Criticisms and defences of the balance-of-payments constrained growth model: some old, some new

JOHN S.L. McCOMBIE[*]

1. Introduction

It is now nearly three and a half decades since Thirlwall (1979) first promulgated his "rule," or "law" as it has now become known. This is that the maximum sustainable growth of a country is given by the now familiar equation for the balance-of-payments constrained growth rate, namely $y^{BP} = x/\pi = \varepsilon z/\pi$. Indeed, it is the mark of how widely established this law has become that it is now hardly necessary to define the variables. Nevertheless, x is the growth of the volume of exports, π is the domestic income elasticity of demand for imports, ε is the world income elasticity of demand for exports, and z is the growth of world income (or, strictly speaking, the weighted average growth rate of the country's trading partners).

The rationale behind the law is that no country can grow faster than its balance-of-payments equilibrium rate for very long, as its level of overseas debt to GDP ratio will grow to levels that will precipitate a collapse in international confidence, the downgrading of its international credit rating, and a sovereign debt and currency crisis. If the balance-of-payments equilibrium growth rate is below the maximum possible permitted by supply factors, the country is constrained to grow at the slower rate. It is a Keynesian demand-oriented model to the extent that an increase in the growth of exports, by relaxing the balance-of-payments constraint, will allow a faster growth of demand and, hence, output.

Since Thirlwall first published his seminal paper in 1979 there has been an explosion of papers on the subject. The theoretical foundations of the law have been established as reflecting the Harrod foreign trade

[*] Cambridge Centre for Economic and Public Policy, Department of Land Economy, University of Cambridge, UK. Email: jslm2@cam.ac.uk I am grateful to Tony Thirlwall and two anonymous referees for helpful comments.

multiplier (Harrod, 1933), or more generally, the Hicks super-multiplier (McCombie, 1985). The law has been applied to both the developed and the developing countries. Capital flows and relative prices have been explicitly included in both the empirical testing and the theoretical modelling (Thirlwall and Nureldin Hussain, 1982). The statistical testing has become progressively more rigorous, taking into account new developments in econometrics. Various different specifications of the model have been developed and estimated. The single-country model has been theoretically extended to the two-country case and the distinction between balance-of-payments, supply-constrained, and policy-constrained growth and their relationships has been elaborated (McCombie, 1993). Empirically, the model has been tested in a three-region case (Nell, 2003). Differences in the export and import elasticities have proved to be the crucial determinants of a country's growth rate and increasing attention has been paid to why these disparities exist (see the collection of papers in McCombie and Thirlwall, 2004).

These developments have been discussed in McCombie and Thirlwall (1994; 2004) and most recently by Thirlwall (2011). Consequently, they will not be considered further here. Instead, this paper concentrates on the major criticisms that have been levelled over the years against the law. It first presents a summary of the early critiques, commencing with McCombie's (1981) note that argued that all that the law is doing is basically capturing an identity. It then considers some criticisms that were advanced by McGregor and Swales (1985; 1986; 1991), namely, that the "law of one price" renders the model incoherent and that their statistical testing refutes the law. Finally, McGregor and Swales argue that the law fails to account for non-price competition and cannot explain changes in export market shares. The last criticism overlaps to some extent with Balassa's (1979) and Crafts' (1988; 1991) argument that Balassa's construction of hypothetical "constant-market-shares" export income elasticities of demand shows that, for example, the UK's growth could not have been balance-of-payments constrained. Krugman's (1989) alternative supply-side explanation of the law (what he terms the 45-degree rule) is then considered. Two more recent criticisms are discussed next. The first is

Palley's (2002) contention that the model is inconsistent as there is no mechanism for reconciling the growth of supply and demand in the model. Secondly, I look at the implications for the balance-of-payments constrained growth model of the argument that the export-led growth theory suffers from the "fallacy of composition." This is the argument that while one country can pursue export-led growth, not all countries can do so simultaneously. The results of two statistical studies that claim to provide evidence in favour of the effect of the fallacy of composition are not compelling. The overall conclusion is that none of these criticisms undermines or refutes the law, which still remains one of the most important explanations of "why growth rates differ."

2. Thirlwall's Law: behavioural relationship or identity?

The first criticism of Thirlwall's Law, somewhat ironically, was by McCombie (1981) who argued that it "bordered on circular reasoning." It is worth recapitulating this critique, if only because it re-emerges from time to time. The essence of the criticism is as follows. Suppose we calculated the exponential growth of the income, exports, and imports over a period of, say, several years. These average growth rates per annum are approximately equal to:

$$y \equiv \frac{dY}{dt}/Y \quad ; \quad x \equiv \frac{dX}{dt}/X \quad ; \quad \text{and} \quad m \equiv \frac{dM}{dt}/M \tag{1}$$

We may therefore *define* the export and import income elasticities of demand simply as:

$$\varepsilon \equiv \frac{dX}{dZ}\frac{Z}{X} \equiv \frac{x}{z} \qquad \text{and} \qquad \pi \equiv \frac{dM}{dY}\frac{Y}{M} \equiv \frac{m}{y} \tag{2}$$

Thus, purely as a matter of accounting identities, together with the assumption that $x = m$, it follows that:

$$y = \frac{x}{\pi} = \frac{\varepsilon}{\pi} z \qquad\qquad\qquad\qquad (3)$$

which is none other than Thirlwall's Law.

The argument continues: we can obtain an estimate of, say, π by using time-series data over this period and regressing, as was originally done by Houthakker and Magee (1969), the following equation:

$$ln\, M_t = c + \pi\, ln\, Y_t + \mu_t \qquad\qquad\qquad (4)$$

where c is a constant and μ is the error term. Houthakker and Magee (1969) was the seminal paper estimating both the world income elasticity of demand for a country's exports and the country's income elasticity of demand for imports. These estimates were used in Thirlwall's (1979) classic paper.

The only reason why the two methods of determining the value of π should lead to different values is statistical; the regression equation may be subject to specification errors such as the short-run cyclical fluctuations in the variables. In a footnote, I pointed out that Houthakker and Magee (1969) included a relative price term in the regressions, but in most of their regressions it proved to be relatively small and/or statistically insignificant and so the term can be dropped.[1] "The crucial point is that our argument has been simply in terms of elasticities and no mention of the determinants of growth has been introduced. The only condition is that x_t equals m_t. It is here that an economic model is needed to explain this equality and Thirlwall advances the neo-Keynesian approach in which output adjusts to bring the balance of payments into approximate equilibrium. But equally if all the advanced countries were supply constrained, and not demand constrained, it would be unlikely that there could exist any prolonged differences between x_t and m_t, although the adjustment process would, of course, be entirely different" (McCombie, 1981, p. 457).

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[1] This finding has been confirmed by many other studies. See the survey and papers in McCombie and Thirlwall (1994) and (2004) respectively.

The qualification to this argument is that, in fact, the relative price term should theoretically be included in the regression analysis, and the fact that, as noted above, it generally proved to be small in value and/or statistically insignificant, is important. The inclusion of the term means that the law is not an identity as suggested above and the export and import demand functions are behavioural equations. If we were in a neoclassical world, where the rates of growth of exports and imports adjust to the rate of change of relative prices, then there is no reason why the estimates of ε and π should be statistically significant in the Keynesian export and import demand equations. In a neoclassical world, the estimated coefficients of the relative price term should be large and statistically significant. The estimates show that it is not relative prices that, for example, cause imports to adjust, but changes in income in a Keynesian manner.

Williamson (1984, p. 75, fn. 1), referring to McCombie (1981), considers that the law is "almost a tautology," but is "half saved" because it uses estimated values of the income elasticities of demand for imports which allows for changes in relative prices. However, Williamson further comments that it also uses *ex post* rates of growth of exports. Nevertheless, the law also holds when estimated values of the world income elasticity of the demand for exports are used, which answers Williamson's criticism.

As Thirlwall (1981) pointed out in his reply, the law is not indicative of circular reasoning, but shows that the rate of change of relative prices (and the growth of capital flows) "have been relatively unimportant in allowing growth to deviate from the rule" (p. 458). It was in this publication that Thirlwall first noted that the theoretical foundation of the law was the dynamic analogue of the Harrod trade multiplier.

3. McGregor and Swales' various criticisms

In a series of papers, McGregor and Swales (1985; 1986; 1991) raised three further major criticisms of the law that led to a rejoinder by Thirlwall (1986) and two responses by McCombie (1989; 1992). First, McGregor and Swales argued that the reason why relative prices

empirically show little variation is due to the neoclassical "law of one price." This states that arbitrage will ensure that the price of identical tradable goods and services will exchange at the same price in a common currency (with an allowance for transportation costs). Consequently, there will be little observed fluctuation of relative prices. The law of one price, McGregor and Swales argue, implies that for a small country the price elasticities of demand for exports are infinite and so growth cannot be balance-of-payments constrained.

A number of points are worth noting here. First, in many studies where relative prices do show significant variation, the estimates of the elasticities are so low that it cannot be ruled out that the Marshall-Lerner conditions are only just met (in which case even large rates of change of relative prices will have no effect on the balance-of-payments). Secondly, there are other reasons, such as real wage resistance and oligopolistic pricing as to why relative prices do not greatly change. (McGregor and Swales dispute the empirical relevance of these adjustment mechanisms). Thirdly, if we were in a neoclassical world, the world income elasticity of demand for exports should be small and statistically insignificant. This is not the case. Finally, even if the Marshall-Lerner conditions are satisfied, to increase permanently the *growth* of exports and to reduce the growth of imports would require a *continuous* depreciation of the currency, which is implausible.

The second criticism of McGregor and Swales is related to the statistical testing of the law. In his original paper, Thirlwall (1979) used Spearman's rank correlation coefficient to test the relationship between the balance-of-payments constrained growth and the actual growth rates for the advanced countries over the early post-war period (the correlation is close, being over 0.75). McGregor and Swales argued that the relationship should be tested by regression analysis, i.e. by regressing:

$$y_i = c + b y_i^{BP} \qquad\qquad (5)$$

using cross-country data, where i denotes the country concerned. Strictly speaking, as y^{BP} is a calculated variable (with an associated standard error) and hence subject to measurement error, it should be the dependent

variable in the regression. The null hypothesis is that if all countries are balance-of-payments constrained, the constant term should not be statistically significant and the estimate of *b* should not differ significantly from unity. They find that the regression results reject the null hypothesis. As Thirlwall (1986) points out, there are a number of shortcomings with this approach. First, it assumes that all countries are included in the sample (so that balance-of-payments deficits and surpluses exactly cancel out) and it further assumes that *all* countries are balance-of-payments constrained. The latter, both theoretically and empirically, cannot be the case. (For example, in the early post-war period, Japan's growth was below its balance-of-payments equilibrium growth rate and as a result it was accumulating substantial trade surpluses). But it only requires a few countries not to be balance-of-payments constrained for all the rest to be so.

This led to McCombie's procedure for testing the hypothesis separately for each country. First, the hypothetical income elasticity of demand (π^*) is calculated that equates the ratio of the observed rate of growth of output to that of exports, i.e.:

$$\pi^* \equiv y/x \tag{6}$$

where the *y* and *x* are the average per annum growth rates calculated over the sample period. The null hypothesis is that for a country to be balance-of-payments constrained there should be no statistically significant difference between π^* and $\hat{\pi}$, where $\hat{\pi}$ is the estimated value of the elasticity coefficient from the import demand function and has an associated standard error. This hypothesis is not refuted for the majority of countries in Thirlwall's sample (and in many other studies). Unfortunately, it is not possible to test the hypothesis for the relationship $y = \varepsilon z/\pi$ as the standard error of ε/π cannot be calculated.

The last criticism of McGregor and Swales was that the model failed both to capture non-price competitiveness and to account for changing export market shares. The first point fails to recognise that the differences in the estimated income and export elasticities are in effect capturing non-price competitiveness. The second point confuses "constant-market-

shares" income elasticities of demand with the income elasticities of demand as conventionally estimated. As both Balassa (1979) and Crafts (1988; 1991) make a similar mistake, I turn next to their critiques.

4. Crafts' critique and "constant-market-share" income elasticities of demand for exports

If the rate of changes in relative prices are relatively unimportant in explaining the growth of exports and imports, as we discussed in the previous section, then, by inference, it must be differences in non-price competition that matter crucially in international trade.

Balassa (1979), like McGregor and Swales after him, was concerned that no variable explicitly took into account differences in the non-price competitiveness of traded goods in the classic estimates of Houthakker and Magee (1969) and Goldstein and Khan (1978) of export and import demand functions. To this end, Balassa calculated what he termed the hypothetical or "apparent" income elasticities of demand for exports. Using 171 commodity categories, the aggregate "apparent" income elasticities of demand for a particular country are those that would have occurred if the country's exports had grown at the same rate as the world average for each of these commodities. In other words, this hypothetical income elasticity of demand for exports is the income elasticity of demand that would occur if a particular country had maintained its share of world trade in all of its individual export markets.

To the extent that these elasticities differ between countries, it would be because some countries had their exports concentrated in those goods and services for which world demand was growing faster than average and others in sectors where world demand was growing slower. In fact, there were relatively little differences between countries in their "constant-market-share" elasticities. For the period 1953-1971, these turned out for the industrial countries to take a value of about 2.1. In the case of the UK, the actual world income elasticity of demand for its exports for the early post-war period was about 1.0 whereas the hypothetical income elasticity of demand was 2.0. The corresponding

figures for Japan were 3.6 and 2.0. Thus, the differences between the hypothetical and the actual income elasticities of demand can be taken as a measure of the degree of a country's non-price competitiveness.

Notwithstanding this finding, Balassa (1979), focussing on the United States, inconsistently concludes that "while the Houthakker-Magee and Goldstein-Khan estimates lead to the conclusion that, given its unfavourable export structure, the United States would have to accept a lower rate of growth of real incomes through a slowing-down of the growth of output or a deterioration of its terms of trade, according to the estimates obtained by the use of the constant-market-share approach, economic growth in the United States is not constrained by balance-of-payments considerations" (p. 607).

Crafts (1988; 1991) argues likewise that the UK has not been balance-of-payments constrained. He accepts that Balassa's constant-market-share method is the correct way of estimating the income elasticity of demand for exports. "Using Balassa's estimates [of the constant-market-share export income elasticities] … leads to the implication that British growth was less constrained by demand elasticities than French or German growth and only slightly more constrained than Japanese growth" (Crafts, 1991, p. 270).

Using Balassa's hypothetical elasticities gives the UK a balance-of-payments equilibrium growth rate of 7.1% per annum for the period 1951-73 (actual growth rate 2.7% per annum), compared with the United States' 6.6% per annum (actual growth rate 3.7% per annum) France's 6.2% per annum (actual growth rate 5.0% per annum); Germany's 5.9% per annum (actual growth rate 5.7% per annum) and Japan's 8.0% per annum (actual growth rate 9.5% per annum) (*ibid*., table 9.5, p. 269).

It is difficult to see why Balassa, for the US, and Crafts, in particular for the UK, argue that this shows that the countries could not have been balance-of-payments constrained. All the approach shows is that if the US and the UK had been able to match the average of the advanced countries in quality improvements, the efficiency of their overseas distribution networks and other non-price characteristics of their exports, then their exports would have grown faster, at about the same average rate of the rest of the advanced countries. Consequently, their output

growth consistent with balance-of-payments equilibrium would have been commensurably higher. But this does not imply that the US and the UK were not, in fact, actually balance-of-payments constrained. The point is that the US and the UK could *not* match the other advanced countries in terms of non-price competitiveness. The actual export growth rates of the US and UK were nowhere near as fast as the hypothetical growth rates calculated using the "apparent" elasticities and so the latter are of no relevance in determining whether or not growth was actually demand (or supply) constrained. What matters for the observed growth of a country is its actual income elasticities of demand for imports and exports and not some hypothetical values that might have been achieved if the country had been more non-price competitive. The correct estimates of the two income elasticities of demand that should be used in Thirlwall's Law are those of the traditional import and export demand functions and which confirm the robustness of the law in explaining growth disparities.

If all that Balassa and Crafts mean is that the growth rate at which the balance-of-payments constraint becomes binding is not immutable and may be raised by supply-side policies designed to improve non-price competitiveness, then this is uncontroversial. But such microeconomic policies are unlikely to have any quick or dramatic impact.

The constant-market-share analysis showed that the elasticities of export demand did not differ greatly between the advanced countries; the UK's poor export performance was because of a failure in all of its overseas markets. However, as has been noted above, a country's world income elasticities of demand for its exports and imports are not immutable. Gouvea and Lima (2010) have shown that the success of the East Asian economies was due to the fact that their exports shifted into those sectors for which world demand was growing especially rapidly. They built on the approach of Araujo and Lima (2007) who extended theoretically the balance-of-payments constrained growth model by using Pasinetti's (1993) disaggregated structural economic dynamics approach. The latter, while emphasizing the importance of demand-led structural change, does not have a balance-of-payments constraint.

By definition, the aggregate income elasticities of demand for exports and imports are the weighted income elasticities of the respective individual sectors, but where the weights can change over time. Using the latter construction, Araujo and Lima derive what they term the "Multi-Sectoral Thirlwall's Law." They show that even though the individual sectoral income elasticities of demand for exports and imports are constant, the balance-of-payments constrained growth rate can increase if a country over time specializes more in those sectors where the individual export income elasticities of demand are highest as well as in import-competing sectors where the income elasticity of demand is also greatest. In other words, the aggregate export and import elasticities increase and decrease respectively over time as a result of their changing composition. As Thirlwall (2011) puts it, "this is what import substitution and export promotion policies are meant to achieve" (p. 24).

Gouvea and Lima (2010) use this approach to analyse the growth rates of four Latin American and four Asian economies. They find that both the multi-sectoral and the original aggregate version of Thirlwall's Law hold, with the exception of the latter for South Korea. Using the multi-sectoral approach, they show that the ratio of the aggregated sectoral export income elasticities of demand to the aggregated import income elasticities for the Asian countries increased over time, whereas this was not true of the Latin American countries (with the exception of Mexico).

Thus, the important conclusion is that the acceleration of growth in the Asian economies was primarily due to their increasing specialisation in those exports for which world demand was growing more rapidly. As we noted above in discussing Crafts (1988; 1991), for the advanced countries, disparities in ε are not caused by variations in the composition of exports, but rather to some countries performing better in *all* export markets than others. (For a discussion of the UK, see Connell, 1979). But this is not the case for developing countries.

Hausmann *et al.* (2007) have also stressed the importance of the sophistication of a country's exports for its rate of output growth. They measure the sophistication of a particular export in terms of an index of the weighted per capita income of the countries that export that good,

where the weights correspond to the revealed comparative advantage of the countries producing that good (PRODY). Then the average productivity of a country's export basket is measured using this productivity index together with the relative shares of exports of the country concerned (EXPY). They found that EXPY was a statistically significant explanatory variable of per capita GDP growth in a regression that also included control variables.

Felipe (2009) also regressed output growth on the logarithm of the initial GDP per capita, the logarithm of the export sophistication index and the change in industry's share in total output. He found that generally all these variables were statistically significant at the one-percent confidence level. The results suggest that a 10 per cent increase in the index of export sophistication raises growth by about half a percentage point. There is also evidence that there is a strong correlation between the sophistication index and the degree of diversification (Felipe, 2009). This is due to the rapidly growing countries developing a greater ability to become competitive in a wider array of exports and has the benefit that it reduces the overdependence on any one market. Felipe[2] has also found that the more sophisticated products tend to have a higher export elasticity of demand. Consequently, this approach, and the empirical results noted above, provide an explanation for the observed disparities in the aggregate income elasticities of demand for a country's exports and are in accord with the predictions of the balance-of-payments constrained growth model.

Hildago *et al.* (2007) have extended this analysis to construct what they term the "product space." This may be described as a network of connections between various products that shows the ease with which a country is able to move from the production of one to another commodity. If a country produces in a region where these linkages are strong, then it will be able to more easily diversify its export production.

Felipe (2009) summarises the position as follows. "As these authors [Hausmann *et al.*] argue 'the implication is that the gains from globalization depend on the ability of countries to appropriately position

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[2] Personal communication, 4 March 2011.

themselves along this spectrum'. What matters for future growth is not the volume of exports but the capacity to continue latching on to higher–income products over time. Industrial policies geared toward upgrading the production and export structure therefore seem to matter and have a positive impact on future growth" (p. 165). See Wade (1990) for a similar view on the importance of government policy and the role of the State in promoting export growth.

5. Krugman's 45-degree rule

Krugman (1989) rediscovered Thirlwall's Law, which he termed the 45-degree rule, as empirically $\varepsilon / \pi = y / z$ or, when the (log) of the former is regressed on the (log) of the latter, the coefficient is unity or the slope of the line is 45-degrees. (Krugman provides some empirical evidence providing further confirmation of this empirical relationship). Like McCombie and Thirlwall (1994), he rules out sustained changes in the real exchange rate as a factor in bringing the balance of payments into equilibrium. Consequently, it is necessary to explain why the rule holds. The Keynesian explanation is that it is growth rates that adjust to maintain the balance of payments in equilibrium, but this is rejected by Krugman on "a priori grounds" that it is "fundamentally implausible." He continues that "we all know that differences in growth rates among countries are primarily determined in the growth rates of total factor productivity, not differences in the rate of growth of employment; it is hard to see what channel links balance of payments due to unfavourable income elasticities to total factor productivity growth" (Krugman, 1989, p. 1037).

The Krugman article is instructive because it goes to the heart of the question about the direction of causation. Drawing on new trade theory, monopolistic competition, and the importance of increasing returns, he argues that faster growth leads to increased specialisation and the production of new goods for sale in overseas markets. Thus high "export elasticities of demand" are due to a dynamic supply side and rapid growth, rather than vice versa. In other words, while at any point in time

a country faces a downward sloping demand curve for its exports, the curve shifts outwards over time with greater specialization.

There are three problems with this explanation. The first is that the degree of specialization and the ability to take advantage of specialization will be partly a function of the *size* of the economy. One would expect that the US with its large internal market and high technical sophistication would therefore have a high world elasticity of demand for its exports which, in fact, it does not.

Secondly, there are many channels whereby slow output growth causes slow total factor productivity growth. "There is a rich literature on export-led growth models (including the Hicks super-multiplier) incorporating the notion of circular and cumulative causation (Myrdal, 1957) working through induced investment, embodied technical progress, learning by doing, scale economies, etc., that will produce fast productivity growth in countries where exports and output are growing fast" (McCombie and Thirlwall, 1994, p. 390). The Verdoorn Law (McCombie *et al.,* 2002), which is discussed in the next section, provides substantial evidence of the importance of these factors.

Thirdly, for a developing country it is implausible that specialisation in a commodity, such as coffee, is going to raise the country's income elasticity of demand for exports. Nor is it likely that this will also occur if coffee is replaced by any other primary commodity.

However, it is worth emphasizing the similarity in the two approaches, notably the emphasis on the importance of increasing returns to scale. In a sense, Krugman's position is that a faster growth of output through increased specialisation and increasing returns to scale causes the income elasticities to change at a speed that the balance-of-payments constraint is never encountered. The Keynesian approach is that while in the very long run the elasticities may change,[3] in the medium term they act as a constraint. This induces a mechanism of virtuous and vicious circles of economic growth (Thirlwall, 1991).

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[3] After all, it is not likely that Japan has always had an export elasticity exceeding three.

6. The pitfall of "Palley's Pitfall:" reconciling the demand and supply sides of the balance-of-payments constrained growth model

In an interesting contribution to the debate over the theoretical foundations of the balance-of-payments constrained growth model, Palley (2002) argues that the model, as part of the Keynesian paradigm, has "fallen into the pitfall of failing to properly account for the supply side" (p. 115). He argues that "the BOPC [balance-of-payments constraint model] embodies an internal inconsistency owing to its failure to incorporate the supply side of the economy.[4] In the long run, not only is growth constrained by the requirement of dynamic current account balance, but there is a requirement that the rate of growth of output equals the rate of growth of *potential* output. This leads to the potential for inconsistency between the dual requirements of capacity balance and current account balance" (Palley, 2002, p. 120, emphasis added). Like Krugman (1989), he argues that endogenously determined changes in the income elasticity of demand for imports remove this inconsistency. This leads, in effect, to no country being balance-of-payments constrained, and, as Palley puts it, "the steady-state growth rate [is] uniquely determined by supply-side factors" (*ibid*.).

In this section, it is shown that Palley's analysis is flawed, in that any change in the income elasticity of demand for imports of a particular country is due to short-run cyclical effects, and the long-run income elasticity is far more difficult to reduce.

Setterfield (2006; 2011) also addresses this problem within the same framework, but allows supply-side factors to alter when there is a potential disparity between the balance-of-payments equilibrium growth rate and the possible growth given by the supply side. In particular, he allows the Verdoorn coefficient to adjust, rising when there is an increase in the pressure of demand. However, while he sees this as a complimentary adjustment mechanism to Palley's, the implications are very different. In Setterfield's argument the long-run growth rate is still

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[4] In fact, Thirlwall and Dixon (1979) were the first to explicitly incorporate the balance-of-payments constraint into the cumulative causation growth model.

determined by the balance-of-payments equilibrium growth rate as in Thirlwall's Law, contrary to what is implied by Palley's analysis. In this sense, Setterfield's argument, which is discussed below, is more in the more plausible demand-oriented tradition of economic growth. However, I turn first to the shortcomings in Palley's argument.

6.1. Palley's analysis

The balance-of-payments equilibrium growth rate is given by the familiar rule.

$$y^{BP} = y^d = \frac{\varepsilon}{\pi} z \tag{7}$$

This is the determinant of the growth of demand working through the dynamic Harrod foreign trade multiplier or the Hicks super-multiplier.

Turning to the supply side, the growth of productivity is given by the Verdoorn Law[5] which is essentially a technological relationship (a linear specification of Kaldor's (1957) technical progress function):[6]

$$p = \lambda + vy^d \tag{8a}$$

or

$$\ell = -\lambda + (1-v)y^d \tag{8b}$$

where ℓ is the growth of employment. The *d* superscript denotes that while the Verdoorn Law is a supply-side relationship, the growth of

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[5] For a detailed discussion of Verdoorn's Law see McCombie *et al.* (2002).
[6] Strictly speaking, the evidence suggests that the Verdoorn Law generally holds only for the industrial sector. However, with recent developments in information technology, etc., it may now hold for parts of the service sector. A problem is that often services output growth is measured as the growth of inputs with an arbitrary allowance for productivity growth.

output is driven by the growth of demand. λ is the rate of exogenous productivity growth, but in the extended Verdoorn's Law, it is also a function of such factors as the diffusion of technical innovations, the rate of embodiment of new technology in investment, the growth of both public and private capital stock, and the general dynamism of entrepreneurs.[7]

The parameter v is the Verdoorn coefficient and empirically generally takes a value of one-half. It implies that industry is subject to considerable increasing returns (of both the dynamic and static variety) as a one percentage point increase in output growth is accompanied by an increase of one-half of a percentage point in both employment growth and induced productivity growth. Thus, it captures the effects not only of static increasing returns to scale (the increase in productivity as the scale of production increases) but also dynamic increasing returns to scale (through, for example, learning by doing) (Kaldor, 1966).

The equation (8b) may be simply derived from the first using the identity for exponential productivity growth $p \equiv y - \ell$. The equation (8b) is often used in the statistical estimation of Verdoorn's Law as it avoids the spurious correlation engendered by having y on both sides of the equation in equation (8a).

In order to show that the balance-of-payments constrained growth model is internally inconsistent, Palley introduces a third relationship, namely what he terms the "potential output growth" and which may be regarded as the Harrod natural rate of growth (y^n), although Palley does not use this term.[8] As we have seen, this is best interpreted as the *maximum* rate of growth of output consistent with supply-side constraints when there is no demand (i.e. balance-of-payments) constraint. This growth rate is determined by autonomous factors, such as the exogenous

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[7] In a multi-sector model, it will also be a function of the rate of transfer of labour from low to high productivity sectors, usually from agriculture to industry or, more recently, to the service sector (McCombie, 1980).

[8] Harrod (1939) defined the natural rate of growth as "the *maximum* rate of growth allowed by the increase of population, accumulation of capital, technological improvement and the work/leisure preference schedule, supposing that there is always full employment in some sense. […] The system cannot advance more quickly than the natural rate allows" (p. 30, emphasis added).

component of the rate of technical change and the growth of the labour force, and endogenous factors such as the level of R&D, the growth of public capital and human capital. This growth rate is given by:

$$y^n \equiv p^n + n \qquad (9)$$

where p^n is the hypothetical growth of productivity if the economy was growing at its natural rate, namely, y^n. The variable n is the growth of the labour force and is also assumed to equal ℓ (as it is assumed that the participation rate does not change over time).

So why does the inconsistency arise? It occurs because, according to Palley, economies grow at their natural rate, which implies that the growth of supply is given by the natural rate or, from equations (7), (8) and (9) by:

$$y^n = \lambda + v\left(\frac{\varepsilon}{\pi}\right)z + n \qquad (10)$$

For the model to be consistent, according to Palley, y^n must equal y^d or, equivalently, equation (7) must equal equation (10). But there is nothing in the original balance-of-payments constrained growth model that ensures that this occurs. In other words, there is no mechanism to bring the growth of demand into line with the growth of notional supply or the natural rate of growth. "[A]s a result there is growing excess capacity" (Palley, 2002, p. 123) or "growing excess supply" (Palley, 2002, p. 121) if $y^{BP} < y^n$, and, according to Palley, this is not observed in practice.

In order to rectify this supposed theoretical inconsistency, Palley assumes that the income elasticity of demand for imports is *endogenous*. Its value falls as excess capacity grows and, conversely, rises as capacity utilisation increases and bottlenecks are encountered. Thus, there will be

a value of the income elasticity of demand (π') that brings the growth of demand into equality with the natural growth rate.[9]

   According to Palley's argument, as the growth of capacity increases, say, because of an increase in any of the internal determinants of demand, so the income elasticity of demand for imports falls. This allows the balance-of-payments equilibrium rate of growth to increase until presumably supply constraints are eventually encountered. In this scenario, there is consequently no balance-of-payments constraint as y^{BP} adjusts to the growth of supply and all countries will be growing at their maximum possible rate consistent with their supply constraints at the Harrod "natural rate of growth" (y^n). The natural rate of growth is thus the growth of productive potential, which is the trend rate of growth of the capacity of the economy. This is shown in figure 1. The actual growth rate, (y_1^a in the figure), according to this argument, displays cyclical fluctuations around this trend rate of growth due to the trade cycle and it is associated with short-run variations in capacity and capital utilization.

   In support of this proposition, Palley cites the empirical work of Thirlwall and White (1974) and Thirlwall and Hughes (1979). They found that for the US and the UK respectively, as output grew rapidly above trend (i.e. there was a boom), the growth of imports accelerated and the balance of trade deteriorated. This was confirmed by Eltis (1979) who found that for the UK over the period 1961-1975, in periods when the country's GDP increased rapidly above trend, the *short-run* income elasticity of demand increased to around 5 to 6 while the long-run "basic" income elasticity was about 2. Conversely, in a recession, the short-run elasticity fell. However, as we shall see below, it is dangerous to infer from these results that the *long-run* elasticity of demand for imports is a function of the pressure, or the growth, of demand.

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[9] This is given by $\pi' = \dfrac{(1-v)z\varepsilon}{\lambda + n}$.

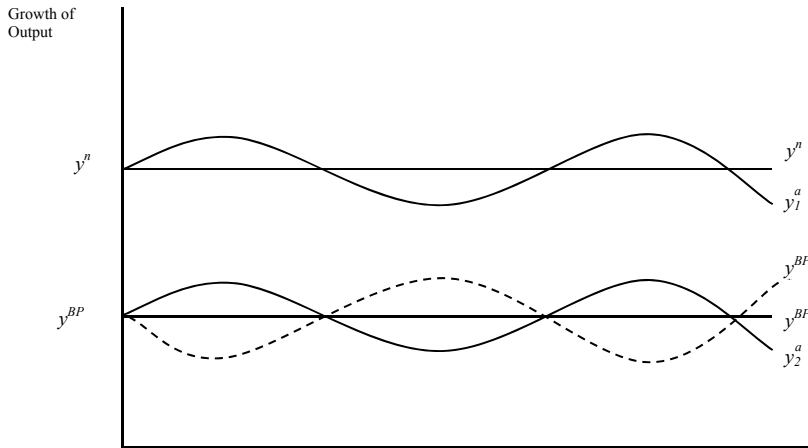Figure 1 – *Growth of output under different assumptions*

Figure 1 Growth of Output under Different Assumptions

What are the implications of Palley's interpretation for the balance-of-payments constrained growth model? It becomes, in effect, a demand-constrained growth model without a constraint. Unlike the neoclassical approach, where the rate of change of relative prices ensures that the balance of payments is in equilibrium at the natural rate of growth, in Palley's scenario it is the income elasticity of demand for imports that adjusts. Consequently, all countries (including presumably the less developed countries) grow at the natural or maximum productive potential rate.[10]

Palley does not discuss the disequilibrium path of the economy. However, in a Keynesian model when growth is below the natural rate,

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[10] Setterfield (2006) terms it *quasi-supply-determined growth* arguing correctly that it is a situation "in which the reconciliation of the actual and potential growth rates is achieved wholly by means of adjustments to the rate of growth of demand: the supply side 'rules the roost'." (p. 53).

according to Palley, "government policy can influence the rate of demand growth, and in doing this it can influence the rate of potential output" (Pally, 2002, p. 117). Consequently, the government increases the rate of growth of demand that leads to greater investment, etc., that increases the growth of installed capacity. The increase in output growth would potentially increase the growth of imports, but this is offset by the increased capacity that allows all the increased demand to be met by domestic production and the long-run income elasticity of demand for imports falls commensurately. Presumably, there is nothing to stop the growth of demand from increasing until the natural rate of growth is reached. In terms of figure 1, the balance-of-payments constrained equilibrium growth rate y^{BP} (which in this scenario is a misnomer) increases until it reaches y^n. This is all highly implausible. All the evidence suggests that an increase in demand and domestic output, in the short run, is met by an increase in imports. The path of the actual growth of the economy is given by y_2^a, and the growth of the short-run balance-of-payments equilibrium growth rate is given by y^{BP*} and moves contra-cyclically as short-run bottlenecks are reached. The ensuing balance of payments crisis causes deflationary policies to be introduced and growth reverts towards the long run balance-of-payments equilibrium depicted by y^{BP}. Over the long run, the current account deficits and surplus cancel each other out.

This is the typical stop-go growth that affected the UK in the early post-war period and affects any country that is balance-of-payments constrained. It is as the economy moves into recession and excess capacity increases that the short-run income elasticity falls. Even if growth was investment-led and the growth of capacity increased, given that export growth is exogenously determined by the growth of world demand, for the balance-of-payments not to deteriorate would require the marginal propensity to import to be zero. The only case where this is not the case is where export growth is supply constrained, and the increase in capacity actually increased its growth rate. But all the evidence suggests that the differences in the income elasticities of demand for imports and exports are caused by disparities in non-price competiveness (the advanced countries) and the growth of the targeted overseas markets (the new industrialising countries). The long-run growth of imports and

exports is not determined by the growth of productive capacity, rather the causation is the other way around. Palley's adjustment mechanism is simply implausible.

The problem with Palley's explanation is that the growth of productive potential (which it will be recalled is the growth of capacity that would have existed if there had been no balance-of-payments' constraint) has no role to play in this model, if the growth of demand is constrained by the balance of payments. There is no actual excess capacity resulting from the difference between the natural and the balance-of-payments constrained growth rate. This is because the short side of the model (i.e. the growth of demand) is the one that determines actual growth and the natural rate remains merely a hypothetical rate.

6.2. Setterfield's analysis

If it is implausible that the long-run income elasticity of demand adjusts to bring the balance-of-payments into equality with the growth of productive potential, is there any other mechanism? Setterfield (2006; 2011) has presented an alternative solution to the reconciliation of the growth of supply and demand. Setterfield assumes that growth can be balance-of-payments constrained and argues that it is the supply side that adjusts. This is in the tradition of the original balance-of-payments equilibrium growth model, where it is argued there are mechanisms that ensure the growth of supply adjusts to the balance-of-payments equilibrium growth rate (see Thirlwall, 1979).[11]

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[11] Setterfield (2011) terms the growth of productive potential or capacity that is equal to the balance-of-payments growth rate, the natural rate of growth. This is because the balance-of-payments constrained growth rate *determines* the actual rate of growth and hence the rate of capital accumulation and the intensity of the use of the labour force. Hence, this "Kaldorian" natural rate of growth, as opposed to Harrod's *exogenous* natural rate of growth, is endogenously determined to the extent that if the balance-of-payments constrained growth rate increases, so the natural rate will also increase. This "balance-of-payments" constrained natural rate of growth represents a ceiling on the growth rate of the economy in the sense that the actual growth rate is determined by the exogenous components of demand.

Returning to Palley's framework, from the identity $y \equiv p + \ell$ and the Verdoorn Law, $p = \lambda + vy$, it follows that the actual rate of growth of supply (y^s) is given by:

$$y^s = \frac{\lambda + \ell}{1 - v} \tag{11}$$

At first glance, it seems that the equality of this with $y^{BP} = \varepsilon z/\pi$ will be coincidental. But whereas Palley implausibly reconciles the difference by allowing π to change, so that the growth of demand adjusts to the growth of supply, Setterfield allows v to vary. This affects the growth of supply and productivity and the former adjusts to the balance-of-payments constrained growth rate.

Setterfield (2006) considers the case where initially $y^{BP} > y^s$ where y^s is the (temporary) rate of growth of the supply of output. According to Setterfield, this fast growth in demand will encourage greater induced technical change. Hence the Verdoorn coefficient, v, will increase in value, thereby from equation (11) increasing the growth of the supply of output. By this mechanism the growth of supply may be brought into equality with the growth of demand.[12] In fact, λ and ℓ are also endogenous. A faster growth of demand will lead to a higher level of R&D and both private and public investment. With rapid growth, the return on investment (the incremental output-capital ratio) is greater (reflecting Lamfalussy's, 1961, distinction between "enterprise" and "defensive" investment). In the early post-war, the continental European countries had large reservoirs of disguised unemployment in the agriculture sector and the rapid transfer of labour from this relatively low productivity sector to industry increased the growth of productivity (Kindleberger, 1966; Cornwall, 1977; McCombie, 1980). Moreover, the growth of the labour force also varies according to the growth of demand through net migration. For all these reasons, there is no unique rate of

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[12] It should be noted that unless v takes a value of one, when there are increasing returns for ever and this is most implausible, when v is allowed to vary an increase in output will still require an increase in the growth of labour services.

growth associated with a constant rate of unemployment. Consequently, the fact that, for example, the UK was growing in the early post-war years with an unemployment around two per cent does not mean that it could not have grown faster with an increase in export growth (Kaldor, 1979). As León-Ledesma and Thirlwall (2002) have shown empirically, the natural rate of growth is endogenous.[13] The less developed countries are also unlikely to be supply constrained (because of disguised unemployment and because investment is determined by the growth of output, as much as the converse).[14]

Thus, so long as y^{BP} is below the natural rate of growth, it will determine the growth of supply and the growth rate is balance-of-payments constrained. (If y^{BP} is above the natural rate of growth, as was likely in the case of Japan in the early post-war period, the country will run a balance-of-payments surplus and is supply-constrained).

If the growth of supply is initially above the balance-of-payments constrained growth rate, then because of the lack of a sufficient rate of growth of demand the opposite will occur, reducing y^s until it comes into line with y^{BP}. But the important point to note is that in both these scenarios, it is the balance-of-payments growth rate that determines the actual growth rate (i.e. the growth of supply adjusts to the growth of demand and not vice versa). As Setterfield (2006) points out, in this case, "the demand-side thus 'rules the roost' in what can be identified as a model of *fully-demand-determined* growth" (p. 55).

Thirlwall (2001) has examined the various relationships between Harrod's warranted, natural and balance-of-payments equilibrium growth rates. (Harrod never combined his model of the dynamic foreign trade multiplier with the warranted and natural growth rate). The condition where a country is balance-of-payments constrained is where when the warranted growth rate is above, below, or equal to the natural rate of growth which is above the balance-of-payments constrained growth

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[13] This is the Kaldorian (not the Harrodian) natural rate of growth.
[14] Palley (2002) discusses some of these mechanisms but discounts them on the grounds that they cannot persist in the steady-state rate of growth. But the concept of steady state is not a particularly useful concept for analysing the actual growth of economies, especially when there is path dependence.

which, in turn, determines the actual growth rate. As Thirlwall (2001) puts it: "[f]or most countries, it must be true, however, that as long as some countries run payments surpluses through choice, or are literally supply constrained (such as some oil producing countries), the ultimate constraint must be its balance-of-payments equilibrium growth rate, not the Harrodian natural rate of growth" (p. 87).

7. Export-led growth, balance-of-payments constrained growth and the fallacy of composition

The advantages of export-led growth, in addition to relaxing the balance-of-payments constraint, are well known. It allows countries to exploit economies of scale that their often small domestic market does not allow. It induces greater competition as they compete in overseas markets, especially in the advanced countries, against both domestic producers and other exporting nations. It facilitates the transfer of technology that partly comes from foreign direct investment which, in turn, often accompanies an export-led growth strategy. It allows the less developed countries to develop industries for which there is a high income elasticity of demand and which are too technologically advanced (or expensive) to be sustained by their domestic market. A unit of foreign currency earned in the overseas markets often requires fewer resources than that saved by domestic industries replacing imports. It is also argued that an export-led growth strategy raises employment more than an import substitution strategy. There is a great deal of empirical evidence that a faster growth of exports is associated with a higher growth of GDP (see the surveys in Edwards, 1993, and Shirazi and Manap, 2004.) Moreover, Chow (1987) and Darrat (1987) find significant causal effects from export to output growth. Marin (1992) finds it between export and productivity growth.[15]

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[15] Granger causality tests should, however, be treated with caution as these tests largely capture the relationship between exports and output fluctuating around the trend rate of growth. The balance-of-payments equilibrium growth rate suggests that the relationship is between faster *trend* rates of growth of exports and output. Consequently, Granger tests

It is somewhat paradoxical that the importance of export-led growth has been emphasised by both neoclassical economists (contrasting it favourably with import substitution industrialization, ISI) and more interventionist minded economists. Representative of the former are Balassa (1978; 1983) and Tyler (1981), and of the latter Wade (1990). The World Bank's *World Development Report* of 1987 placed great emphasis on the positive role of exports and the failure of ISI. Commentators also point to the rapid growth of Japan in the early post-war period, the Asian Tigers since the mid-1960s and more recently China as being a direct consequence of their export performance. Tyler (1981) expresses a commonly held view when he argues that many studies point to the harmful effects of ISI, especially in the Latin American countries. Even though ISI may lead to a faster growth rate and could be judged by some as necessary *faute de mieux*, there is a better alternative of export-oriented growth. This does not bring with it the price and other distortions that accompany ISI. A theme in these writings is that any form of government intervention will most likely prevent these countries pursuing the benefits of specialization according to comparative advantage. Related to this is the advocacy of rapid trade liberalisation where protectionism still remains. Indeed, Shirazi and Manap (2004) have gone so far as to describe this view as the "new conventional wisdom." Thus, the advocacy of export-led growth sometimes becomes seen as synonymous with trade liberalisation, including the supposed advantages of unilateral abolition of tariffs and quotas.

But the success of Japan and the Asian Tigers was also due to the deliberate and careful intervention by governments (Wade, 1990). Policies adopted included tariffs and administrative import controls, cheap credit and an under-valued exchange rate, export subsidies and export credits. The "governed market" school of thought points out that

are unlikely to be very informative and, indeed, it is not hard to think of reasons as to why GDP may increase prior to an increase in exports as a result of increased order books for exports. Multiplier effects from the increased demand for inputs for producing the exports will raise GDP prior to the increased sale of exports, but the increase in GDP does not cause the increase in exports.

comparative advantage should be viewed as a dynamic concept and the key to a successful export strategy is to develop those industries for which world trade is growing fast; namely the high-tech manufactured goods for which the world income elasticity of demand is high.

This can be contrasted with the failed ISI, where import controls merely cushioned inefficiency. ISI can lead to rent seeking and the damaging effect of special interest groups to which the most effective remedy is the progressive exposure to overseas competition. But the sequencing is very important, as is the introduction of other government measures supportive of an export-led growth policy. Reduction in protectionism is, in the long run, a necessary, but not a sufficient, condition for development. The empirical evidence suggests that a reduction in tariffs and quotas raises the income elasticity of demand for imports, and if there is no compensating increase in exports this can actually lead to a fall in the long-run growth rate. The work of Pacheco-López and Thirlwall (2007) is instructive in this regard. They studied the effect of trade liberalization in 17 Latin American countries during the period 1977-2002. They found that "in the aftermath of trade liberalisation, growth performance did improve in the majority of countries, but at the expense of trade balance deterioration. For some countries, the growth was not sustainable; for others it was sustainable only by financing larger trade or current account deficits. In the vast majority of cases, the trade-off between growth and the trade balance did not improve as a result of liberalization, but deteriorated" (p. 487).

One of the implications of the balance-of-payments constrained growth model is that in order to increase its growth rate, a country should increase its value of ε and this lends support to an export-led growth strategy. However, the latter has been criticised on the grounds that it suffers from the problem of "fallacy of composition." What may be an optimal strategy for one country when viewed in isolation may not be possible when a wider group of countries is considered. The fallacy of composition argument has been applied, in particular, to the less developed countries, especially in the context of whether or not they can emulate the East Asian countries' strategy (or more recently that of India and China) of successful export-led growth. For a survey see Mayer (2002). In this section we briefly review this

criticism and consider the question: "is there a more preferable strategy?" And to what extent does the fallacy of composition argument invalidate the conclusions of the balance-of-payments constrained growth model? The fallacy of composition argument, in this case, is that while an export-led growth strategy may be optimal for one country, all countries, so it is claimed, cannot pursue this path.

The first major criticism focussing on the fallacy of composition arose from the paper of Cline (1982) who calculated the necessary increase in export shares that would be required for all the developing countries to match the export-output ratio of the newly industrialised countries (NICs). He found that in 1976 developing countries' exports would have captured 61 per cent of the advanced countries' import markets, compared with the actual 17 per cent and he argued that long before these high ratios could be reached protectionist policies would have been introduced. Havrylyshyn (1990) outlines the most obvious criticism of Cline, which is that with growth and higher living standards in the developing countries, the advanced countries will export more to the developing countries. *Pari passu* there will also be greater trade between the developing countries themselves. In other words, there will be greater world specialisation of production. The Cline argument is a partial rather than a general equilibrium analysis.

Palley (2003) has identified a number of problems, or "pathologies" as he calls them, with export-led growth strategy. First, it prevents the development of the growth of the domestic market, although this ignores the workings of the Hicks super-multiplier. Secondly, if competition is based on relative prices, it leads to "a race to the bottom." Less developed countries will hold back wages and improvements in working conditions to try to remain price competitive. This leads, especially in the case of homogeneous commodities, to a deterioration in the terms of trade. Finally, the developing countries will be linked into the cycles of the advanced countries. A slowdown in the growth of the advanced countries will induce a fall in the growth rates of the less developed countries.

There may be elements of truth in this, but it is useful to consider the argument in the context of Thirlwall's Law in a multi-country framework. If the growth of exports of some countries increases through, say, an export

drive, this will increase their rate of growth of output, and hence their growth of imports. This will in turn increase the growth rate of those countries supplying the imports and hence the growth of world income. Thirlwall's simple law treats the growth of world output as exogenous, whereas it will be affected by these various feedback effects. Thirlwall's Law also shows that a policy of simply attempting to increase domestic demand will be thwarted by the balance-of-payments constraint, *pace* Palley (2003).[16] This will occur to the extent that any increased growth will lead to a higher import growth that through the balance-of-payments constraint will necessitate growth returning to its former level.

Certainly, it will become more difficult for the less developed countries to compete in world markets where the new industrialised countries have established a substantial presence. But this does not mean that there is a more viable development strategy. What the evidence suggests, as discussed above, is that countries should focus on dynamic comparative advantage, developing exports in areas where world demand is growing fast and competition from other countries is relatively less. This means moving out of exporting homogeneous goods, such as primary commodities where there is fierce price competition and declining terms of trade, into areas where non-price competitiveness is more important and the world income elasticity of demand is high. This economic strategy may, of course, be simply *faute de mieux*, but no less important for that.

It is easy to overstate the fallacy of composition argument as a critique of export-led growth. It can, for example, equally be applied to a strategy of domestic-led growth. Arguing that firms should concentrate on the developing the domestic market is equally subject to the fallacy of composition argument.

7.1 Some problems in tests of the fallacy of composition hypothesis

Palley (2003) attempts to test for evidence of the crowding out of exports by determining the extent to which the growth of a country's

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[16] However, as we have shown above, Palley seems to deny the relevance of the balance-of-payments constraint on economic growth.

exports to the US is adversely affected by the growth of other countries' exports to that country. In other words, he attempts to estimate the degree to which the growth of one country's exports to the US displaces, or crowds out, the growth of the exports of another country. But there are problems with his analysis.

He first considers the country shares of imports into the US over the period 1978-1999 from a number of countries that are reported in table 1. Not surprisingly, the shares for some groups of countries, or individual countries, such as Western Europe and Japan declined as others, such as China and Mexico's, rose (see table 1). However, since the shares are constrained to unity, as Palley (2003) correctly points out, this is not evidence of crowding out as "a country's loss may therefore just be the product of arithmetic rather than export displacement" (p. 183). The decline in a country's share in one market may also not be due to crowding out, but the result of a shift of exporting to other overseas markets.

Table 1 – *Changes in the composition of US total imports*

Country shares	1978	1999	Percentage point change in US imports: 1978-1991
Western Europe	25.8	20.7	-5.1
Japan	17.3	13.0	-4.3
Canada	23.8	20.0	-3.8
Mexico	4.3	11.0	+6.7
Four Tigers	9.6	9.4	-0.2
South Korea	2.6	3.1	+0.5
Hong Kong	2.5	1.0	-1.5
Taiwan	3.7	3.5	-0.2
Singapore	0.8	1.8	+1.0
China	0.0	8.1	+8.1
Rest of World	19.0	17.7	-1.3

Source: Palley (2003, table 8.3, p. 181).

In order to test the crowding out hypothesis, supposedly avoiding the adding up problem, Palley performs a regression analysis that he claims confirms this phenomenon. Nevertheless, it may be easily seen that the results actually contain no more insights than his table. Thus, as the table does not necessarily imply the crowding out of the imports of one country by another, neither do the regression results. This is not to say there is no crowding out, but just that these data cannot tell us.

Palley estimates the following regression for a particular country:

$$m_{jt} = a_0 + a_1 m_{USt} + a_2 (\theta_{it-1} m_{it}) + \varepsilon_t + \varepsilon_t \tag{12}$$

where m_{jt} is the growth of US merchandise imports from country j (or alternatively, country j's exports to the US), m_{USt} is the growth of total US merchandise imports (excluding imports from the OPEC countries) and $\theta_{it-1} m_{it}$ is the growth of imports from country i to the US, weighted by its lagged share in US imports. ε_t is the error term.

The regressions are generally run bilaterally, e.g. j is Canada and i is, say, Western Europe, or Japan, or Mexico, etc., as in equation (12). In some regressions, however, additional countries are included as regressors.

It is found that a_1 is positive and generally statistically significant. This means that, *ceteris paribus*, an increase in the US total imports leads to an increase in those of the country j under consideration. If the value of the coefficient of a_2 is negative and statistically significant, then Palley infers that country i's exports to the US are displacing country j's.

However, because of an underlying identity, it is not clear that this is necessarily the case. To see why, for expositional ease, we assume that total imports into the US are from two individual countries (namely, country 1 and 2) together with the "remaining countries" (denoted by the subscript 3). The following equation for the shares of the countries in US imports is given definitionally as:

$$\frac{M_1}{M_{US}} + \frac{M_2}{M_{US}} + \frac{M_3}{M_{US}} \equiv 1 \tag{13}$$

These shares are the data given by table 1, although there are, of course, more countries.

Equation (13) may be expressed in terms of growth rate as:

$$\theta_1 m_1 + \theta_2 m_2 + \theta_3 m_3 \equiv m_{US} \qquad (14)$$

where m is again the growth of imports and θ_i is the share of country i's imports in the US total.

It follows that:

$$m_1 \equiv \frac{m_{US}}{\theta_1} - \frac{\theta_2 m_2}{\theta_1} - \frac{\theta_3 m_3}{\theta_1} \qquad (15)$$

Let us assume that the share of the imports of the "remaining countries" (which, it will be recalled is designated by the subscript 3) remain roughly constant over time, so $m_3 \approx m_{US}$. This is likely to be the case to the extent that the imports of the "remaining countries" are a large share of the US's total imports.

We therefore have:

$$m_1 \equiv \frac{(1-\theta_3)}{\theta_1} m_{US} - \frac{\theta_2}{\theta_1} m_2 \qquad (16)$$

or

$$m_1 \equiv a_0 + a_1 m_{US} + a_2 [\theta_2 m_2] \qquad (17)$$

where $a_1 = (1-\theta_3)/\theta_1$ and $a_2 = -1/\theta_1$.

This is virtually identical to equation (12) which is estimated using annual data and where θ_i is the average value of the import share over the time period. The difference is that equation (17) uses θ_2 (the average share over the period) whereas equation (12) uses θ_{2t-1}, but this does not significantly affect the argument.

If $m_3 \approx m_{us}$ and the share of imports supplied by country 1 has fallen, then, by definition, the share of country 2 must have increased

by the same amount, and *vice versa*. Consequently, purely by virtue of equation (17), we are bound to find that the estimate of a_2 is negative.

For example, from table 1, Japan's share fell over the period 1978-1999 by 4.3 percentage points, while Mexico's share increased by 6.7 percentage points, so the growth of Japan's exports to the US were less than those of Mexico. When Japan is the dependent variable j, and Mexico is the regressor i, in equation (12), Palley finds the coefficient a_2 is negative and statistically significant, even when other countries are included as regressors (see Palley, 2003, table 8.4, equations (3.1a) and (3.1b)).[17] He argues from this result that "Mexican imports into the U.S. are displacing Japanese imports" (p. 188).

However, this is hardly surprising and it may be confirmed that this result is driven by the identity. From table 1, the average shares of Japan and Mexico over the estimating period are approximately 0.15 and 0.07 and so from equation (17), we would expect the coefficient on m_{US} to be approximately equal to 1.50. This turns out to be not very far from the value of the estimated coefficient. (As $(1-\theta_3)=\theta_1+\theta_2$, the estimate of a_1 which equals $(\theta_1+\theta_2)/\theta_1$ should always exceed unity which turns out statistically to be the case in nearly all of the different country regression results.) The estimate of a_2 should, from the identity, be around -6.7 which again, given the degree of approximation involved, is not too different from the estimate of around -9.

It should be noted that even though the imports from Japan to the US were growing more slowly than those of Mexico, if Japan is chosen as the independent variable, its coefficient a_2 would also be negative and statistically significant. This could ironically be interpreted as implying that Japan's exports were crowding out those of Mexico. But again, clearly, all that is being picked up are the coefficients of the identity. Consequently, the sign of the coefficient a_2 in equation (17)

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[17] In later regressions Palley introduces a time dummy and uses the growth of a country's unweighted imports as a regressor but it makes little difference to the argument advanced above.

cannot be taken as necessarily implying that country i is crowding out the imports from country j.[18]

The estimated relationship will not be exact because the import shares change over time. Moreover, the coefficients of equation (17) will be biased to the extent that $m_3 \neq m_{US}$ and, indeed, the coefficient a_2 may be statistically insignificant. (This may also be true of other countries that are included as regressors, unless *all* the remaining countries are included, when the complete identity will be estimated.) This may give the impression that a behavioural relationship is being estimated. But the principle still holds; all that it is being estimated is a mispecified identity that does not contain any inferences beyond those already given by table 1 above. Indeed, in these circumstances, it may seem appropriate to include more countries as regressors but, at the limit, if all remaining countries are included, then the estimates of the values of their coefficients will be equal to the negative value of their import share divided by that of the country chosen as the independent variable.

It is important to re-emphasise that this argument does not imply there is no crowding out. It is just that the regressions based on equation (12) cannot shed any light on the matter and, hence, the results should be treated with caution as their interpretation is ambiguous.

Blecker and Razmi (2010) also tested the crowding out hypothesis and estimated, *inter alia*, the following equation for both total and individual manufacturing exports using panel-data techniques for the developing countries:

$$\ln X_{jt} = b_o + b_1 \ln M_{INDt} + b_2 \ln RPX_{jt} + b_3 \ln X_{DC-jt} + \psi_t \qquad (18)$$

where X_j is the volume of exports for a particular industry of developing country j, M_{IND} is the total volume of imports of the industrialized

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[18] To see this, consider the case of country 1 whose share of imports to the US has declined and the rest of the importing countries (denote by the subscript 2) whose share has risen commensurately. The growth of country 1's imports is, consequently, less than those of the rest of the countries. However, it follows that both the equations $m_1 = (1/\theta_1)m_{US} - (\theta_2/\theta_1)m_2$ and $m_2 = (1/\theta_2)m_{US} - (\theta_1/\theta_2)m_1$ hold.

countries, RPX_j is the ratio of price of the domestically produced manufactured goods in the industrialized countries to the export price of country j, and X_{DC-j} is the volume of exports of the remaining developing countries. ψ is the error term.

The exports of country j are therefore expected to be a positive function of the total imports of the advanced countries and a positive function of the relative price term. If the crowding out hypothesis holds, then it is argued that $b_3 < 0$. In other words, an increase in the growth of exports of the remaining developing countries, holding other factors constant, will reduce the growth of country j's exports. Using panel-data estimation techniques data for nine different industries (and also for total industry), this hypothesis is generally not rejected. In particular, the sign of b_3 is negative and statistically significant in nine of the ten cases (Blecker and Razmi, 2010, p. 386, table 19.2).

Equation (18) is not an exact identity because M_{IND} is the *total* imports of the industry by the industrialized countries. As such, it includes the exports of the industrialized countries to each other and excludes the exports of the developing countries to each other. Moreover, equation (18) also includes a relative price term. However, the following identity holds

$$ln X_j \equiv \frac{1}{\varphi_j} ln X_{TOT} - \frac{(1-\varphi_j)}{\varphi_j} ln X_{DC-j} \tag{19}$$

where φ is the share of country j's exports in the total exports, X_{TOT}, of the developing countries. If there is a close relationship between the total exports of the developing countries X_{TOT} and the total imports of the industrialised countries M_{IND}, as is plausible, it can be seen from equation (19) that even though a relative price term is included in the equation (18), the negative value of the coefficient of lnX_{DC-j} is likely to be driven by equation (19). Hence, the results cannot be unambiguously interpreted as evidence of crowding out.

8. Conclusions

This paper has considered various criticisms that have been levelled at the balance-of-payments constrained growth model in the distant and more recent past. It has been shown that the model is not just an identity. The early criticisms of McCombie (1981), McGregor and Swales (1985; 1986; 1991), Crafts (1988; 1991) and (implicitly) Krugman (1989) do not stand up to scrutiny. The argument of Palley (2002) that the balance-of-payments constrained growth model is inconsistent has been shown itself to be inconsistent. While the fallacy of composition argument with respect to export-led growth may have some truth, it simply shows the importance for a country to develop exports in those industries where the world income elasticities of demand are, or are likely to become, high. Statistical tests that have been undertaken by Palley (2003) and Blecker and Razmi (2010) that supposedly demonstrate that the fallacy of composition undermines the strategy of export-led growth, because of an underlying identity, have been shown to be problematical.

Thus, to summarise: the overall conclusion of the paper is that the main insights of the balance-of-payments constrained growth model have not been invalidated. Growth for many countries is determined by their economic performance in overseas markets and is constrained by their balance-of-payments.

Thirlwall's Law has been extended, elaborated and tested and re-tested using data sets from both the advanced and the less developed countries and has stood the test of time. It remains a powerful and plausible alternative to the neoclassical theory where changes in relative prices serve to equilibrate the balance of payments and where growth theory is couched in real terms, with no financial variables. Even casual empiricism, such as the sub-prime crisis of 2007, shows how the collapse of growth in one country, through trade interlinkages, can cause a slowdown in the growth of others. As Davidson (2006) succinctly put it: "Thirlwall's Law analysis demonstrates that international financial payments can have severe real consequences, i.e. money is never neutral in an open economy" (p. 80). After over thirty years since its

development, Thirlwall's Law is still proving a powerful explanation of why growth rates differ.

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