

MPRA

Munich Personal RePEc Archive

New insights from a structural economic dynamic approach to balance of payments constrained growth

Araujo, Ricardo Azevedo
University of Brasilia

2011

Online at <http://mpra.ub.uni-muenchen.de/30332/>
MPRA Paper No. 30332, posted 15. April 2011 / 20:38

New Insights from a Structural Economic Dynamic Approach to Balance of Payments Constrained Growth

Ricardo Azevedo Araujo^{*}

Department of Economics, University of Brasilia, Brazil

Abstract

In this paper it is shown that once-for-all variations in the level of the exchange rate may play an important role in the sectoral composition of the economy and this fact has important implications in terms of a disaggregated version of the Thirlwall's law even if the argument of the quantitative unimportance of relative price movements holds. The growth rate of a country is then shown to be affected by once-for-all movements in the level of nominal exchange rates and the concept of a natural exchange rate is introduced.

Keywords: Structural Economic Dynamics, Thirlwall's law, Exchange rates.

JEL Classification Number: O19, F12

^{*} I would like to thank Gilberto Tadeu Lima for useful suggestions. The usual disclaimer applies. This paper was supported in part by a grant from CNPq. All correspondence should be addressed to: Department of Economics, FACE, University of Brasilia, Campus Universitario Darcy Ribeiro, Zip code 70910-900. E-mails: rsaaraujo@unb.br.

1. Introduction

An important point related to the derivation of the Thirlwall's law [Thirlwall (1979)] is that it has been carried out under the assumption that the real terms of trade or the real exchange rate remains constant in the long run [Lopes and Cruz (2000, p.478)], which means that relative prices are assumed to stay invariant, playing no important role in the long run. For Thirlwall (1979, p.50) the dynamic irrelevance of relative prices is attributed to the Neoclassical law of one price, which means that the price of a product must be the same in all markets, after allowing for transport costs and tariffs¹. According to this view, movements in the nominal exchange rate guarantee that the law of one price holds and, consequently, relative prices stay invariant in the long run.

Alonso and Garcimartin (1998-99, p. 260) went a step further and have considered that the assumption that “prices do not matter in determining the equilibrium income is neither necessary nor sufficient to affirm that growth is constrained by balance of payments”. They conclude that relative prices do not play any role for two reasons: the first is supported by empirical studies showing that Purchase Power Parity² – PPP hereafter – holds in the long run. The second suggests that the price elasticities

¹ Later McCombie and Thirlwall (1994, p. 307) have criticized this view on the grounds that “[w]hen the law of one price is imposed; it is as though the whole world is producing the same good: the rationale for trade in these circumstances is unclear.” Besides they consider that they consider that the imposition of this law is especially questionable in a model with no supply side, which is the case of the Thirlwall's model.

²According to the PPP hypothesis the exchange rate between two currencies will move in line with relative price levels in the two economies. For commodities in which the Law of one Price holds the PPP would hold continuously. In this paper we intend to show that the real exchange rate does not play a passive role as assumed in the models of the Thirlwall's tradition.

are very small. These views were disputed by Leon-Ledesma (1999) for whom the existence of the dynamic equalization is due to fixed international prices in oligopolistic markets where product differentiation are the dominant entrepreneurial strategies which implies that prices play a minor role in international market competition and hence have little variation through time.

From these statements it is possible to conclude that although some minor controversy in the literature exists on the mechanisms responsible for the dynamic equalization of relative prices, there seems to be a consensus that observed differences in the income elasticities of demand for exports and imports reflecting the non-price characteristics of goods is what matter to explain differences in the long run growth rates with almost no room for the role played by relative prices.

But there is at least one reason to challenge this view: as pointed out by Frenkel and Taylor (2006) temporary but prolonged changes in the real-exchange-rate can have permanent impact on the structure of the economy and, through this, determine structural changes and economic growth in the long run. In this vein, Barbosa-Filho (2006) concludes that the level of the real exchange rate may be an important determinant of the price and income elasticities of the trade flows since it affects the relative price between the domestic production of tradable and non-tradable goods and, in this way, it can affect the structure and the growth rate of the economy.

This view is also supported by Rodrik (2008, p. 366) who considers that an increase in the exchange rate, also seen as the relative price of tradable goods in terms of non-tradables, produces structural changes that can explain some successful growth experiences. Whether measured by its share in GDP or its share in employment, the relative size of industry depends strongly and positively on the degree of

undervaluation³. Blecker (2002, p. 70) also confirms this view by considering that “a key variable in this process is the exchange rate: countries with low, competitive rates will succeed, while those with high, overvalued rates will lose out.”

Porcile and Lima (2010, p. 1020) also emphasized the importance of keeping a high, competitive real exchange rate to spur exports and foster growth in the long run. According to them “[c]ountries that sustained very high levels of economic growth over decades, like Korea, Taiwan, Singapore and more recently China, kept their real exchange rate at competitive levels. (...) Inversely, countries that overvalued their currency were frequently caught in low-growth traps, suffering from long periods of feeble growth”.

In fact, some authors writing in the context of the Thirlwall’s law have already acknowledged that movements of the exchange rate could affect growth rates. McCombie and Thirlwall (1994, p. 445), for instance, consider the possibility that a devaluation increases the growth rate; but according to them this effect is felt only under a continuous real depreciation rather than under a once-and-for-all devaluation. Besides, another requirement for a positive effect of a permanent devaluation is the fulfillment of the Marshall-Lerner condition, which states that the sum of the price elasticities is larger than one. If this inequality does not hold then even permanent devaluations in the Thirlwall’s model will have no effect on growth rates. Atesoglu (1993) has found a quantitatively small but significant impact of relative prices on the growth rate of imports. By excluding the terms of trade the income elasticity of demand is not

³ According to Rodrik (2008, p. 366) “Why overvaluation is so consistently associated with slow growth is not always theorized explicitly, but most accounts link it to macroeconomic instability”. In the present treatment it is presented a new theoretical treatment that links overvaluation to economic growth through the effect of the former on the structural economic dynamics.

considerably affected by quantitative relative price movements, which provides further support for the aggregated Thirlwall's law.

At this stage, it is important to note that one of the major criticisms Post-Keynesians leveled against the Neoclassical model is that it aggregates the whole economy into one sector, rendering the model incapable of performing an analysis of structural change. Furthermore, implicit in this representation is a well-known and strict definition of balanced growth, assuming that growth is non-inflationary and full-capacity utilisation, while also assuming that all sectors grow at the same rate. But the Thirlwall's law is subject to this same criticism since it considers national economies in the aggregate. It is even possible to say that a great deal of the points raised in the literature related to the Thirlwall's law has some implicit or explicit connection with the aggregation hypothesis⁴.

Hieke (1997), for instance, by studying the evidence for the U.S. economy has found a favorable evidence for the Thirlwall's law if the income elasticity of demand is allowed to change from one period to another. In the present paper we consider this possibility by focusing on the income elasticity of demand as a mean of sectoral elasticities weighted by the share of each tradable sector in the trade balance. Hence movements in the aggregate elasticity of demand are due to structural changes that have impact on the share of each sector. Other authors such as Alonso and Garcimartin (1998-99, p. 266) consider that trade functions may not be properly defined for countries that experience significant structural changes. According to them “[n]ot taking

⁴ Alonso and Garcimartin (1998-99, p. 259) emphasizes the need of considering an economy with more than one sector and particular degrees of returns of scale for each sector recalling that demand plays a crucial role in such context.

these two variables into consideration – prices and structural change, proxied by technology – may confirm Thirlwall’s Law erroneously.”

Araujo and Lima (2007) have shown that in fact the structural economic dynamics may be conveyed through trade functions that allow coefficients to vary according to the dynamic evolution of preferences and technological progress. In this vein the existence of stable trade functions is not incompatible with structural changes⁵. In the present paper this line of research is pursued by showing that relative prices may play an important role to explain differences in the long run growth rates even in the context of PPP. In other words, it is shown that movements in the exchange rate does really matter for the determination of the sectoral composition of the economy and this fact has important implications in terms of a disaggregated version of the Thirlwall’s law. According to this view changes in the level of the exchange rate lead to changes in the composition of international flows, affecting the average elasticity.

In order to accomplish this task, we depart from the Araujo and Lima (2007) extension of the Pasinetti’s (1993, 1981) model of structural change to consider a multi-sector version of the Thirlwall’s law⁶. Then it is possible to show that the sectoral composition of an economy is strongly affected by permanent movements of the exchange rate. The set of relevant elasticities that enter a multi-sector Thirlwall’s law is

⁵ In fact, the idea that structural change may impact the income elasticities of imports and exports and hence the growth rate has been around for some time. [See Thirlwall (1997) and Setterfield (1997)]. McCombie and Roberts (2002) also consider the possibility that the ratio of the income elasticity of the demand for exports to the income elasticity of demand for imports being related to previous growth in an inverted-U manner. [See Araujo and Lima (2007)]

⁶ Golvea and Lima (2009) have provided empirical support for the disaggregated version of the Thirlwall’s law.

then shown to be affected by the competitiveness of sectors, which is determined ultimately by movements of the exchange rate. In this vein, even in the case in which the elasticity of demand for imports and exports are constant it is possible to conclude that there may be structural changes due to variations in the exchange rate that can explain the growth rate of output. Following this approach it is possible to highlight the relevance of the Thirlwall's law for disaggregated economies, confirming the original insight that the Balance of Payment Constrained Growth hypothesis – BPCG hereafter – holds for multisectoral economies.

To close the paper, following the Pasinettian tradition, we provide the concept of a natural exchange rate that if adopted would contribute, along with other natural economic variables such as prices, rate of profit etc. to keep the economy in equilibrium. With this concept we convey the idea that although it is not possible to establish what is the correct or the best exchange rate, the one related not only to the equilibrium in the balance of payment but also to the equilibrium of other macroeconomic variables such as the demand effective and the employment level should be pursued. We acknowledge that although equilibrium is a desirable outcome the concept of a natural exchange rate is only a normative criterion with disequilibria as the inevitable outcome of structural economic dynamics.

This paper is structured as follows: in the next section we perform a digression on the exchange rate of the Pasinetti's model. Section 3 studies the impact of variations of the exchange rate on the structure of the economy and considers its impacts on the determination of the growth rate via Thirlwall's law. Section 4 establishes the notion of a natural exchange rate and section 5 summarizes the results.

2. The Exchange Rate in Pasinetti

Following Pasinetti (1981, 1993), let us assume that there are $n - 1$ tradable sectors both in country A and in country U and that there is no full specialization. For the sake of convenience only let us assume that there are only tradable goods in this economy since we do not intend to compare the dynamic of prices between tradable and non-tradable. According to Pasinetti, the price of each good in each country is given by:

$$p_i^U = l_i^U w^U, \quad i=1, \dots, n-1 \quad (1)$$

$$p_i^A = l_i^A w^A, \quad i=1, \dots, n-1 \quad (2)$$

The real exchange rate is defined as:

$$E_{U/A} = q_{U/A} \left(\frac{p_U}{p_A} \right) \quad (3)$$

Where $q_{U/A}$ stands for the nominal exchange rate and the price index in countries A and U are denoted respectively by:

$$p_A = \sum_{i=1}^{n-1} \theta_i^A p_i^A \quad (4)$$

$$p_U = \sum_{i=1}^{n-1} \theta_i^U p_i^U \quad (5)$$

where $\theta_i^U = (c_i^{Uh} + \xi c_i^{Ue}) l_i^U$ is the share of the i -th sector in the national income of country U and $\theta_i^A = \left(c_i^{Ah} + \frac{1}{\xi} c_i^{Ae} \right) l_i^A$ is the share of i -th sector in the national income of country A . c_i^{Ae} and c_i^{Ue} both stand for foreign demand coefficients for good i , but the

former refers to country A and the latter to country U . c_i^{Ah} and c_i^{Uh} stand for home demand coefficients for good i in countries A and U respectively. The $n - 1$ production coefficients in each country are denoted by l_i^A and l_i^U .

Now let us show that the sectoral composition of the economy is affected not only by the technical and demand coefficients but also by movements in the real exchange rate. In order to fix the ideas let us consider an appreciation leading to an overvalued exchange rate. The argument is easily adapted for the case of an undervaluation. It is not difficult to accept that an overvalued exchange rate may damage the ability of exporting for some sectors and this may have an impact not only on the structure of the economy but also on its growth rate. In order to check this point let us consider a numerical illustration. Assume for the sake of convenience only that the nominal exchange rate is equal to one, that is: $q_{U/A} = 1$ and that we have only four sectors in our economy.

Assume that the average productivity in country A is twofold the average productivity in country U , that is: $\sum_{i=1}^4 l_i^U = 2 \sum_{i=1}^4 l_i^A$. Hence we consider that the real wage in country A is twofold the real wage in country U , that is: $w^A = 2w^U$. In order to fix the ideas let us assume that the labour coefficients in the sectors of the two countries have the following relationships: $l_1^U = 1.6l_1^A$, $l_2^U = 1.8l_2^A$ and $l_3^U = 2.2l_3^A$, $l_4^U = 2.4l_4^A$. Araujo and Teixeira (2004) have shown that those goods for which differences in productivity are smaller than twofold, i.e. $l_i^U < 2l_i^A$, will have a lower price in U than in A . Those goods for which differences in productivity are greater than tenfold, i.e. $l_i^U > 10l_i^A$, will have a lower price in A than in U . In this case the relationship between prices is given by: $p_1^U = 0.6p_1^A$, $p_2^U = 0.8p_2^A$, $p_3^U = 1.2p_3^A$ and $p_4^U = 1.4p_4^A$. It is not

difficult to prove this fact. Write $w^U = \frac{p_i^U}{l_i^U}$ and $w^A = \frac{p_i^A}{l_i^A}$ from expressions (1) and (2) respectively. As we are assuming that $w^A = 2w^U$ then the relationship between p_i^U and p_i^A is given by the relation between l_i^U and l_i^A .

This fact shows that despite the fact that the U country has a smaller productivity in all sectors it has comparative advantage – Ricardo (1921) [1817] – in sectors 1 and 2 and then tends to specialize in these sectors. Country A has comparative advantage in sectors 3 and 4 and tends to specialize in the production of these goods. Let us assume now a variation in the nominal exchange rate. Let us assume that there is an appreciation leading to the new relationship between the currencies: $q_{U/A} = 1.2$; now the relationship between the real wages is given by: $w^A = 1.67w^U$ despite the fact that the average productivity in country A is twofold the average productivity in country U . In this case, the relationship between prices in each sector is given by: $p_1^U = 0.96p_1^A$, $p_2^U = 1.075p_2^A$, $p_3^U = 1.33p_3^A$, $p_4^U = 1.44p_4^A$. It means that country U loses its comparative advantage in sector 2 due to the appreciation of the exchange rate.

In the short run a possible way of evaluating the effects of variations in the level of the nominal exchange rate is to compare the per capital incomes after and before the variation. Araujo and Teixeira (2004) have shown that the per capita income in an open version of the Pasinetti's model may be written as:

$$y_U = \sum_{i=1}^{n-1} l_i^U (c_i^{Uh} + \xi c_i^{Ue}) \quad (6)$$

In the context of our numerical example before the exchange rate appreciation, expression (6) may be written as:

$$y_U = l_1^U (c_1^{Uh} + \xi c_1^{Ue}) + l_2^U (c_2^{Uh} + \xi c_2^{Ue}) + l_3^U c_3^{Uh} + l_4^U c_4^{Uh} \quad (6)'$$

After the exchange rate appreciation expression (6) becomes:

$$y_U = l_1^U (c_1^{Uh} + \xi c_1^{Ue}) + l_2^U c_2^{Uh} + l_3^U c_3^{Uh} + l_4^U c_4^{Uh} \quad (6)''$$

Note that it is reasonable to assume that the labor coefficients are not affected by the variation in the exchange rate. Hence if the magnitude of the demand coefficients that remain in expression (6)'' is the same of those that enter expression (6)' we can conclude that the per capita income after the variation in the exchange rate is smaller than before⁷. Of course this analysis is not taking into consideration that the effect of changes in the exchange rate are not restricted to eliminating one of the export coefficients of expression (6)'. The coefficients that remain in this expression may also be affected by this change.

However if the we face low price elasticities of imports and exports then the quantitative unimportance of relative price movements may be invoked in order to justify the constancy of the above mentioned coefficients in formulas (6)' and (6)'' which would allows us to conclude that the country U is worse off after the appreciation in the nominal exchange rate. However statistical evidence suggests that this principle supported by the Marshall-Lerner condition, is satisfied for most major countries only in the long run. [Kenen (1994)].

An important point to consider here is that when country U loses its comparative advantage in sector 2. If it stops exporting good 2 it may even face a deficit in its

⁷ According to the Marshall-Lerner condition depreciation will improve a country's the balance of payment if the sum of the price elasticities of domestic and foreign demands for imports is larger than one.

balance of payment that may imply a depreciation of the exchange rate in the long run. This is particularly true if no capital flows are assumed. But in the presence of capital flows the deficit in the trade balance may be financed by capital inflows that prevent the exchange rate to return to its original position.

Another point that must to be taken into consideration is the fact that here it was assumed that the number of tradable good is given and not affected by movements in the exchange rate. But possibilities exist that unfavorable movements in the exchange rate may induce some sectors to stop producing tradable goods and start producing non-tradable ones. According to this view the tradable sectors are more prone to suffer from market failures such as learning and coordination externalities and credit market imperfections that abound in underdeveloped markets, and a real depreciation would promote capacity expansion in these sectors thus increasing growth. This means that the permanent movements in the exchange rate may have important impact on the economic structure since it affects the export ability of some sectors. [See Rodrik (2008, p. 389)].

3. The Effects of the Variation of the Level of the Nominal Exchange Rate on Economic Growth

In order to assess the impact of variations in the exchange rate on the rate of growth let us consider first the original contribution due to Thilwall (1979). According to this view this effect is felt only under a continuous real depreciation rather than under a once-and-for-all devaluation. Besides, another requirement for a positive effect of a permanent devaluation is the fulfillment of the Marshall-Lerner condition, which states that the sum of the price elasticities is larger than one. In order to highlight this point, consider standard export and import functions:

$$X = \left(\frac{P_d}{EP_f} \right)^\tau Z^\zeta \quad (7)$$

$$M = \left(\frac{EP_f}{P_d} \right)^\psi Y^\varphi \quad (8)$$

Where X stands for exports, Z is the international income, M is imports and Y is domestic income. P_d stands for domestic prices, P_f means foreign prices and E is the nominal exchange rate. The prices elasticities of demand for exports and imports are denoted respectively by τ and ψ , respectively, and the income elasticities for exports and imports are denoted by ζ and φ , respectively. In equilibrium:

$$P_d X = EP_f M \quad (9)$$

Taking logs and differentiating expressions (7), (8) and (9) we conclude respectively that:

$$\hat{x} = \tau(\hat{p}_d - \hat{p}_f - \hat{e}) + \zeta \hat{z} \quad (7)'$$

$$\hat{m} = \psi(\hat{p}_f + \hat{e} - \hat{p}_d) + \varphi \hat{y} \quad (8)'$$

$$\hat{p}_d + \hat{x} = \hat{p}_f + \hat{e} + \hat{m} \quad (9)'$$

Where the hats denote growth rates. By substituting (7)' and (8)' into expression (9)', one obtains:

$$\hat{y} = \frac{(1 + \tau + \psi)(\hat{p}_d - \hat{p}_f - \hat{e}) + \zeta \hat{z}}{\varphi} \quad (10)$$

According to expression (10) only a continuous devaluation or currency depreciation – $\hat{e} > 0$ – will improve the balance-of-payments equilibrium growth rate; this will happen if the sum of the elasticities of demand for imports and exports exceeds unity in absolute value, which

is the Marshall-Lerner condition: $|\tau + \psi| > 1$. But a once-for-all depreciation of the currency will not raise the balance-of-payment equilibrium indefinitely⁸. [See McCombie and Thirlwall (1994, p. 236).

Now let us show that by adopting a disaggregated version of the Thirlwall's law even once-for-all movements in the exchange rate will have impact on the BPC growth rate. In the strong form of the BPCG hypothesis the multi-sector Thirlwall's law [Araujo and Lima (2007)] may be written as:

$$\sigma_y^U = \frac{\sum_{i=1}^{n-1} \xi \beta_i c_i^{Ue} l_i^U}{\sum_{i=1}^{n-1} \phi_i c_i^{Ae} l_i^U} \sigma_y^A \quad (11)$$

Where $\frac{\dot{y}_A}{y_A} = \sigma_y^A$, $\frac{\dot{y}_U}{y_U} = \sigma_y^U$, ϕ_i is the income elasticity for imports and β_i is the income elasticity for exports. In order to consider properly the effects of movements of the exchange rate on expression (11) let us assume, following the previous section, an appreciation in the exchange rate in the previous example of four tradable consumption goods. Accordingly, in the first scenario country U exports goods 1 and 2 while imports goods 3 and 4. In the second scenario country U no longer exports good 2 but keeps its exports of good 1. In this case, the Thirlwall's law in each of the scenarios is given by:

⁸ Under the Marshall- Lerner condition one obtains what Perraton (2003) has called the strong form of the

BPCG hypothesis, $\hat{y} = \frac{\zeta}{\varphi} \hat{z}$. By considering that PPP holds Thirlwall's Law may be rewritten as:

$\hat{y} = \frac{1}{\varphi} \hat{x}$ which he terms the weak form of the BPCG hypothesis.

$$\sigma_y^U = \frac{\beta_1 c_1^{Ue} l_1 + \beta_2 c_2^{Ue} l_2}{\phi_3 c_3^{Ae} l_3 + \phi_4 c_4^{Ae} l_4} \sigma_y^A \quad (12)$$

$$\sigma_y^U = \frac{\beta_1 c_1^{Ue} l_1}{\phi_2 c_2^{Ae} l_2 + \phi_3 c_3^{Ae} l_3 + \phi_4 c_4^{Ae} l_4} \sigma_y^A \quad (13)$$

Note that now we can compare the growth rate of country U for both scenarios invoking the Marshall-Lerner condition to guarantee that the coefficients that remain in expressions (12) and (13) are the same. Note that this principle holds since it was adopted in the original derivation of the Thirlwall's law. Hence it is possible to conclude that the growth rate in the second scenario is smaller than in the first one since the numerator is smaller and the denominator is larger in expression (13) and the other variables and parameters remain the same. This fact confirms our suspicion that even once-for-all variations in the exchange rate play an important role in structural change since the competitiveness of the sectors relies heavily on the nominal exchange rate. This illustration shows that productivity is important but not decisive in determining the export ability. Besides it is important to consider that the import and export elasticity although considered constant still play an important role in determining the overall growth rate. In order to fully understand their meaning it is important to weigh them by the share of each sector in national income, being this share strongly affected by the nominal exchange rate.

Although this paper does not discuss the causes of variations of the nominal exchange rate there is at least one circumstance in which the source of these movements can also be affected by the elasticities of products that are produced and exported, that is the case in which countries generate significant trade surplus in exporting primary. Consider for instance that the sector 2 in country U is a manufacturing one. After the

appreciation in the exchange rate this country does not export good 2 and this may result in de-industrialization due to overshooting. If the appreciation in the exchange rate is due to a significant trade surplus in primary commodity 1 then this phenomena is identified as Dutch Disease, a phenomena that has damaged the growth experience of new industrial countries that discovered natural resources [see Palma (2005)]. If the country is able to eliminate the negative effect produced by a trade surplus in primary commodity over the exchange rate then it is able to proceed to the process of industrialization by producing and exporting the industrial goods produced by sector 2. The process de-industrialization is not the desired outcome for a developing country that intends to promote the proper structural changes that allow it to grow faster.

Some authors such as Pasinetti (1993, 1981) emphasizes that the main gains that accrue from international intercourse is related to learning. Here we have considered that the labor coefficients are fixed – due to the inexistence of technological progress – but we can expect that the higher the participation of a country in exporting activities the higher its access to foreign knowledge through learning by export. In this case, an overvalued exchange rate may damage the ability of absorbing international learning through affecting the capacity of exporting.

4. The Natural Exchange Rate

In the previous sections the effects of changes in the exchange rate were studied but we have not established the exchange rate that should be adopted. For many authors the equilibrium exchange rate is the one that yields balance of payment equilibrium⁹.

⁹According to this view real exchange rate misalignment implies some sort of macroeconomic disequilibrium that is itself bad for growth. For a survey of this view see Berg and Miao (2010).

But this is not the whole story since there may be different values for the exchange rate that produce balance of payment equilibrium as we show below. One could say that it is the one that yields the higher growth rate but this is not also a complete answer for at least one reason: although there is some evidence that an undervalued exchange rate is propitious to economic growth it is not possible to say that the higher the former the higher the latter. An overvalued exchange rate may have positive impact on economic growth by cheapening the price of imported capital goods and thus increasing the ability of underdeveloped countries of importing capital goods necessary to master foreign techniques¹⁰. Another possible positive effect of an overvalued exchange rate on economic growth is via its positive effect on the profit rate which stimulates capital accumulation and may foster economic growth.

Hence trying to establish the correct or the best exchange rate based only on the growth performance may be misleading and such task should be replaced by the aim of finding a natural exchange rate, that is, an exchange rate that is compatible with a natural growing economic system in full employment. This is also according to the procedure of determining the natural value of other economic variables such as the profit rate, the interest rate etc. which was adopted by Pasinetti (1991, 1983). In this vein the natural exchange rate will be the one that if adopted yields full employment and full capacity utilization.

As shown by Araujo and Teixeira (2004) in an open dynamic economic system the effective demand condition is split in two conditions, namely a condition for full employment and a condition for full expenditure of national income. The reason why

¹⁰ In fact many underdeveloped countries face capital dependence and there is evidence that a large portion of technological progress is embodied in capital goods.

we have two conditions instead of one is straight: in an open economy the national income may be spend in imported goods and in this case the fulfillment of the expenditure condition does not imply the fulfillment of the employment condition. But as pointed out by these authors when these two conditions are fulfilled at the same time then another condition is automatically met which is the equilibrium in the balance of payments. In order to tackle this point formally, consider the full employment condition and the full expenditure condition for an open dynamic system, which are given by:

$$\sum_{j=1}^m (c_j^{Uh} + \xi c_j^{Ue}) l_j = 1 \quad (14)$$

$$\sum_{j=1}^m (c_j^{Uh} + c_j^{Ui}) l_j = 1 \quad (15)$$

By equalizing the left hand side of these two expressions, it is possible to show, after some algebraic manipulation, that they express a new condition, which can be viewed as embodying a notion of equilibrium in the balance of payment. From the point of view of country U it may be expressed as:

$$\sum_{j=1}^m (\xi c_j^{Ue} - c_j^{Ui}) l_j = 0 \quad (16)$$

As pointed out by Araujo and Teixeira (2004, p.) “[t]he basic intuition for this result can be grasped by observing that the labor coefficients l_j ’s are being used to weight both the export and import demand coefficients for commodity j . Therefore, this condition requires that exported commodities expressed in terms of quantity of labor in country U be equal to the quantity of imported commodities also expressed in terms of labor in U .” By considering, that the labor coefficient for sector j may be written as

$l_j = \frac{p_j}{w}$ this expression may also be written as:

$$\sum_{j=1}^m (\xi c_j^{Ue} - c_j^{Ui}) p_j = 0 \quad (16)'$$

This condition expresses the trade balance equilibrium in terms of prices. In a pure labor economy there is equivalence between the trade balance equilibrium in terms of prices and in terms of labor.

The above analysis shows that the equilibrium in the balance of payment may be seen as the outcome of the equilibrium in the labor market and in the goods market. But it does not exclude the possibility of equilibrium in the balance of payment without full employment and full expenditure of national income. Note that if (16) is fulfilled then the left hand side of (14) and (15) must have the same value but it is not necessarily equal to one. Then equilibrium in the balance of payment is a necessary but not sufficient condition to guarantee the full employment and full expenditure of national income. But expressions (14) and (15) may be adopted to establish an equilibrium path that may be useful to determine the natural exchange rate.

An important point to consider here is that the natural exchange rate will not privilege all sectors: some of them may be shrinking while others may be expanding. In fact the final outcome of the structural economic dynamics as pointed out by Pasinetti is structural unemployment and disequilibria. But the concept of the natural exchange rate reminds us the notion of an equilibrium economy whose economic variables can be adopted as a normative criterion to guide policy makers in the choice of actual economic variables.

5. Concluding Remarks

There is a consensus amongst heterodox economists that the challenging of economic development is in fact the challenging of allowing the proper structural changes in the economy [See Ocampo (2005)]. In this vein, variables such as tastes and technology play a fundamental role since they determine the evolving pattern of sectoral composition of the economy. But another strand of the literature also emphasizes that other economic variables such as exchange rate may play an important role too. This is the central message of this paper.

It is shown that variations in level of the nominal exchange rate affect the benefits that accrue from the principle of comparative cost advantages. Following this rationale and considering a multi-sectoral version of the Thirlwall's it is possible to show that the growth rate of a country may be strongly affected by once-for-all movements in the nominal exchange rate. An appreciation of the exchange rate reduces the competitiveness of the national industries producing structural changes that may slow down growth and investment. Besides a country can still raise its growth rate even when such a raise in growth of world income does not occur, provided it is able to change the sectoral composition of exports and/or imports accordingly. This result contradicts the conventional wisdom that only permanent and continuous movements in the exchange rate do not play an important role for long run economic growth.

In this vein the heterodox view that the process of economic growth in developing countries may be induced by growth strategies such as export led is confirmed [see Thirlwall (1997)]. Although this analysis shows that a proper management of the exchange rates may foster economic growth it does not establish what exchange rate should be adopted. In order to alleviate this shortcoming we have

introduced the notion of a natural exchange rate. Along with the notions of natural profit rate, natural interest rate from the Pasinettian literature the concept of a natural exchange rate endow us with the notion of an exchange rate that contributes to the maintenance of equilibrium in a natural economy. Such an analysis also provides us with normative criteria to choose the exchange rate that will produce full employment along equilibrium in the balance of payment.

5. References

- Araujo, R. and Lima, G. 2007. A Structural Economic Dynamic Approach to Balance of Payment Constrained Growth. *Cambridge Journal of Economics* 31(5), 755 – 774.
- Araujo, R. and Teixeira, J. 2004. A Pasinettian approach to international economic Relations: the pure labour case. *Review of Political Economy*, 16(1), 117 – 129.
- Alonso, J. and Garcimartin, C. 1998-99. A new approach to balance-of-payments constraint: some empirical evidence. *Journal of Post-Keynesian Economics* 21(2), 259 – 282.
- Atesoglu, H. 1997. Balance-of-payments-constrained growth model and its implications for the United States. *Journal of Post-Keynesian Economics* 19(3), 327 – 335.
- Atesoglu, H. 1993. Balance-of-payments constrained growth: evidence from the United States. *Journal of Post-Keynesian Economics*, 15(4), 507 – 514.
- Barbosa-Filho, N. 2006. Exchange Rates, Growth and Inflation. Paper submitted to *the Annual Conference on Development and Change*, Campos do Jordão, Brazil, November 18 – 20, 2006.

- Bairam, E. 1997. Levels of economic development and appropriate specification of the Harrod foreign-trade multiplier. *Journal of Post-Keynesian Economics* 19(3), 337 – 343.
- Berg, A. and Miao, Y. 2010. The Real Exchange Rate and Growth Revisited: The Washington Consensus Strikes Back? *IMF Working Paper* 10/58.
- Blecker, R. 2002. The Balance of Payment-constrained Growth Model and Limits to Export-Led Growth. In: *A Post-Keynesian Perspective on Twenty-First Century Economic Problems*. Edited by P. Davidson. Edward Elgar Publishing Limited, UK.
- Frenkel, R. and L. Taylor (2006). Real Exchange Rate, Monetary Policy and Employment. *DESA Working Paper* No. 19, United Nations.
- Golvea, R. and Lima, G. 2009. Structural Change, Balance-of-Payments Constraint and Economic Growth: Evidence from the Multi-Sectoral Thirlwall's Law. *Proceedings of the XXXVII Brazilian Meeting of Economics*.
- Hieke, H. 1997. Balance-of-payment-constrained growth: a reconsideration of the evidence for the U.S. economy. *Journal of Post Keynesian Economics* 19(3), 313 – 325.
- Kenen, P. 1980. *Essays in International Economics*. Princeton University Press, Princeton, New Jersey.
- Lopez, J. and Cruz, A. 2000. "Thirlwall's Law" and beyond: the Latin American Experience. *Journal of Post Keynesian Economics* 22(3), 477– 95 .
- McCombie, J. 1997. On the Empirics of Balance of Payments-Constrained Growth. *Journal of Post Keynesian Economics* 19(3), 345–76.

- McCombie, J. and Roberts, M. 2002. The Role of Balance of Payments in Economic Growth. *In: Setterfield, M. (Org.). The Economics of Demand-led Growth: Challenging the Supply-side Vision of the Long Run.* Cheltenham, UK; Northampton, MA: Edward Elgar, 87 – 114.
- McCombie, J. and Thirlwall, A. 1994. *Economic Growth and Balance-of-Payments Constraint.* St. Martins Press. New York.
- Moreno, J. 1999. Mexico's Economic Growth and the Balance of Payments Constraint: A Cointegration Analysis. *International Review of Applied Economics* 13(2), 150–9.
- Ocampo, A. 2005. The Quest for Dynamic Efficiency. *In: Beyond Reforms: Structural Dynamics and Macroeconomic Vulnerability.* Edited by José A. Ocampo. Stanford University Press.
- Palma, G. (2005). Four Sources of 'De-Industrialization' and a New Concept of the 'Dutch Disease'. *In: Beyond Reforms: Structural Dynamics and Macroeconomic Vulnerability.* Edited by José A. Ocampo. Stanford University Press.
- Pasinetti, L. 1981. *Structural Change and Economic Growth – A Theoretical Essay on the Dynamics of the Wealth of the Nations.* Cambridge University Press. Cambridge, UK.
- Pasinetti, L. 1993. *Structural Economic Dynamics – A Theory of the Economic Consequences of Human Learning.* Cambridge University Press. Cambridge, UK.
- Perraton, J. 2003. Balance of Payments Constrained Growth and Developing Countries: An Examination of Thirlwall's Hypothesis. *International Review of Applied Economics* 17(1), 1 – 22.

- Porcile, G. and Lima, G. 2010. Real exchange rate and elasticity of labour supply in a balance-of-payments constrained macrodynamics. *Cambridge Journal of Economics* 34, 1019–1039.
- Ricardo, D. 1921 [1817], *Principles of Political Economy and Taxation*, in Pierro Sraffa (ed.), *Works and Correspondences of David Ricardo*, I, Cambridge University Press, Cambridge.
- Rodrik, D. 2008. The Real Exchange Rate and Economic Growth: Comments and Discussions. *Brookings Papers on Economic Activity*, Fall, 365 – 412.
- Thirlwall, A. 1979. The Balance of Payments Constraint as An Explanation of International Growth Rates Differences, *Banca Nazionale del Lavoro Quarterly Review* 128, 45 – 53.
- Thirlwall, A. 1994. *Growth and Development*. Fifth edition, Macmillan Press Ltd. London.
- Thirlwall, A. 1997. Reflections on the Concept of Balance-of Payments-Constrained Growth. *Journal of Post Keynesian Economics* 19(3), 377–86.