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A Neo-Ricardian Critique of the Traditional Static Theory of Trade, Customs Unions and Common Markets*

THEODORE MARIOLIS**

Abstract

The vast majority of meaningful discussions about the processes of economic integration and liberalization of trade have so far revolved around the neoclassical theory. This paper is based on the neo-Ricardian theory, briefly investigates the issues of free trade, customs unions and common markets, and shows that the relevant neoclassical propositions do not hold and/or make no sense in a world 'of production of commodities by means of commodities'. Thus, the fundamental theoretical presuppositions of the aforesaid debate are called in question.

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Introduction

Processes of economic integration are in progress all over the world, whilst at the same time the World Trade Organization is promoting, through negotiations, the gradual liberalization of the international trade in goods and services. As is expected, all these processes generate heated discussions and polemics, which do not always bear the characteristics of a scientific dialogue.

Setting aside all the scientifically unfounded perceptions (aptly criticized by Krugman, 1994), the vast majority of the remaining positions are based, implicitly or otherwise, on the *principles* of the traditional, neoclassical theory of international trade and, more generally, of international economics.[1] Hence, the *central* message of the prevailing scientific debate may be summed up as follows: the liberalization of trade yields gains in all the participating nations iff it takes place in the direction determined by the 'law of comparative advantage'. If the conceptual and analytical framework of the traditional theory is accepted, then, undoubtedly, this message must also be accepted. But does the traditional theory constitute a coherent and reliable depiction of the real economic world?

This paper is *not* a critique of the prevailing discussion but of its fundamental theoretical presuppositions. Specifically, it is based on the principles of the neo-Ricardian (or Sraffian) theory of closed and open systems,[2] and shows that the traditional, neoclassical propositions concerning the issues of free trade, customs unions and common markets do not hold and/or make no sense in a world 'of production of commodities by means of commodities' (Sraffa, 1960). For simplicity's sake, but also in order to enable a direct comparison of our findings with those of the traditional theory, the analysis focuses on two-sector systems of single production.[3] However, when it is deemed necessary, we allow for more than two sectors or joint production.

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[1] See Krugman (1996), El-Agraa (1997), Jovanović (1998), Krugman and Obstfeld (2000, chs 7 and 9), Samuelson (2004), *inter alia*.

[2] See Pasinetti (1977), Kurz and Salvadori (1995, 1998), and Parrinello (1970), Steedman (1979A, 1979B, 1987, 1999), respectively.

[3] For systematic (and updated) reviews of the traditional (textbook 'Ricardian' and Heckscher-Ohlin) theory, see Matsuyama (2008) and Jones (2003), respectively.

The remainder of the paper is structured as follows. The next section presents a basic model for a two-sector closed economy. The following three sections deal with trade, customs union, and common market issues, respectively. The final section concludes.

The Closed Economy

Consider a closed economy, which produces two commodities, 1 and 2, each of which serves a dual role as a capital good and as a consumption commodity. The economy has a linear, productive and irreducible single production technique *à la* Sraffa (1960, Part I). Labour is fully employed. The uniform rate of growth, g, equals zero, the uniform rate of interest (or profit), r, is (semi-) positive and it is given from outside the system.[4] The uniform money wage rate, w, is paid at the end of the common production period. Finally, all consumers have identical, homothetic preferences. Thus, the aggregate consumption pattern depends only upon relative commodity prices.

On the basis of these assumptions we can write:

$$\mathbf{p}^{\mathrm{T}} = (1+r)\mathbf{p}^{\mathrm{T}}\mathbf{A} + w\mathbf{l}^{\mathrm{T}} \tag{1}$$

$$r = r^{*} < R \equiv (1-\lambda)\lambda^{-1} \tag{2}$$

$$(\partial U / \partial c_1)/(\partial U / \partial c_2) = p_1 / p_2 \tag{3}$$

$$\mathbf{x} = \mathbf{A}\mathbf{x} + \mathbf{c} \tag{4}$$

$$\mathbf{l}^{\mathrm{T}}\mathbf{x} = 1 \tag{5}$$

$$p_1 c_1 + p_2 c_2 = 1 \tag{6}$$

where $\mathbf{p}$ denotes the vector of commodity prices, $\mathbf{A} \equiv [a_{ij}],\ i, j = 1,\ 2$, the matrix of input-output coefficients, $\mathbf{l} \equiv [l_j]$ $(>\mathbf{0})$ the vector of direct labour coefficients, r^{*} the exogenously given value of the interest rate, λ (<1) the Perron-Frobenius (P-F hereafter) eigenvalue of matrix A, R the maximum rate of profit, $U(c_1, c_2)$ a homothetic preference function for commodities, $\mathbf{c} \equiv [c_1, c_2]^{\mathrm{T}}$ the vector of consumption per unit of labour ('^{T}' is the sign for transpose) , and $\mathbf{x}$ the vector of

[4] Essentially, nothing would change if we assumed that g was positive, but smaller than r. Regarding this, *i.e.*, the role of the so-called 'golden rule hypothesis', $g = r$, see, *e.g.*, Pasinetti (1977, ch. 7).

gross output per unit of labour.[5] Relation (3) derives from the first-order conditions for utility-maximisation, (5) is an identity, and (6) is the normalization condition, *i.e.*, we adopt the endogenously determined vector of consumption as the standard of value or *numéraire* and, therefore, w also symbolizes the level of the real wage rate (for a thorough analysis of this system, see Johansen, 1963; Mainwaring, 1974 and 1982).

From (4) and (5) we get the 'production-possibilities frontier' (PPF):

$$\mathbf{l}^{\mathrm{T}}\mathbf{x} = \mathbf{l}^{\mathrm{T}}[\mathbf{I}-\mathbf{A}]^{-1}\mathbf{c} = 1$$

or

$$\boldsymbol{\omega}^{\mathrm{T}}\mathbf{c} = \omega_1 c_1 + \omega_2 c_2 = 1 \tag{7}$$

where $\mathbf{I}$ denotes the identity matrix, $\boldsymbol{\omega}^{\mathrm{T}} \equiv [\omega_1, \omega_2] \equiv \mathbf{l}^{\mathrm{T}}[\mathbf{I}-\mathbf{A}]^{-1}$ the vector of the quantities of labour 'embodied' in the different commodities (or 'Ricardian-Marxian labour values'), and ω_2/ω_1 the 'marginal rate of transformation in production'. Relation (1) determines the relative prices as a function of r:

$$\mathbf{p}^{\mathrm{T}} = w\mathbf{l}^{\mathrm{T}}[\mathbf{I}-(1+r)\mathbf{A}]^{-1} = w\boldsymbol{\omega}^{\mathrm{T}}(r)$$

or

$$P(r) \equiv p_1/p_2 = \omega_1(r)/\omega_2(r) \tag{8}$$

with

$$P(0) = \omega_1/\omega_2 \tag{8a}$$

$$\dot{P}(r) \geq 0 \Leftrightarrow (l_1 a_{11} + l_2 a_{21})/(l_2 a_{22} + l_1 a_{12}) \geq l_1/l_2 \tag{8b}$$

$$\dot{P}(0) = 0 \Leftrightarrow P(r) = P(0) = \omega_1/\omega_2 = l_1/l_2 \tag{8c}$$

---

[5] One may assume the following intertemporal utility function

$$\sum_{t=0}^{\infty}(1+\rho)^{-t}U(c_{1t}, c_{2t}) \tag{3a}$$

where $\rho\ (>0)$ denotes the given rate of time preference and $U(\bullet)$ the period utility function. As is well known, maximisation of the intertemporal utility function implies that:

$$1+r = (1+\rho)(1+g) \tag{3b}$$

or

$$r \approx g + \rho$$

Thus, given a zero or positive g (in the latter case g is set equal to the growth rate of the labour force), r is determined by (3b).

where

$$[\boldsymbol{\omega}(r)]^{\mathrm{T}} \equiv [\omega_1(r), \omega_2(r)] \equiv \mathbf{l}^{\mathrm{T}}[\mathbf{I} - (1+r)\mathbf{A}]^{-1}$$

denotes the vector of labour values associated with the *imaginary* production technique $[(1+r)\mathbf{A}, \mathbf{l}]$ (or '$r-$labour values'), and $\dot{P}(r)$ the first derivative of the relative prices with respect to r. Consequently, the marginal rate of transformation shows relative commodity prices (*i.e.*, the 'labour theory of value' and the traditional neoclassical theory of prices hold) iff $r = 0$ or $\mathbf{l}^{\mathrm{T}}$ is the left-hand side P-F eigenvector of $\mathbf{A}$ (the latter case corresponds to Marx's 'equal organic compositions of capital' case).[6]

From (2) and (8) we obtain the value of the relative prices

$$P^* \equiv P(r^*) = \omega_1(r^*) / \omega_2(r^*) \tag{9}$$

and thus, the horizontal relative supply curve in the economy. The relative demand curve (derived from (6)), the relative supply curve and equation (7) determine the equilibrium value of $\mathbf{c}$ (see Figure 1a-b, drawn from the case $\dot{P}(r) > 0$).

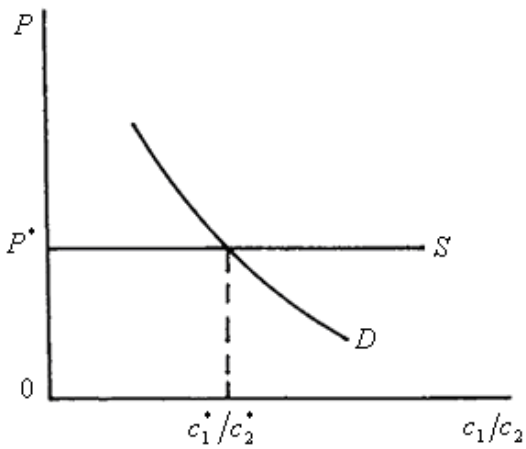

Figure 1a

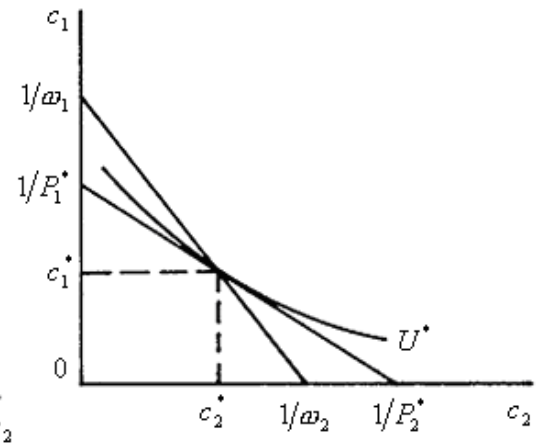

Figure 1b

Finally, we obtain the so-called 'factor price frontier' (or '$w-r$ trade off'), *i.e.*,

[6] Within the context of the neoclassical theory, the following holds: when perfect competition in the product markets breaks down or when a factor market *distortion* is present, the absolute slope of the production-possibilities frontier will, in general, fail to show relative prices (see, *e.g.*, Chacholiades, 1978, p. 111 and ch. 20). For an immanent critique of the neoclassical theory, which is based on the general proof of the proposition that 'a positive rate of interest is equivalent in its effects to a factor market distortion', see Steedman (1979B, Essay 4).

$$w(r,\mathbf{c}^*) = \mathbf{p}^{\mathrm{T}}\mathbf{c}^* - r\mathbf{p}^{\mathrm{T}}\mathbf{A}\mathbf{x}^* = \mathbf{p}^{\mathrm{T}}\mathbf{c}^* - r\mathbf{p}^{\mathrm{T}}\mathbf{A}[\mathbf{I}-\mathbf{A}]^{-1}\mathbf{c}^*$$

or

$$w(r,\mathbf{c}^*) = 1 - rK(r,\mathbf{c}^*) = \{[\boldsymbol{\omega}(r)]^{\mathrm{T}}\mathbf{c}^*\}^{-1} \tag{10}$$

whith[7]

$$\dot{w}(r,\mathbf{c}^*) = -K(r,\mathbf{c}^*) - r\dot{K}(r,\mathbf{c}^*) < 0 \tag{10a}$$

$$\ddot{w}(r,\mathbf{c}^*) \geq 0 \Leftrightarrow \dot{K}(r,\mathbf{c}^*) \leq 0 \tag{10b}$$

where $\mathbf{c}^*$ denotes the equilibrium value of $\mathbf{c}$ and $K(r,\mathbf{c}^*)$ the capital-labour ratio associated with c^* (see, *e.g.*, Figure 2, where $1-w^*$ equals the profits per unit of labour, $\tan\phi$ gives the equilibrium value of the capital-labour ratio, and OA gives the equilibrium value of the net output (consumption) – capital ratio).[8]

[7] It should be noted that in joint production systems it is possible for there to be a positive correlation between w and r ('no $w-r$ trade-off'; Steedman, 1982, pp. 383-384; d'Autume, 1988, pp. 343-345; Bidard, 1997, p. 689). Since in the real world joint production constitutes the rule (see Steedman, 1984), this finding would seem to be of some importance.

[8] It goes without saying that $\mathbf{c}^*$ varies with r (in a definite way). Hence, a change in r changes the '$w-r$ trade-off'. Assume, for example, a Cobb-Douglas utility function, *i.e.*, $U(c_1,c_2) = c_1^a c_2^{1-a}$. It then follows that the equilibrium values of the wage rate are given by

$$w^*(r) = [(\omega_1/\omega_1(r)) + (\omega_2 b/\omega_2(r))](1+b)^{-1} \tag{11}$$

where $b \equiv (1-a)a^{-1}$.

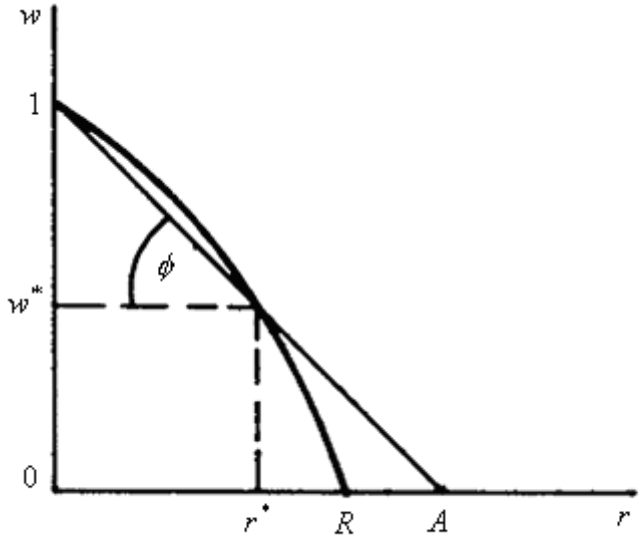

Figure 2

Free Trade

Now consider three closed economies A, B, C, which have *different* techniques of production, and investigate the trading possibilities between these economies.[9] Also, assume that (i) there are no impediments to trade; (ii) trade is balanced; (iii) both labour and money (financial) capital are internationally immobile; (iv) for each economy, the interest rate is the same in no- and with-trade equilibria; and (v) the 'motive' for trade is the attainment of a superior $w-r$ combination, *i.e.*, we deal with the issue of international specialization as a particular issue of the 'choice of technique' (see Mainwaring, 1974, pp. 537 and 541-542; Steedman, 1979A, chs 4-5 and 9-10; Kurz and Salvadori, 1995, pp. 149-150).

Let $P^k \equiv p_1^k / p_2^k$ be the without trade relative prices in economy $k = A, B, C$, and let $P^t \equiv p_1^t / p_2^t$ be the international price ratio. From (1) and (6) we obtain

$$w_1^k > (<)\, w^k > (<)\, w_2^k \Leftrightarrow P^k < (>)\, P^t \tag{12}$$

[9] It should be stressed that our analysis takes the form of comparative statics (or comparative dynamics, if $g > 0$). The issue of *transition* from autarky to trade, or *vice versa*, is beyond the scope of this paper (regarding this issue, see Steedman, 1979B, Essays 4 and 12; Evans, 1989, pp. 196-203; Mainwaring, 1991, ch. 2).

where w^k is the without trade real wage rate in k, and w_j^k is the real wage rate in k, when it specializes in process $j = 1, 2$.[10] Hence, the international relative supply curve, S, has the form depicted in Figure 3 (we assume that $P^A < P^B < P^C$, D is the international relative demand curve, and, therefore, $OE = (\omega_1^A)^{-1}[(\omega_2^B)^{-1} + (\omega_2^C)^{-1}]^{-1}$, $OF = [(\omega_1^A)^{-1} + (\omega_1^B)^{-1}]\omega_2^C$, and economies A and B export commodity 1, whilst C exports commodity 2).[11] When economy k specializes in commodity 1, it has the following 'consumption-possibilities frontier' (CPF):

$$c_1^k = (a_{21}^k / l_1^k)[(\Omega^k)^{-1} - (P^t)^{-1}] + (\omega_1^k)^{-1} - (P^t)^{-1} c_2^k \tag{13}$$

whilst when it specializes in commodity 2 it has the following CPF:

$$c_2^k = (a_{12}^k / l_2^k)(\Omega^k - P^T) + (\omega_2^k)^{-1} - P^t c_1^k \tag{14}$$

where $\Omega^k \equiv \omega_1^k / \omega_2^k$. From (7) and (13) or, respectively, from (7) and (14), it follows that nothing prevents the appearance of *negative* gain from trade, precisely because nothing prevents the validity of the following relations:

$$P^k < P^t < \Omega^k \tag{13a}$$

or, respectively,[12]

$$\Omega^k < P^t < P^k \tag{14a}$$

(see also Figure 4, drawn for the former case, where $\tan y = (P^t)^{-1}$).

---

[10] In joint production systems, when there is no '$w - r$ trade-off', (12) has no general validity. Specifically, it is entirely possible for the following to hold:

$$\{(w_1^k, w_2^k) > w^k \Leftrightarrow P^t < P^k\} \text{ and } \{(w_2^k < (>) w_1^k\} \Leftrightarrow P^k < (>) P^t\} \tag{12a}$$

Thus, there is not always a pattern of international specialization, which would entail the increase of the real wage rate in both economies (Mariolis, 2004).

[11] In joint production systems (irrespective of whether (12a) holds or does not hold) it is possible for there to be (at certain values of the interest rate, and iff $\mathbf{A} \neq \mathbf{0}$ and $r \neq g$) a negative correlation between the relative supply of the commodities and their relative price, *i.e.*, a 'perverse' relative supply curve. Consequently, the 'law of comparative advantage' has no general validity (Mariolis, 2004). Nevertheless, it should also be noted that 'perverse' relative supply curves appear in the framework of certain single-product systems (*i.e.*, two commodities, which are used both as means of production and as means of consumption - zero net accumulation with fixed supplies of *two* homogeneous primary inputs - many techniques; see Steedman, 1979B, Essays 2-3).

[12] Evidently, these relations cannot hold iff $\mathbf{A} = \mathbf{0}$ or $0 \leq g = r$, since $\mathbf{A} = \mathbf{0}$ (or $g = r = 0$) implies that $P^k = \Omega^k$, whilst $0 < g = r$ implies that $P^k = \Omega^k(g) \equiv \omega_1^k(g) / \omega_2^k(g)$, where $\boldsymbol{\omega}^{\mathrm{T}}(g) \equiv \mathbf{l}^{\mathrm{T}}[\mathbf{I} - (1+g)\mathbf{A}]^{-1}$ denotes the vector of the 'synchronized labour costs or Austrian socially necessary labour' (see Samuelson and v. Weizsäcker, 1971), and $-(\Omega^k(g))^{-1}$ gives the slope

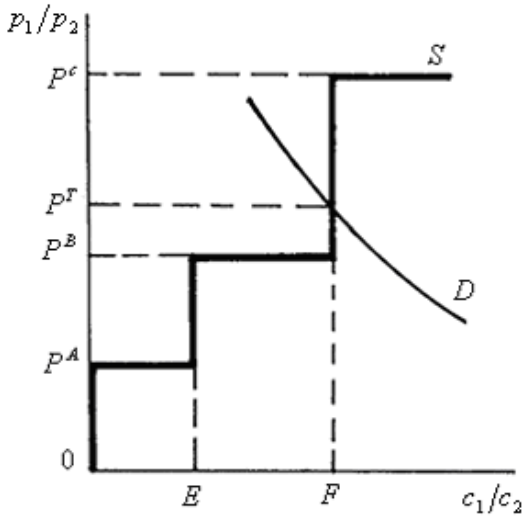

Figure 3

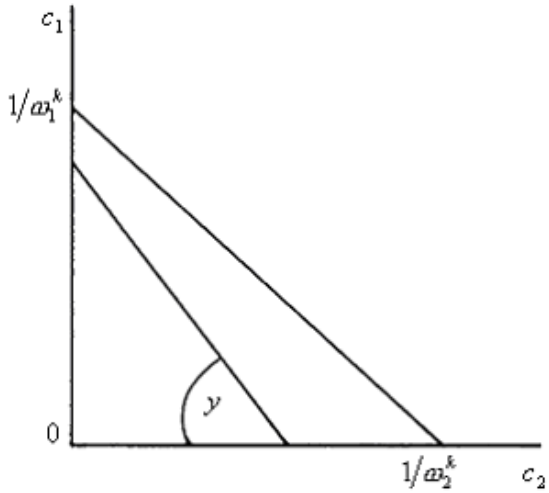

Figure 4

We conclude, therefore, that neither the pattern of international specialization nor the sign of gains from trade can be determined *a priori*. Evidently, the aforesaid indeterminacy is due to the fact that the 'comparative advantage' depends on the distribution of income, *i.e.*, on the exogenously given value of the interest rate, whilst the sign of gains from trade is determined by (13a) and (14a), *i.e.*, *a posteriori*. Thus, a change in r may change the order of P^A, P^B, P^C, the position of the international relative supply curve, and, ultimately, also the signs of gains from trade: Let us assume, for example, that the functions of relative prices in economies A, B, C have the forms depicted in Figure 5.

of the CPF in a closed, growing economy (see also footnote 6 of this paper, as well as Steedman, 1979B, Essays 8, 11 and 14). So, the gains are necessarily positive only in these trivial cases.

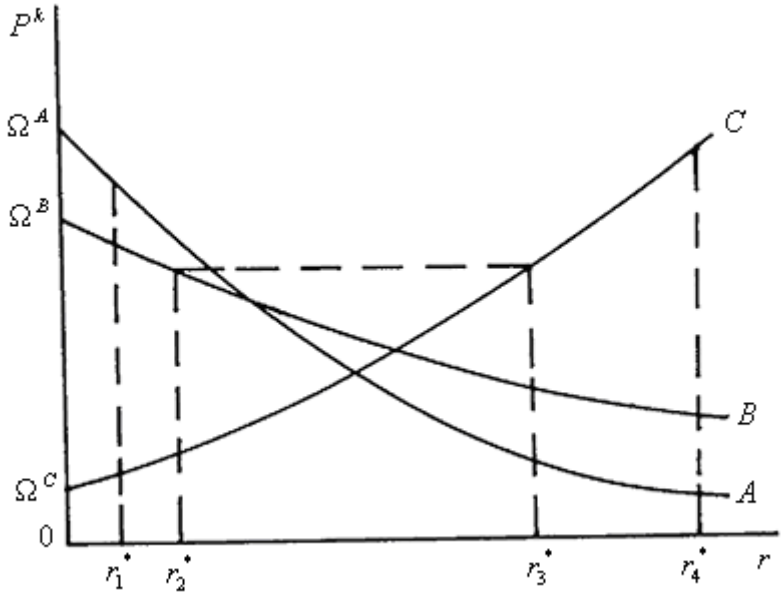

Figure 5

At $r^k = r_1^*$ the following holds

$$\Omega^C < P^C < P^B < \Omega^B < P^A < \Omega^A$$

(15)

If $\Omega^B < P^t < P^A$, then C and B export commodity 1, A exports commodity 2, and all the economies gain from trade. If $P^B < P^t < \Omega^B$, the pattern of specialization does not change, but B loses. At $r^k = r_4^*$ the following holds

$$P^A < \Omega^C < P^B < \Omega^B < P^C < \Omega^A \qquad (16)$$

If $\Omega^C < P^t < P^B$, A exports commodity 1, B, C export commodity 2, whilst A, C lose and B gains. If $P^B < P^t < \Omega^B$, A and B export commodity 1, C exports commodity 2, and all the economies lose.[13] Finally, at $r^B = r_2^*, r^C = r_3^*$, and for $r_2^* < r^A$ it is possible for the following to hold

$$\Omega^C < P^A < P^B = P^C < \Omega^B < \Omega^A$$

(17)

If $P^t = P^C$, A takes the place of the so-called 'small economy', exports commodity 1 and loses. Also, it is possible for B and C to specialize completely in commodity 2

[13] When one (or more) economy loses, the reverse of the pattern of specialization through tariff and non-tariff policies may lead to positive gain from trade (Mainwaring, 1976; Steedman, 1979A, chs 6, 7 and 10).

(what exactly happens will depend on the conditions of demand). In that case the 'large economy' B gains, whilst the 'large economy' C loses.[14]

4. Customs Unions

In accordance with the traditional 3×2 theory of customs unions (Gehrels, 1956; Lipsey, 1957, 1960), consider three economies: A (home economy), B (partner) and C (rest of the world). Economies B and C are 'large', produce the two commodities, and levy prohibitive tariffs on each other's products. Economy C has a comparative advantage in the production of commodity 2 (*i.e.*, $P^B < P^C$). Finally, economy A is 'small', and specializes completely in the production of commodity 1 (*i.e.*, $P^A < P^B < P^C$; see Figure 6, where $\tan y = (P^C)^{-1}$ and $\tan z = (P^B)^{-1}$).

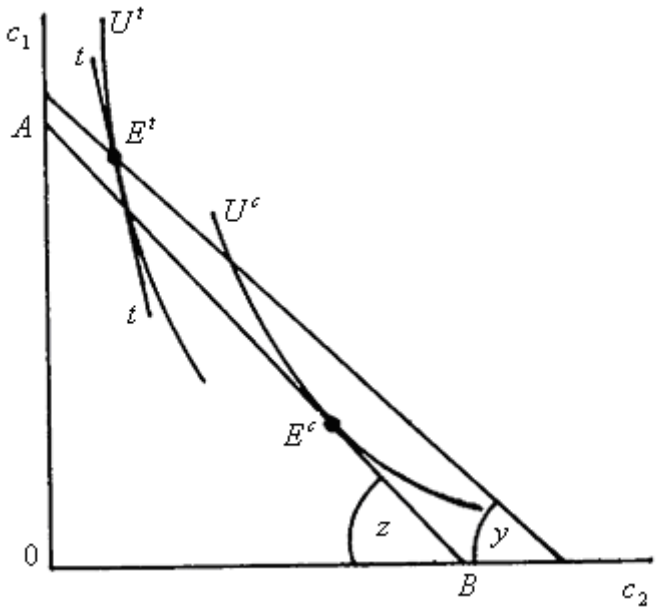

Figure 6

Before a customs union is formed between A and B, A levies a non-discriminatory tariff on all imports of commodity 2. Assuming that all tariff revenue is returned to the consumers as a lump sum, it follows that A trades with C only, and

[14] It may be noted that the appearance of negative gains is entirely possible also in the framework of endogenous growth models *à la* King and Rebelo (1990) (Mariolis, 2005).

reaches equilibrium at E^t (where the marginal rate of substitution in consumption equals A's domestic price ratio given by the reciprocal absolute slope of the line tt).

After the customs union is formed between A and B, A's tariff on imports from B is eliminated, and A's imports shift to B at B's price ratio P^B. Iff the line AB lies above U^t, then A becomes better off, because A reaches equilibrium at a point, such as E^c, which lies on a higher indifference curve, U^c, than E^t.

In contrast to the traditional theory, the following points should be noted:

(i). It is possible for A to lose from free trade. When this is indeed the case (*i.e.*, $P^C < \Omega^A$), A is in a position to gain from trade if it specializes in commodity 2, *i.e.*, in the commodity in which it has a comparative disadvantage, and levies a tariff on all imports of commodity 1.

(ii). Even if A gains from free trade, it is possible for the situation of autarky to be preferable (in terms of consumption possibilities) to the formation of a customs union (this is indeed the case when, and only when, $P^B < \Omega^A < P^C$).

(iii). *Ceteris paribus*, whether the line AB lies above U^t depends on the value of r^B.[15] Thus, the following traditional proposition: 'At the customs union and free trade area levels, the possible sources of economic gain from economic integration can be attributed to […] enhanced efficiency in production made possible by increased specialization in accordance with the law of comparative advantage, due to the liberalised market of the participating nations' (El-Agraa, 1997, p. 5; see also, *ibid.*, pp. 34-35), cannot generally be sustained. On the one hand, the 'comparative advantage' is determined (also) by the distribution of income and, on the other, an 'increased specialization in accordance with the law of comparative advantage' indeed guarantees the attainment of a superior wage rate – interest rate combination[16] but not necessarily the improvement of consumption possibilities.

(iv). Given the conditions of production and demand, even the identification of economies as 'small/large' (as well as the determination of the static effects of

[15] If each consumption commodity is produced in its own *integrated* sector, the commodity price ratio is a non-monotonic function of the interest rate (see, *e.g.*, Steedman, 1979B, Essay 5). Consequently, a change in the distribution of income has unpredictable effects on the relative position of the said line.

[16] However, this is not *always* true (see footnotes 10 and 11 of this paper).

customs unions as a whole; for the traditional analysis, see, *e.g.*, Chacholiades, 1978, ch. 23) critically depends on the distribution of income.[17]

5. Common Markets

Consider two closed economies, A and B, with $r^A \neq r^B$, and assume that (i) commodities are consumed in fixed proportions irrespective of relative prices (*i.e.*, c_1 / c_2 is given from outside the system); and (ii) the economies allow either the free movement of money (or financial) capital (case 1) or the free movement of money capital and labour (case 2). In the former case an internationally uniform interest rate is established, whilst in the latter case an internationally uniform wage rate is also established.[18]

We shall deal with these cases in turn:[19]

Case 1. If the economies share an identical technology, then they choose either the same technique or different techniques, which constitute a convex, linear combination of the same techniques ('switch point case'). Thus, as a result of the free movement of money capital, an internationally uniform wage rate is also established. However, it is

[17] It has been shown that when an economy has a set of alternative techniques of production, and the number of these techniques is greater than or equal to the number of commodities, the price vector may be repeated over a range of the interest rate (it then follows immediately that the well-known 'factor price equalisation theorem' is not of general logical validity; Steedman, 1979B, Essays 6, 7 and 10). Consequently, if economies A, B, C have different sets of alternative techniques (*i.e.*, different technologies; for the traditional analysis, see Michaely, 1965; Melvin, 1969), more than one combination of r^A, r^B, r^C can be associated with the same relative prices P^A, P^B, P^C. In such a case, different distributions of income lead to the same situation in terms of Figure 6, but possibly in different situations in terms of consumption possibilities (as a result of the choice of different production techniques).

[18] For the traditional analysis of these cases, see Mundell (1957); MacDougal (1960); Kemp (1966); Jones (1979, Part 4), Journal of International Economics (1983); Ruffin (1984); Caves *et al*. (1990, chs 9-10); and Razin and Sadka (2001, chs 1-2). It is important to note the following: '[S]ome analyses of the 'international mobility of capital' proceed as if a country's endowment of 'capital' were a quantity of a homogeneous, physical input, part of which may be used in domestic production, whilst the remainder is 'hired' for use in another country! It is, perhaps, not entirely clear to what real world process such an analysis is supposed to correspond, unless it be the leasing of ships and aircraft. In the real world, international investment flows are, in themselves, *financial* flows. The latter will, of course, often lead directly to trade flows of the specific capital goods to be used in, say, equipping a factory but it is nevertheless crucial to keep the two types of flow conceptually distinct. That distinction is, however, always in danger of being lost in an analysis based on the conception of an aggregate 'factor' called 'capital', since, as is now widely recognised, that conception has fused – and confused – the concepts of 'capital as finance' and 'capital as specific means of production'.' (Steedman, 1979B, pp. 9-10).

[19] For alternative analyses, which emphasise different aspects, see Brewer (1985), Abraham-Frois (2006) and Parrinello (2006).

impossible to say *a priori* that the 'gains from free trade in capital services' are positive (Consider Figure 3 and, for example, Figure 7, where $\bar{r}$ is the uniform interest rate, c^k, $\bar{c}$ represent the level of consumption per head in the autarchic economy k and in the open system, respectively, and a, b represent 'switch points'. In both economies, consumption per head, consumption per capital and profits per head are reduced).

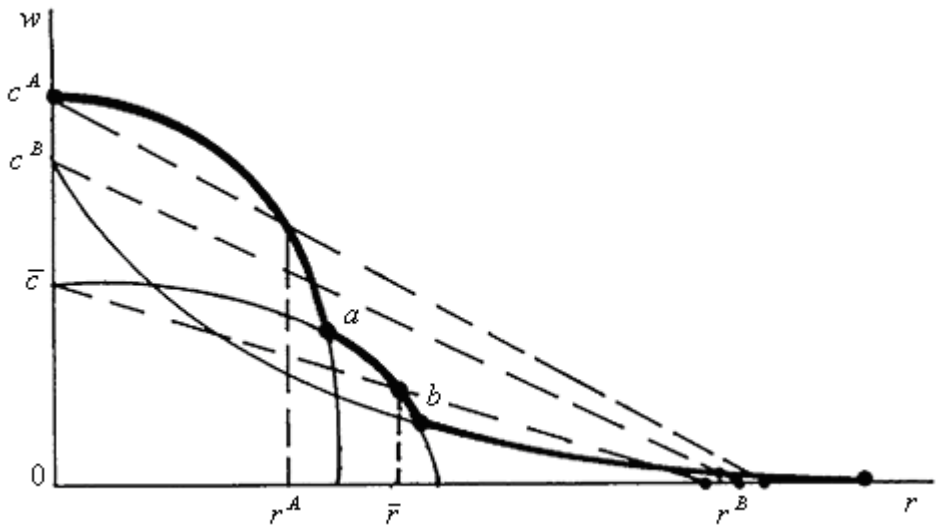

Figure 7

If the economies have different technologies, then, in general, the relative commodity prices will differ as between the economies. Hence there is a basis for commodity trade. However, the pattern of specialization, the sign of the gains, the changes in the consumption – capital ratios, and so on, are not unambiguously determined. Not only because what was said on the basis of Figures 5 and 7 essentially continues to hold, but also because, now, the relative commodity prices are not, in general, monotonic functions of the interest rate (see, for example, Figure 8, where the points a and b, c correspond to 'switch points' on the wage-profit frontier for A's and B's technology, respectively).

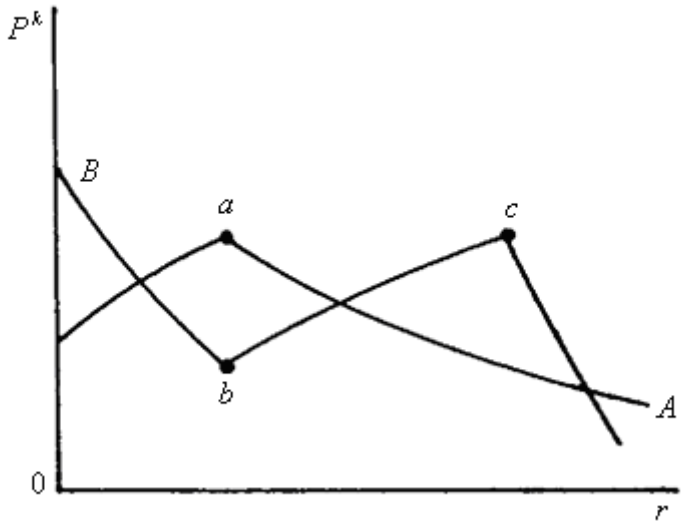

Figure 8

Case 2. In this case, *i.e.*, in the framework of a common market, the law that governs the international division/combination of labour is the 'law of *absolute* advantage'. If economies A and B have different technologies, then, precisely because of the possible existence of so-called 'negative price Wicksell effects' and phenomena of 'switching-reswitching' of techniques (see, *e.g.*, Kurz and Salvadori, 1995, ch. 14), any *a priori* determination of the pattern of specialization is, in the general case, impossible. Thus, it is not possible to know the sign of the gains that arise from this form of economic integration. *Ceteris paribus*, everything depends on the value of the interest rate. Assuming, for example, that each economy has only one process $k(j)$ for the production of commodity j, where $k = A, B$ and $j = 1, 2$, it follows that the international system has the following four alternative techniques of production: $I = \{A(1), A(2)\}$, $II = \{B(1), B(2)\}$, $III = \{B(1), A(2)\}$ and $IV = \{A(1), B(2)\}$. So, let us accept that the '$w - r$ relationships' are depicted in Figure 9.[20]

[20] It is well known that (i) two 'adjacent' techniques on two sides of a 'switch point' will differ in only one process, except for fluke cases (Bruno *et al*., 1966, p. 542; Pasinetti, 1977, ch. 6, § 5.3); and (ii) in

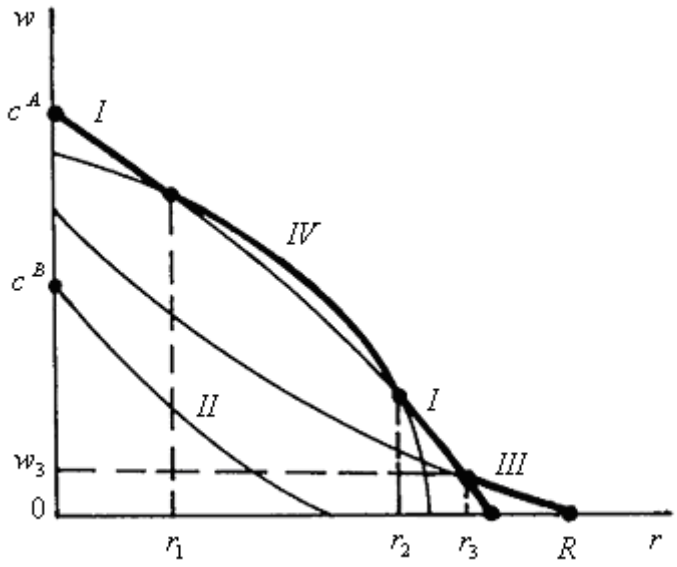

Figure 9

Consequently, if $0 \le r < r_1$ or $r_2 < r < r_3$, then B does not produce any commodity, whilst if $r_1 < r < r_2$ $(r_3 < r \le R)$, then B produces commodity 2 (1). As is well known, at $r = r_3$ it holds (analogously for the other 'switch points'; see, *e.g.*, Kurz and Salvadori, 1995, ch. 3):

$$\mathbf{p}^{\mathrm{T}} = (1+r_3)\mathbf{p}^{\mathrm{T}}\mathbf{A}^A + w_3[\mathbf{l}^A]^{\mathrm{T}}$$

or

$$\mathbf{p}^{\mathrm{T}} / w_3 = [\omega_1^A(r_3), \omega_2^A(r_3)] \tag{18}$$

and

$$p_1 = (1+r_3)(p_1 a_{11}^B + p_2 a_{21}^B) + w_3 l_1^B \tag{18a}$$

which imply that

$$\omega_1^A(r_3)\Delta a_{11} + \omega_2^A(r_3)\Delta a_{21} + \Delta l_1 = 0 \tag{19}$$

where $\Delta a_{ij} \equiv a_{ij}^B - a_{ij}^A$, $\Delta l \equiv l^B - l^A$. For $r_2 < r < r_3$ it holds:

$$\omega_1^A(r)\Delta a_{11} + \omega_2^A(r)\Delta a_{21} + \Delta l_1 > 0 \tag{19a}$$

whilst for $r_3 < r \le R$ it holds:

$$\omega_1^A(r)\Delta a_{11} + \omega_2^A(r)\Delta a_{21} + \Delta l_1 < 0 \tag{19b}$$

---

two-sector models the maximum number of switches between two 'adjacent' techniques equals 2 iff the relevant '$w - r$ relationships' are both concave or both convex (Woods, 1988, pp. 89-90).

Also, when at a value of r the techniques I and II are equally profitable (in that case all the techniques are equally profitable; this fluke case does not appear in Figure 9), it holds:

$$\omega_j^A(r) = \omega_j^B(r), \;\; j = 1,\; 2 \tag{20}$$

i.e., each economy is in a position to produce both commodities.

Thus, we may conclude that there is *not* an unambiguous relation between the productivities of labour and technique choice (*i.e.*, between $(\omega_1^k)^{-1}$, $(\omega_2^k)^{-1}$ and the pattern of specialization).[21] Finally, it should be noted that this conclusion holds also when the economies produce nontraded goods. In that case (which may be analysed by following Sraffa, 1960, §§ 93-4, and Bharadwaj, 1970) the determination of the 'switch points' is carried out on the basis of relations, which have the same structure (and meaning) with (19), (19a-b) and (20), but represent the processes producing traded goods. Consequently, at a 'switch point' only the prices of traded goods are identical, whilst nothing can be said *a priori* about the relationships between the prices of nontraded goods. Evidently, this means that, in the general case, the relative international price levels cannot be unambiguously correlated with international productivity differences (in traded and nontraded goods). Therefore, all those propositions, which are related, directly or indirectly, to the so-called 'Harrod – Balassa – Samuelson effect' (see, *e.g.*, Obstfeld and Rogoff, 1998, ch. 4) and which are systematically used for the theoretical and empirical analysis not only of actual economic integrations but also of the international system as a whole (see, *e.g.*, De Grauwe, 2000, chs 1-2; Krugman and Obstfeld, 2000, ch. 15), should be regarded with scepticism. The aforesaid propositions are based on the traditional conceptual and analytical framework.[22]

6. Concluding Remark

The placement of the produced means of production and income distribution at the centre of the analysis leads the elementary, static theory of trade, customs unions and

[21] It goes without saying that, in joint production systems, the pattern of specialization can change in a complicated way as the conditions of demand change (see, *e.g.*, Kurz and Salvadori, 1995, ch.8; Bidard, 1997).

[22] For a detailed investigation, see Mariolis (2008).

common markets to results that deviate to a significant degree from established results and do not allow the drawing of unambiguous conclusions. This 'indeterminacy' does not indicate a weakness in the theory but rather expresses a feature of economic reality itself. Thus, it should constitute an incentive for theoretical and empirical research. At all events, a critical examination of the prevailing discussions about the processes of economic integration and liberalization of trade becomes absolutely necessary.

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