European Research Studies
Volume III (1-2), 2000, pp. 79-90

The Division of Labour in European Monetary Union: Absolute Versus Comparative Advantage

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Abstract

It is accepted that the stability and effectiveness of European Monetary Union (EMU) is now decisively dependent on the introduction of the greatest possible flexibility into the labour market. This, of course, entails in the long-term a fundamental change in the European division of labour: Namely, it will no longer be governed by the law of comparative advantage, but rather by the law of absolute advantage. If the real economic world was adequately described by the usual Ricardian model of international trade, then the aforesaid change would set in motion strong processes of unequal development between countries and regions. In this paper we investigate whether the conclusions that emerge from the usual Ricardian model retain their validity within the context of more realistic models (i.e. existence of reproduced means of production and joint production). The general conclusion to be drawn from this investigation is the following: The existence of processes of unequal development cannot be excluded. However, the concepts and propositions of traditional theory do not help to identify those evolutions which take place in economic reality. Consequently, any further discussion, at both a theoretical and empirical level, should begin with this given.

1. Introduction

It is more or less accepted (see «Theory(-ies) of Optimum Currency Areas») that the stability and effectiveness of European Monetary Union (EMU) is positively dependent on the following 'variables': **1.** The extent of intra-European trade as a whole. **2.** The particular importance of intra-industry trade, which, as is known, expresses the homogeneity of national production structures (in contrast, that is, with inter-industry trade, which is considered to express the differences between the various national economies with respect to the technological conditions of production and available quantities of factors of production). **3.** The degree of flexibility of prices of commodities and of factor (of production) prices. **4.** The degree of mobility of capital. **5.** The degree of mobility of the labour force. **6.** The degrees of freedom of national fiscal policies. **7.** The redistributional role of the EU budget[1].

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[1] Regarding these issues, see Mundell 1961, McKinnon 1963, Ingram 1969, Fleming, 1971, Krugman and Obstfeld 1994, Ch. 21.

There is no doubt that the process of «completion of the internal market», while positively affecting 'variables' 1 to 4, did not succeed in increasing the mobility of the labour force or the flexibility of wages to the levels necessary for the «smooth» functioning of the EU. Given, however, that 'variables' 6 and 7 have de facto been deactivated (see the so-called «Stability Pact» and the fact that most states are opposed to Community budget increases in excess of 1.3% of their aggregate GDP) and given that the future evolution of 'variables' 1 to 4 is determined endogenously (rather than being subject to the control of the agencies of economic policy), it follows that the smooth functioning of EMU is now decisively dependent on the introduction of the greatest possible flexibility in the labour market (for a summary of the relevant discussion, see Krugman and Obstfeld (1994), Ch. 21, Sachinides and Hardouvelis (1998), Ch. 2).

This, of course, in combination with the prospect of the existence of a single currency, entails in the long-term a fundamental change in the European division of labour: Namely, it will no longer be governed by the law of comparative advantage, but rather by the law of absolute advantage[2].

If the real economic world was adequately described by the usual Ricardian model of international trade (which supposes the existence of one, and only one, factor of production – namely, labour), then the aforesaid change would be decisive: within the framework of EMU, each national economy would produce those commodities, in the production of which presents the absolutely highest productivity of labour (depicted in the model as an absolutely measurable magnitude, which, in addition, is independent of prices and the distribution of income). Consequently, those national economies (and/or the regions of certain national economies), which are characterised by a generally low productivity of labour, will either not be in a position to produce any commodity or, in the best-case scenario, will be in a position to produce only certain commodities (which in the main will be «unskilled labour-intensive» commodities – for a summary of the relevant discussion, which also takes into account the role of external economies of scale, see Krugman and Obstfeld 1994, Ch. 2, 8, 21. See also Ch. 2 of the so-called «White Book», European Commission, 1985). Put differently, on the one hand the increase in the mobility of the labour force and in the flexibility of wages constitute a fundamental precondition of the «smooth» functioning of EMU, while on the other, they set in motion (since they reconstruct the basis of the European division of labour) processes of unequal development between countries and regions, which undermine the stability and effectiveness of the system as a whole.

In this paper, we shall examine whether the conclusions that emerge from the usual Ricardian model of international trade retain their validity in the cases of the existence of reproduced means of production and joint production. That is, we shall examine whether the said conclusions retain their validity within the context of more realistic models.

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[2] For an analysis of their combined role, see Jones 1980.

In Part II, we present a general model with reproduced means of production[3] and joint production[4]. In Part III, we deal with the consequences which result from the existence of reproduced means of production and we disregard the role of joint production. In Part IV, the opposite is the case: i.e. we focus on the role of joint production and ignore the role of reproduced means of production. Lastly, in Part V, we refer to the general case[5].

2. The General Model

We assume a *linear* system of *joint* production $[B, A, \ell, X]$. The (semi-) positive matrix $B, B \equiv [b_{ij}] \geq 0$, symbolises the nxm output matrix, the element b_{ij} $(i = 1, 2, \ldots, n$ and $j = 1, 2, \ldots, m)$ of which represents the quantity of commodity i produced by the process j, when it operates at the unit activity level. The (semi-) positive matrix $A, A \equiv [a_{ij}] \geq 0$, symbolises the produced input coefficient matrix. The positive vector $\ell, \ell \equiv [\ell_j] > 0$, symbolises the $1xm$ vector of inputs of direct *homogeneous* labour, when the system operates at the unit activity level. Finally, the (semi-) positive vector $X, X \equiv [X_j] \geq 0$, symbolises the $mx1$ vector of the activity levels of the m processes.

If we assume that wages are paid at the end of the production period and the workers do not save, then the following equations and inequalities need to be satisfied (see Morishima, 1964, Ch. 6-7, 1969, Ch. 5, Mainwaring 1976, d' Autume 1988, 1990, Kurz and Salvadori 1995, Ch. 8, Bidard 1997):

$$pB \leq pA(1+r) + w\ell \tag{1}$$

$$pBX = pAX(1+r) + w\ell X \tag{2}$$

$$BX \geq AX(1+g) + cd\ \ell X + ef\ \ell X \tag{3}$$

$$pBX = pAX(1+g) + w\ell X + pef\ \ell X \tag{4}$$

$$pu = 1 \tag{5}$$

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[3] As is well known, in models with reproduced means of production, the fundamental propositions of the traditional Heckscher-Ohlin-Samuelson theory lose their validity (and/or their meaning). See Steedman (ed.) 1979.

[4] As is well known, in actual economic reality, joint (and not single) production constitutes the rule (see Bidard (ed.) 1984, Ch. 1-3, and Economides et al. 1997). In addition, when joint production is introduced into the analysis, then traditional perceptions regarding comparative and absolute advantage, as well as regarding intra-industry trade (which is not considered to have, compared to inter-industry trade, strong repercussions on the distribution of income) must be modified.

[5] It is clear that if the well-known «factor price equalisation theorem» held, then discussion of the issues set out in this paper would be meaningless. However, the said theorem does not hold (see Steedman (ed.) 1979, Ch. 3, 6, 7), not even on an abstract/theoretical level (for a brief discussion regarding the empirical level, see Krugman 1996, Ch. 3, 4).

where $p(\geq 0)$ the $1xn$ vector of prices, $w(\geq 0)$ the uniform nominal wage rate, $r(\geq 0)$ the uniform profit rate, $g(\geq 0)$ the uniform growth rate, $d(\geq 0)$ the $nx1$ vector of the composition of the real wage rate, of which the level is symbolized by the real number $c(w = p(cd))$, $f(\geq 0)$ the $nx1$ vector of the composition of capitalists' consumption, of which the level (per unit of labour employed) is symbolized by the real number $e(pef\ \ell X = (r-g)pAX)$, and $u(\geq 0)$ an $nx1$ vector (equation (5)) is a normalization equation of the relative prices). Moreover, we assume that, firstly, the values of r and $g(r \geq g)$ are exogenously given and, secondly, the vectors *d* and *f* are exogenously given or, alternatively, they depend on the relative prices of the commodities (in this case, the forms of the said dependencies are exogenously given). In any case, however, the set of the unknowns of the model includes *p, X, c, e, w.* Finally, a *solution* of the model is a set of activity levels (*X*) and prices (*p*) such that: a) every operated process yields the given profit rate, while no non-operated process yields more (see (1) and (2)), b) the requirements for use, defined by accumulation at the given growth rate and the supposed consumption demand, are met (see (3) and (4)).

Obviously, we can distinguish the following representative sub-cases:

1. If $m = n = 2,\ r = g = 0,\ A = O$ and $B = I_2$ (where I_n the *nxn* identity matrix), then we obtain the simple Ricardian model of a closed economy. Ceteris paribus, if $m \geq n \geq 2$ and each column of *I* has only one positive component, then we obtain the general ricardian model of a closed economy (see Samuelson 1964, Dornbusch et al. 1977).

2. If $m \geq n \geq 2,\ r \geq g \geq 0,\ A \geq O$ and each column of *B* has only one positive component, then we obtain the neo-Ricardian (or Sraffian) single production model of a closed economy (see Sraffa 1960, Part I and §§92-95). The Part III of the present paper deals with the existence of such a model within the framework of an open economy (see Parrinello 1970, Steedman 1979, Steedman (ed.) 1979, Mariolis 2000).

3. If $m \geq n \geq 2,\ r = g = 0,\ A = O$ and at least one column of *B* has more than one positive components, then the above-mentioned Ricardian model includes the joint production case. The Part IV of the present paper deals with the existence of such a model within the framework of an open economy (see also Steedman 1982).

4. If $m \geq n \geq 2,\ r \geq g \geq 0,\ A \geq O$ and at least one column of *B* has more than one positive components, then we obtain the neo-Ricardian (or Sraffian) joint production model of a closed economy (see Sraffa 1960, Ch. 7-9 – however, see also Morishima 1964, 1969). The Part V of the present paper deals with the existence of such a model within the framework of an open economy (see also Parrinello 1970, pp. 303-308, Steedman (ed.) 1979, Ch. 13, Mariolis 1997).

3. Single production and reproduced means of production

We assume that there are two «countries», α and I, which in autarky produce the same n *basic* (à la Sraffa (1960), §§6-8) commodities. We also assume that in each country there is only one method (process) for each commodity $\left(m^{a}=m^{\beta}=n\right)$, the methods, however, differ from country to country. As is well known, to any given (exogenously) profit rate there corresponds (even if $\left(m^{a},m^{\beta}>n\right)$) a unique set of relative prices of the $\underline{n}$ commodities and a unique wage rate («non substitution theorem»). Generally, relative prices will differ from country to country either because of differences in production techniques or differences in no-trade profit rates. These differences of prices constitute the *basis* of international trade and determine its direction[6] (i.e. the patterns of specialization). The opening of *free* trade will establish a set of relative commodity prices which is common to both countries, but this does not ensure world-wide uniformity of with-trade profit rates and wage rates.

If we assume, *now*, that labour and money (financial) capital are *fully* mobile between countries, then world-wide uniformity of with-trade profit rates and wage rates is thereby maintained (for the intermediate case, i.e. fully mobile (immobile) money capital (labour), see Mainwaring 1982). Thus, given this assumption, the international division of labour *tends* to be determined by the law of *absolute* advantage.[7]

Therefore, we can distinguish the following sub-cases[8] (in the following $\left[I_{n},A^{\varkappa},\ell^{\varkappa}\right]$ symbolizes the production technique of country $\varkappa=\alpha,\beta,I_{n}$ symbolises the *nxn* identity matrix, $D^{\varkappa}\equiv\left[I_{n}-A^{\varkappa}\left(1+r\right)\right]^{-1}$, $0\leq r<R$, where $R=min\left\{R^{\varkappa}\right\}$ and $R^{\varkappa}\equiv(1-\lambda^{\varkappa})/\lambda^{\varkappa}$, where $\lambda^{\varkappa}$ (<1, by assumption[9]) the so-called Perron-Frobenius eigenvalue of matrix $A^{\varkappa}$):

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[6] Obviously, within the framework of the modern (i.e. capitalist) mode of production, the motive for trade is the attainment of a superior real wage rate-profit rate $(c-r)$ combination. As it is proven, such a combination is attained when each country exports the commodities which are relatively cheapest to produce (for a thorough investigation, see Steedman 1979, Ch. 9-10). However, and in contrast with the traditional theory, the so-called «gain from trade» (in terms of the consumption possibilities) may be negative (see Erdilek and Schive 1976, Steedman 1979, Ch. 5, Steedman (ed.) 1979, Ch. 4, 11, 12).

[7] It must be noted that the following analysis has the form of comparative dynamics, i.e. of comparing two similar, but based on different laws, growing international systems. Consequently, any process of transition (from one steady growth path to another) will not be discussed.

[8] As it is easily proven, the validity of the condition $\left(m^{\alpha},m^{\beta}>n\right)$ does not overturn the conclusions.

[9] As is well known, the economically significant interval of *r* is $[0,\ R]$, because to this (and only to this) there corresponds positive price vectors and semi-positive wage rates.

1. If $\left\{\ell^{\alpha}D^{\alpha} > (<)\ \ell^{\beta}D^{\beta},\ \forall r\right\}$, then country $\alpha(\beta)$ is not able to produce any commodity (Proof: from the system (1)-(5), with $m=2n$, we obtain $c^{*} = \left(\ell^{*}D^{*}d\right)^{-1} \Rightarrow c^{\alpha} < (>)\ c^{\beta}, \forall d, w^{\alpha} < (>)\ w^{\beta}, \forall u, X^{\alpha} = (>)\ 0, X^{\beta} > (=)\ 0$).

2. If $\left\{\exists r \equiv r^{*} : \ell^{\alpha}D^{\alpha} = \ell^{\beta}D^{\beta} \text{ and } \forall r \neq r^{*} : \ell^{\alpha}D^{a} \neq \ell^{\beta}D^{\beta}\right\}$, then for $r = r^{*}$ both countries produce certain of all the commodities (Proof: from the system (1)-(5), with $m = 2n$ and $r = r^{*}$, we obtain[10] $c^{\alpha} = c^{\beta}, \forall d, w^{\alpha} = w^{\beta}$, $\forall u, X^{\alpha} \geq (>)\ 0, X^{\beta} \geq (>)\ 0$). However, if $r \neq r^{*}$, then the above-mentioned sub-case 1 reappears (an absolute possible situation11 is set out in Figure 1).

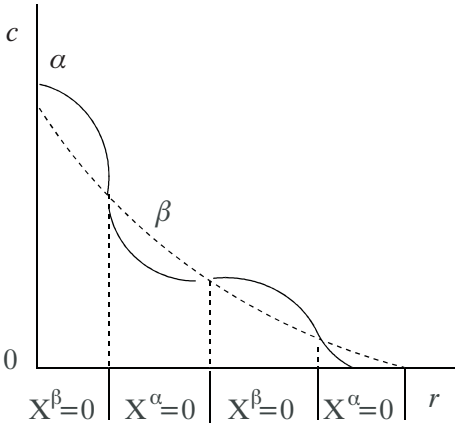

Figure 1

3. If $\left\{\exists r \equiv r^{**} : (p_h/w)^{a} = (p_h/w)^{\beta}, (p_s/w)^{a} < (p_s/w)^{\beta}, (p_t/w)^{a} > (p_t/w)^{\beta}\right\}$, then for $r = r^{**}$ both countries produce certain or all the commodities h, while country $\alpha(\beta)$ produces all the commodities $s(t)$ (Proof: Suppose that country $\alpha(\beta)$ produces all the commodities. In this case, the processes *h* of $\beta(\alpha)$ yield the given profit rate r^{**}, the processes $s(t)$ of $\beta(\alpha)$ do incur extra

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[10] As it is easily proven, it holds:

$$p^{*}\left(A^{\beta} - A^{\alpha}\right)\left(1 + r^{*}\right) + w^{*}\left(\ell^{\beta} - \ell^{\alpha}\right) = 0$$

Note the analogy between this equation and the well-known «envelope theorem».

[11] As it is proven, the number of switches between the techniques $\left[I_n, A^{*}, \ell^{*}\right]$ cannot exceed *n* (for a more precise answer, see Kurz and Salvadori 1995, p. 172).

costs and the processes $t(s)$ of $\beta(\alpha)$ are able to pay extra profits). Consequently, the pattern of production may take the following form (Figure 2):

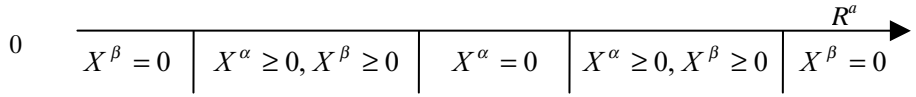

Figure 2

4. Joint Production Without Reproduced Means of Production

We assume that there are two «countries», a and β, which in autarky produce the same n commodities by means of $m^\varkappa$, $\varkappa = \alpha, \beta$, joint production processes. As is well known, under this circumstance the so-called «non-substitution theorem» does not hold and thus, the general investigation of this case is somewhat complex. However, we can distinguish the following sub-cases:

1. Let $(b_{is}/\ell_s)^\alpha > (b_{it}/\ell_t)^\beta$, $s = 1, 2, \ldots, m^\alpha$, $t = m^\alpha + 1, \ldots, m^\alpha + m^\beta$, i.e. the countries's available processes are classifiable with respect to their average productivity of labour (in real terms). If the division of labour is determined by the absolute advantages, then (take into account the well-known Farkas Theorem – see, e.g. Kurz and Salvadori 1995, pp. 507) no one process of country β operates[12].
2. If the countries's available processes are not classifiable with respect to their average productivity of labour (in real terms), then it is not possible to make any predictions. The following example is representative.

Example 1

		Labour	Output 1	Output 2
	Process 1	1	1	16/5
Country *α*	Process 2	1	4	1
	Process 3	1	3/2	3
Country *β*	Process 4	1	3	2

We also assume that the consumption demand is uniform (between the countries) and is described by the function $(C_1 / C_2) = \gamma(p_2 / p_1)$ (where γ is a positive real number, C_1 and C_2 are the consumption levels for commodities 1 and 2). Consequently, from the system (1) – (4) we obtain Figures 3–5 (Figure 3 expresses the autarkic economies, Figure 4 expresses trade on the basis of the

[12] We note that this conclusion does not depend on the composition of the consumption demand.

comparative advantages[13] and Figure 5 expresses trade on the basis of the absolute advantages. S is the supply curve, D_1 and D_2 are the demand curves for $\gamma_1 = 3$ and $\gamma_2 = 0.5$.

Finally, the numbers (1, 2, 3, 4) on the supply curves indicate the corresponding processes).

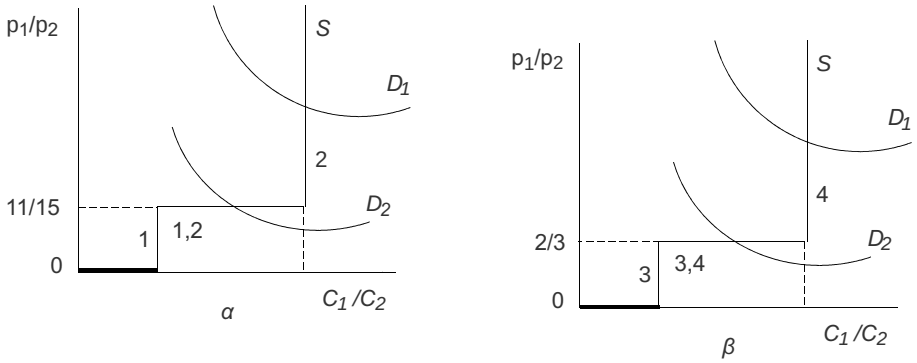

Figure 3

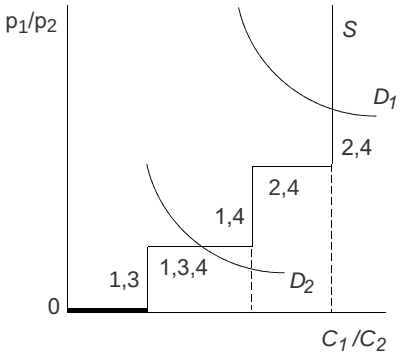

Figure 4

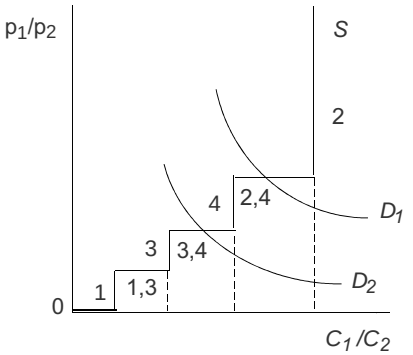

Figure 5

[13] Note that, irrespective of the existence of joint processes, each country exports the commodity which is relatively cheapest to produce.

5. Joint Production and Reproduced Means of Production

As far as we know, a general mathematical investigation of this case is not available[14] (in particular when the so-called «golden rule hypothesis», i.e. $r = g$, is not given). More concretely, this case includes phenomena that are unexpected on the basis of the traditional and the neo-Ricardian theory (e.g. the «factor price frontier» is not downward sloping, the dominant technique and the wage-maximising technique does not coincide, the dominant technique is not unique. For a thorough presentation of these issues, see Kurz and Salvadori 1995, Ch. 8, Bidard 1997). For this reason, we shall simply reproduce an indicative example (Kurz and Salvadori, 1995, pp. 222-225), which, however, does not include all the possible complications[15]. Evidently, within the framework of this example the reader can arbitrarily assume the countries's, α, β, processes.

Example 2

$$B = \begin{bmatrix} 3 & 5 & 0 \\ 3 & 0 & 5 \end{bmatrix},\ A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix},\ \ell = [1,\ 1,\ 1]\ ,\ g = 0$$

$$d = [1,\ 0]^T\ ,\ f = [0,\ 1]^T\ ,\ u = [1,\ 1]^T$$

From the system (1) – (5) it follows that:

a) If $0 \le r \le 4/5$, then $X_1 > 0,\ X_2 / X_1 = (4 - 5r)/(2 + 5r), X_3 = 0, w = 2 - r,$ $p_1 = 3/5, p_2 = 2/5$

b) If $4/5 \le r \le 6/5$, then $X_1 > 0,\ X_2 = X_3 = 0,\ w = 2 - r,\ p_1 = (2 - r)/2,$ $p_2 = r/2$ (note that even infinitesimal changes in demand will affect prices). However, if the commodities are consumed in the fixed proportion $C_1 / C_2 = 1/2$ and $r = 1$, then $X_1 > 0,\ X_2 = 0,\ X_3 > 0,\ w = 1,\ p_1 = 2/5,$ $p_2 = 3/5$.

c) If $6/5 \le r \le 2$, then $X_1 > 0,\ X_2 = 0,\ X_3 / X_1 = (5r - 6)/(12 - 5r),\ w = 2 - r,$ $p_1 = 2/5,\ p_2 = 3/5$.

6. Conclusions

The general conclusion to be drawn from this investigation is the following: Contrary to that which holds within the framework of traditional theory (a par-

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[14] Obviously (see Part IV, sub-case 1), if $\left(\left[b_{is} - a_{is}(1+r)/\ell_s\right]\right)^{\alpha} > \left(\left[b_{it} - a_{it}(1+r)/\ell_s\right]\right)^{\beta}$, and the division of labour is determined by the absolute advantages, then no one process of country β operates. However, these relations depend on (in the general case) the distribution of income.

[15] On the basis of Bidard's 1997, p. 689, Example 1, it can be proved that what was said in footnote 13 is not always true.

ticularly simplified version of which is the usual Ricardian model), neither comparative advantage nor absolute advantage are magnitudes which may be determined on the basis of the technical data of production and the so-called «initial endowments of the economy» (nor are they magnitudes which characterise individual commodities). In reality, they are chiefly determined by the distribution and growth of income, by the technical conditions of production and by the composition of consumption demand. It would appear, however, that specifically with respect to this process of determining the aforesaid advantages, the conclusions which – in the general case – may be drawn a priori are rather limited.

The basic conclusion of Ricardo, i.e. the substantial difference between national and international division of labour or, put differently, that «competition» between nations is substantially different to competition between enterprises (Krugman), in each case remains true. On the basis of the present investigation however, it was shown that the conclusions drawn from the traditional analytical framework do not help to identify those developments which take place in actual economic reality. Nevertheless, this does not entail that a foreseeable change in the law which governs the European division of labour will not set in motion processes of unequal development between countries and regions. It should not be overlooked that the analysis which we have presented is subject to a set of obvious limitations: ***a)*** it had the nature of a comparative dynamic approach, ***b)*** it did not take into consideration the existence of internal and external economies of scale, ***c)*** it was based on the assumption that all patterns of specialisation are equal among themselves with respect to their repercussions on the extended reproduction of separate economies[16], ***d)*** it did not even examine the issue of the existence of non-tradeable commodities, nor the situation which arises «after» the opening of international trade between a «complete European economy» and the rest of the world[17]. Consequently, the preceding investigation entails that the determination of the possible existence of processes of unequal development, as well as the ascertainment of their direction and intensity, is a complex issue, which, however, must occupy the agencies of economic policy, at both a national and European level. Lastly, it should, in our opinion, be considered given, that the concepts and propositions of traditional theory do not constitute a coherent framework for dealing with the said issue. Consequently, any further discussion, at both a theoretical and empirical level, should begin with this given.

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[16] As put by S. Levy (quoted by Ros 1990, p. 479), even in neo-Ricardian models: «Economies are indifferent whether in the equilibrium solution they produce commodities 1 through h or commodities $h+1$ through n. In more pedestrian terms, from the point of view of the model, it does not matter whether in the equilibrium solution you produce bananas or computers».

[17] Expressing this in accordance with the «schema» which we have used, the following may occur (for the proof, see Steedman 1979, pp. 95-98, Fujimoto, 1983): processes which do not operate inside the system (α, β), will operate upon opening of trade with some other system.

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