns may differ across sectors; the total capital return in each tradable sector is determined as the residual between the total value of output and the total wage payments.

In the upper part of figure 3 the initial equilibrium is indicated by A_O. Consider then a change in the terms of trade, represented as before by a fall in P_Y. This will cause a shift to the left of the labour demand curve in sector Y (not shown) and thus a shift to the left in the L_T curve. Note that, as the Stolper-Samuelson theorem does not hold, in this case a change in the terms of trade is transmitted to the price of non-tradable goods by the income and substitution effects (see Dornbusch, 1974). As stated in Edwards (1986, 1988) assuming that the three goods are substitutes in consumption and production and that the income effect does not exceed the substitution effect, then a fall in P_Y will cause a fall in the price of the non-tradables in terms of X and an increase in terms of Y. As a result, the L_Z curve shifts down. The resulting short run equilibrium is indicated by point A_1. It is characterised by a lower wage rate in terms of X, a fall in employment in sector Y and an increase in employment in sector X; the effect on employment in sector Z is ambiguous.

Now consider in the lower part of figure 3 the effects of a reduction in the price of the capital intensive good. The short run consequences of a fall in P_Y are as follows (a detailed analysis of effects on factors returns in presence of specific factors can be seen in Mussa, 1974, Edwards, 1988, amongst others):

$$\hat{r}_X > \hat{P}_X > \hat{w} > \hat{P}_Y > \hat{r}_Y$$

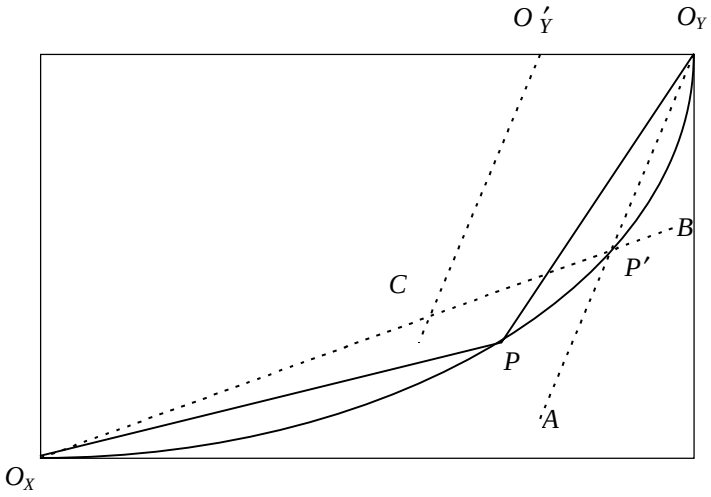
where $\hat{r}_X$ and $\hat{r}_Y$ are the proportionate changes in the returns to capital in the X and Y sectors respectively. This inequality implies that wage rises in term of Y and falls in terms of X, and that the wage-rental ratio increases in sector Y and decreases in sector X. As a result, sector X becomes more labour intensive (labour employment rises) and sector Y becomes more capital intensive (labour employment falls), reflected by the slopes of the rays $O_X B_O$ and $O_Y B_O$ respectively in the lower part of figure 3. In the simple case depicted, it has been assumed that in the short run the allocation of labour to the non-traded sector remains the same, as does its capital intensity (capital intensity would decrease (increase) in the case of an increase (decrease) in allocation of labour to the sector).

The same figure may be used to consider the long run position after a change in the terms of trade. In the long run, capital is mobile and is reallocated according to the rental differential until in the final equilibrium rental is equalised across sectors (a detailed analytical exposition of the adjustment process can be found in Neary 1982, a summary of effects for each factor in short and long run can be found in Edward 1988). As noted earlier, in the long run the wage-rental ratio will rise in all sectors, causing them to become more capital intensive, shown in the lower part of figure 3 by the rays $O_X B_1$, $B_2 B_1$, and $O_Z B_2$ for sectors X, Y, Z in turn. That reallocation of capital implies changes in the marginal productivity of labours in all sectors, shifting the curves L_X, L_Y, and L_Z in the upper part of the diagram. The final equilibrium will be characterised by a reduction in capital allocation from sector Y towards X and Z, implying a shift in L_Y to the left, in L_X to the right, and in L_Z to the left (not shown in the diagram), and a movement of labour towards the X sector, and out of the Y and Z sectors.

II.2 Effects of terms of trade shocks in the presence of a minimum wage

Now consider the effect of changes in the terms of trade when there are domestic distortions. Specifically, it is assumed that there is a price rigidity in the labour market, in the form of a minimum wage law applicable to the whole economy.

FIGURE 4 Labour allocation in the presence of an effective minimum wage



Consider first the effect of imposing a minimum wage on the economy using the Edgeworth box, as in Johnson (1969). Figure 4 shows the H-O submodel of traded goods, where the contract curve is defined in the absence of domestic distortions and P denotes the initial equilibrium. When an effective minimum wage is imposed over the whole economy the wage-rental ratio is increased, so that both sectors become more capital intensive, as is shown by the rays $O_X B$ and $O_Y A$. However, it may be shown that a point such as P' is not an equilibrium. Note that along the contract curve the price ratio (P_X/P_Y) is increasing, as can be seen by reference to figure 2. A point such as P' would require a higher price ratio than at P, and thus at current prices it cannot be an equilibrium. Any equilibrium at constant prices lower than at P' must be to the left of P' on the $O_X B$ ray for X and on a ray parallel to $O_Y A$. As X contracts and Y expands more labour than sector Y is willing to hire is released in sector X, giving rise to unemployment. So, allocation will be determined at a point such as C, with a proper translation of the O_Y origin to O_Y', where the unemployment caused by the imposition of a minimum wage can be measured by the distance $O_Y O_Y'$.

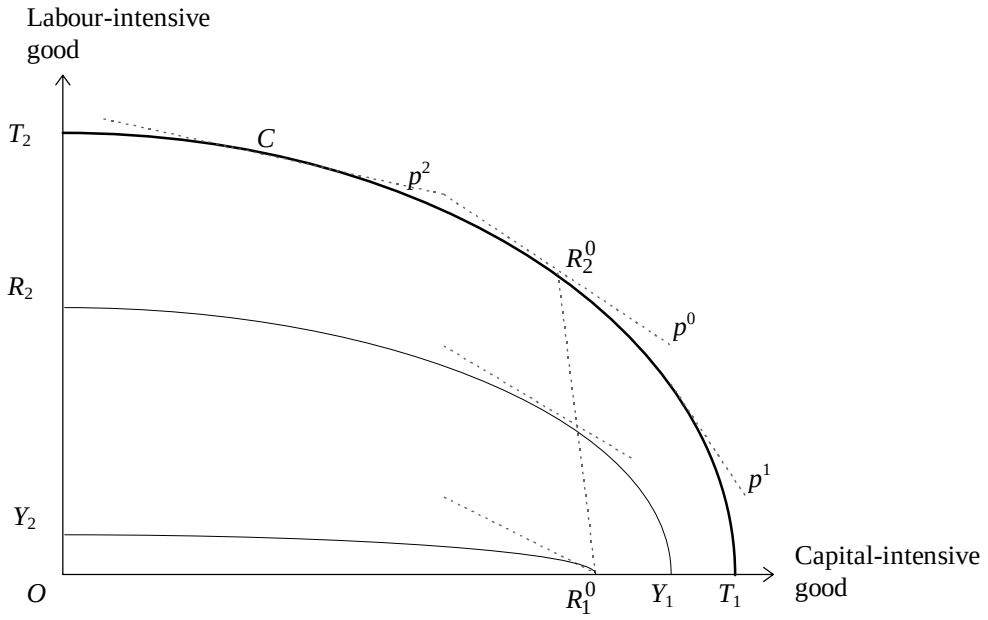
In fact, setting a minimum wage for the whole economy causes a modification of the production possibilities frontier in the economy, as is analysed in the pioneering work of Brecher (1974), which will be discussed with the aid of figure 5. For that purpose, recall the previous H-O submodel for tradable goods in the absence of market distortions and full employment (an alternative way to work with just two goods for a small economy is to consider the non-tradable sector and a composite good consisting of both tradable sectors, as in Corden, 1984, and Corden and Neary, 1982; this could be done as a second step, extending the present analysis to demostrate the effects on the non-traded sector). The vertical axis in figure 5 shows the quantity of the labour intensive good (X) and the horizontal axis that of the capital intensive good (Y), and the production possibilities frontier is shown by the curve $T_2\,T_1$. The point R_2^0 represents the initial production equilibrium, where the marginal rate of transformation is equal to the price ratio p^0 ($=P_Y/P_X$).

Note that a variable level of employment (with capital fully employed over time) is reflected by a biased shift of the production possibilities frontier. In the presence of increasing unemployment there will be a shift towards the origin, as shown in curves R_2Y_1 and $Y_2R_1^0$. At constant goods prices, by the Rybczynski theorem, the locus of equilibrium points for different levels of labour endowment (or employed labour in this case) is shown by the negatively sloped line $R_2^0\,R_1^0$, corresponding to the tangency points between the price ratio and the different production possibilities frontiers. Along $R_2^0\,R_1^0$, by application of the Stolper-Samuelson theorem, factor rewards remain constant, and thus factoral intensity remains constant for both sectors at any production point on this line.

Now consider in figure 5 the introduction of a minimum wage for the whole economy. Assume that this takes the form of a floor for the wage in real terms, say in terms of good X. Initially, assume that the minimum wage is set exactly at the level defined by the marginal productivity in sector X at point R_2^0, i.e. it is not binding. Then R_2^0 is an optimum equilibrium at p^0 due to the fact that the producers' optimisation conditions (marginal rate of transformation equal to price ratio) do not violate the minimum wage law, and there is no unemployment. Note also that, as along $R_2^0\,R_1^0$ factor rewards remain constant, factor rewards for any point on this line exactly satisfy the minimum wage law.

Lastly, figure 5 may be used to examine the effects of changes in the terms of trade in the presence of a minimum wage. To simplify the diagrammatic exposition, consider now that the change in the terms of trade assumes the form of a fall in the price of the labour intensive good. Suppose a fall in P_Y so that p rises from p^0 to p^1. By the Stolper Samuelson theorem, at the new prices the profit maximising real wage rate falls in terms of both goods, and thus the minimum wage floor becomes binding. Then unemployment appears, which implies a shift inwards of the production possibilities frontier. Suppose that the new production possibilities frontier in this case is R_2Y_1. As wages cannot go down, production is not possible at any point on R_2Y_1 to the right of A. At the lower P_X the labour intensive good is unprofitable relative to the other good, and in fact, at the new prices the fixed wage is too high to any alternative of incomplete specialisation, thus complete specialisation in the capital intensive good will occur. The long run equilibrium point will be located on OT_1 to the right of R_1^0. This location is explained by the fact that at R_1^0 the minimum wage is not binding at p^0 and then, at p^1 in sector Y wages can still go down in terms of P_Y without violating the minimum wage law, causing some additional employment and increased output.

FIGURE 5 The production possibilities frontier and the transformation curve



Suppose now that the price of the labour intensive good rises, such that P_Y/P_X falls from p^0 to p^2. Accordingly, by the Stolper Samuelson theorem the wage rate rises above the minimum floor, and then the minimum wage is not binding any longer and no unemployment would occur. In this case, C is the long run equilibrium production point. Therefore, for any price ratio lower than p^0 equilibrium points will be on the initial production possibilities frontier (full employment for both factors) in the section delimited by $T_2R_2^0$.

According to the previous reasoning, when a minimum wage is imposed on the whole economy (exactly at the level defined by the marginal productivity of sector X at point R_2^0) the production possibilities frontier T_2T_1 turns to the transformation curve $T_2R_2^0R_1^0T_1$ in the long run: from T_2 to R_2^0 the minimum wage is not binding, there is full employment and incomplete specialisation; from R_2^0 to R_1^0 the minimum wage is binding and there is incomplete specialisation with unemployment; from R_1^0 to T_1 there is complete specialisation in the capital intensive good with unemployment except at point T_1. Note that from R_2^0 to T_1 the wage rate is fixed, and then employment is variable when prices change.

The most interesting part of Brecher's transformation curve is the portion where the minimum wage floor is effective, and consequently there is unemployment of labour. In such cases, as was first noted by Harberger (1950), when the terms of trade change the optimisation condition is not fulfilled: the marginal rate of substitution is not equal to the price ratio. The explanation can be seen in contrast to the long run equilibrium conditions without distortions (that is where price equals unit marginal cost (zero profit condition), where each factor receives the value of its marginal productivity, and returns are equalised across sectors). In this case, when output in one sector is reduced by one unit, released factors produce the same value of output in the other sector. However, in the presence of a binding minimum wage, some of the factors released would become unemployed, so that when the production of one sector contracts by one unit the

output in the other sector does not expand by the same value; that is to say, the marginal rate of transformation is not equal to the price ratio.

Turn now to the short run. In this case capital is assumed to be sector specific, and thus cannot be reallocated. This implies a modification in the production possibilities frontier, which becomes more concave, reflecting the fact that one sector cannot expand when the other contracts to the extent that it could if there were perfect mobility of both factors. Then, in figure 5 the short and long run production possibilities frontier would coincide at the initial equilibrium but elsewhere the former would lay inside the latter (not shown). In the short run, analogously to what was described earlier for the case of a fall in P_Y, a fall in P_X will affect factor returns as follows:

$$\hat{r}_Y > \hat{P}_Y > \hat{w} > \hat{P}_X > \hat{r}_X$$

Then, when the minimum wage (in terms of good X) is already effective a fall in P_X implies a loosening of the constraint imposed by the wage floor (assuming that it is not enough to make it ineffective). This will cause unemployment to fall, and then the production possibilities frontier will shift outwards. (If the minimum wage floor is not initially binding then, returning to figure 5, the short run equilibrium will be located on the portion from R_2^0 to T_1 of the production possibilities frontier with full employment.) When the minimum wage is already effective, a rise in P_X will cause more unemployment, and the production possibilities frontier will shift inwards. (If the minimum wage floor is not initially effective, when P_X rises the profit maximising wage rate in terms of good X goes down, and then the constraint becomes binding. Then, unemployment will occur and the production possibilities frontier shifts inwards.)

The above explanations have been synthesised in a general approach by Neary (1985), which introduces a general framework for the theories of factor price rigidities and international factor mobility. This approach enables us to examine the behaviour of a small open economy facing a perfectly elastic supply of either of its productive factors (capital and labour) which, as Neary points out, has been analysed mainly in two areas of international trade theory: the theory of direct foreign investment and the theory of minimum wage rates. In the former, the literature stemming from Mundell (1957) has shown that international capital movements are a perfect substitute for international trade in goods to the extent that both lead to factor price equalisation across countries. In the latter, the models used in the literature stemming from Harberger (1950) and Brecher (1974) to analyse domestically imposed wage rigidities are formally identical to those in the Mundell tradition. To summarise, this approach allows us to analyse within the same framework both perfect factor mobility internationally, that is factor price equalisation across countries, and factor price rigidities imposed domestically for any of the production factors.

Accordingly, it can be demonstrated that in the circumstances under which international factor price equalisation holds, if a further factor price rigidity is imposed, either specialisation in production (as in Brecher) or in trade (as in Mundell) will appear; which of these outcomes will result depends on considerations on the structure of the economy, the extent of impediments to trade, and the assumptions about the dynamic adjustment of the economy towards the new equilibrium (Neary's proposition 6, 1985, pp. 562).

However, when the factor price equalisation theorem does not hold, that is factor prices are not independent from endowments, the imposition of factor price rigidities leads to an increase in the economy's price-output responsiveness (Neary's proposition 3, op.cit., pp. 559). This proposition is demonstrated by showing that:

$$\frac{\partial \bar{\mathbf{x}}}{\partial \mathbf{p}} - \frac{\partial \mathbf{x}}{\partial \mathbf{p}} > 0 \qquad (1)$$

where $\bar{\mathbf{x}}$ and $\mathbf{x}$ are the matrices of first derivatives with respect to prices of the revenue functions in the constrained and unconstrained economies, respectively. Note that this result implies for the own price responsiveness of good j:

$$\frac{\partial \bar{x}_j}{\partial p_j} > \frac{\partial x_j}{\partial p_j}$$

Additionally, it can be demonstrated that the imposition of factor price rigidities reduces the responsiveness of the remaining flexible factor prices to changes in endowment (Neary's proposition 4, op.cit., pp. 560). The demonstration of the proposition rests on showing that:

$$\frac{\partial \bar{\mathbf{w}}}{\partial \mathbf{l}} - \frac{\partial \mathbf{w}}{\partial \mathbf{l}} > 0$$

where $\bar{\mathbf{w}}$ and $\mathbf{w}$ are the matrices of first derivatives of the revenue functions with respect to the endowment of flexible price factors (denoted by $\mathbf{l}$ in the expression above) in the constrained and unconstrained economies, respectively. Note that this result shows the responsiveness of an individual factor's price to a change in its own endowment to be:

$$\frac{\partial \bar{w}_i}{\partial l_i} > \frac{\partial w_i}{\partial l_i}$$

These two last propositions reflect, as Neary emphasises, the Le Chatelier-Samuelson principle, stating that as more constraints are imposed on a economy, the responsiveness of its outputs to changes in price become more negative, and the responsiveness of the remaining flexible factor prices to changes in endowment become less negative. Intuitively, the latter part can be interpreted in the sense that as more factor price rigidities are imposed, the economy becomes closer to the factor price equalisation situation; i.e. a less negative response of factor prices to endowment leads, in the extreme case, to the situation in which factor prices are independent of endowment. Note that the former part implies that the presence of factor price rigidities leads in the limit case to complete specialisation.

III - METHODOLOGY

As stated by Shoven and Whalley (1992) the Walrasian general equilibrium model provides an ideal framework for assessing the effects of policy changes on resource allocation, allowing also the identification of gainers and losers from such policies. An applied general equilibrium model determines the allocation of resources in the economy by the interaction of demand and supply, resulting in a set of equilibrium prices.

A Walrasian equilibrium is characterised by vectors of prices and outputs such that the demand equals the supply for all goods (in the absence of free goods). The Walrasian equilibrium assumes competitive behaviour of all agents: on the demand side, consumers maximise utility subject to a budget constraint; on the production side, producers are profit maximisers. The system is homogeneous of degree zero in absolute prices, so that the absolute level of prices does not affect the equilibrium outcome, i.e. only relative prices matter.

For continuous demands the existence of the competitive equilibrium is ensured (Arrow & Debreu, 1954) but not, however, its uniqueness. From the normative point of view, the first theorem of welfare economics states that in a Walrasian equilibrium the resource allocation is Pareto efficient, and the second theorem states that any Pareto efficient allocation can be supported as a competitive equilibrium with appropriate lump-sum transfers. Accordingly, starting from an initial equilibrium any policy that distorts relative prices will move the economy out of the Pareto efficient allocation, implying a social cost in a general equilibrium model. Furthermore, distributional aims may be attained by lump-sum transfers without affecting efficiency.

In fact, due to its complexity, even simple general equilibrium models cannot be solved analytically. It was Scarf (1967) who provided the first algorithm to find a general equilibrium solution in a computational application, making possible the development of applied general equilibrium models. The further development of algorithms has enabled the obtaining of fast solutions for highly disaggregated models. Computational applications allow us to work with high dimensionality models with great level of detail, dissagregated as required for the purpose and subject only to information availability. By specifying the economy in such detail it is possible to include distortions as domestic and border taxes.

In applying general equilibrium to analyse policy changes or exogenous changes, a new equilibrium (unobservable) is computed and compared to the observed data originated by the current policy or state. The economy is considered initially to be in equilibrium, what is called the benchmark equilibrium; usually units for goods and factors are chosen so that they have a price of one in the benchmark (the Harberger convention). The parameters for the functional forms are obtained from secondary sources or provided through calibration. The calibration procedure determines the parameters values so that the model replicates the base-year equilibrium observation as a solution. The parameterised model may then be used to solve for alternative equilibria after a policy change or external shock, what are called counterfactual equilibria. If the model consists of Cobb Douglas functions, the calibration will provide all the required parameters; however, when CES (constant elasticity of substitution) or LES (linear expenditure system) functions are used, exogenously determined elasticities are required.

The strengths and weakness of the methodology are discussed in, among others, Greenaway et al. (1993). Starting with the main positive aspects, CGE (computable general equilibrium) models provide a coherent structure for dealing with complex problems, giving a framework for evaluating interdependencies and feedbacks, particularly income and substitution effects. These interdependencies are the essence of general equilibrium models, where ‘everything depends on everything else’. Then, taking into consideration the facility for simulation of alternative scenarios, CGE modelling is a useful tool for policymakers. An important strength of the CGE models is that they have solid theoretical microfoundations with explicitly specified functions for all the agents. The models are able to deal with non-marginal changes, which is more suitable for policy applications than an analysis based on differential calculus; they also allow the assessment of the impact of policy changes on efficiency and equity (e.g. via welfare measures such as the equivalent variation indicator).

These authors also discuss the main weakness of this methodology. An important limitation is given by the requirement for the functional forms to be tractable, which limits the choice to only a few simple functions, and very often models are overly stylised; to worsen matters, neither the specification of the functional forms nor of the model can be tested. It is also difficult to obtain a data set consistent with Walrasian equilibrium, and thus the assumption of equilibrium in the benchmark is usually rather strong. The model requires the calibration of parameters, which are based on one single observation (data on one year or on an average of years) and these cannot be tested. Finally, the possible existence of multiple solutions for the Walrasian equilibria represents a major drawback. However, the well behaved functional forms usually chosen rule out such a possibility.

General equilibrium models may be applied to a wide range of questions in quite different areas. They have been heavily used over the last twenty five years in trade policy and public finance, but also they have been applied in development policies, energy and environmental issues (for surveys see Shoven and Whalley, 1992 and Greenaway et al., 1993). Applied tax models allow the evaluation of efficiency and distributional effects of tax system, shedding light on potential tax reforms (e.g. Piggot and Whalley, 1985). Applied trade models may be multicountry (e.g. the Global Trade Analysis Project, GTAP) or single-country type (e.g. Dervis et al., 1982). The former are suitable for analysing global issues, either world-wide as for the GATT/WTO trade liberalisation rounds, or regionally as for the effects of the EU enlarged market. The latter are suitable to investigate the effects of developments abroad on individual economies, as changes in world demand, international prices or trade regulations.

IV- MODELLING

This section analyses the effects of terms of trade shocks to exportable sectors under some special assumptions for the labour market, using a computable general equilibrium approach. The model used is based on Blake, Milner, Reed and Westaway's (1995), henceforth BMR&W. Two new features are introduced: firstly, two kinds of labour, male and female, are considered, both being perfectly mobile across sectors. Secondly, there is a minimum wage effective over the whole economy.

BMR&W's paper investigates, using a computable general equilibrium application, the effects of a maintained export (traditional) price boom for the Mauritian economy. Their model includes tradable and non-tradable goods, and two alternatives for modelling are discussed. Firstly, a model including only two productive sectors, exportables and non-tradable, as in De Melo (1988) and Devarajan et al. (1990). However, as noted by the authors, this kind of model is not suitable for analysing the main aspect of Dutch disease, that is the effect a the terms of trade shocks in one exportable sector has on the other sector. The second alternative model includes three productive sectors: traditional exportables, non traditional exportables which are produced within an Export Processing Zone, and non-tradables. There is also an importable good which is not produced domestically.

This work follows the main features in BMR&W's second alternative model, which can be summarised as follows:

- *Productive sectors*. In the economy there are two export sectors, traditional and non traditional (that are only exported and not consumed domestically), an import sector (which is not produced domestically), and a non-traded sector. Production sectors are assumed to be perfectly competitive. Export sectors are modelled by nested functional forms: Leontief at the top level between imported inputs, non-traded inputs and the value-added which is a composite good produced by a Cobb Douglas function using capital and labour. Production in the non-traded sector is also modelled as a Leontief function at the top level between imported inputs and the value-added as a composite good (produced in the same way as that in the export sectors). Imported inputs for the three sectors are assumed to be different, being taxed differently. The economy is assumed to be a price taker, i.e. import and export prices in foreign currency are considered exogenous, and the exchange rate is fixed as the numeraire.

- *Factor mobility and factoral intensities*. Labour is assumed to be perfectly mobile across sectors, and capital is assumed to be specific to each sector. Perfect competition is assumed in the labour market, and wages are perfectly flexible. In the model, the labour factor is remunerated by the value of its marginal productivity, wages are equalised across sectors and the labour force is fully employed over time. Labour is considered to be internationally immobile and its supply to be fixed. The traditional exportable good (sugar) is capital intensive, the non traditional (clothing) is labour intensive, and the factoral intensity for the non-traded sector lies in between.

- *Trade restrictions and taxes*. There are duties on traditional exports, and neither duties nor subsidies on non-traditional exports. There are tariffs on imports for all destinations except inputs for the non-traditional sector. There are indirect taxes on exports, imports, and non-traded goods, and an income tax.

- *Consumer*. There is a typical household in the economy. The household sector includes all non-production private sector activities except investment. Household income comes from factor endowments, transfers from the rest of the world and from the government. Household expenditure is modelled as a Cobb Douglas function of the aggregate composite good, savings, transfers (to the government and abroad) and income tax. The composite good is a CES function of importable and non-traded goods, and in the absence of an estimate for the elasticity of substitution, alternative values are assumed. Savings behaviour is assumed to be passive, as a constant proportion of income, and investment to be savings driven.

- *Government*. Sources of income for the government are taxes on trade, indirect taxes, income tax, transfers from the household and the rest of the world. Government expenditure is specified via a Cobb Douglas utility function of savings, government transfers (to the household and abroad), and non-traded goods (being the total expenditure on non-traded goods fixed). The government budget is assumed to be balanced over time.

The BMR&W model contains a suitable level of aggregation and its main features are considered to be useful for the purpose of this paper. It will now be extended by including some new features, intending to reflect more closely the reality of many developing countries.

A relevant distinction may be made by the decomposition of the labour force, into male and female labour. In the case of Mauritius, male and female participation in the productive activities is clearly different across sectors: traditional exportables employ mainly male workers, non-traditional exportables predominantly female workers, and there is a more even mix in the non-tradable sector. In addition, wages differs for both types of workers, with female wages lower than male. Consequently, it may be expected that the terms of trade shocks will have different consequences for each type of worker.

Accordingly, two kinds of labour, male and female, are introduced into the analysis. Each type of labour is homogeneous, but they are imperfect substitutes for one another in production, with the ratio of male to female labour differing across sectors. Value-added in each productive activity is considered as a composite good, produced by a Cobb Douglas function using capital, male labour and female labour. Both types of labour are assumed to be perfectly mobile domestically, and thus the wages for each type are equal across sectors.

Note that with capital and two types of labour entering the production function we must be careful in applying the usual terms ‘capital intensive’ and ‘labour intensive’. However, it is convenient to use such labels, particularly as, in the original model (BMR&W), the three production sectors are discussed in such terms. In the new model that categorisation is maintained by using the ratio of total capital cost to total labour costs for each sector in the benchmark as the indicator. Similarly, it is no longer possible to talk in terms of a unique ‘capital/labour ratio’ for a sector, which implies that we cannot link the capital/labour ratio and the marginal product of capital directly. Then, in this case it is more useful to calculate the marginal product of capital directly, and infer from the direction of the change whether the ratio of capital to the composite factor ‘labour’ has increased or decreased.

Another relevant feature for most developing countries is the presence of domestic distortions in the labour market. As is noted in the literature, the effects of external shocks are modified by the presence of domestic distortions, in the sense that the economy is not allowed to respond optimally to a change in the environment. Taking this fact into consideration, distortions in the labour market are introduced into the analysis, assuming the form of a minimum wage law. Minimum wage laws are intended to increase workers’

real wage, but cause unemployment when they are effective. Thus, full employment is not longer ensured in the model, and the level of employment is variable when the economy faces terms of trade shocks. Moreover, the presence of a minimum wage implies that labour supply is perfectly elastic at that level.

Usually minimum wage laws are set in money terms. Although, they are intended to protect workers' real wages, setting a floor in real terms would make their application rather complex. It has been considered convenient to model the minimum wage law as a floor for the real wage, and thus nominal wages are endogenous. A conventional way of setting the wage floor is to consider the real wage in terms of the consumer's basket. Another alternative is to assume that the floor is set in terms of the price of the final good of the sector in which the worker is employed. As the consumer basket consists of non-tradable and importable goods, and prices for imports are to be considered fixed in the experiments, the changes in the wage in terms of the non-tradable good can be viewed as a good proxy of the changes in the real wage. However, as a matter of simplification in the application of the distortion to the model (Model 2), the minimum wage is set in terms of the importable good (not produced).

Finally, this model assumes that the minimum wage sets a floor for each kind of labour, and that it is equal across sectors. The law is assumed to be effective at the moment of the occurrence of shock.

V- DATA AND RESULTS

Along the lines of the previous chapter, two alternative models are considered to analyse effects of external shocks. This application is base on data from the Mauritian economy (Social Accounting Matrix (SAM) for Mauritius in 1987)[2], that has been used to calibrate the model is given in Table 1. The only difference between the SAM in Table 1 and that used in BMRW's second model (Blake et al., table 6) is that the homogeneous labour force of the latter is decomposed into male and female labour (values are assumed).

The first model analyses the case where there is no distortion in the labour market. The second model includes an effective minimum wage law. Models are run for moderate changes in the international price of both exportables, in Excel 5.0. The effects of changes in the terms of trade on the labour market are likely to be different according to whether they involve the labour intensive sector (non traditional exportable) or the capital intensive sector (traditional exportable), henceforth NTE and TE sectors respectively. Besides, taking into consideration the different composition of employment in each sector, it is expected that female and male workers will be differently affected by a shock. Thus, models are run under plausible alternatives of changes in the terms of trade: a moderate improvement or a worsening of the world price for TE and for NTE (P_{TE} and P_{NTE} respectively).

As mentioned before, there is no available estimate for the parameter σ in the CES consumer's utility function. For that reason two alternative elasticities of substitution are used: a low elasticity, setting σ at 0.5, and a high elasticity, setting σ at 2. The employment composition is assumed to be different across sectors, being the shares in the wage bill as follows: for traditional exports, 10% female and 90% male, for non traditional exports, 90% female and 10% male, and 50:50 for the non-traded sector. The exchange rate is chosen as the numeraire.

All results are organised in four experiments, each of which is run alternatively for a rise and a fall in the world price, for both elasticities of substitution, as follows: 1) Model 1, changes in P_{NTE} (tables 2 to 4); 2)

[2] A brief description of the Mauritian economy can be found in the Appendix A of the complete version of this work.

Model 1, changes in P_{TE} (tables 5 to 7); 3) Model 2, changes in P_{NTE} (tables 8 and 9); 4) Model 2, changes in P_{TE} (tables 10 and 11). Finally, results from these four experiments are compared in tables 12 and 13. [3]

Table 1 Three-Sector Social Accounting Matrix for Mauritius, 1987*

	NTE	*TE*	*NT*	*HSE*	*GOV*	*INV*	*EXP*	*ROW*
NTE	6667						-6667	
TE		8322					-8322	
NT	-1015	-3848	20570	-9779	-2722	-3206		
M	-3490	-838	-4273	-3581		-2309		14491
MLAB	-956	-93	-3452	4501				
FLAB	-106	-836	-3452	4394				
CAP	-1100	-1733	-7968	10800				
SAV				-5162	-1298	6460		
HSE				-1214	403			811
GOV				1852	-1872			20
FEX				802	30	-499	14989	-15322
MT		-236	-1034	-1035	2751	-446		
XD		-599			599			
IT		-138	-393		531			
YT				-1578	1578			
RATES								
TAR		28.2%	24.2%	28.9%		19.3%		
DUTY		7.2%						
IND		1.79%	1.91%					

Source: taken from Blake et al. (1995), table 6. * See description of the SAM in Blake et al. (1995). Values for male and female labour are assumed.

Notation: NTE non traditional exportable sector, TE traditional exportable sector, NT non-tradable sector, importable sector, MLAB male labour, FLAB female labour, CAP capital services, SAV savings, HSE household, GOV government, INV investment, EXP exports, ROW rest of the world, FEX foreign exchange, MT import tariffs, XD export duties, IT indirect taxes, YT income taxes.

V.1 Model 1

This model assumes that there is no minimum wage in the economy. There are other distortions in this model (tariffs, duties, indirect taxes, etc.) that in the current experiments will be considered to remain constant in order to focus on the comparisons between the effects of a shock with and without a minimum wage. In fact, changes in terms of trade are analysable in the same way as changes in tariffs or duties, with the only difference that a terms of trade disturbance generates larger income effects (Edwards, 1988); this could be done as a further stage of this work.

The model has been calibrated in the usual way by setting all world prices and factor returns at one in the benchmark data set, which is assumed to represent an equilibrium. The model is run for moderate changes

[3] The whole set of results for both models are presented in Appendix B in the complete version of this work.

in prices of exportables, setting them arbitrarily at 10%, considering firstly changes in P_{NTE} and secondly in P_{TE}.

The first experiment then consists of simulating changes in P_{NTE}. In this case the shock affects directly the labour intensive sector employing mainly female labour, but there are also general equilibrium effects in the whole economy. That is, it is expected that a positive shock for NTE will imply an expansion of the sector and a contraction of the other sectors due to the fact that they are substitutes in production sharing the same pool of mobile factors, assumed to be fixed in the model, reflecting in fact a change in the relative prices of the mobile factors. Besides, there are effects on the demand side, explained by changes in consumer's relative prices and income effects induced by the shocks.

The overall effects of the alternative shocks faced by the NTE sector on the output of all productive activities will be analysed in detail with the help of Table 2. The following results for σ=2 (similar remarks may be made for σ=0.5) are noteworthy:

- When P_{NTE} goes up by 10%, NTE output expands by 11.3% and the production of TE contracts by 8.1%. The change in non-tradables output is negative here but the sign depends on the elasticity assumed.

- A fall of 10% in P_{NTE} cause a contraction in NTE production of -15.3%, and a expansion in TE activities by 8.2%. The effect on the size of the non-tradable sector depends on the elasticity assumed, but is always small.

TABLE 2 Effects on productive sectors of changes in the world price of non traditional exports (P_{NTE}) (percentage changes over benchmark)

	10 % increase		10% reduction	
	σ = 0.5	σ = 2	σ = 0.5	σ = 2
Ex non traditional	8.7	11.3	-13.4	-15.7
Ex traditional	-10.0	-8.1	10.2	8.2
Non-tradable	0.3	-0.4	- 0.2	0.4

According to these results, after a positive terms of trade shock for NTE, as expected, the sector expands at the expense of the TE sector, but there is an ambiguous effect on non-tradables, depending on the elasticity assumed. This latter result is explained by the fact that, for example, an increase in P_{NTE} always pushes up the price of non-tradables, modifying consumer relative prices against non-tradable goods, and consumer demand for the non-traded good is less sensitive to changes in relative prices for low values of the elasticity of substitution. Then, for a low elasticity the overall effect on the demand for non-tradables is positive (the income effect dominates), whereas for a high elasticity the effect is negative (the substitution effect dominates). The same reasoning may be applied to a fall in P_{NTE}: for a low elasticity, changes in relative prices are not enough to outweigh the negative income effect, whereas for a high elasticity the overall effect on the non-traded output is positive.

These shifts in production reflects the reallocation of the labour force, as is shown in Table 3. The structure of employment of the two types of labour is modified by the shock. For example, a positive shock in the NTE sector leads to an increase in the output of the sector and thus to an increase of employment of both types. However, as will be discussed next, the female labour intensity in the sector decreases.

As labour is perfectly mobile, reallocation will occur until wages are completely equalised across sectors. As was discussed before, with capital immobility the reallocation of labour changes the K/L ratio, affecting the marginal productivity of capital and thus the capital rental. For example, when the good price

goes up the returns to both factors are increased. The increase in wages in the sector causes the labour allocated to the sector to increase, with a consequent fall in the money wages. Then the marginal productivity of capital rises and thus the capital return rises. Accordingly, w/r falls.

TABLE 3 Changes in allocation of labour force after changes in the world price of non traditional exports (P_{NTE}) (in percentage over the endowment of each type in the benchmark)

			10 % increase				10% reduction			
	Benchmark		$\sigma = 0.5$		$\sigma = 2$		$\sigma = 0.5$		$\sigma = 2$	
	F	M	F	M	F	M	F	M	F	M
NTE	21.2	2.4	25.0	3.1	26.2	3.3	16.0	1.6	15.2	1.5
TE	2.1	19.0	1.4	13.9	1.5	15.0	3.0	24.9	2.9	23.6
NT	76.7	78.6	73.7	83.0	72.3	81.7	81.0	73.5	81.9	74.9
total	100	100	100	100	100	100	100	100	100	100

Notation: NTE non traditional exportables, TE traditional exportables, NT non tradables

However, there are two kinds of labour employed in different proportions across sectors and it is revealing to compare the effects of external shocks on their money and real wages. Note that in fact, this 3 factors model with two mobile labour factors and a fixed capital works as a superimposition of a H-O and a specific factors models. As has been commented earlier, when there is a positive shock in one sector (say NTE) the effects on factors returns in a specific factors model with only one type of labour are:

$$\hat{r}_{NTE} > \hat{P}_{NTE} > \hat{w} > \hat{P}_{TE} > \hat{r}_{TE}$$

This mean that the real wage falls in terms in NTE and rises in terms of TE, that is the effects on labour factor (unique type) it will be smaller than the change in NTE prices. However, when there are more than one type of mobile labour factor the model is formally identical to a H-O one with capital and labour. Then, even though the above inequality holds both for a unique type of labour or for an average of all types of labour, taking into consideration that the NTE sector is intensive in female factor, the following expression holds along with the previous one:

$$\hat{w}_F > \hat{P}_{NTE} > \hat{w}_M$$

where $\hat{w}_F$ and $\hat{w}_M$ are the female and male wage rate respectively. This expression shows that the effect on money wages for each type of labour are different and thus the return in terms of the good they produce.

The Table 4 shows that in fact the two types of labour are differently affected by the shock. The results show that a rise in P_{NTE} means that female labour in terms of the good produced in the sector becomes more expensive whereas male labour becomes cheaper, and analogously for a reduction in P_{NTE}, as follows (this is for the high elasticity, similar results are obtained for the low elasticity):

- A rise in P_{NTE} will cause an increase in money wages for both types of workers. However, a 10% increase in P_{NTE} causes a more than proportional increase in female wages (15.3%), and a less than proportional increase in male wages (4.6%)

- A fall in P_{NTE} causes a reduction in money wages for male and female workers. The former is less than proportional (-4.2%) and the latter is more than proportional (-14.6%) to the change in good prices.

As expected, the type of labour used intensively in the production process is most favoured by a positive shock in the sector. Then, as NTE is intensive in female labour relative to male, an increase in P_{NTE} causes a more than proportional increase in female wages, and a less than proportional increase in male wages. This implies a change in the relative returns of both kinds of labour, inducing increased hiring of the relative cheaper labour, leading to a reduction in female labour intensity in the sector. That is, even though a positive shock leads to an expansion of the sector and consequently to an increased employment of both types, as a rise in P_{NTE} causes the relative price of female labour to go up, it induces to a reduction in female labour intensity.

These results are very important and provide some insight for dealing with the next model. In fact, this can be viewed as a kind of "magnification effect" for mobile factors in the model, which explains the opposite effects that the shock produce on real wages. As has been already mentioned, the consumer basket consists of non-tradable and importable goods; in these experiments prices for imports are fixed, but the price of non-tradables is affected by the terms of trade shocks. Then, the wage in terms of non-tradables can be considered as a good proxy for measuring the direction of the change in the real wage; other alternative measures are also provided in Table 4. The following are the main results for the case where $\sigma=2$ (the same remarks may be made for $\sigma=0.5$):

- Effects of a rise in P_{NTE} measuring real wages in terms of NTE: a 10% rise in P_{NTE} will cause female wages to increase by 15.3% and male by 4.6%, thus whereas the real wage for female workers increases by 4.8% the real wage for male workers falls by -4.9%.

- Effects of a fall in P_{NTE} measuring real wages in terms of NTE: a 10% fall in P_{NTE} cause female wages go down by -14.6%, and male by -4.2%, causing the real wage for female workers to fall by -5.1% and the real wage for males to rise by 6.4%.

- Effects of a rise in P_{NTE} measuring real wages in terms of non-tradables: a 10% rise in P_{NTE} will cause the price of non-tradable goods to increase less than proportionally (by 8.9% for $\sigma=0.5$ and by 6.8% for $\sigma=2$); then the real wage for female workers increases and the real wage for male workers falls.

- Effects of a fall in P_{NTE} measuring real wages in terms of non-tradables: a 10% fall in P_{NTE} will push down the price of non-tradable goods less than proportionally (by 8.3% for $\sigma=0.5$ and by 6.7% for $\sigma=2$); the real wage for female labourers goes down whereas that for male goes up.

As these results show, a change in the terms of trade has opposite effects on the real wages of male and female workers whether considering the real wage either in terms of the non-tradable or in terms of the same sector that face the shock; thus a positive shock favours the mobile factor used intensively, increasing its real return, while the real return to the other mobile factor decreases.

TABLE 4 Effects on money and real wages of changes in the world price of non traditional exports (P_{NTE}) (percentage change over benchmark)

	10 % increase		10% reduction	
	$\sigma = 0.5$	$\sigma = 2$	$\sigma = 0.5$	$\sigma = 2$
w_F	17.1	15.3	-16.1	-14.6
w_M	6.5	4.6	-5.4	-4.2
w_F/P_{NTE}	6.5	4.8	-6.8	-5.1
$_{wM}/P_{NTE}$	-3.1	-4.9	5.0	6.4
w_F/P_{TE}	17.2	15.3	-16.1	-14.6
w_M/P_{TE}	6.5	4.6	-5.4	-4.2
w_F/P_{NT}	7.5	7.9	-8.5	-8.4
w_M/P_{NT}	-2.2	-2.5	3.1	2.6

Notation: w_F is the nominal wage for female labour, w_M is the nominal wage for male labour, P_{NTE} is the producer price for the non traditional exports, P_{TE} is the producer price for traditional exports, P_{NT} is the consumer price for non-tradables.

To finish this first experiment, the main results obtained for a change in the world price of the non traditional exportable sector will be summarised. NTE production expands (contracts) after a positive (negative) terms of trade shock, while the opposite occurs in the TE sector. The effect of the shock on non-tradables output depends on the assumed elasticity of substitution between non-tradables and importables. The nominal wages change in the same direction as good prices but magnified, the effect for female labour being more than proportional and for male workers less than proportional. This implies a change in the relative prices for the two types of labour, and leads to a reduction in female labour intensity after a positive shock in the sector. That also explain the fact that the effects on real wages are opposite for the two kinds of labour.

The second experiment consists of simulating changes in the world price of the traditional exportables (P_{TE}). This shock differs from the previously analysed in that it affects directly a capital intensive sector employing mainly male labour. According to that, we might expect a milder expansion facing a positive shock (due to capital immobility), as well as a weaker effect on wage rates than in the first experiment, but relatively stronger for male workers.

Firstly, the effects on the output of all productive sectors, for favourable and unfavourable changes in terms of trade and both alternative elasticities of substitution, are as shown in Table 5. According to that, the following results are noteworthy:

- A rise in P_{TE} implies an expansion of the sector, and a contraction of the other exportable sector for the high elasticity of substitution; however, the signs are not as expected for a low elasticity. In both cases non-tradables output expands.

- A fall in P_{TE} causes a contraction in TE and non-tradables, and an expansion in the NTE sector, for both elasticities of substitution.

TABLE 5 Effects on productive sectors of changes in the world price of traditional exports (percentage over benchmark)

	10 % increase		10% reduction	
	σ = 0.5	σ = 2	σ = 0.5	σ = 2
Ex non traditional	-13.5	-9.9	13.4	10.9
Ex traditional	-0.6	2.2	-0.8	-3.1
Non-tradable	1.9	0.9	-2.0	-1.1

Note that a positive shock in the TE sector causes an expansion in the non-traded sector, for both elasticities, mainly explained by the fact that duties on expanding TE cause the government revenue to rise and thus, as it is assumed that a fixed proportion of net revenue is transferred to the consumer, the household's income rises. This fact gives an explanation for the unexpected sign of the change in output in the TE sector for a low elasticity. Recall that, a rise in P_{TE} also pushes up P_{NT}, so modifying relative prices faced by consumer. Thus as changes in demand are less sensitive to changes in relative prices for low values of the elasticity of substitution; in this case a rise in P_{TE} leads to an overexpansion of the non-traded output (which is the biggest sector in this economy), pulling out resources from TE sector (it will be shown later on that in this case there is a more than proportional increase in P_{NT}).

Considering the high elasticity case as the more representative, the expansion of the booming sector (TE) is accompanied by a (mild) expansion in the non-tradables and a contraction of the other exportable sector. These alterations in the production patterns reflect the reallocation of the labour force, which is shown in Table 6. In this case, a positive shock for the TE lead to an increase of both types of employment in the sector.

TABLE 6 Changes in allocation of labour after changes in the world price of traditional exports (P_{TE}) (in percentage)

			10 % increase				10% reduction			
	Benchmark		σ = 0.5		σ = 2		σ = 0.5		σ = 2	
	F	M	F	M	F	M	F	M	F	M
NTE	21.2	2.4	16.0	1.7	17.3	1.9	27.3	3.3	26.0	3.2
TE	2.1	19.0	2.1	18.6	2.3	20.2	1.9	18.7	1.8	17.5
NT	76.7	78.6	81.9	79.7	80.4	77.9	70.9	77.9	72.2	79.3
total	100	100	100	100	100	100	100	100	100	100

As before, changes in money wages are of the same sign as the shock, but in this case a smaller effect may be expected due to the fact that the sector is capital-intensive. Changes in money wages will be discussed next, using Table 7. The main results, for the case of the high elasticity of substitution (analogous results are obtained for the case of the low elasticity of substitution), are as follows:

- A rise in P_{TE} will cause a rise in money wages for female and male workers for the whole economy. However, a 10% rise in P_{TE} cause a more than proportional increase in male wages (12.7%), and less than proportional rise for female workers (6.6%).

- A reduction in P_{TE} causes money wages for male and female workers to fall, being for the former more than proportional (-12.6%) and for the latter less than proportional (6.2%) than the change in world prices.

TABLE 7 Effects on money and real wages of changes in the world price of traditional exports (percentage change over benchmark)

	10 % increase		10% reduction	
	$\sigma = 0.5$	$\sigma = 2$	$\sigma = 0.5$	$\sigma = 2$
w_F	9.3	6.6	-7.6	-6.2
w_M	15.0	12.7	-14.0	-12.6
w_F/P_{NTE}	9.3	6.6	-7.6	-6.2
$_{wM}/P_{NTE}$	15.0	12.7	-14.0	-12.6
w_F/P_{TE}	-0.6	-3.0	2.6	4.2
$_{wM}/P_{TE}$	4.6	2.5	-4.4	-2.9
w_F/P_{NT}	-1.2	-1.2	2.1	1.8
$_{wM}/P_{NT}$	3.8	4.4	-4.9	-5.1

Notation: w_F is nominal wage for female labour, w_M is nominal wage for male labour, P_{NTE} producer price for non traditional exports, P_{TE} is producer price for traditional exports, P_{NT} is the consumer price for the non-traded goods.

In this case, as TE is intensive in male labour relative to female, a rise in P_{TE} cause a more than proportional increase in male wages and a less than proportional rise for female, which implies that female labour in terms of the good produced in the sector becomes cheaper whereas male labour becomes more expensive. This also implies there is a change in the relative prices of the two types of labour, causing in this case a shift in the mix of workers with a reduction in the male labour intensity in the sector. Note also that, since TE is a capital intensive sector, a 10% change in P_{TE} causes a smaller effect on money wages than does the same change in P_{NTE}, comparing in each case the wages that are most affected.

Thus, a positive external shock for TE will favour most the mobile factor that is intensively used in that sector. The magnified effect on money wages explains the fact that real wages for male and female are oppositely affected, in this case either in terms of TE or non-tradables. Table 7 also shows, for the case of the high elasticity of substitution (analogously for the low elasticity case), the following related results:

- Effects of a rise in P_{TE} measuring real wages in terms of TE: a 10% rise in P_{TE} will cause female wages to increase by 6.6% and male wages by 12.7%; thus whereas the real wage for female workers falls by -3.0%, the real wage for male workers rises by 2.5%.

- Effects of a fall in P_{TE} measuring real wages in terms of TE: a 10% fall in P_{TE} causes female wages go down by -6.2%, and male wages by -12.6%, causing the real wage for females to rise by 4.2% and for males to fall by -2.9%.

- Effects of a rise in P_{TE} measuring real wages in terms of non-tradable: a 10% rise in P_{TE} will cause the price of non-tradable goods to rise, less than proportionally for the high elasticity (7.9%) and more than proportionally for the low elasticity (10.7%). As a result, the real wage for female workers goes down and that for males rises.

- Effects of a fall in P_{TE} measuring real wages in terms of non-tradable: a 10% fall in P_{TE} will push down the price of non-tradable goods less than proportionally (9.5% for the low elasticity and 7.8% for the high elasticity). Then, the real wage for female labourers goes up whereas that for males goes down.

Note that whatever the definition of the real wage, the alternative shocks are transmitted differently for the two types of labour. Thus one important conclusion from the two experiments with Model 1 is that when more than one type of worker is considered, no matter what sector is booming, the fate of the two types of workers in terms of their real wages is different. However, the effects on wages rates are milder when the shock affects the capital intensive sector.

V.2 Model 2

This model considers the presence of a minimum wage in the economy. Initially, the model is calibrated in the usual way, setting all world prices at one at the benchmark data set, which is assumed to represent an equilibrium. The exercise is carried out in two stages. Firstly, the model is used to analyse the effects of imposing an effective minimum wage in the economy. Secondly, changes in the terms of trade in presence of a minimum wage are considered.

It is assumed the minimum wage in the economy takes the form of a floor for the real wage. As noted earlier, the terms of trade shocks cause varied effects on wages in terms of NTE, TE or non-tradables. For that reason, it has been considered convenient not to chose the real wage in terms of these goods, in order to avoid focusing on a special case, or otherwise to clutter the analysis with all possible alternatives. Then, as a means of simplification, the minimum wage is assumed to consist of a floor for the real wage in terms of the imported good for consumption.

As the minimum wage is intended to increase real wages, it has been assumed that it is initially effective, achieved by setting it 20% above the equilibrium level in the benchmark. This policy will give rise to unemployment in the economy equally distributed among female and male workers. This will be the starting point for the subsequent experiments.

Before the shock, then, there is unemployment which is worsened when the economy faces a negative shock and is relieved when the shock is positive. Thus as wages cannot fall below the minimum, the level of employment is variable. Accordingly, it may be expected that the effects from external shocks on output and unemployment will depend on whether the change affects a capital or labour intensive sector. Moreover, it may also be expected that the consequences for each type of unemployment (female or male) will be different.

The next exercise, the third, simulates moderates changes in P_{NTE} (10%) when there is an effective minimum wage. In this model, an external shock will induce not only a reallocation of resources but also changes in the level of labour used. Consider first the effects on unemployment by type, using Table 8 These are the main results (considering σ=2; analogous comments may be made for σ = 0.5):

- When P_{NTE} goes up by 10%, the minimum wage is still effective for both types of labour, but, whereas there is a sharp fall in female unemployment, from 20.6% to 6.9%, there is a small reduction in that for males, from 20.5% to 15.1%

- When P_{NTE} goes down by 10% the minimum wage becomes even more binding. There is a strong rise in female unemployment, from 20.6% to 31.8%, but only a small increase in that for males, from 20.5% to 24.7%.

TABLE 8 Changes in unemployment after a change in the world price of non traditional exports when there is an effective minimum wage (in percentage, for each type of labour, over endowment)

	Before shock		10 % increase		10% reduction	
	$\sigma = 0.5$	$\sigma = 2$	$\sigma = 0.5$	$\sigma = 2$	$\sigma = 0.5$	$\sigma = 2$
Female	18.8	20.6	3.1	6.1	30.9	31.8
Male	18.8	20.5	12.3	15.1	23.8	24.7

Note that whereas the effect on money wages was in the same direction as the shock for the two types of labour in Model 1, in this model the effect on unemployment is in the opposite direction to the shock for both. It is also noteworthy that here, as in Model 1, with a positive shock the most favoured mobile factor is that used intensively in the sector, however in this case the gain is through a sharp reduction in female unemployment whereas in Model 1 it was by a more than proportional increase in female money wages.

According to these results, after a 10% increase in P_{NTE} the minimum wage is still effective for both types of workers; however, a greater change could make it ineffective. Suppose then a bigger increase, of 20%. As was shown in Model 1, a rise in P_{NTE} leads to a more than proportional increase in female money wages and less than proportional for male. Then, the minimum wage (in terms of the importable, whose price remains fixed) will became ineffective for females, whereas for males it will still be binding. Then, there will be full employment for female labour, and thus in this case the expansion in this sector would be more moderate, closer to that occurring in Model 1; that is to say, the shifts outwards in the production possibilities frontier will be smaller the less binding be the constraint (before the shock). If there were an increase in P_{NTE} sufficient to make the minimum wage ineffective for the two types of labour (say, 50%) then we would be back to Model 1 with full employment in the counterfactual, even though with a different starting point than before (with unemployment) .

When the minimum wage is effective the labour supply is not fixed, thus after a shock employment will be affected. Even though all sectors are substitutes in production in the sense that they share the same pool of mobile factor, in the presence of unemployment there is an additional slackness that allows to one sector to expand after a positive shock without implying a contraction elsewhere as strong as required in the full employment case. On the other hand, a negative shock will increase unemployment, causing then a stronger contraction in one sector with a milder expansion in the other than in the case of full employment. These effects will be further analysed with the help of Table 9, where it can be highlighted (for $\sigma=2$) :

- A rise of 10% in P_{NTE} implies an expansion of NTE output by 29.0 % and of non-traded by 3.6%, and a contraction of the TE sector by -2.9%.

- A fall of 10% in P_{NTE} cause a contraction in NTE by -29.5% and in non-tradables by -3.1%, while TE output expands by 2.4%.

TABLE 9 Effects on output of productive sectors of changes in the world price of non traditional exports when there is a minimum wage effective (percentage change over benchmark)

	10 % increase		10% reduction	
	$\sigma = 0.5$	$\sigma = 2$	$\sigma = 0.5$	$\sigma = 2$
Ex non traditional	28.8	29.0	-29.4	-29.5
Ex traditional	-3.7	-2.9	3.0	2.4
Non-tradable	4.4	3.6	-3.7	-3.1

These figures show that after a rise in P_{NTE}, as it causes a fall in unemployment, the expansion in the NTE sector is stronger and the contraction in the TE sector is smaller than in Model 1, which can be explained

by the shift outwards of the production possibilities frontier when unemployment falls. Analogous consequences can be identified for the case when P_{NTE} falls. This gives rise to higher unemployment, causing then a stronger contraction in the NTE sector and a smaller expansion in the TE sector than in the case of full employment, due in this case to a shift inwards of the production possibilities frontier.

It is also noteworthy that in this model there are unambiguous results for non-tradables. In this case the magnitudes of changes are clearly more important than in Model 1, with an expansion in the output of the sector when P_{NTE} rises and a contraction in the opposite case. This shows that when the booming sector and non-tradables are not strong substitutes in production (i.e. there is unemployment of the two types of labour), both sectors share the same fate (in the sense of the direction of change in output). An explanation for this is that in this case the changes in prices of non tradables (e.g. when P_{NTE} rises causes P_{NT} to fall in terms of NTE and to rise in terms of importables) are milder than in Model 1, thus substitution effects tend to be smaller than income effects.

These changes in production patterns reflect changes in the level of employment and in the allocation of labour. Note that with a minimum wage effective for the two types of labour there is no alteration in the relative prices of labour after a shock, and thus labour type intensity remains fixed.

In summary, in this model NTE expands (contracts) after a positive (negative) terms of trade shock more heavily than when the economy operates at full employment, while the contraction (expansion) of the TE sector is smaller. Now there are unambiguous results for non-tradables, where its output follows the expansion (contraction) of the NTE sector. When there is an increase in P_{NTE}, it leads to a reduction in unemployment, but the type of labour intensively used is most favoured, there being a stronger reduction in female unemployment.

Turning now to the fourth, and last, experiment, consider changes in P_{TE} when there is a minimum wage effective over the economy. As was noted in the previous exercise, in this model an external shock induces changes in the levels of labour used. Given the differences across sectors in the male/female employment mix, it follows that there will be differential effects on male and female unemployment. Table 10 summarises these effects, where the main results are as follows (for σ=2; analogous comments may be made for σ = 0.5):

- When P_{TE} goes up by 10%, minimum wage is still effective for both types of labour. But, whereas there is a sharp fall in male unemployment, from 20.5% to 8.0%, there is a smaller reduction in female unemployment, from 20.6% to 13.2%.

- When P_{TE} goes down by 10%, both minimum wages become even more binding. The rise in male unemployment is the higher, from 20.5% to 32.0%, while the increase in female unemployment is from 20.6 % to 27.7%.

TABLE 10 Changes in unemployment after a change in the world price of traditional exports when there is an effective minimum wage (in percentage, for each type of labour, over endowment)

	Before shock		10 % increase		10% reduction	
	σ = 0.5	σ = 2	σ = 0.5	σ = 2	σ = 0.5	σ = 2
Female	18.8	20.6	9.3	13.2	27.3	27.7
Male	18.8	20.5	4.6	8.0	31.6	32.0

In this model rises of the same magnitude in P_{NTE} and in P_{TE} (exercises 3 and 4) cause different magnitudes of changes in output, and affect differently the two types of unemployment. The effects on the type of unemployment differs according to which kind of labour is intensively used. For example in the case of an increase in P_{NTE} the heavier fall is in female unemployment, whereas a rise in P_{TE} will cause a greater fall in that for males.

Note that in this experiment also, a 10% increase in P_{TE} leaves the minimum wage still effective for both types of workers. With a higher increase, say 20%, a rise in P_{TE} leads to a more than proportional increase in male wages and less than proportional rises for females, and the minimum wage will become ineffective for male workers but for females it will still be binding. Then, there will be full employment for male labour and thus the expansion in this sector would be more moderate. With a rise in P_{TE} sufficient to make the minimum wage ineffective for both types of labour we would be back to Model 1.

As was mentioned before, the shock affects the output of the productive sectors differently, as will be analysed next using Table 11. Here it is shown that:

- A 10% rise in P_{TE} implies an expansion of the TE of 12.0% and of non-tradables by 5.3%, and a contraction for the NTE sector of -2.3%.

- A 10% fall in P_{TE} cause a contraction of TE output by -13.3% and in the non-tradable sector by -5.4%, and an expansion of NTE by 2.3%.

According to these results, a rise in P_{TE} implies an expansion of TE and a contraction of NTE as in Model 1, but the expansion is stronger and the contraction is smaller, which is explained by the shift outwards of the production possibilities frontier (for TE and NTE) when unemployment falls. In this case, the non-tradable sector expands as in Model 1, but the expansion is greater for the same reason. A similar outcome may be identified in the case when there is a fall in P_{TE}: this causes a contraction in TE and expansion for NTE, but as it leads to higher levels of unemployment the contraction is stronger and the expansion is smaller than in the case of full employment; the non-tradable sector contracts heavier than in Model 1.

As has previously been mentioned, rises of the same magnitude in P_{NTE} and in P_{TE} cause overall unemployment to fall by a similar amount, but they lead to different magnitudes of changes in output. It is worth noting that, in the presence of unemployment, a similar positive shock in each sector allows the labour intensive sector to expand more strongly than the capital intensive sector (as capital is fixed). Lastly, note that in this model, as before in Model 1, the type of labour intensively used is the most favoured by a positive shock, but now by a sharp reduction in its unemployment .

TABLE 11 Effects on the output of productive sectors of changes in the world price of traditional exports when there is a minimum wage effective (percentage change over benchmark)

	10 % increase		10% reduction	
	$\sigma = 0.5$	$\sigma = 2$	$\sigma = 0.5$	$\sigma = 2$
Ex non traditional	-2.9	-2.3	2.8	2.3
Ex traditional	11.2	12.0	-12.6	-13.3
Non-tradable	6.6	5.3	-6.5	-5.4

Finally, the results for both models will be compared. Recall that Models 1 and 2 are basically the same, the only difference between them being the policy applied in the labour market. It has been argued that

when a minimum wage is introduced in the economy to reduce workers' vulnerability to shocks then this also affects the general response of the economy.

As has been noted, output responses are affected by the presence of a minimum wage. It would be useful to be able to verify expression (1) in Chapter 2 (i.e. Neary's proposition 3) that measures the differential responsiveness of the constrained and unconstrained economy facing changes in prices. However, these CGE models do not represent a truly unconstrained economy due to the presence of border and domestic taxes. Even so, it will be informative to compute such a measure to evaluate the discrepancies in the sectorial outputs responses with and without the additional labour market distortion in the economy. Then expression (1) is computed for the discrete changes in prices and outputs considered in the preceding experiments. The results are shown in Table 12, where rows indicate the output sector, and the columns indicate the change in prices, for both elasticities of substitution (results are computed for increases in prices, and as we are dealing with discrete changes, the results for a reduction are marginally different). These figures allow a general comparison among the results previously reported, showing that the maximum discrepancies in output for both situations appear for the sector that is directly affected by the change in its own price.

TABLE 12 Measuring discrepancies in output response between both models (for discrete changes, measured in percentages)

	$\sigma = 0.5$		$\sigma = 2$	
	P_{NTE}	P_{TE}	P_{NTE}	P_{TE}
Ex non traditional	20.1	10.6	17.7	7.6
Ex traditional	6.7	11.8	5.2	9.8
Non-tradable	4.1	4.7	4.0	4.4

Notation: P_{NTE} is the producer price for non traditional exports, P_{TE} is the producer price for traditional exports. Values are approximations to the expression (1) in Chapter 2.

So far, no consideration has been given to the welfare effects implied by the presence of a minimum wage in the economy. Even though the main purpose of such a policy is to protect the consumer against adverse external shocks, the presence of a minimum wage effective does not allow the economy to respond optimally in presence of an external shock, leading to a distorted allocation of resources and to unemployment.

The equivalent variation index is usually considered as suitable for measuring welfare changes for a typical consumer. The equivalent variation provides a money equivalent to the change in the household's utility after a shock. The values of the index for both models in all the experiments are shown in Table 13, where these facts are noteworthy:

- facing positive terms of trade shocks, the welfare effects are higher when there is not a minimum wage in the economy.

- negative terms of trade shocks worsen welfare, but such a deterioration is smaller when there is a minimum floor for wages rates.

Accordingly, welfare is, as expected, affected by the presence of a minimum wage. In terms of the equivalent variation index, positive terms of trade shocks cause higher benefits for the consumer when there is no minimum wage in the economy, showing the adverse effect of a distorted resources reallocation lead by its imposition. However, facing a negative shock welfare deterioration is smaller when workers are protected by the minimum wage.

TABLE 13 Equivalent variation index values

	MODEL 1		MODEL 2	
	$\sigma = 0.5$	$\sigma = 2$	$\sigma = 0.5$	$\sigma = 2$
inc. P_{NTE}	1825	1606	1531	1410
red. P_{NTE}	-1672	-1506	-1186	-1099
inc. P_{TE}	2234	1945	2008	1820
red. P_{TE}	-2086	-1916	-1842	-1695

Notation: P_{NTE} is the producer price for non traditional exports, P_{TE} is the producer price for traditional exports

VI- CONCLUSIONS

This work discusses the general equilibrium effects of a terms of trade shock for a small open economy, applied to the case of the Mauritian economy. It is focused on the short term, modelling the labour market in a way that reflects more closely the reality in many developing countries. To this purpose, it has considered two types of labour (male and female workers) and two alternatives regulation schemes, with and without an effective minimum wage.

A series of experiments has been performed to evaluate the general equilibrium effects from favourable and unfavourable shocks in the terms of trade in the exportable sector, paying particular attention to the effects for each type of worker. Models 1 and 2 differs in that the latter assumes the presence of a minimum wage effective over the whole economy. As a general result in both models it is possible to conclude that the shock affects differently the two types of labour, no matter if the shock is in the capital intensive sector, the labour intensive one, the female labour intensive one or the male intensive one.

An import result is that the type-labour intensity is a key to explaining the differences that appear in the effects between the two types of worker when a shock occurs. It has been shown that in the absence of a minimum wage the effects on nominal wages are in the same direction as shocks in prices but are magnified, being more than proportional for the type of labour in which the production is relatively intensive. For this reason, effects on real wages are opposite for both kinds of labour. When there is an effective minimum wage, unemployment appears, and also the type of labour intensively used is most favoured with a positive shock but now by a sharp reduction of unemployment of its type.

Another result that has been discussed is that the output-price responses economy wide are modified when a minimum wage is imposed. Such discrepancies are explained by the fact that with a minimum wage effective employment is variable, causing shifts accordingly in the production possibilities frontier. Thus with a positive shock the booming sector is allowed to expand more strongly and the lagging sector to contract less than when the economy operates at full employment; moreover, only under such circumstances the non-tradables output follows unambiguously the expansion in the booming sector.

Finally, the welfare effects of the imposition of a minimum wage in the economy were discussed. The comparison of results of the equivalent variation index between the economy with and without an effective minimum wage shows some ambiguous results for the typical consumer. When there is a minimum wage effective in the economy the typical consumer is worse off with a positive shock respect to the situation without the minimum wage, however, he/she is relatively better off in a negative shock when there is a minimum wage, bearing a smaller welfare deterioration.

The results from these CGE experiments show that the effects of a shock are broadly in line with those predicted in the theoretical literature that is also reviewed in this work. Note that this is so even though the Mauritian economy is subject to distortions over and above those assumed in the theoretical models (trade taxes, indirect taxes, income taxes, etc.), which may be an indication either that the level of distortions in the Mauritian economy is relatively minor or that their net effect is relatively neutral.

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