

Long-Run Growth in Open Economies: Export-Led Cumulative Causation or a Balance-of-Payments Constraint?

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Abstract

The post-Keynesian tradition contains two different models of long-run growth in open economies: the model of export-led cumulative causation (ELCC) originally conceived by Nicholas Kaldor and the model of balance-of-payments-constrained growth (BPCG) developed by A.P. Thirlwall. These models diverge significantly in their core underlying assumptions. For example, they disagree about whether long-term gains in relative price competitiveness are possible and whether import demand constrains long-run growth. The two modeling approaches also yield conflicting policy implications. For example, some ELCC models imply that a domestic demand stimulus can boost long-run growth by sparking a virtuous circle of cumulative causation (including an endogenous increase in productivity growth), while most BPCG models imply that only policies that raise the income elasticity of export demand or lower the income elasticity of import demand can permit faster growth in the long run. The fact that both models have found econometric support suggests that each contains empirically supported elements, but the tests that have been conducted to date have not had sufficient power to distinguish between them. This paper will present both models in a common analytical framework to compare their theoretical differences and policy implications. The paper will argue that a generalized BPCG model that allows for financial flows and relative price effects can incorporate the cumulative causation feedbacks from the ELCC approach while also imposing the balance of payments equilibrium condition that is missing from the latter. The paper will also explore under what conditions different versions of the models apply.

1. Introduction

Post-Keynesian economists concerned with long-run growth in open economies have developed two related but fundamentally different theoretical approaches. On the one hand, models of export-led cumulative causation (ELCC) stress the possibility that some countries can achieve ever-widening “virtuous circles” of faster technological progress, improving competitiveness, rising exports, and rapid output growth (although, in this view, other countries may be doomed to suffer “vicious circles” of slower technological progress, worsening competitiveness, stagnant exports, and sluggish output growth). Providing that labor supply constraints can be overcome, only the growth of export markets limits long-run growth as exports are seen as the key limiting constraint on demand (Cornwall, 1977, p. 163). On the other hand, models of balance-of-payments-constrained growth (BPCG) emphasize the limitations placed upon a nation’s growth by the need to finance necessary imports either through export growth or net financial (“capital”) inflows.¹ In this latter view, virtuous circles may be impossible to realize because rapid output growth is likely to make imports rise too fast to be compatible with equilibrium in the balance of payments (Thirlwall and Dixon, 1979).

These two views do coincide in certain respects. Both maintain the Keynesian belief that aggregate demand constraints are paramount in determining a nation’s output, even in the long run, and see those constraints as lying primarily in the international domain rather than the domestic economy.² Both theories agree that increasing the growth rate of exports is key to

¹ The BPCG literature is now quite voluminous and includes numerous theoretical extensions and empirical tests. See McCombie and Thirlwall (1994) for a survey of the early literature and McCombie and Thirlwall (2004) for a collection of most of the main contributions up to that point.

² In this respect, both views are at odds with other post-Keynesian perspectives that put more emphasis on domestic investment demand as constraining profits and growth. See Robinson (1962) and later expositions by Marglin (1984) and Foley and Michl (1999).

raising a country's long-run growth rate of output. Beyond that, however, the two views disagree strongly on core theoretical assumptions and policy implications. In theory, the BPCG model puts primary emphasis on import demand and the balance of payments, while the ELCC model assumes that these are not limiting factors in the growth process. The ELCC model focuses on changes in relative cost competitiveness driven by endogenous technological progress as driving export success (or failure), while the BPCG model assumes that such changes either dissipate in the long run (due to relative purchasing power parity holding) or else have small effects on trade flows (so-called "elasticity pessimism").

In terms of policy, perhaps the most radical implication of the ELCC model is that a stimulus to domestic demand can spark a virtuous circle of export-led growth, because of the positive response of technology and productivity to faster domestic expansion. In contrast, the BPCG model implies that a stimulus to domestic demand is unlikely to bring sustained long-run benefits in an open economy because it is likely to raise import demand without boosting exports. The two models also have different implications for what kinds of policies can be effective for promoting exports in the long run. The ELCC view implies that cost reductions or currency depreciations could provoke self-sustaining increases in both exports and output, while the BPCG view implies that such policies are likely to be ineffective in the long run and that nothing can raise export growth except either faster growth of foreign economies or an increase in the income elasticity of export demand. Thus, qualitative competitiveness matters in both theoretical approaches, but cost competitiveness and real exchange rates matter only in the ELCC version.³

Strikingly, both of these apparently incompatible theoretical models can claim economic support. For example, León-Ledesma (2002) estimates an international panel data model

³ Some extensions of the BPCG approach allow for relative price or real exchange rate effects (e.g., Perraton, 2003; Blecker, 2002; Dutt, 2002), but I am referring here to the original version of Thirlwall (1979).

that supports most ELCC hypotheses, while Alonso and Garcimartín (1998-99) find econometric evidence consistent with key components of the BPCG framework. Although these and other studies suggest the usefulness of further research in these theoretical frameworks, the existing empirical tests have not been powerful enough to enable rejection of one of these two competing theoretical approaches or to identify the conditions under which each one applies.

This paper seeks first to identify the key theoretical differences between the ELCC and BPCG approaches to long-run growth in open economies. Canonical versions of each model will be presented and compared, and critiques and counter-critiques of each will be considered. In the end, it will be argued that the ELCC growth equilibrium as traditionally modeled is not, in fact, a sustainable long-run equilibrium in a well-specified model that incorporates a balance of payments constraint. However, we will also show that reaching this conclusion does not require all the strong assumptions typically made in the simplest versions of the BPCG approach, particularly the assumptions that rule out relative price (real exchange rate) effects in the long run. Using an extended BPCG model incorporating financial (capital) flows and assuming (following Moreno-Brid, 1998) that these must be a constant share of gross domestic product in the long run, and also allowing for the relative price effects that are assumed away in Thirlwall's (1979) original approach, we find that a broader solution of the BPCG model—one that allows for cumulative causation to have some impact on long-run growth—reconciles the core contributions of both approaches.

2. Literature Survey

The ELCC concept harks all the way back to Adam Smith's (1776, p. 27) famous dictum that

“the division of labour is limited by the extent of the market.” Smith envisaged a process of dynamic increasing returns in which a larger market for a nation’s output would lead to greater specialization, improved technology, and higher productivity. Smith fashioned this principle into the foundation for what he called one of “the two distinct benefits” of international trade:⁴

By means of [foreign trade], the narrowness of the home market does not hinder the division of labour in any particular branch of art or manufacture from being carried to the highest perfection. By opening a more extensive market for whatever part of the produce of their labour may exceed the home consumption, it encourages them to improve its productive powers, and to augment its annual produce to the utmost, and thereby to increase the real wealth and revenue of the society. (Smith, 1776, pp. 561-62)

Smith’s emphasis on dynamic feedbacks from exports to productivity growth was largely forgotten after Ricardo (1821) shifted the focus of international trade theory to static efficiency gains based on comparative advantage.⁵ However, the idea of dynamic feedbacks was revived by some of the early post-World War II development economists, especially Myrdal (1957) in his “principle of circular and cumulative causation.” Later, Kaldor borrowed this concept in his work on explaining differences in growth rates among the industrialized nations (Kaldor, 1966, 1970) and in arguing that the pervasiveness of increasing returns invalidates the general equilibrium approach to economics (Kaldor, 1972). More specifically, Kaldor came to believe that the analysis of economic growth should be founded on a series of empirical generalizations or “stylized facts,” which have come to be known as “Kaldor’s Growth Laws.” Four of these laws, as summarized by Thirlwall (1983, pp. 345-47, italics in original) are most relevant to the present analysis:

i) The faster the rate of growth of the manufacturing sector, the faster will be the

⁴ The other “distinct benefit,” the so-called “vent-for-surplus,” has proven more controversial. For an interpretation that reconciles the two benefits along with citations to previous interpretations, see Blecker (1997).

⁵ Mainstream trade theorists did not return to Smithian concepts of static and dynamic increasing returns until the work of Krugman (1990, 1991) and other “new” trade theorists in the late 20th century.

rate of growth of Gross Domestic Product (GDP)....

ii) The faster the rate of growth of manufacturing output, the faster will be the rate of growth of labor productivity in manufacturing owing to static and dynamic economies of scale, or increasing returns in the widest sense....

vi) The growth of manufacturing output is *not* constrained by labor supply but is fundamentally determined by demand from agriculture in the early stage of development and exports in the later stages....

vii) A fast rate of growth of exports and output will tend to set up a cumulative process, or virtuous circle of growth, though the link between output growth and productivity growth.

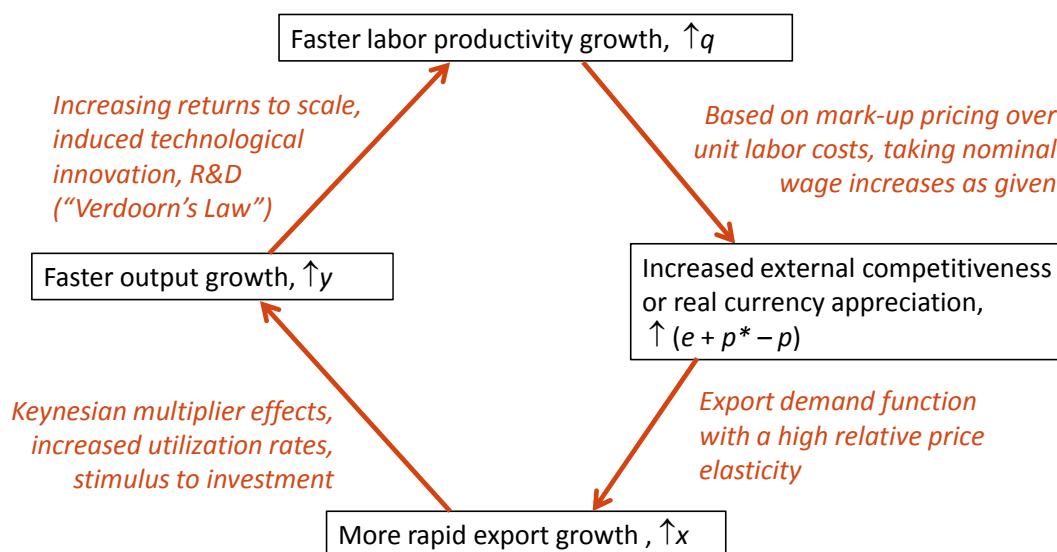
Of these propositions, number ii) is based on Verdoorn's (1949) empirical finding of a positive correlation between the growth rates of labor productivity and output in manufacturing across countries, and thus is often referred to as "Verdoorn's Law."

Several economists developed explicit models of export-led growth that sought to incorporate these ideas of cumulative causation. Early contributions included Beckerman (1962) and Lamfalussy (1963), but the most widely known and accepted version is due to Dixon and Thirlwall (1975) and was further developed by Cornwall (1977), Setterfield and Cornwall (2002), and Setterfield (2002), among many others.⁶ A canonical version of the export-led growth model with cumulative causation is presented in the next section, so we will not discuss the mathematical details here. However, Figure 1 shows the basic logic of a simplified version of the ELCC model, showing the "circular and cumulative causation" between export growth, output growth, productivity growth, and international competitiveness (measured by the rate of increase in the real exchange rate or relative price of foreign goods). The diagram is drawn to represent a "virtuous circle" of increases in all these factors; a "vicious circle" of decreases in all these factors could be represented simply by reversing the upward direction of the arrows shown next

⁶ A similar model is used by Roberts (2007) to demonstrate that the ELCC model implicitly contains "conditional convergence" properties similar to those found in the Solow (1956) neoclassical growth model.

to the variables. Unlike many of the earlier models in the literature (but more similar to Setterfield and Cornwall, 2002), the graphical representation in Figure 1 ignores the special role of the manufacturing sector and focuses only on aggregate output, productivity, and exports.

Figure 1:
The Basic Export-Led Growth Model



Note: See text in section 3, below, for exact definitions of variables.

In terms of empirical support, it is worth remembering that the ELCC model was developed as a generalization of empirical regularities found in early cross-country regression analysis, including Kaldor (1966) and other studies around that time. Each of the linkages shown in Figure 1 is equivalent to a structural equation of an ELCC model, and each one claims empirical support in some of those studies. More recently, León-Ledesma (2002) has estimated an extended version of an ELCC model for 17 countries over four time periods between 1965 and 1994, in which a fifth endogenous variable (a measure of R&D expenditures) is added, and a number of exogenous variables are included to help identify the structural equations in a simul-

taneous equations framework. León-Ledesma finds that the coefficients representing the key causal relationships in his extended ELCC model have the theoretically expected signs and are statistically significant, using two- and three-stage least squares to solve the identification problem. These estimates confirm that the structural relationships assumed in the ELCC framework continue to have empirical support using more recent data and econometric methods. However, León-Ledesma does not test for whether the long-run average growth rates of the countries are the ones that would be predicted by his ELCC model, as opposed to any other particular model (such as Solow, BPCG, etc.).⁷

Almost as soon as it was developed, the ELCC growth model received an important challenge from Thirlwall (1979) and others who, although sympathetic to the Kaldorian approach, believed that the ELCC models erred in ignoring the role of import demand and neglecting to incorporate a balance of payments equilibrium condition. Thirlwall and Dixon (1979, p. 173) criticized these models (including their own earlier version) because “No consideration is given to the possibility that the rate of growth of income determined by the model may generate a rate of growth of imports in excess of the rate of growth of exports, thereby imposing a constraint on the export-led growth rate if balance of payments equilibrium must be preserved.” If import demand is incorporated into the model and a balance of payments constraint is imposed, exports continue to play a key role in determining long-run growth because faster growth of exports allows faster growth of imports without risking a chronic balance of payments (current account) deficit.⁸ Nevertheless, Thirlwall and Dixon (1979) showed that, under certain assumptions, the

⁷ It is interesting to note also that, given his specification of time periods (dividing the 1965-94 period into four sub-periods for which data are averaged), León-Ledesma’s results can be considered more medium-run than long-run (the significance of this distinction will become clear below).

⁸ Although this literature generally refers to “balance of payments” equilibrium, it is clear from the context that what is meant is really balance in the current account.

cumulative causation mechanism is thwarted and the growth rate consistent with equilibrium in the balance of payments—the balance-of-payments-constrained (BPC) growth rate—is determined solely by the ratio of the growth rate of exports to the income elasticity of import demand—irrespective of whether Verdoorn’s Law (Kaldor’s second law, which incorporates dynamic increasing returns) holds.

This solution for the BPC growth rate, which is also found in Thirlwall (1979), is sometimes referred to (following Davidson, 1990-91) as “Thirlwall’s Law.” This simple version of the “Law” depends on certain strong assumptions, however. One of these assumptions is that the current account must be balanced in the long run. The BPCG model can easily be modified to allow for a long-run current account imbalance matched by a sustainable level of “capital” (net financial) inflows or outflows.⁹ One way of incorporating financial flows was introduced by Thirlwall and Hussain (1982), who focused on the growth rate of net financial inflows compared with the growth rate of the value of exports (i.e., the sum of the growth rates of export prices and export volumes). An alternative method was developed by Moreno-Brid (1998), who assumed that the current account balance (which must be equal to net financial inflows) must be a constant share of GDP in the long run. Although either way of modeling financial flows is easily accommodated in the BPCG model from a mathematical viewpoint, Thirlwall and Hussain’s approach potentially allows for a perpetually rising ratio of financial inflows (net borrowing) to GDP, which cannot be sustainable, and therefore Moreno-Brid’s approach is superior from the vantage point of modeling a long-run balance of payments constraint incorporating *sustainable* financial inflows. Therefore, we will focus mainly on Moreno-Brid’s approach to financial flows in our analysis, but we will also briefly consider the implications of adopting the Thirlwall

⁹ In this paper, I will adopt the terminology of modern balance-of-payments accounting (e.g., in the IMF and US government presentations) in referring to “financial flows” and the “financial account,” rather than “capital flows” and the “capital account,” regardless of the terminology used in earlier studies.

and Hussain framework.

A second key assumption in Thirlwall's Law is that there are no relative price effects in the long run. This assumption is crucial for ruling out cumulative causation as long as the latter is modeled as lowering the relative price of a country's exports by raising its productivity growth rate. Thirlwall (1979) argued that it is realistic to assume that relative purchasing power (PPP) holds in the long run, so that relative prices of home and foreign goods (measured in a common currency) do not change. In this case, any competitive gains from more rapid productivity growth must be offset either by exchange rate appreciation or a rise in domestic prices (perhaps, although Thirlwall did not say so, because of increasing nominal wages or raw materials costs; he simply cited the famous "law of one price").¹⁰ Alternatively, Thirlwall and Dixon (1979) point out that the same result is achieved if the price elasticities of export and import demand (in absolute value) sum to approximately unity, so that the Marshall-Lerner condition¹¹ is not satisfied and changes in relative international prices have no effect on the trade balance (this assumption can be referred to as "elasticity pessimism").¹² Thirlwall and Hussain (1982) accept that changes in export prices (which, in their model, are the same as domestic prices) may be significant for developing countries, but only insofar as they affect the real value of net financial inflows measured in home currency—not for cumulative causation reasons (which are implicitly ruled out by the assumption of PPP, and perhaps were considered less important for developing

¹⁰ For an analysis of the stability of the equilibrium in a Thirlwall-type BPCG model focusing mainly on labor markets and wage dynamics, see Pugno (1998).

¹¹ The Marshall-Lerner condition states that a real devaluation of a country's currency will improve its balance of trade if the absolute value of the sum of the price elasticities of export and import demand exceeds unity, under certain assumptions including initially balanced trade. The extended Marshall-Lerner condition with nonzero net financial flows and imbalanced trade is stated below.

¹² There is a slight difference in the Thirlwall's Law solutions under these two assumptions, i.e., PPP and elasticity pessimism, as discussed below.

countries that historically were largely specialized in primary products).¹³

It is not so clear, however, that relative price or real exchange rate effects can be completely neglected on either of these grounds. Alonso and Garcimartín (1998) find econometric evidence for the “elasticity pessimism” view in most of the industrialized countries covered in their study (Canada and Japan are two notable exceptions, where they find that Marshall-Lerner holds), but other empirical studies have found price elasticities of exports and imports that sum to more than unity for most countries (e.g., Cline, 1989).¹⁴ In studies of various individual countries, ranging from the US to Japan to India, Marshall-Lerner is usually found to hold (e.g., Lawrence, 1990; Blecker, 1992; Razmi, 2005). At best, the evidence on elasticity pessimism is mixed, and elasticity estimates vary widely across different countries, time periods, and econometric methodologies. Moreover, according to standard J-curve logic, we would expect price elasticities to be relatively low and Marshall-Lerner to be violated in the short run (i.e., up to a year or two following a devaluation), but elasticities to increase (in absolute value) and satisfy Marshall-Lerner over longer time periods when trade flows are (for well-known reasons) easier to adjust.

The empirical evidence on long-run, relative PPP is also mixed, and highly sensitive to the currencies, price indexes, time periods, and econometric methods used (Rogoff, 1996).¹⁵ One

¹³ Perraton (2003) finds that including terms of trade (relative price) effects, i.e., not assuming PPP, improves the fit of BPCG models applied to data for developing countries.

¹⁴ Alonso and Garcimartín (1998) also find evidence for the BPCG view that output growth rates, rather than international relative prices (real exchange rates), are the variable that adjusts to restore balance of payments equilibrium when countries are tending to run surpluses or deficits on current account. While I am not aware of any studies that contradict this finding, it does not necessarily imply either that relative prices don't change in the long run or that changes in relative prices have no effects when they do occur. Furthermore, the estimates of León-Ledesma (2002) suggest that relative prices do change as predicted in the ELCC model, i.e., in response to productivity growth differentials, and do impact on export growth.

¹⁵ In fairness to Thirlwall (1979), the evidence for PPP was stronger at the time he conceived the BPCG model, based mainly on data from the Bretton Woods period of adjustable pegs for exchange rates. The behavior of real exchange rates since the collapse of Bretton Woods and the advent of flexible rates has been less kind to the PPP hypothesis.

recent survey summarizes the descriptive evidence from US-UK exchange rates as follows:

Neither absolute nor relative PPP appear to hold closely in the short run, although both appear to hold reasonably well as a long-run average and when there are large movements in relative prices, and both appear to hold better between producer price indices than between consumer price indices. (Taylor and Taylor, 2004, p. 139).

An empirical literature from the 1990s that found that real exchange rates were not mean-reverting even in the long run has now been overturned by more powerful econometric methods, but more recent studies find that the speed of adjustment to PPP can sometimes be slow and mean-reversion may be non-linear (i.e., faster for larger deviations from PPP) (Taylor and Taylor, 2004). It is clear that relative PPP does hold over long periods of time such as a half century or longer for certain major currencies, but it is far from clear that it holds for shorter time periods (e.g., decades) or all currencies.¹⁶

Furthermore, there is no consensus that the long-run equilibrium real exchange rate should be constant over time (and some of the newer studies finding faster rates of adjustment also allow for varying equilibrium rates). Many economists have argued that real exchange rates need to change in the long run in response to factors such as international differences in income elasticities of export and import demand and income growth rates (Houthakker and Magee, 1969), international differences in relative rates of productivity growth between tradable and nontradable goods (Balassa, 1964; Samuelson, 1964; Chinn, 2000), and changes in international asset or debt positions (Lane and Milesi-Ferretti, 2002).¹⁷

Although it is difficult to summarize the subtle and ever-changing literature on PPP, it does seem safe (at present!) to conclude that the longer the time period one considers, the more

¹⁶ For example, Bahmani-Oskoei (1995) found that PPP held for only 8 out of 22 developing countries studied.

¹⁷ Williamson (1994) and Cline and Williamson (2009) have calculated what they call “fundamental equilibrium exchange rates” (FEERs) that are derived from a model of the exchange rates that would be required to maintain a sustainable current account surplus or deficit for each country, given the relevant parameters in the export and import demand functions and trend growth rates. These FEERs are not constant in the long run.

likely it is that relative PPP will hold. Moreover, it also seems that PPP is more likely to hold between countries that are more structurally similar and hence do not have reasons for their equilibrium real exchange rates to change over long periods of time. In fact, recent empirical studies in the BPCG framework using modern time-series methods have found that the model without relative price effects applies better over very long time periods than over medium-run periods. For example, Razmi (2005) finds that the BPCG model explains Indian growth well over very long time periods (his data are for 1950-99, and the model predicts actual growth well for the full sample and periods up to about 30 years). Razmi (2005) reports that “income was by far the dominant influence in determining the balance of payments constraint in the long run,” but in shorter periods (such as decades), there are substantial variations of actual growth from BPCG predictions and relative price effects cannot be neglected. This conclusion, supported by the results of León-Ledesma (2002) discussed earlier, opens the door to incorporating cumulative causation and relative price effects in BPCG models applied to medium-run time periods, even if those effects are not plausible over very long-run periods.

3. The Canonical Export-Led Growth Model

The following model, which is adapted with some modifications from Setterfield and Cornwall (2002), represents the core ideas of the ELCC approach.¹⁸ Essentially, this model provides the math that expresses the cumulative causation process shown in Figure 1. Although the model is simplified in certain respects compared to earlier ELCC models discussed in the previous section (especially in not treating manufacturing and other sectors separately), the

¹⁸ The first three equations of the model correspond closely to the earlier model of Dixon and Thirlwall (1975); the fourth equation is Setterfield and Cornwall’s innovation. See also note 21 below.

model has been specified in aggregate terms to facilitate comparisons with the BPCG model in later sections. This aggregative approach can also be justified by appeal to Kaldor's first law, which, as stated above, says that faster growth of manufacturing output results in faster growth of aggregate output (i.e., the manufacturing sector is the "engine of growth" for the whole economy).

Starting on the export side, export demand is specified as a conventional, constant-elasticity function of the real exchange rate and foreign income. With all variables measured in instantaneous rate-of-change form (differences in natural logarithms) for convenience, the export function is:

$$(1) \quad x = \varepsilon_x(e + p^* - p) + \eta_x y^*,$$

where x is export growth, e is the rate of nominal currency depreciation (log difference of the nominal exchange rate, measured in home currency per unit of foreign currency), p and p^* are the rates of change in the home and foreign price indexes, respectively, y^* is foreign (rest-of-world) income growth, and ε_x and η_x are the price and income elasticities of export demand, respectively (defined so that $\varepsilon_x, \eta_x > 0$). Note that $(e + p^* - p)$ represents the rate of real depreciation of the home currency, or rate of increase in the relative price of foreign goods.

Foreign price inflation p^* is taken as exogenously given on the small country assumption, but domestic price inflation p is determined by changes in unit labor costs and the gross profit markup:

$$(2) \quad p = \tau + w - q,$$

where (again with all variables in growth rate form) τ is the rate of change in (one plus) the markup over unit labor cost, w is the rate of wage inflation, and q is the rate of labor productivity growth. Although markups can change due to changes in non-labor costs or competitive condi-

tions in markets,¹⁹ we abstract from changes in markups here for simplicity and assume $\tau = 0$.

Productivity growth is assumed to be endogenous according to a simplified, aggregative version of Verdoorn's Law:²⁰

$$(3) \quad q = q_0 + \alpha y ,$$

where q_0 is a shift factor representing autonomous technological dynamism (including catch-up possibilities) and technology policies (e.g., R&D subsidies, intellectual property rights, etc.), α represents the Verdoorn effect (dynamic increasing returns or positive feedbacks), and $q_0, \alpha > 0$.

Finally, aggregate demand (national income) increases at a rate determined by the weighted average of the growth rates of export demand and domestic expenditures multiplied by the Keynesian multiplier λ :²¹

$$(4) \quad y = \lambda(\omega_a a + \omega_x x) ,$$

where a is the growth rate of domestic expenditures²² and ω_a and ω_x are the shares of domestic expenditures and exports (respectively) in total demand. Equations (1), (2), and (4) can then be combined (assuming $\tau = 0$) to yield what Setterfield and Cornwall (2002) call the “demand regime” (DR) equation,²³

¹⁹ See Blecker (1998) for a BPCG model that incorporates flexible markups with partial pass-through of exchange rate changes.

²⁰ The simplification here is that *aggregate* productivity growth is assumed to depend on *aggregate* demand for all goods and services, rather than this relationship being confined to the manufacturing sector as in the original Verdoorn-Kaldor specification discussed earlier.

²¹ See Setterfield and Cornwall (2002, pp. 81-82, Appendix 5.A) for derivation. Most earlier ELCC models simply assume that y is an increasing function of x , but do not explicitly include a .

²² Domestic expenditures, often referred to as “absorption,” are equal to the sum of consumption, investment, and government purchases.

²³ This solution differs in some respects from Setterfield and Cornwall's DR relation. They ignore exchange rates and wages, effectively assuming that $e = w = 0$. They also assume that p^* is determined by foreign equations for markup pricing and Verdoorn's Law parallel to equations (2) and (3) here; in our notation, (2') $p^* = \tau^* + w^* - q^*$ and (3') $q^* = q_0^* + \alpha^* y^*$, where the *'s indicate foreign variables or parameters (the authors omit the * on q_0^* , but I presume this was a typographical error). Since Setterfield and Cornwall also assume $w^* = \tau^* = 0$, p^* ultimately depends only on y^* , which is taken as exogenously given. Thus, in their model (but in our notation, and after

$$(5) \quad y = \Omega + \lambda \omega_x \varepsilon_x q$$

where $\Omega = \lambda[\omega_a a + \omega_x(\varepsilon_x(e + p^* - w) + \eta_x y^*)]$ and the variables a , e , p^* , w , and y^* are all treated as exogenously given constants.²⁴

Then, defining the Verdoorn equation (3) as the “productivity regime” (PR), Setterfield and Cornwall note that (3) and (5) together constitute a system of two linear equations in two endogenous variables (output growth y and productivity growth q), taking all other variables as exogenously given. Provided that there is not too much cumulative causation, this system then solves for a unique and stable equilibrium. Graphically (see Figure 2), this requires that the PR line be steeper than the DR line in $q \times y$ space, which is equivalent to the slope condition $1/\alpha > \lambda \omega_x \varepsilon_x$ or $\alpha \lambda \omega_x \varepsilon_x < 1$. Contrary to what Kaldor suggested, the mere existence of cumulative causation is not sufficient to create a disequilibrium situation in the long run; only if the forces of cumulative causation are very strong (i.e., $\alpha \lambda \omega_x \varepsilon_x > 1$, or PR is flatter than DR as drawn in Figure 2) would an equilibrium not exist.²⁵ Assuming that the equilibrium exists, the equilibrium ELCC growth rate y_E is determined by the simultaneous solution of equations (3) and (5):

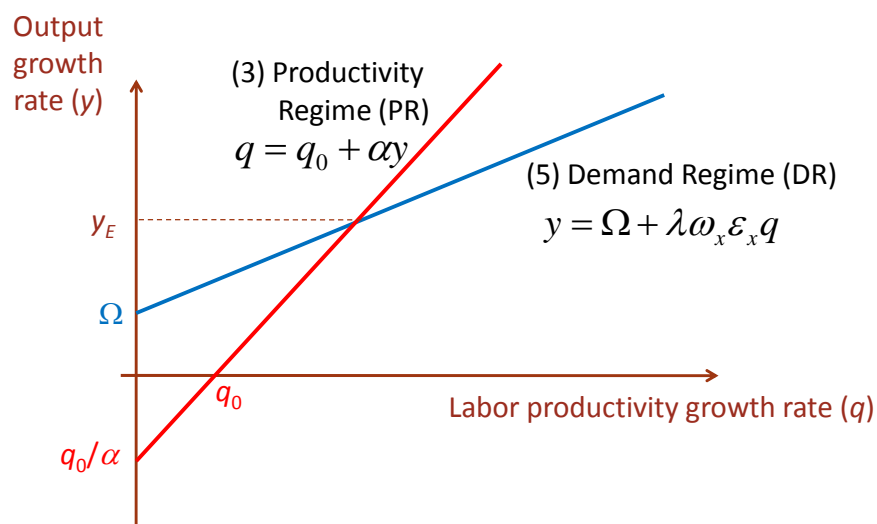
$$(6) \quad y_E = \frac{\Omega + \lambda \omega_x \varepsilon_x q_0}{1 - \alpha \lambda \omega_x \varepsilon_x} .$$

correcting the typographical error in their published solution), the constant term in their DR relation is $\Omega = \lambda[\omega_a a - \omega_x \varepsilon_x q_0^* + \omega_x(\eta_x - \alpha^* \varepsilon_x) y^*]$. We prefer to treat p^* as exogenously given and to allow explicitly for e and w to assume nonzero values, since this is not only more general but also facilitates comparisons with the BPCG model below.

²⁴ This means that domestic demand, the nominal exchange rate, foreign prices, domestic wages, and foreign income are all assumed to grow at constant rates. While treating foreign variables as exogenously given can be justified on the “small country” assumption, assuming that the other variables are fixed independently of home country output and productivity growth is more dubious, and the implications of this assumption will be discussed below.

²⁵ Although it may seem contrary to the spirit of Kaldor (1972) to represent his model in a way that has an equilibrium solution, it should be noted that this demand-determined growth equilibrium is quite different from a conventional model of a long-run growth path determined by increases in factor supplies and exogenous technological progress. Disequilibrium in the ELCC model presented here would imply *ever-rising or ever-falling growth rates*, which do not seem plausible in the long run (China may have grown at a rapid 10% clip in recent years, but this rate has not continued to increase).

Figure 2:



Not surprisingly, any shock that would exogenously stimulate productivity growth (for example, an R&D subsidy or improved property rights in innovations) would increase q_0 and shift the PR line down and to the right, thereby having a positive effect on the equilibrium growth rate y_E . Similarly, any event that would stimulate exports to grow faster (such as a faster rate of currency depreciation e , faster foreign income growth y^* , or an opening of foreign markets that raised the income-elasticity of export demand η_x) would shift the DR line upward, also increasing the ELCC growth rate y_E . What is most surprising in this model, however, is that a stimulus to *domestic demand* (increase in a) would have the same effect as a stimulus to export demand in shifting the DR line up, thereby permanently raising the equilibrium growth rate y_E . In fact, given the logic of this model, the domestic demand stimulus would actually increase export growth by causing productivity to rise faster, thereby making exports more competitive.

This may seem like a strong, if not unbelievable, conclusion. Of course, this strong result stems in part from the oversimplified, aggregative nature of the present model. In a more com-

plete ELCC framework, in which the Verdoorn relationship (endogenous productivity growth) was limited to the manufacturing sector, only the part of increase domestic demand that went toward the purchase of domestically produced manufactures would be able to kick-start the process of cumulative causation; demand increases that were spent on services or imports would not have the same effect. Still, even if only a portion of the demand stimulus raised spending on domestic manufactures of exportable goods, at least some long-term benefit would result.

However, even leaving these issues of disaggregation aside, the ELCC model laid out above ignores other key economic forces that could limit the cumulative growth gains from any type of demand stimulus, especially a domestic one but also an export-led one. Perhaps most obviously, the assumption that the nominal rates of currency depreciation e and wage inflation w would remain constant irrespective of an increase in domestic growth of output and productivity could be called into question. Much theory and intuition suggests that a country experiencing an export-led boom might be expected to confront pressures toward currency appreciation (lower e) or faster wage increases (higher w). The former can be avoided through maintaining a fixed nominal peg for the exchange rate, or through currency market intervention (as in China in the past decade), provided that the central bank can sterilize the resulting reserve accumulation.²⁶ The latter, however, is harder to avoid.

Advocates of the ELCC approach (e.g., Cornwall, 1977) emphasize that the labor supply is not an inelastic constraint on long-run growth, as it appears in conventional models of the Solow (1956) variety. To be sure, labor supplies can vary elastically in the growth process due to factors such as international migration (including temporary guest worker programs as well as more permanent forms of migration) and changes in social norms regarding age and gender in

²⁶ Another possibility is that the current account surplus could be lent to other nations, resulting in an offsetting financial (private capital) account deficit and preventing reserve accumulation.

the workplace. In multisectoral models, labor can potentially be drawn out of less-productive agricultural or service sectors into manufacturing. In developing countries with dual economies, migration of “surplus labor” from rural or pre-modern areas may augment “modern sector” labor supplies. But unless the labor supply is *perfectly* elastic at the current wage level, it would seem that *some* upward pressure on wages is unavoidable in a rapidly growing economy (and China, where wages have increased significantly, is no exception). Thus, some of the optimistic aspects of the ELCC model stem from the implicit assumption that improvements in cost competitiveness due to faster productivity growth are not counterbalanced by offsetting currency appreciation or wage increases. While one cannot necessarily assume that these adjustments will fully offset all competitive gains in a process of cumulative causation—exchange rates do not always behave as predicted, and wage increases may lag behind productivity growth—neither should one ignore these types of adjustments altogether.

4. The Balance-of-Payments-Constrained Growth Model

A related but distinct critique of the ELCC approach concerns the fact that the ELCC model lacks an import function and a balance-of-payments equilibrium condition, and hence “the equilibrium growth rate specified may be inconsistent with the long run requirement of payments balance” (Thirlwall and Dixon, 1979, p. 173). This section presents the model of Thirlwall and Dixon (1979), who sought to correct this problem, although their model will be modified to incorporate net financial flows following the approach of Moreno-Brid (1998).

To enhance comparability with the ELCC model in the preceding section, equations (1) through (3) are all retained, including the Verdoorn relation to incorporate cumulative causation.

The model is then augmented by adding a conventional import demand function with constant elasticities

$$(7) \quad m = -\varepsilon_m(e + p^* - p) + \eta_m y ,$$

where m is import growth and ε_m and η_m are the price and income elasticities of import demand, respectively (defined so that $\varepsilon_m, \eta_m > 0$). Next, we define balance of payments equilibrium as implying that the current account balance (surplus or deficit) must equal a constant, sustainable ratio to national income. Following the approach of Moreno-Brid (1998), but converted into our notation, a constant ratio of the current account balance to GDP implies that

$$(8) \quad \theta(x - y) = e + p^* - p + m - y ,$$

where θ is the ratio of the value of exports to the value of imports, both measured in domestic currency.²⁷ Note that (8) now replaces (4) as the equation that determines the output growth rate.²⁸

Now, suppose that an economy in which cumulative causation operates via Verdoorn's Law is subject to the balance of payments constraint specified in (8). If we substitute equations (1), (2), (3), and (7) into (8) and solve for y , again assuming $\tau = 0$, we obtain a very general expression for the balance of payments constrained growth rate, y_B :²⁹

$$(9) \quad y_B = \frac{(\theta\varepsilon_x + \varepsilon_m - 1)(e + p^* - w + q_0) + \theta\eta_x y^*}{\eta_m - 1 + \theta - \alpha(\theta\varepsilon_x + \varepsilon_m - 1)} .$$

²⁷ See Moreno-Brid (1998) for the derivation. The more traditional assumption of balanced trade (i.e., a current account balance equal to zero) in the long run is the special case in which $\theta = 1$ and (8) becomes $p + x = e + p^* + m$.

²⁸ Since equation (4) still has to hold—it is, after all, nothing more than a dynamic version of the standard Keynesian multiplier for national income determination—this means that the domestic expenditure growth rate a in equation (4) must now become endogenous in the long run so that national income will tend to grow at the rate implied by (8). This point is discussed further below.

²⁹ This equation combines the solution of Thirlwall and Dixon (1979, p. 183, equation 19) for a BPCG model with cumulative causation with the solution of Moreno-Brid (1998, p. 418, equation 8) for a model including financial (capital) mobility, both translated into the present notation. In order for the model to yield intuitively plausible results, the denominator of this solution must be assumed to be positive. See also note 30, below.

It is at this point that the BPCG theorists introduce their strong assumptions to rule out relative price effects. First, suppose that the price elasticities of import and export demand are too low to satisfy the extended Marshall-Lerner condition with financial flows; more specifically, suppose $\theta\varepsilon_x + \varepsilon_m \approx 1$.³⁰ Under this assumption, (9) reduces to³¹

$$(10) \quad y_B = \frac{\theta\eta_x y^*}{\eta_m - 1 + \theta}$$

and α (the Verdoorn coefficient representing endogenous feedbacks from income growth to productivity growth) has no effect on the BPC equilibrium growth rate. If we further add the assumption that trade must be balanced in the long run, so that $\theta = 1$, then (10) becomes:

$$(11) \quad y_B = \frac{\eta_x y^*}{\eta_m}.$$

Second, consider what happens if relative PPP is assumed, so that $e + p^* - p = 0$. To see the implications, note that when $e + p^* - p = 0$ is assumed, the relative price change terms drop out of both the export and import demand functions (equations 1 and 7) and also from the equilibrium condition (8). Since Verdoorn's Law (3) and markup pricing (2) enter the model only through the relative price effects, these two relationships also disappear from the solution. In this case, $x = \eta_x y^*$ by (1) and $m = \eta_m y$ by (7), and substituting these into the equilibrium condition

$$(8') \quad \theta(x - y) = m - y,$$

³⁰ From now on, the term “elasticity pessimism” will be used to represent this assumption in models that allow for financial flows. Note that the extended Marshall-Lerner condition $\theta\varepsilon_x + \varepsilon_m > 1$ is less likely to hold, and the alternative that $\theta\varepsilon_x + \varepsilon_m \approx 1$ is more likely to hold, the lower is θ (i.e., the bigger is the country's trade deficit), for any given values of ε_x and ε_m . To this extent, elasticity pessimism is more warranted in countries with large initial deficits.

³¹ Again, for intuitively sensible results (a positive growth rate), the denominator must be positive. This is very likely in equation (10), since the only way it could be negative would be for a country to have a very low income elasticity of import demand η_m and a very large trade deficit ($\theta \ll 1$), which seems like an unlikely combination. If $\eta_m > 1$, as seems to be empirically true in most countries, then $\eta_m - 1 + \theta > 0$ regardless of the size of θ (since $\theta > 0$).

the model again solves for equation (10)—or (11) if we also assume $\theta = 1$. Furthermore, in this case (10) and (11) respectively simplify to³²

$$(10') \quad y_B = \frac{\theta x}{\eta_m - 1 + \theta} \quad \text{and (assuming } \theta = 1) \quad (11') \quad y_B = \frac{x}{\eta_m},$$

Now, several important points emerge immediately. First, there are a variety of different solutions for the BPC growth rate, depending on what we assume about three factors: price elasticities, real exchange rates, and financial flows. Equation (11') states the simplest and perhaps best known version of Thirlwall's Law, but it is a special case that requires both PPP and the absence of financial flows. Second, which of these versions of the BPCG model applies is likely to depend on the time frame considered. As noted earlier, elasticity pessimism is more likely to hold in the short run than in the long run, while PPP (i.e., the absence of real exchange rate changes) is more likely to hold in the long run than in the short or medium run (and the validity of both assumptions can vary across countries). Third, none of these solutions (i.e., equations 9, 10, 10', 11, or 11') is equivalent to the ELCC growth rate shown in equation (6). Thus, regardless of what we assume about these factors, the economy is not likely to grow at the ELCC growth rate (6) if the balance of payments constraint is effective, even if cumulative causation effects are present, relative price effects are significant, and financial flows are allowed. Fourth, merely assuming that the balance of payments must be in equilibrium (in the sense that the current account balance is either zero or a sustainable, constant fraction of GDP) does not necessarily rule out any impact of cumulative causation effects on the economy's long-run growth rate. As long as PPP does not hold and the extended Marshall-Lerner condition does hold, cumulative causation *can* affect the most general BPC growth rate (9) even though this is not the same as the

³² Perraton (2003) refers to equation (11) as the “strong” form of Thirlwall's BPCG hypothesis and (11') as the “weak” form.

ELCC growth rate (6).³³ For the reasons noted earlier, this is more likely to occur in medium-run time periods (e.g., decades) than over longer ones (e.g., generations or half centuries).

5. Reconciling the Two Growth Rates

To fix ideas, it is helpful to compare the ELCC and BPCG solutions graphically. Here, we use the most general solution for the BPC growth rate, i.e., equation (9), which allows for cumulative causation effects and financial flows, does not assume PPP, and does assume that the extended Marshall-Lerner condition holds. To represent this solution on the same type of diagram as was used for the ELCC model in Figure 2, it is convenient to substitute equations (1), (2), and (7) into (8)—again assuming $\tau = 0$ and taking e and w as exogenously given—and obtain the following equation for y as a function of q :

$$(12) \quad y = \frac{(\theta\varepsilon_x + \varepsilon_m - 1)(e + p^* - w + q) + \theta\eta_x y^*}{\eta_m - 1 + \theta}.$$

This relationship, which is upward sloping as long as the extended Marshall-Lerner condition holds and PPP does not hold (and horizontal if either Marshall-Lerner is violated or PPP holds),³⁴ may be called the “BP constraint” (for balance of payments).

Graphically, the BPCG solution y_B is represented by the point where the BP constraint (12) intersects the PR relation (3), just as the ELCC solution y_E is represented by the point where DR (5) intersects PR (3). In general, the BP relation may lie either above or below the DR

³³ Note that, assuming $\theta\varepsilon_x + \varepsilon_m > 1$ and $e + p^* - p \neq 0$, and also assuming that the denominator of (9) is positive as discussed above, then $\partial y_B / \partial \alpha > 0$ in (9).

³⁴ Note that, if the extended Marshall-Lerner condition does not hold, (12) becomes (10), and if PPP does hold, then (12) becomes (10'). Either way, the BP relationship then becomes horizontal in Figures 3 and 4, i.e., y_B is independent of q .

Figure 3:

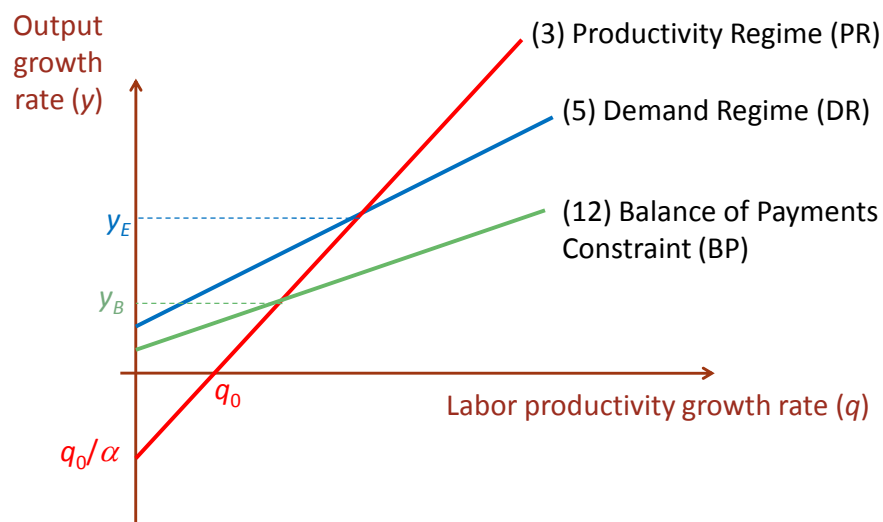
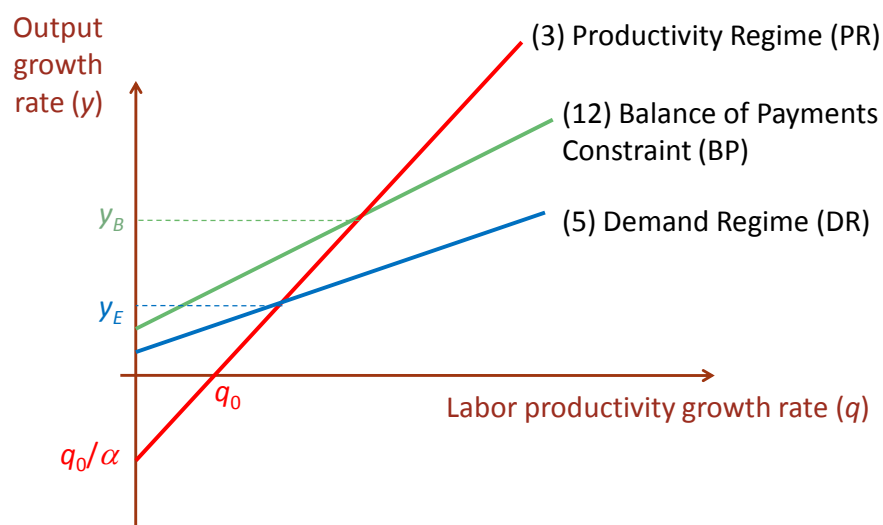


Figure 4:



relation, as there is no reason (from inspection of equations 5 and 12) that one is necessarily higher than the other.³⁵ Thus, Figure 3 shows the case where $y_E > y_B$ and Figure 4 shows the

³⁵ Since this statement applies to the slopes as well as the intercepts in equations (5) and (12), the DR and BP relations could also intersect, thereby creating additional cases not shown in Figures 3 and 4. These other cases are not

opposite situation. Let us focus, with no loss of generality, on the case shown in Figure 3, where the ELCC growth rate exceeds the BPC growth rate.

Now, it might be thought that allowing for financial flows to be somewhat elastic might relax the BP constraint, effectively permitting the BP constraint to shift upward until y_B would coincide with y_E . After all, financial flows do not have to be fixed at a given percentage of GDP; some range of current account imbalances can be sustainable as long as the interest rate on the foreign debt is not too high relative to the country's growth rate. Since the BP equation (12) assumes a given ratio of the current account balance to GDP (CA/Y), can't we just assume that this ratio might fall somewhat, thereby enabling the economy to borrow more and thereby to reach the ELCC growth rate without risking a payments disequilibrium?

The answer, somewhat surprisingly, is no, at least not if we model financial flows following the approach of Moreno-Brid (1998) as we have here. To see this point, recall that the BP equilibrium condition (8) is specified in *growth rate* form, and assumes a *constant ratio* CA/Y . An increase in the *level* of this ratio does *not* change the form of the equilibrium condition (8). Of course, greater net financial inflows would imply a lower ratio of exports to imports θ , but this has ambiguous effects on the height of the BP relation (12) and may very well shift it down (away from DR) instead of up (toward DR).³⁶ Or, to put the point another way, note that at the ELCC equilibrium ($y = y_E$) in Figure 3, the economy is not merely experiencing a current

considered for reasons of space, and because the key theoretical points can be illustrated with full generality by reference to the simpler cases shown in these two figures.

³⁶ Consider, for example, the simple case of a horizontal BP constraint given by equation (10), which would apply if either elasticity pessimism or PPP holds. In this equation, the shift in BP due to a change in θ is given by

$$\frac{\partial y_B}{\partial \theta} = \frac{(\eta_m - 1)\eta_x y^*}{(\eta_m - 1 + \theta)^2}$$

which has the same sign as $\eta_m - 1$. If $\eta_m > 1$, as is often found empirically, the BP relation would shift down when θ falls. If elasticity pessimism or PPP is violated so that the more general BP equation (12) applies, this derivative becomes more complex but does not cease to be ambiguous in sign.

account deficit, but rather a current account balance that is *continuously falling relative to GDP*. In other words, it is not possible to grow at the rate y_E with *any* constant ratio CA/Y , and therefore y_E is simply unsustainable in the long run. Similarly, in Figure 4, the economy cannot grow at y_E except if it could have a *perpetually rising ratio* CA/Y , which is also not sustainable.

Note that the impossibility of growing at y_E derives simply from the assumptions that balance of payments equilibrium must be maintained in the long run and that financial flows cannot increase or decrease indefinitely *as a percentage of GDP* (i.e., as long as the ratio CA/Y cannot rise or fall continuously). The strong assumptions of either PPP or elasticity pessimism are *not* required for this result. If neither of these assumptions holds, the correctly specified BPC growth rate incorporates cumulative causation effects, as in equation (9). But it is this growth rate, and not the ELCC growth rate (6), that should be considered as the long-run equilibrium growth rate in a properly specified post-Keynesian open economy model. Thirlwall and Dixon (1979) were correct in saying that either PPP or elasticity pessimism rules out cumulative causation effects on the BPC growth rate, but they were incorrect in implying that these assumptions are necessary to show that the ELCC growth rate is not a sustainable long-run equilibrium.

This then raises the question of how an economy that is experiencing a virtuous circle of export-led growth (e.g., at the point where $y = y_E$ in Figure 3) in the short run will adjust to grow instead at the lower BPC growth rate y_B in the long run. Since the BP constraint cannot be expected to rise to intersect DR at y_E , for the reasons discussed above, instead the DR relation must fall to intersect BP at y_B , and the question becomes what adjustment mechanism(s) can be expected to make DR fall toward BP in the long run. The first and most obvious candidate is a decrease in the rate of growth of domestic expenditures a , which lowers the intercept term Ω in equation (5) and thereby shifts DR downward. This could be accomplished either through

deliberate government policy (e.g., contractionary fiscal or monetary policies),³⁷ or through private sector spending restraint (perhaps induced by rising debt burdens during the period of booming growth). Thus, an “expenditure reducing policy” (or a private sector expenditure reduction) is a plausible way of making the ELCC equilibrium shift to coincide with the BPCG equilibrium.³⁸

A second possibility is a relative price adjustment. As noted earlier, an export-led boom (such as where $y_E > y_B$ in Figure 3) could be expected to lead to either faster nominal wage growth (a rise in w) or currency appreciation (a fall in e), either of which would also lower Ω and shift DR downward. However, whether this is a stable adjustment process or not depends on whether relative price effects are allowed in the BPCG solution. Consider first the cases assumed by Thirlwall and Dixon (1979), where either PPP or elasticity pessimism holds, so that equation (12) reduces to (10) or (10'). In this situation, the BP curve is horizontal and is not affected by changes in w or e , so the DR relation can shift down toward a fixed BP relation and there can be a stable adjustment to the BPCG equilibrium where $y = y_B$. Thus, under Thirlwall and Dixon's (1979) assumptions, and even allowing for financial flows, their BPC growth rate is a stable attractor for the long run equilibrium. Indeed, the rise in w or fall in e in this situation can be seen as a mechanism that brings about the PPP condition assumed by Thirlwall and Dixon for the long run. However, if the adjustments in w and e are not sufficient to establish PPP and Marshall-Lerner holds, then the relative price adjustment process may be unstable. Assuming

³⁷ This statement applies to reductions in the growth rate of government spending or increases in interest rates designed to slow the growth of private consumption and investment spending. Tax increases that raise marginal tax rates would instead lower the Keynesian multiplier λ , which would reduce the slope as well as the intercept of the DR relation (5).

³⁸ Several empirical studies have researched to what extent fiscal and monetary policies as well as private sector spending respond endogenously to limit current account imbalances. See, for example, Summers (1988), Bayoumi (1990), Artis and Bayoumi (1990), and Epstein and Gintis (1992).

$\theta\varepsilon_x + \varepsilon_m > 1$ and $e + p^* - p \neq 0$, then $\partial y_B / \partial e > 0$ and $\partial y_B / \partial w < 0$ in (12), so a fall in e or rise in w would also shift the BP relation downward in Figure 3, and, depending on the other parameters, the downward shift in DR might never catch up with the downward shift in BP so that the BPCG equilibrium would never be reached. The longer the time period considered, however, the more likely it is that PPP would eventually rule, and hence the more likely that the adjustment process will eventually prove to be stable.

Similar considerations would apply in the opposite case depicted in Figure 4. If the economy was growing at the (low, sluggish) rate $y_E < y_B$ in Figure 4, the country would be experiencing a continuously increasing ratio of CA/Y, which is not plausible in the long run. Consequently, the country would have to adjust through either expansion of domestic demand (a rise in a , perhaps through “expenditure increasing policies”) or else a real depreciation (rise in e or fall in w relative to p^*), assuming that the relative price changes would bring about a stable adjustment process (which is more likely, if the changes in w or e bring the country toward PPP in the very long run).

There is, however, another way of modeling the BP constraint with financial flows that could make it flexible so that the economy could possibly adjust to grow at the rate y_E (in the situation shown in either Figure 3 or 4). That is, if we model financial flows following the approach of Thirlwall and Hussain (1982), who did not impose the assumption of a constant ratio of CA/Y, the balance of payments equilibrium condition can be written as:

$$(8'') \quad (1-\phi)(x+p) + \phi f = e + p^* + m,$$

where (using lower case letters to represent growth rates and upper case Roman letters to represent levels of variables) f is the growth rate of financial inflows (F , measured in domestic currency) and $\phi = F/(PX + F)$ is financial inflows as a percentage of total “receipts” in the

balance of payments (if there are net financial outflows then $F < 0$, and also $\phi < 0$ assuming $-F < PX$). If we then substitute equations (1) and (7) for export and import demand and (2) and (3) to incorporate cumulative causation, we obtain the following (modified) version of Thirlwall and Hussain's most general solution for the BPC growth rate as a function of a given rate of increase in financial inflows f :³⁹

$$(13) \quad y_B = \frac{[(1-\phi)\varepsilon_x + \varepsilon_m - 1](e + p^* - w + q_0) + (1-\phi)\eta_x y^* + \phi(f - w - q_0)}{\eta_m - \alpha[(1-\phi)\varepsilon_x + \varepsilon_m - 1 + \phi]}$$

Assuming that the denominator of (13) is positive, as seems necessary for intuitively plausible results, then $\partial y_B / \partial f > 0$. Now the outcome depends on whether f is exogenously fixed or can adjust "elastically" in a situation where $y_B \neq y_E$. Suppose, for example, $y_B < y_E$ as in Figure 3.⁴⁰ It is plausible that, in a country experiencing an export-led boom, financial inflows would be attracted into the country's growing economy, thereby increasing f and raising the BPC growth rate y_B toward the higher rate y_E . Similarly, if $y_B > y_E$ as in Figure 4, it is plausible that in a country stuck in a "vicious circle" of slow export growth and slow productivity growth, financial inflows would be reduced or outflows would increase, thereby depressing f and pushing y_B downward toward y_E . On the other hand, if financial markets are relatively closed and financial inflows or outflows are "inelastic," then y_B cannot adjust toward y_E and the BP constraint will remain in force at a fixed level of f .

³⁹ In the original article, Thirlwall and Hussain (1982) assume PPP, in which case (13) simplifies to

$$y_B = \frac{(1-\phi)\eta_x y^* + \phi(f - p)}{\eta_m}$$

⁴⁰ Note that, if (8'') replaces (8) as the BP equilibrium condition, then the BP constraint (12) shown in Figures 3 and 4 (i.e., y_B written as a function of q) would have to be replaced by the following expression:

$$y_B = \frac{[(1-\phi)\varepsilon_x + \varepsilon_m - 1](e + p^* - w) + (1-\phi)\eta_x y^* + \phi(f - w) + [(1-\phi)\varepsilon_x + \varepsilon_m - 1 + \phi]q}{\eta_m}$$

which would be upward sloping if $(1-\phi)\varepsilon_x + \varepsilon_m - 1 + \phi > 0$. Also note that if this BP constraint replaces (12), then the meaning of being above or below the BP line also changes: points above it represent higher rates of growth of financial inflows (f) and points below it represent lower rates f .

The catch here is that, if it is flexible, f cannot change too drastically relative to the rate of nominal income growth ($y + p$) or the country may experience a potentially unsustainable explosion of its foreign debt or asset position. In the case shown in Figure 3, if $f < y + p$ initially and f does not have to increase too much to make $y_B = y_E$, the BP constraint could be relaxed and the country could enjoy its export-led growth boom as long as the financial inflows kept growing at the requisite rate and the CA deficit and external debt did not become unsustainably large. On the other hand, if f would have to rise so much that $f > y + p$ would result, then the CA/Y ratio would begin to fall continuously and, as noted previously, this is implausible in the long run.

Even so, such an export-led boom financed by financial inflows could easily persist for a while, perhaps sustained by bubble behavior in financial markets (since it is typical in a bubble that investors suspend disbelief and ignore warning signs of unsustainable financial positions—see Shiller, 2008), leading eventually to some kind of financial crash or debt crisis marked by a shift from a bubble to a panic mentality in the financial markets. In this case, the financial crisis would be the “enforcement mechanism” that would impose a stricter BP constraint in the long run, but at tremendous cost to the country involved.

6. Conclusions

In spite of their differences, the BPCG and ELCC models share common roots in Kaldor’s ideas about the centrality of export markets for facilitating demand-led growth in open economies. Both models have found empirical support in the literature, although upon closer examination it appears that support for the strongest versions of the BPCG model (i.e., the versions that exclude relative price effects) is found mainly in very long-run data while support

for ELCC models is to be found mostly in studies that adopt a more medium-run perspective. If relative price effects are allowed in BGCG-type models—and the evidence suggests that these may be significant for some countries over periods of a decade or longer—then it is possible to incorporate the cumulative causation effects emphasized in the ELCC approach in models that embed a BP constraint. However, the solution of this synthetic model is different from the one that emerges from a pure ELCC model without a BP constraint.

Allowing for financial flows, which is important for considering open economies in an epoch of financial liberalization, adds further insight to the comparison of the two approaches. If we assume, following Thirlwall and Hussain (1982), that countries can obtain financial inflows that grow at steady rates, then it is conceivable that a country undergoing rapid export-led growth *à la* the ELCC model could relax its BP constraint and continue to grow rapidly by increasing the growth rate of its financial inflows. However, as pointed out by Moreno-Brid (1989), financial inflows cannot grow at any arbitrary rate in the long run without potentially causing the current account balance (deficit or surplus) to rise without limit as a percentage of GDP, which would be unsustainable. If instead we follow Moreno-Brid's approach and assume that the current account balance must be a stable fraction of GDP in the long run, then it becomes clear that the BP constraint really is binding and the ELCC equilibrium cannot generally be reached, even if cumulative causation effects are incorporated in the BPCG model. Or, to put it another way, increasing financial inflows can at most be a temporary way of relaxing the BP constraint, but they do not allow a country to grow at the ELCC growth rate in the long run.

The conclusion that the strict BPCG model holds only in the very long run when relative price effects can be ignored (e.g., due to PPP holding) should not, of course, be surprising. Since its earliest formulations (e.g., Thirlwall, 1979), the BPCG model without relative price effects

has always been intended as a long-run model. But, this should not be taken to imply that medium-run models such as ELCC are irrelevant. Setterfield (2002) has suggested that the ELCC approach does not define a stable long-run equilibrium, but rather defines a sort of punctuated equilibrium phenomenon in which a country settles for some period of time on a growth path defined by a certain set of demand and productivity conditions (i.e., DR and PR regimes), but then moves along a “traverse” toward a new equilibrium as the underlying parameters of the system endogenously adjust.⁴¹ In this view of the ELCC model, the equilibrium solution of the model is at best a “weak attractor” for the medium run (Setterfield, 2002, p. 227), and negative as well as positive feedbacks are admitted into the long-run evolution of an economy (which is seen as a path-dependent process). Although Thirlwall’s Law may hold in growth rate form in the very long run, we may conjecture that it is possible that the level of income at which a country’s BP constraint is satisfied could be permanently affected by its virtuous or vicious circles of cumulative causation over the intervening medium-run periods.

⁴¹ On the issue of whether some of the parameters of the BPCG model can adjust endogenously, see Krugman (1989) and Thirlwall (1991).

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