Economic Growth in Open Economies: Balance of Payments Constrained Growth - and Beyond?

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Abstract

This paper examines the model of balance of payments constrained growth (or 'Thirlwall's law') as a key post-Keynesian model of demand-determined growth, which builds upon earlier post-Keynesian work on the determinants of growth. The paper argues that in many ways the model provides a compelling account of stylised facts about growth that are not adequately explained in mainstream models. Nevertheless, there are a number of areas in which the model may need refinement and extension for successful application. In particular here, the paper examines issues in terms of the model's conceptualisation of adjustment and possible extensions in terms of its underlying conception of growth and structural cahnge

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The model of balance of payments constrained growth has now been examined over decades; there have been many empirical attempts to test it – space precludes a summary of the results here - and it has been subject of a number of surveys and anthologies (e.g. McCombie and Thirlwall, 1994; 2004; Soukiazis and Cerqueira, 2012). A recent UK government document appears to accept it as stylized fact (BIS, 2010). It remains a very long way from being widely accepted as a valid growth model within mainstream economics,[1] but nevertheless it is perhaps the most widely discussed post-Keynesian growth model. It has a number of attractive features for post-Keynesian researchers: it is a parsimonious model that puts demand-side factors at the centre of explanations of growth, it examines growth processes explicitly in an open economy context and it can readily be tested for individual countries or country groups.

This paper will largely avoid surveying and assessing the very large number of empirical studies that attempt to test this model; for the most part it will just assume that growth rates are sufficiently similar to those predicted by the model that it can be considered as a stylised fact in need of an explanation. Instead the focus here is on how far the existing theory of balance of payments growth provides a coherent explanation for this and areas where it may need refining or extending. Section one sets out the core model in the context of an alternative vision of the growth process from the mainstream. Section two examines further the interpretation of coefficients generated by tests of this model. Section three examines whether the model has an adequate conception of how equilibrium is achieved in these models. Section four follows on from those considerations to examine how far the underlying growth models here are adequate conceptually and empirically. Section five concludes and has a brief examination of the policy implications of this model.

1. Balance of Payments Constrained Growth: An Alternative to the Mainstream Vision

The model of balance of payments constrained growth underlies some versions of the post-Keynesian approach to growth, notably as set out recently in Thirlwall (2013) who originated the original model (hence it is often dubbed 'Thirlwall's Law'). It places demand at the centre of explanations of growth, productivity, factor accumulation and – possibly – structural change (more on this below). One can argue over definitions of post-Keynesian economics, but the assumption that demand matters for economic activity beyond the short-run is surely central.

The contrast with mainstream growth models is stark. The following assumptions are generic to models in the Solow tradition and more recent ones, loosely labelled 'endogenous'; indeed, they are so generic that they are often implicit or set out without much apparent need to justify them:

1. Growth is determined solely by supply-side factors (essentially factor accumulation and technological change – these are either determined in accordance with standard microfoundations or left unexplained)
2. Each country's growth rate is essentially determined by domestic conditions and is independent of the growth of other countries.
3. Patterns of trade specialisation have no implications for a country's growth rate
4. Balance of payments conditions do not affect long run growth

It is possible to find broadly mainstream models where (2) or (3) are relaxed; I would argue that assumption (1) is hard core for mainstream models and the standard models used in the mainstream growth literature maintain all of these. In applications, though, these assumptions may be effectively dropped – even (1).

Arguing that mainstream growth models abstract from trade may appear a little surprising given the emphasis in much of the literature on openness to trade. Yet, although this is common the mechanisms through which trade is expected to affect output in this approach remain unclear (Perraton, 2011) and for the most part patterns of trade specialisation are not assumed to have any implications for growth rates.

Thirlwall's original balance of payments constrained growth hypothesis, as an extension of the Harrod super trade multipier, is now well-known (e.g. McCombie and Thirlwall, 1994, ch. 3). Current account equilibrium will be maintained over time if the domestic currency values of imports and exports grow at the same rate. Demand for a country's exports and imports are assumed to be stable functions of relative prices and income levels. Assuming that relative prices between countries do not vary, then the current account equilibrium growth rate for each country will be determined by the ratio of the world's income elasticity of demand for its exports to the country's income elasticity of demand for imports. Multiplying this ratio by the world growth rate (or, in some applications, the growth of world trade) gives the growth rate for each country that would maintain current account equilibrium in the absence of relative price changes. Empirical evidence suggests that changes in relative prices between industrial countries are typically small in the long run; further, the assumption of no change in relative prices can be justified in terms of assuming that oligopolistic competition in world markets is based primarily on non-price factors and/or that domestic price adjustment operates so that changes in the nominal exchange rate do not lead to persistent changes in the real effective exchange rate. (Note, too, that relative prices would have to fall continuously to raise the balance of payments equilibrium growth rate, assuming the Marshall-Lerner condition was satisfied). The income elasticities are assumed to capture the influence of non-price factors on demand.

Amongst industrial countries at least, differences in growth rates are typically strongly associated with differences in growth rates of productivity, variously measured. McCombie

and Thirlwall (1994, ch. 2) argue that an external demand constraint on growth is consistent with this observation if productivity is determined in accordance with 'Verdoorn's Law'. Herein lies the key link alternative conceptions of the growth process – productivity and the accumulation of capital are centrally determined in this account by demand-side factors.

Balance of payments constrained growth is typically estimated along the following lines. Firstly it is assumed that the export and import demand functions take the following forms:

$$X_{it} = AW_t^{\alpha_i}\left(\frac{E_{it}P_{it}}{P_t^*}\right)^{\beta_i} e^{u_{it}} \qquad (1)$$

$$M_{it} = BY_{it}^{\gamma_i}\left(\frac{E_{it}P_{it}}{P_t^*}\right)^{\delta_i} e^{\varepsilon_{it}} \qquad (2)$$

X_{it} and M_{it} are the volumes of exports and imports for country *i* at date *t*. Y_{it}, E_{it}, and P_{it} are real GDP, the nominal effective exchange rate and the price of domestic goods for country *i* at date *t*. W_t is a constant price measure of the total exports of industrial countries and P^*_t is a price index for the exports of industrial countries. *A* and *B* are intercept terms. u_{it} and ε_{it} are random error terms.

The next stage of the analysis is to use the parameters of equations (1) and (2) to construct predictions of the growth rate across countries and then compare them with the actual growth rates. We can distinguish two forms of the hypothesis. In the *strong form* of the hypothesis we use the world income or trade elasticity of demand for exports in conjunction with the growth rate of world income or trade to predict exports. Equation (3) gives the formula for the predicted growth rate using the strong form of the hypothesis where g_{y_i} is the growth rate of real output for the *i*'th country and g_w is the growth rate of world trade (or world income in some studies).

$$g_{y_i} = \left(\frac{\alpha_i}{\beta_i}\right) g_w \qquad (3)$$

In the *weak form* of the hypothesis we take the actual growth rate of exports for the *i*'th country - g_{x_i} - rather than the product of its export elasticity and the growth rate of world trade and write the equilibrium condition as:

$$g_{y_i} = \frac{g_{x_i}}{\beta_i} \tag{4}$$

Studies then typically proceed by estimating how well estimates can track the growth of an individual country or alternatively for groups of countries with predicted growth rates estimated relative to actual ones. Krugman (1989), whilst propounding an alternative explanation, dubbed the striking correlation between actual growth rates of industrialised countries and those predicted by the strong form of this hypothesis as the '45-degree line'; supportive results have also been found for developing countries (e.g. Perraton, 2003). Other studies indicate that for industrialised countries at least elasticities are stable over extended periods and, although the Marshall-Lerner condition is satisfied, price elasticities are still fairly low (e.g. Hooper *et al*., 2000). Although the large range of studies has produced mixed results, for the most part here I am simply going to assume that the model enjoys empirical support, that the '45-degree line' constitutes a stylised fact in need of explanation.

That countries cannot engineer faster growth rates though relative price movements is justified in various ways in this literature. In some interpretations this model is taken to assume the law of one price holds. This would be problematic both conceptually and empirically. Conceptually this is synonymous with perfect competition in global markets; effectively countries would be price takers able to sell any amount of a good at the world price - the textbook small country assumption - and could not therefore be meaningfully described as demand-constrained. Empirically the evidence for the law of one price is weak, although relative PPP appears to hold approximately over the medium term for industrialised countries.[2] For developed economies, effectively the underlying assumption is that oligopolistic market structures mean that price competition cannot effectively be used to raise sales. Frank Hahn expressed this idea some time ago, as a critique of the monetarist approach to the balance of payments and its use of the PPP assumption:

> while there may be a world price for family cars, this does mean that British Leyland can sell to the Germans whatever they like at that price. It only means that they cannot charge more without losing most of their customers or charge less without strong retaliation. (Hahn, 1977: 245)

With developing economies, price competition might be expected to play a greater role; many mainstream development economists have routinely criticised 'elasticity pessimism', the assumption that price elasticities of demand for developing country exports (and

possibly income elasticities too) are low. There are a number of econometric reasons why estimates of price elasticities here may be biased downwards (in absolute terms), but even here tests indicate the developing country exports are significantly affected by demand conditions and the small country assumption cannot be assumed to hold for developing countries (e.g. Faini *et al*., 1992; Muscatelli *et al*., 1994a; 1994b; 1995).

However, although prolonged exchange rate misalignment does not appear to occur for developed countries in the contemporary period there is evidence of this for developing economies. The possible implications of this are explored further below.

2. What Do the Income Elasticities Mean?

Although there are a number of technical issues in the estimation of price elasticities, clearly a great deal rests on the estimates and interpretation of the income elasticities of demand. This, as with much else with the model, grows out of Kaldor's work and here particularly his work on the paradox that in the post-war period industrialised countries' export growth rates were either unrelated to changes in relative unit labour costs or actually saw countries with rising costs gaining market share and vice versa.

This has widely been taken as indicating the central importance of non-price factors in determining the growth of trade. The apparent stability of income elasticities amongst industrialised countries can be taken as evidence that there are deep factors which tend to endure and affect non-price competitiveness, even with structural change in these economies and shifts in their patterns of specialisation. The differences in income elasticities here are unlikely to be simply down to differences in patterns of specialisation given similarities in these countries' patterns of trade specialisation and the post-war growth in intra-industry trade.

Yet in another sense this is clearly unsatisfactory. If the elasticities are the key parameters that determine growth, then a relevant theory needs to provide some explanation for their determinants and account for their persistence. Proudman and Reddding (2000) do find evidence for persistence in trade patterns amongst the major industrialised economies, but again there is no clear explanation for this.

Krugman (1989) does provide a supply side explanation based on a growth model with monopolistic competition and increasing returns, with the number of product varieties produced being proportional to a country's effective labour force. If the effective labour force of one country grows faster than another then it will be able to expand its share of the global market without lowering prices; naïve estimation of econometrics would then indicate that more rapidly growing economies had higher income elasticities of demand for

exports. Yet, as Krugman himself concedes, there is no particular reason to accept this account as a reasonable growth model.

The position with developing countries raises some further issues. Garcimartin *et al*. (2012) note that estimates for elasticities amongst developing countries from studies such as Perraton (2003) and Senhadji (1998) and Senhadji and Montenegro (1999) indicate many countries have relatively strong growth potential consistent with potential for convergence in income per head over time towards the richest. Garcimartin *et al*. (2012) appear to regard this as a strength of the model. Nevertheless, other evidence points to a fall in gains from trade by developing countries since c.1980 and that trade has been less conducive to convergence than earlier in the post-war period (Dowrick and Golley, 2004). As studies of balance of payments constrained growth tend to be based on estimates from across periods where there is evidence of a structural break this may need to be investigated further.

Some scepticism may be warranted here. Even as developing countries have diversified away from primary exports, their manufacturing exports have tended to be concentrated in industries that have been in decline in industrialised countries. It is thus *prima facie* a little surprising that these countries apparently have income elasticities of demand for their exports that compare favourably with those estimated for industrialised countries.

Other evidence is consistent with stability in most developing countries trade patterns. Although the Asian NIEs have seen significant shifts in their export patterns over time, this appears to be the exception rather than the rule amongst developing countries (Chow and Kellman, 1993; Lafay, 1992; Noland, 1997). For other developing countries, patterns of exports appear to be much more stable over time, indicating the lock-in of comparative advantage implied in Thirlwall's hypothesis.

For the most successful developing country exporters, the apparent estimates of income elasticities of demand for exports may partially at least be artefacts, as suggested by Muscatelli *et al*. (1994a; 1994b; 1995). This, however, raises problems for interpretations of the model as implying convergence. If those countries with relatively high estimates of income elasticity of demand for exports actually reflects, in part at least, significant up-grading in trade then it cannot simply be assumed that these provide a reliable guide to medium run growth prospects.

Working with more disaggregated data can produce more reliable estimates of elasticities of individual developing countries, and help to track shifts in them from structural change and changes within the global economy (see e.g. Blecker and Ibarra, 2013 for a recent attempt to do this for Mexico). Explaining the deeper causes of these parameters remains underexplored in this literature.

3. Aggregate Demand, Equilibrium and Balance of Payments Constrained Growth

Consider the standard national income accounting identity for an open economy with no government section:

$$Y = C + I + X - M \tag{5}$$

where Y is aggregate output, C is consumption, I is investment, X is exports and M is imports. This becomes an equilibrium condition when we replace the *ex post* quantities in (5) with *ex ante* functional relationships. For example, suppose we assume a standard consumption function, an accelerator theory of investment, an exogenous level of exports determined by world trade and a level of imports determined by aggregate output. Substituting these functions into (5) and rearranging gives us:

$$sY - v\,\mathrm{d}Y/\mathrm{d}t = X_0 W^{\beta 1} - M_0 Y^{\beta 2} \tag{6}$$

where s is the marginal propensity to save, v is the accelerator coefficient, W is the level of world trade, b_1 and b_2 are the world trade elasticity of exports and the demand elasticity of imports respectively and X_0 and M_0 are constant terms.

We can interpret Thirlwall's law as requiring that the right hand side of (6) should be equal to zero, at least in the long run. Imposing this condition and differentiating with respect to time yields the familiar Thirlwall's law result (7) that the rate of growth of output must equal the product of the rate of growth of world trade and the ratio of the export elasticity to the income elasticity:

$$\frac{1}{Y}\frac{dY}{dt} = \left(\frac{\beta_1}{\beta_2}\right)\frac{1}{W}\frac{dW}{dt} \tag{7}$$

For this condition to hold, and the aggregate demand side of the economy to be in equilibrium, we require the left hand side of (6) to also equal zero. Imposing this condition and rearranging yields another familiar condition (7) which states that the rate of growth of output equals the ratio of the marginal propensity to save to the accelerator coefficient. This is the condition for the Harrod warranted growth path for a closed economy.

$$\frac{1}{Y}\frac{dY}{dt} = \frac{s}{v} \qquad (8)$$

The problem for the economic modeller is that there is no necessary reason why the equilibrium conditions expressed in (6) and (7) should be consistent with each other. Indeed it is highly unlikely for arbitrary values of the parameters that they will be. We therefore need to specify some mechanism by which we can ensure compatibility.

McCombie and Thirlwall (1994, chapter 6) effectively solve this problem by introducing a government sector and then making macroeconomic policy endogenous. If the rate of growth of world trade rises they posit that a Hicks super-multiplier process operates: not only does the increase in the growth rate of exports raise growth directly through the multiplier process but this also permits a higher other autonomous expenditures so that investment and government expenditure would rise until the income growth rate rose to the new equilibrium rate consistent with Thirlwall's law. Although they predict that investment would rise under these circumstances, they do not specify an investment function. If other autonomous expenditures were to rise further (or the growth rate of world trade were to fall) then the income growth rate would exceed that consistent with Thirlwall's law and a current account deficit would emerge. In McCombie and Thirlwall's account macroeconomic policy then becomes endogenous so that other autonomous expenditures fall in response to the balance of payments disequilibrium and this ensures that both Thirlwall's law and the aggregate demand equilibrium condition are satisfied. McCombie and Thirlwall do not specify this reaction function, but Pugno (1998) shows that a macroeconomic policy reaction function to balance of payments disequilibria would stabilise the system. In the simplest case tighter fiscal policy would operate to reduce other autonomous expenditure directly until the economy returned to the equilibrium growth rate determined by Thirlwall's law. However, adjustment could operate through either fiscal or monetary policy (or a combination of the two). This would presumably largely depend on the country's exchange rate regime. Clearly the mechanics of the adjustment process would differ according to whether fiscal or monetary policy was used. Monetary policy would impact directly on consumption and investment, but even fiscal policy would also be expected to have second order effects on consumption and investment to the extent that

any change in the fiscal stance affected domestic interest rates;[3] Further, the lower growth rate would be expected to impact on investment through the accelerator mechanism. Without specified consumption and investment functions the full adjustment process cannot be shown. Further, either fiscal or monetary policy is likely to change the effective exchange rate, at least in the short run, whereas Thirlwall's law assumes that relative prices do not change between countries. This discussion brings out two separate points that are central to our paper. Firstly, the existing literature on Thirlwall's law provides only limited accounts of the process of adjustment to balance of payments disequilibrium. Secondly, under Thirlwall's law only an increase in the export growth rate can permanently raise the economy's growth rate; increases in other autonomous expenditures cannot raise the long run growth rate because of the balance of payments constraint.[4]

Empirically it is worth noting that, although this sounds plausible even during the Bretton Woods period, when one might have expected balance of payments conditions to impact strongly on macroeconomic policy, for most developed economies, apart from Britain and France, changes in the balance of payments do not appear to have had a significant impact on the macroeconomic policy stance (Michaely, 1971)

Another possibility, which McCombie and Thirlwall (1994, p. 407) note in passing, is to incorporate some form of asset dynamics which makes the savings ratio respond to persistent payments imbalances. For example, suppose we make the marginal propensity to save a negative function of the accumulated balance of payment surplus. This is likely to be the case since the accumulation of foreign assets adds to private sector wealth. Under these circumstances, asset flows associated with balance of payments disequilibrium will ensure that both Thirlwall's law and the aggregate demand equilibrium condition are satisfied in the long run. Consider a situation in which in the short run a country is on a warranted growth path which produces a balance of payments deficit - net foreign assets fall and the savings ratio rises. This process continues until the savings ratio has adjusted to a level which ensures that both (7) and (8) hold simultaneously.

An alternative possibility, particularly for developing countries, may be to conceive balance of payments constrained growth as just that – a constraint. Whilst it may provide an upper limit on potential growth, actual growth may be below this period for significant periods of time if other factors limit it; under such conditions, the predicted growth rate consistent with the balance of payments constraint would not necessarily provide a guide to actual growth rates. Balance of payments constrained growth under such conditions would then be closer in spirit to the recent notion of 'growth diagnostics' (Hausmann *et al*., 2008) – different countries face different constraints at different times, careful individual country analysis may be able to determine when and where the balance of payments constraint is binding.

Some recent contributions have postulated adjustment to equilibrium through supply side mechanisms. Thus, Palley (2002) considers essentially the same problem at issue here and explores possible mechanisms for reconciliation, but without providing clear evidence for these. Setterfield (2013) sketches some possibilities using a Leontief style supply side model where growth may be constrained by the supply of capital or of labour. Models in the Kaldorian tradition typically assume that both variables are endogenous to the growth process over the medium term. In effect, either the problems raised here are dismissed as non-problems that would be resolved through a Verdoorn's Law process or they are acknowledged but without a clear model being provided to resolve them. The next section turns to considering growth processes in these models in the context of available evidence.

4. Growth and Structural Change in a Balance of Payments Model

As already noted, the literature on balance of payments constrained growth flows from Kaldor's work and has often invoked Verdoorn's law as underpinning the growth model here (notably McCombie and Thirlwall, 1994, ch. 2). There are various versions and specifications of the law proposed in the literature, notably:

$$p = a_1 + b_1 q + b_2 k \qquad (9)$$

where p is the growth of productivity, q is growth of output and k is growth of capital services. The specification is designed to capture the effects of dynamic economies of scale, Kaldor's conception that that growth of output is associated with productivity growth as it is associated with greater investment and technological advance (the two being inseparable in Kaldor's view, in clear contrast to the Solow growth model and its descendants) and with a greater rate of structural change as labour shifts from low to high productivity activities. It is the rate of output growth that is central to this, output growth is determined by demand and external demand is central as the key exogenous determinant of demand; indeed, it has already be noted that only external demand growth in this model can lead to long run growth.

There are several issues here in this causal chain. In the first place there is the issue of whether these claims are supported empirically. A number of econometric issues have bedevilled attempts to test Verdoorn's law, although some support has been found for it in a range of studies of developed economies in the post-war period (cf. McCombie and Thirlwall, 1994, ch. 2; McCombie *et al*., 2002: Setterfield, 2002).

With developing economies, the issue could partially be circumvented by having productivity growth dependent on imports of capital goods, intermediates and so on. This does find empirical support, but is an over-simplification. There have been far fewer attempts to test Verdoorn's law for developing economies, but Mamgain (1999) found it was not supported even for emerging economies with relatively rapid growth in

manufacturing. This is likely to be linked to an apparent decline in the gains from trade and manufacturing growth, particularly growth from manufactured exports. This is an important development, partly noted earlier, but not one that we can do justice to here.[5]

The essence of growth in this vision is thus productivity growth and associated structural change. As already noted, though, there is no clear link between this vision of development as a process of change and the assumption of stable income elasticities of demand. There are a number of recent possible ways in which this may be explored. Models in the tradition of Pasinetti's multi-sector dynamic work offer potential for exploring this – differences in sectoral income elasticities are central to explaining the growth process and structural change within Pasinetti's approach. Araujo and Lima (2007) set out a version of this framework and show how it can generate balance of payments constrained growth results; again the implications of this for applied work is that greater attention may need to be paid to disaggregating the elasticities in sectoral terms and determining their evolution over time (rather than effectively assuming stability). Further, countries may be able to raise their growth rates through structural change – even with unchanged non-price competitiveness in particular products, it may be possible to raise its growth rate if it manages to shift production towards industries with relatively high income elasticities of demand.

In an important paper, Razmi (2011) carefully explores several possible development paths once non-tradable goods production is explicitly taken into account. This may be important for a number of reasons, but a key issue here is the potential role of the real exchange rate. In much of the literature on balance of payments constrained growth this has been ignored on the basis that countries are assumed to be unable to expand demand systematically for their exports through exchange rate movements. However, this misses possible effects through the real exchange rate affecting incentives within the economy for tradables goods production. Rodrik (2008), in particular, highlights that periods of undervaluation can have significant positive effects on growth – this is likely to stimulate production in sectors that have relatively strong potential for productivity growth. Such effects may be particularly important for developing countries, with a number of countries over the past 10-20 years widely believed to have expanded their exports through maintaining systematically undervalued exchange rates. Although it less likely to be relevant to developed countries over recent decades, evidence from the Bretton Woods period is consistent with European economies effectively having undervalued real exchange rates which contributed to the development of their manufacturing sectors as an engine of growth (Boltho, 1996). Thus, the forms of structural change already highlighted here as being important in promoting sectors with high income elasticities of demand and strong potential for productivity growth may be effected by episodes of significant real exchange rate undervaluation.

5. Conclusions

The basic balance of payments constrained growth model has been a workhorse model in post-Keynesian work that captures key elements of the post-Keynesian approach and provides a parsimonious demand-side explanation for stylised facts about growth processes in developed and developing countries. As already noted, although Krugman (1989) and other broadly mainstream economists have summarily dismissed the demand-side explanation for growth rate differences being proportional to differences in income elasticities of demand, no convincing alternative supply-side model has been produced in the literature.

Nevertheless, this assignment has highlighted that there are a number of issues with the model framework and that continued testing of its basic form is unlikely to be the most useful means of advancing applications of it.

At least in some interpretations, the model fails to provide an adequate account of adjustment to equilibrium – much of this turns on how far Verdoorn's law can be taken as an adequate underpinning for the explanation of medium-long run growth. Empirically it is probably fair to say that the jury remains out on this 'law'. Sectoral disaggregation may help to illuminate the growth process in the spirit of this model, the inter-related processes of structural change within an economy and the determinants of (possibly evolving) income elasticities. This may help to link the work here with Pasinetti's work in particular within the post-Keynesian approach.

A brief word on the possible policy implications of this analysis. Much of the work comes close to implying that countries' growth is effectively determined externally. This is not necessarily a drawback – some studies do indicate that there is scant evidence that any national policy had a significant effect on growth amongst developed countries in the post-war period, although multilateral trade growth did (Landon-Lane and Robertson, 2002). Some of the policies to effect structural change in developing economies noted above are likely to suffer from fallacy of composition problems. By definition not all countries can have undervalued exchange rates. Recent literature on industrial policy (e.g. Hausmann *et al*., 2007) provides a useful examination of successful application of such policies historically, noting that successful countries have managed to move into export lines that are relatively sophisticated and high value for their income per capita level. This is an interesting contrast to much of standard trade theory; nevertheless, the policy implications here come close to suggesting countries should each strive to be above average! The implications of balance of payments constrained growth may not be reassuring – this does not necessarily mean that they are wrong.

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[1] For example, there is no reference to it in recent editions of leading international economics textbooks by Caves, Frankel and Jones; Feenstra and Taylor; Krugman, Obstfeld and Melitz; or van Marrewijk. Krugman himself had noted that developed countries' growth rates appear to be consistent with this hypothesis, although he proposes a supply-side explanation for it (Krugman, 1989).

[2] Econometric tests of this are often inconclusive, but this may reflect the lower power of tests with limited data series available.

[3] More specifically, unless the country was operating a fixed exchange rate under perfect capital mobility, any change in the fiscal stance would be expected to affect domestic interest rates.

[4] Pugno (1998) considers the assumption that relative prices do not vary between countries under Thirlwall's law. He shows that although in the long run an elastic supply of labour would stabilise the system, in the short run adjustment in the labour market would lead to changing relative prices between countries. We do not address this issue.

[5] To the extent that this may reflect outsourcing developments, so that a relatively low proportion of value added of exports is undertaken in a particular developing country, this may show up in estimates of income elasticity of demand for imports. Blecker and Ibarra (2013) consider this issue in the Mexican case.