

An alternative explanation of India's growth transition: a demand-side hypothesis

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This paper formalises the balance-of-payments-constrained (BPC) growth model in a two-regime framework to re-examine India's growth transition in 1980 from a demand-side perspective, as an alternative to the 'supply-oriented' approaches of previous studies. The results provide strong evidence of a demand-led growth transition. Although the government-led expenditure strategy of the 1980s fulfilled the role of moving the Indian economy out of its slow-growing demand regime (1952–79) into a faster-growing one, it could not sustain demand growth at the natural rate due to a balance-of-payments constraint. Consistent with the prediction of the BPC growth model, faster export growth in the post-1990 liberalisation period sustained demand growth at its maximum rate by allowing expenditure (including government spending) to grow at a fast rate. The analysis further suggests that India's export surge in the post-1990 liberalisation period has a significant demand-side explanation, rather than an exclusively supply-side interpretation.

Key words: balance-of-payments-constrained growth model; fiscal policy; India; sustainable demand-led growth; trade policy

JEL classifications: E12, F43, O23, O24, O40

1. Introduction

India's impressive growth transition in 1980 has triggered an extensive debate on its underlying causes.¹ Although some growth accounts acknowledge that the fiscal expansion of the 1980s may have generated a large increase in per capita income growth, the role of demand-led growth is usually downplayed on the basis of its unsustainability and the subsequent balance-of-payments crisis of 1991 (Ahluwalia, 2002; Athukorala

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¹ See Srinivasan's (2005) comments on Rodrik and Subramanian (2005A), and Rodrik and Subramanian's (2005B) reply.

and Sen, 2002; Srinivasan and Tendulkar, 2003). Given the unsustainable nature of demand-led growth, Ahluwalia (2002), Panagariya (2005) and Srinivasan and Tendulkar (2003) emphasise the sustainable growth-inducing effect of the Washington Consensus supply-side reforms since 1991.

Rodrik and Subramanian (2005A), on the other hand, reject the demand-led growth hypothesis of the 1980s on theoretical and empirical grounds. From a theoretical perspective they argue that demand-led growth cannot explain the large and sustained increase in total factor productivity growth since 1980. This argument comes close to an orthodox view of the growth process in which the natural growth rate is fixed or exogenous relative to demand growth. To test the demand-led growth shift hypothesis, their empirical methodology uses the capacity utilisation rate in manufacturing to show that the change in this rate can only account for a small fraction of the large turnaround in total factor productivity growth. Motivated by these findings, they re-examine the initiating force behind India's growth surge since the early 1980s. Their empirical results suggest that the trigger may have been an '*attitudinal*' shift by the government in favour of private business enterprises that, unlike the liberalisation measures of the 1990s, was pro-business rather than pro-market.

The main purpose of this paper is to re-examine India's growth performance from a demand-side perspective, as an alternative to the 'supply-oriented' approaches of previous studies. The theoretical analysis proceeds in two main parts. In a closed-economy context, the first part shows that India's growth transition in 1980 can be modelled as a movement out of a slow-growing demand regime into a faster-growing one. The two-regime framework stresses the endogeneity of the natural growth rate relative to demand growth in the spirit of Kaldor's (1966, 1967) and Verdoorn's (1949) law, which, in turn, closely reflects the main hypothesis in León-Ledesma and Thirlwall (2002) and Murphy *et al.* (1989A, 1989B). Productivity growth in this framework is endogenised through its linkage with demand growth rather than supply growth, as assumed in 'new' endogenous growth models (see Aghion and Howitt, 1998).

Acknowledging that the natural growth rate may be endogenous to demand implies that Rodrik and Subramanian's (2005A) empirical methodology understates the contribution of demand growth to productivity growth. Their methodology is based on a traditional Keynesian model with fixed supply capacity, and states that a *long-lasting*, demand-driven rise in productivity growth requires a large and *sustained* increase in the capacity utilisation rate. However, as will be shown more formally in the theoretical section, if the natural growth rate shifts endogenously to demand, the growth rate of the capacity utilisation rate temporarily rises as the economy moves out of its slow-growing regime, but then becomes zero once the economy reaches the faster-growing regime. A negligible capacity utilisation rate effect across regimes, as shown in Rodrik and Subramanian (2005A), is therefore not a sufficient condition to reject a demand-led productivity surge in India.

The second part of the theoretical analysis attempts to explain an apparent anomaly. If the natural growth rate is truly endogenous to demand and not fixed, what can explain the unsustainable nature of India's fiscal expansion during the 1980s and the eventual balance-of-payments crisis of 1991? To answer this question, demand growth in the slow-growing regime is expressed in terms of the balance-of-payments-constrained

(BPC) growth rule x/π , where x is the growth of exports and π is the income elasticity of demand for imports.² The only way in which an economy can sustain a demand-led growth transition consistent with current account equilibrium on the balance of payments is to permanently raise the growth of exports (x') for a given income elasticity of demand for imports ($\bar{\pi}$). Although a government-led expenditure strategy can raise demand growth into a faster-growing regime, it can only do so in the short- to medium-term, since demand at this rate implies an ever-growing foreign debt burden. In this sense, a government-led expenditure strategy becomes unsustainable—not because it generates excess demand as a traditional Keynesian model would predict, but rather because demand has to be constrained below its maximum potential rate to preserve current account solvency on the balance of payments. The essence of the BPC model is that the brunt of the adjustment falls on income growth, because relative price changes do not act as a sufficient mechanism to restore current account equilibrium (McCombie and Thirlwall, 2004).

Overall, the empirical results provide strong evidence of a demand-led growth transition in the Indian economy. The main results can be summarised as follows. First, the BPC growth rule gives a close fit of India's actual growth rate in its slow-growing demand regime (1952–79). Second, the BPC growth model underpredicts the actual growth rate during the first subperiod of India's fast-growing demand regime (1980–90), which, paradoxically, strongly supports one of its main propositions: because growth during this period was government led and not export led, foreign debt accumulated over time and eventually led to the balance-of-payments crisis of 1991. Third, the BPC growth model retains its predictive power during the second subperiod of India's fast-growing demand regime (1991–2005), which supports the key proposition that a sustainable growth transition can only be achieved through a permanent rise in export growth. It is further argued that India's export surge in the post-1990 liberalisation period has a significant demand-side explanation, rather than an exclusively supply-side interpretation. Lastly, the accurate causality predictions of the two-regime model show that the BPC growth rule represents a demand-constrained relation, rather than a supply-constrained relation as in Krugman's (1989) 45-degree rule.

The rest of the paper is structured as follows. Section 2 outlines the main contributions of the paper. Section 3 provides some descriptive evidence of India's growth transition in 1980 and reviews the competing views on its underlying causes (see also Nell, 2012). Section 4 formalises India's growth transition in a two-regime, demand-constrained framework. Section 5 estimates the import demand relationship to obtain the income elasticity of demand for imports. Section 6 fits the two-regime BPC growth model. Section 7 examines whether India's post-1990 export surge has a significant demand-side explanation. Section 8 provides some conclusions.

2. Contributions to the existing literature

It is important to acknowledge that a good fit of the BPC model is a necessary but not sufficient condition to support the contention that the dominant constraint on an economy's growth performance is insufficient demand. Caporale and Chui (1999) empirically verify the existence of a balance-of-payments growth rule for a sample of 21

² The derivation of the BPC growth model is shown in Thirlwall (1979). Also see Johnson's (1954) theoretical exposition of how balance-of-payments disequilibrium arises in a two-country model.

countries, but interpret their results as evidence of Krugman's (1989) 45-degree rule. In Krugman's model, productivity growth *determines* the balance-of-payments growth rule, which makes it a neoclassical, supply-constrained relationship (McCombie and Thirlwall, 1997B). On the other hand, reverse causality from the BPC growth rule to demand and productivity growth is a necessary requirement for an economy to be regarded as demand constrained (McCombie and Thirlwall, 1997B). Against this background, the present paper makes the following contributions to the existing literature.³

First, the main advantage of analysing the balance-of-payments growth model in a two-regime framework, as opposed to the single-regime frameworks of most studies, is that it becomes possible to interpret the empirical results in a causal sense. The two-regime model in this paper provides a useful way of drawing causality inferences and, in the end, to confirm the existence of a demand-constrained balance-of-payments growth rule in India.

Another contribution of this paper is that its two-regime framework builds on the main finding of a previous study by Nell (2012), in which a saving/investment causality hypothesis is developed to show that India's 1980 growth transition entailed a shift out of a slow-growing demand regime into a faster-growing demand regime. In a causal sense these findings verify the balance-of-payments growth rule as a demand-constrained relation, rather than a supply-constrained relation as in Krugman's 45-degree rule.

Finally, this paper shows that the income elasticity of demand for imports almost doubled in the post-liberalisation period (1991–2005), while export growth also surged from its pre-liberalisation level. Incorporating these structural changes considerably improves the empirical fit of the BPC growth model for the Indian economy.

3. Competing views on the causes of India's growth transition

India's impressive growth transition is clearly evident in Figure 1. Its real gross domestic product (GDP) per capita grew at a relatively slow rate of 1.57% per annum in the first regime (1952–79), but more than doubled to an average rate of 3.56% in the second regime (1980–2005).

But what exactly triggered India's remarkable growth transition in 1980? An overview of the literature suggests that there are two main opposing views. One strand of literature emphasises the growth effect of the large fiscal expansion during the 1980s (Ahluwalia, 2002; Athukorala and Sen, 2002; Panagariya, 2005; Srinivasan, 2005; Srinivasan and Tendulkar, 2003). At first sight the descriptive evidence seems to support the demand-led growth hypothesis. By 1990 the fiscal deficit-to-GDP (at factor cost) ratio had soared to 10.40%, an increase of more than five percentage points from its average rate of 5% in the 1970s.

At the same time, these growth accounts also stress the unsustainable nature of demand-led growth during the 1980s. Fiscal expansion led to a gradual build up of foreign debt and a resulting deterioration in the current account ratio, as shown in Figure 2. The eventual balance-of-payments crisis of 1991 forced a series of

³ Several studies have examined the relevance of the BPC growth model in the Indian economy. For example, Perraton (2003) and Razmi (2005) find that the BPC growth model provides a reasonably good fit of India's average growth performance during the periods 1973–95 and 1950–99, respectively. A comprehensive overview of BPC growth studies can be found in McCombie and Thirlwall (1997B), McCombie and Thirlwall (2004) and Thirlwall (2011).

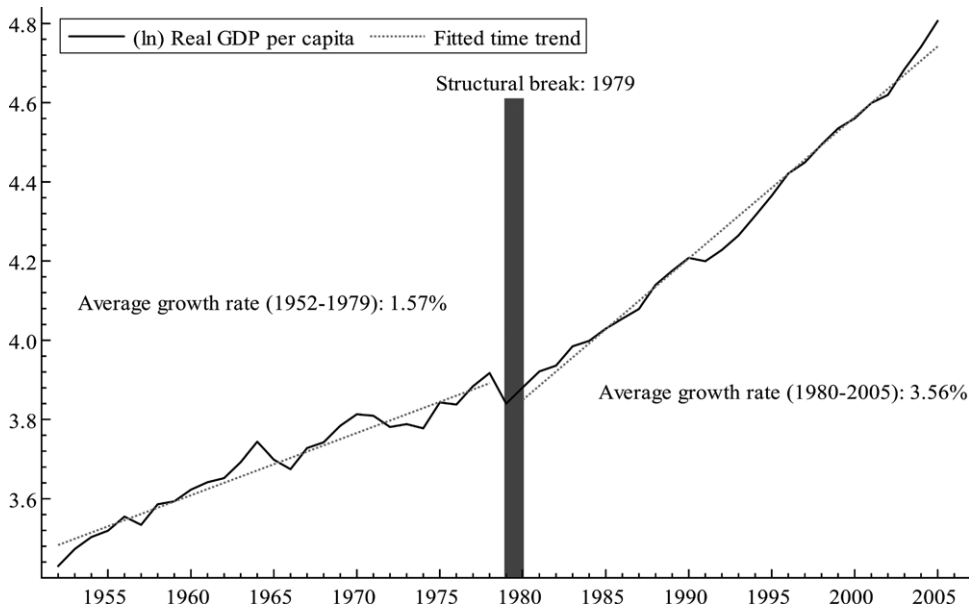


Fig. 1. India's accelerating growth pattern, 1952–2005.

Notes: Harvey and Koopman's (1992) break-point detection test identifies a structural break in the level of real GDP per capita in 1979. The average growth rate in each regime is obtained by estimating the regression $y_t = a + b_1 t + u_t$, where y_t is the natural logarithm (ln) of real GDP per capita income, t is a time trend and u_t is an unobserved disturbance term. The b_1 estimate multiplied by 100 gives the average (instantaneous) growth rate. Source: International Financial Statistics.

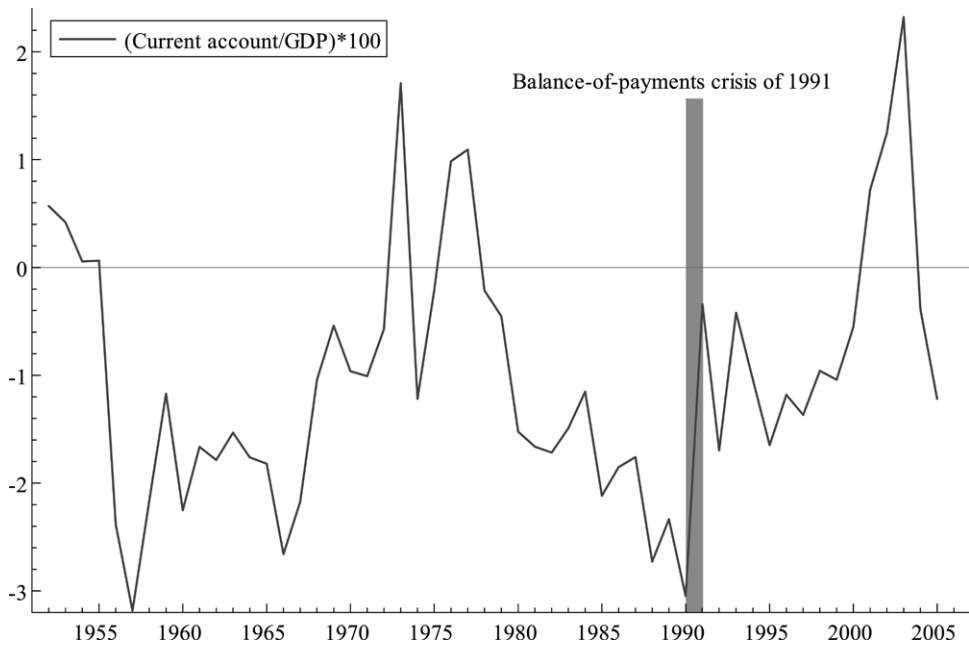


Fig. 2. India's current account ratio, 1952–2005. Source: Reserve Bank of India.

market-oriented structural reforms that included some of the following (Kochar *et al.*, 2006): (i) trade and financial liberalisation measures; (ii) the abolition of industrial licensing; (iii) the scaling down of public sector monopolies; and (iv) the liberalisation of foreign direct investment. Figure 2 shows that these reforms coincided with a permanent improvement in the current account ratio from its 1990 level.

Rodrik and Subramanian (2005A), on the other hand, argue that growth narratives of the Indian economy have tended to understate the growth performance of the 1980s due to its unsustainable nature, whilst overemphasising the sustainable growth-inducing effect of the Washington Consensus supply-side reforms since 1991.⁴ They further point out that the pickup in growth since 1980 should not be neglected: Figure 1 shows no ‘apparent’ difference between the aggregate growth performance during the 1980s and post-1990 period. Thus, although the reforms since 1991 may explain what sustained India’s growth, they do not provide information on what ignited it in the first place.

Based on these observations, Rodrik and Subramanian (2005A) test a number of explanations that could account for the large turnaround in productivity growth since 1980. They find that all these explanations—including the demand-led fiscal expansion—are inadequate to explain the productivity surge since 1980. In addition to their empirical results, Rodrik and Subramanian also appear to take a specific theoretical stance on the role of demand in the growth process: ‘The performance of the 1980s cannot be explained by Keynesian pump priming, because there is a variety of time-series and cross-section evidence pointing to trend improvements in productivity indicators’ (2005A, p. 224). In other words, the natural (trend) growth rate is fixed or exogenous relative to demand, which reflects an orthodox neoclassical view of the growth process.

In their final analysis, Rodrik and Subramanian find that the initiating force behind India’s growth transition was an ‘attitudinal’ shift on behalf of the national government towards private business enterprises. Because India was far from its production-possibility frontier, the pro-business shift, which is distinctly different from the pro-market reforms of the 1990s, prompted a large productivity response during the 1980s.

In summary, the growth narratives differ on what exactly ignited India’s growth transition in 1980. The first strand of literature emphasises the unsustainable nature of demand-led growth during the 1980s and the sustainable nature of supply-led growth in the post-1990 period. The Rodrik and Subramanian view, on the other hand, rejects the demand-led growth shift hypothesis of the 1980s in favour of a pro-business shift. The rest of the paper critically evaluates this ‘supply-oriented’ view of India’s growth transition, from both a theoretical and empirical perspective.

4. A demand-side explanation of growth shifts

As an alternative to the ‘supply-oriented’ approach, this section formalises India’s growth transition in a two-regime, demand-constrained framework. This section proceeds in two main parts. In the first part the analysis assumes a closed economy in which a government-led expenditure strategy has the potential to shift an economy out of a slow-growing demand regime into a faster-growing one. It is further stressed that, in contrast to Rodrik and Subramanian’s (2005A) hypothesis, a long-lasting, demand-driven increase in productivity growth does not require a *sustained* increase in the capacity utilisation rate if the natural growth rate is endogenous to demand. In the

⁴ To support their argument, Rodrik and Subramanian (2005A, p. 205) directly quote from Ahluwalia (2002) and Srinivasan and Tendulkar (2003).

second part it is shown that the unsustainable nature of a government-led expenditure strategy is related to a balance-of-payments constraint on demand, rather than demand growth in excess of a fixed supply capacity.

4.1 A demand-led growth transition in a closed-economy context

To formally illustrate the saving/investment causality conditions that underlie a demand-led growth transition, we first distinguish between Harrod's (1939) three different growth rates: the growth rate of demand (g_d), the warranted growth rate (g_w) and the maximum potential growth rate or natural growth rate (g_n). The following notations are used to denote the growth rates in per capita (person) terms, respectively: $g_{d/p} = g_d - p$; $g_{w/p} = g_w - p$ and $g_{n/p} = g_n - p$, where p is the growth rate of the population. If it is assumed that the labour force participation rate remains relatively stable over time, then population growth is a good proxy for the growth rate of the labour force (l): ($p \approx l$). As shown in Appendix A, the full employment of labour and capital requires:

$$g_{d/p} = g_{w/p} = g_{n/p} \quad (1)$$

In Figure 3, output growth per person ($g_{y/p}$) is measured on the vertical axis and the investment-to-income ratio (I/Y) and saving-to-income ratio (S/Y) on the horizontal axis.

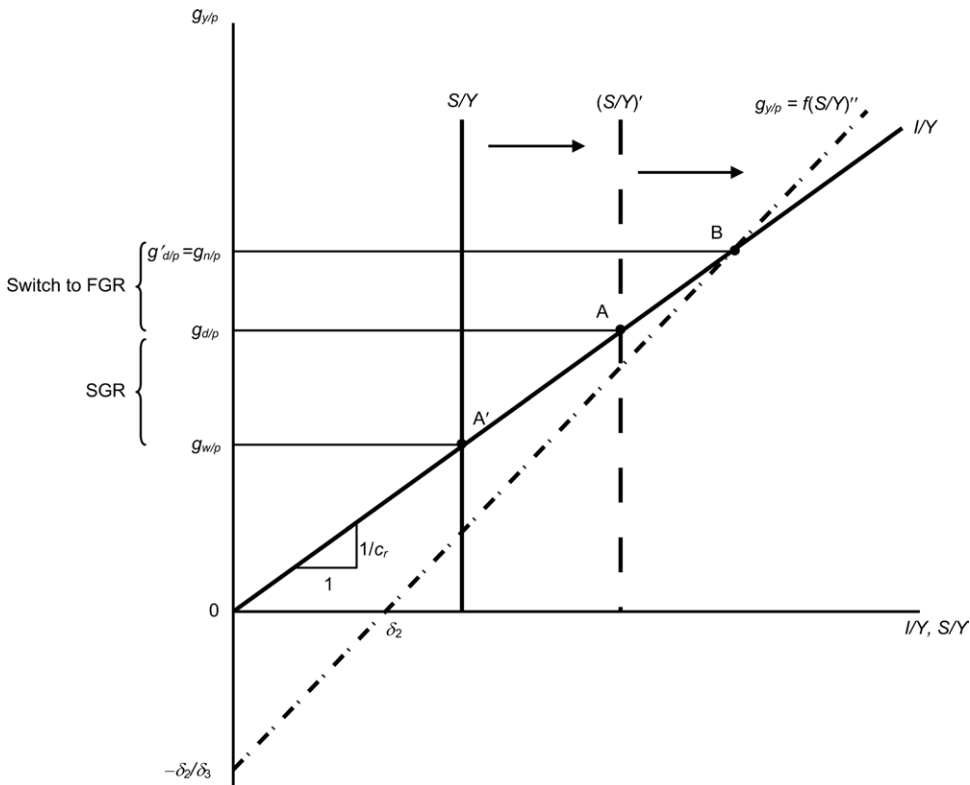


Fig. 3. Demand-led growth in a two-regime framework.

Note: SGR, slow-growing regime; FGR, faster-growing regime. The discussion of Figure 3 draws and extends on the analysis in Nell (2012).

axis. From the inverse of equation (A2) in Appendix A, the sensitivity of output growth per person with respect to the investment ratio is given by the slope coefficient $1/c_r$, where c_r measures the required investment to produce a unit increase of output per person at full capacity or excess capacity for a given interest rate. The warranted growth rate per person ($g_{w/p}$) at point A' in Figure 3 is defined as the rate that induces just enough investment demand to match planned saving ($I/Y = S/Y$).

Consider the demand-led growth shift hypothesis in Figure 3.⁵ The initial disequilibrium position in the slow-growing regime depicts a situation where the growth of demand per person at point A exceeds the warranted growth rate per person at point A': $g_{d/p} > g_{w/p}$. Or put differently, the growth of exogenous demand along the I/Y line from A' to A encourages investment spending that initially (at A) exceeds the level of saving: $(I/Y)' > S/Y$. Improved growth prospects encourage firms to increase their investment outlays by borrowing from the banking sector.

An important assumption at the initial disequilibrium position (A relative to A') is that the supply of bank credit and raw material supply (Hicks, 1974) respond to demand, which, in turn, is determined by the desire of firms to raise their profits from improved growth prospects. The endogeneity of credit supply at the initial disequilibrium position forms the cornerstone of post-Keynesian/structuralist models and stands in direct contrast to the monetarists' version in which the supply of credit is constrained through the central bank's exogenous control over the monetary base.⁶

In accordance with the post-Keynesian/structuralist hypothesis of the credit supply process, the initial rise in investment spending financed by bank credit raises the level of per capita income. In the process, saving adjusts to investment via a Keynesian saving function that links the saving ratio (S/Y) to the level of per capita income (Y/P):⁷

$$\left(\frac{S}{Y}\right)_t = \delta_0 + \delta_1 \ln\left(\frac{Y}{P}\right)_t + \varepsilon_t; \delta_0 < 0, \delta_1 > 0 \quad (2)$$

This adjustment mechanism is illustrated in Figure 3. The initial disequilibrium position in the slow-growing regime ($g_{d/p} > g_{w/p}$) encourages credit-financed investment spending, which then raises the saving ratio through a rise in per capita income in equation (2). The saving schedule shifts to the right, from S/Y to $(S/Y)'$. In effect, the warranted growth rate per person ($g_{w/p}$) adjusts to the growth of demand per person ($g_{d/p}$) until long-term equilibrium is reached at point A.

⁵ To construct the demand-led growth shift hypothesis, the analysis draws on the following theoretical paradigms: Keynesian/post-Keynesian models (e.g. Bhaduri, 2008A; Kaldor, 1955–56; Kalecki, 1971; León-Ledesma and Thirlwall, 2002; McCombie and Thirlwall, 2004; Robinson, 1962), structuralist macroeconomic models (Gibson and Van Severter, 2000; Ros, 2000; Taylor, 1983, 1991) and multiple-equilibrium models with demand constraints in the spirit of Murphy *et al.* (1989A, 1989B).

⁶ From a post-Keynesian perspective, the key references are Kaldor (1982) and Moore (1988). Money supply endogeneity is also an assumption of structuralist macroeconomic models (Taylor, 1983, 1991). Also see Palley's (1994) theoretical analysis of the money supply process that underlies monetarist and structuralist models.

⁷ By allowing for a negative intercept term in equation (A1) of Appendix A, it is possible to derive a non-linear relation between the saving ratio and per capita income (for a detailed derivation, see Hussein and Thirlwall, 1999). The non-linear specification provides an accurate description of cross-country data, whereas the linear specification adopted in equation (2) is more appropriate to the analysis of time-series data.

Although steady growth is achieved in the slow-growing regime at point A ($g_{dlp} = g'_{wlp}$), it is important to note that the economy is still operating below its maximum potential growth rate: ($g_{dlp} = g'_{wlp}$) $< g_{nlp}$. The Harrodian natural growth rate (g_{nlp}) in this two-regime framework represents the maximum *potential* rate at which demand can grow – it is a hypothetical rate and not an actual growth rate. The *actual* growth rate is exogenously determined by demand at point A, so the growth rate of the capacity utilisation ratio at this point is zero, even though the economy is operating below its ('hypothetical') maximum rate.

The adjustment process in the slow-growing regime can be used to predict how an economy can permanently shift into a faster-growing regime. The low-level equilibrium growth trap at point A is consistent with the model of [Murphy *et al.* \(1989A\)](#), which states that insufficient domestic demand may stall industrialisation and permanently constrain an economy's growth rate below its maximum potential. It is also consistent with [León-Ledesma and Thirlwall's \(2002\)](#) fundamental hypothesis in which productivity growth, based on [Kaldor's \(1966, 1967\)](#) and [Verdoorn's \(1949\)](#) law, responds to demand growth through static and dynamic economies of scale that are present in the production of domestic manufactures.⁸ The endogeneity of the natural growth rate to demand growth has a major policy implication: to cover fixed set-up costs in industry and hence make the adoption of increasing returns technologies profitable, a permanent shift into a faster-growing regime would require a large and sustained demand shock.

The adjustment mechanism that describes the switch from a slow-growing regime to a faster-growing regime can be illustrated in [Figure 3](#). First, however, it is necessary to rewrite equation (2) in terms of the growth of output per person $\{\Delta \ln(Y/P)_t\}$:

$$\left(\frac{S}{Y} \right)_t = \delta_2 + \delta_3 \Delta \ln \left(\frac{Y}{P} \right)_t + \psi_t; \delta_2 > 0, \delta_3 > 0 \quad (3)$$

Note that, in the *given* slow-growing regime, saving adjusts to the *level* of per capita income in equation (2). Conversely, in the case of a permanent growth transition, the saving ratio is a function of the *growth* of output per person. Equation (3) can be made compatible with [Figure 3](#) by expressing the growth of output per person $\{g_{y/p} \approx \Delta \ln(Y/P)\}$ in terms of the saving ratio. The resulting function, $g_{y/p} = f(S/Y)''$, is drawn as an upward-sloping schedule in [Figure 3](#).

Suppose a government-led expenditure strategy raises demand growth per person from g_{dlp} at point A in the slow-growing regime to g'_{dlp} . If it is assumed that a given shock to government spending generates sufficient domestic demand (via its multiplier effect) to reach the natural growth rate per person, we have $g'_{dlp} = g_{nlp}$ at point B. Demand growth encourages investment spending (financed by bank credit) at point B that initially exceeds the level of planned saving at point A: $(I/Y)'' > (S/Y)'$. The initial disequilibrium position (B relative to A) is therefore given by $g'_{dlp} > g'_{wlp}$. Since credit-financed investment spending generates its own saving via a rise in the growth of output per person in equation (3), the saving schedule shifts to the right, from $(S/Y)'$ to $(S/Y)''$. In effect, demand growth (g'_{dlp}) pulls up the warranted growth rate from g'_{wlp} in the slow-growing regime to g''_{wlp} in the fast-growing regime. Point B represents the

⁸ The link from demand growth to productivity growth is known as Verdoorn's law, named after the Dutch economist who first revealed such a relationship for Eastern European countries ([Verdoorn, 1949](#)).

long-term equilibrium position in the fast-growing regime with $g'_{d/p} = g''_{w/p} = g_{n/p}$. At point B, capital and labour are both fully employed.

The demand-led growth hypothesis can be summarised by defining the following vector of variables:

$$V_t = [s, i, \ln(Y/P), g_{d/p}] \quad (4)$$

where s and i denote the saving-to-income and investment-to-income ratios, respectively, and all the other variables are defined as before. A demand-led growth transition would imply the following causal relationship in the *slow-growing regime*:

$$g_{d/p} \Rightarrow i \Rightarrow \ln(Y/P) \Rightarrow s \quad (4a)$$

The exogenous growth rate of demand per person encourages investment spending, which then generates its own saving through a rise in the level of per capita income.

The following causality mechanisms summarise the permanent *shift* into a faster-growing regime:⁹

$$\begin{aligned} \uparrow g_{d/p} &= f(\uparrow \text{government spending} \Rightarrow \text{multiplier}) \Rightarrow \text{improved prospects of profit} \Rightarrow \\ &\uparrow \text{credit-financed investment spending } (i) \Rightarrow \uparrow \Delta \ln(Y/P) \Rightarrow \uparrow \text{saving } (s) \end{aligned} \quad (4b)$$

Because a sustained demand shock is necessary to bring the economy closer to its maximum potential growth rate—the movement from A to B in Figure 3—the natural growth rate per person is *endogenous* to the growth of demand per person. In effect, faster demand growth pulls up the Verdoorn–Kaldorian natural growth rate at point A (through increasing returns to scale economies in manufacturing) to the Harroddian natural growth rate ($g_{n/p}$) at point B. Harrod's natural growth rate fulfils the role of setting a 'hypothetical' limit to demand to which supply can adapt. During the transition phase towards a faster-growing regime, however, Harrod's natural growth rate is endogenous to demand growth.

4.2 The endogeneity of the natural rate and the Rodrik–Subramanian test

If the natural growth rate is endogenous to demand, then Rodrik and Subramanian's (2005A, pp. 206–7) empirical methodology is an uninformative way of capturing the contribution of demand growth to productivity growth. Rodrik and Subramanian use the capacity utilisation rate in manufacturing to show that the change in this rate during the 1980s relative to the 1970s can only account for a small fraction of the large turnaround in India's productivity growth. An empirical methodology based on changes in the capacity utilisation rate across regimes, however, is only informative about the role of demand if it is assumed that supply capacity is fixed relative to demand. We can illustrate this proposition with the following example.

⁹ The adjustment mechanisms in equations (4a) and (4b) only focus on income changes (Kalecki, 1971). This is based on the usual assumption that adjustment cannot take place through the redistribution of income from wage earners to profit earners (Kaldor, 1955–56; Robinson, 1962) when the economy is growing *below* its maximum potential rate. However, by exclusively focusing on the product market, Bhaduri (2008A) shows how adjustment can simultaneously occur through income changes and the redistribution of income.

The capacity utilisation ratio in *per capita terms* can be written as $\{(D/P)/(\bar{N}/P)\}$, where D is demand, the bar over supply (N) denotes its fixed or unresponsive nature to demand and P is population. In growth rates this ratio becomes $g_{d/p} - g_{\bar{n}/p}$. According to Rodrik and Subramanian (2005A), demand in a traditional Keynesian model can only explain short-term deviations in output growth relative to an exogenously determined trend. The only way in which demand can explain a large and long-lasting rise in trend productivity in this framework is through a sustained increase in the capacity utilisation rate. Thus, based on the methodology of Rodrik and Subramanian, a large and sustained increase in the capacity utilisation ratio in India's fast-growing regime (1980s) relative to its slow-growing regime (1970s) implies that the demand-creating effect of expansionary fiscal policy has played an important role in utilising *existing* supply capacity more fully. The capacity utilisation ratio in growth rates consistent with this scenario is $g'_{d/p} - g_{\bar{n}/p} > 0$. On the other hand, a relatively small rise in the capacity utilisation rate across regimes, as shown in Rodrik and Subramanian (2005A), suggests that the demand-creating effect of government spending has played a negligible role in utilising existing supply capacity and therefore cannot explain India's large and sustained turnaround in productivity growth. The corresponding capacity utilisation rate in growth rates consistent with this scenario is $g_{d/p} - g_{\bar{n}/p} \approx 0$.

The interpretation differs markedly, however, if the natural growth rate is endogenous to demand. The capacity utilisation rate can now be written as $\{(\bar{D}/P)/(N/P)\}$, where the bar over demand denotes its exogenous nature to supply. A large shock to demand across regimes—the shift from A to B in Figure 3—generates its own supply capacity through economies of scale that are present in the production of domestic manufactures (León-Ledesma and Thirlwall, 2002). In short, *zero* growth in the capacity utilisation ratio across regimes is entirely consistent with a demand-led growth hypothesis: a large demand shock *causes* a large productivity shock, so that the growth rate of the capacity utilisation ratio becomes zero ($g'_{\bar{d}/p} - g_{n/p} = 0$).¹⁰ This result is indistinguishable from the Rodrik and Subramanian hypothesis in which demand plays a negligible role relative to *fixed* supply capacity ($g_{d/p} - g_{\bar{n}/p} \approx 0$). In other words, zero growth in the capacity utilisation ratio across regimes is not a sufficient condition to reject a demand-led growth shift hypothesis.

4.3 The balance-of-payments constraint on demand

The endogeneity of the natural growth rate presents a potential paradox. If the natural growth rate is truly endogenous relative to demand, how can one explain the unsustainable nature of India's demand-led fiscal expansion during the 1980s and the eventual balance-of-payments crisis of 1991? To answer this question the slow-growing demand regime at point A in Figure 3 is expressed in terms of the BPC growth rate (x/π), assuming zero net capital flows and constant relative prices in international markets:¹¹

¹⁰ When the natural growth rate is endogenous to demand, there will only be a transitory rise in the capacity utilisation rate as the economy shifts into a faster-growing regime. The initial demand shock from A to B in Figure 3 temporarily raises the capacity utilisation rate. However, once the natural growth rate adjusts (via equation 4(b)) to faster demand growth at point B, the growth rate of the capacity utilisation rate becomes zero.

¹¹ For ease of exposition, the formal derivation of the BPC growth rate from an initial current account equilibrium position is not shown here. The reader is referred to Thirlwall (1979) and McCombie and Thirlwall (2004).

$$\left\{ g_{d/p} = \left(\frac{x}{\pi} - p \right) \right\} < g_{n/p} \quad (5)$$

where $g_{d/p}$ ($=g'_{w/p}$) is steady-state demand growth per person at point A in Figure 3; x is the growth rate of exports; π is the income elasticity of demand for imports; the BPC growth rate is expressed in per person terms by subtracting population growth (p); and $g_{n/p}$ is the natural or maximum potential growth rate per person. The BPC growth rate in equation (5) is the rate that is consistent with current account equilibrium on the balance of payments.

Suppose, as shown in Figure 3, that a government-led expenditure strategy raises demand growth to its maximum potential rate at point B. Phase I of the growth transition is shown by rewriting equation (5) as:

$$(g'_{d/p} = g_{n/p}) > \left(\frac{x}{\pi} - p \right) \quad (6)$$

where $g'_{d/p}$ ($=g''_{w/p}$) is steady-state demand growth per person at point B in Figure 3. Because growth is above the rate that is consistent with current account equilibrium, the government-led expenditure strategy is unsustainable; sustaining growth at this rate implies a deteriorating current account deficit over time or, put another way, an ever-growing foreign debt burden. When the current account deficit ratio reaches a certain threshold level that is perceived as unsustainable by foreign lenders, the country will be forced to adjust.

In Phase II of the growth transition, the country will have to service its foreign debt obligations accumulated in Phase I. To show under what conditions the economy can service its foreign debt in Phase II, but at the same time sustain demand growth at its maximum potential rate, consider the BPC growth rule augmented for sustainable debt dynamics (McCombie and Thirlwall, 1997A; Moreno-Brid, 1998):

$$g_{d/p}^* = \left(\frac{\theta x}{\pi - (1 - \theta)} - p \right) \quad (6')$$

where θ is defined as the export-to-import ratio at nominal prices. By imposing $\theta = 1$, exports equal imports and the original BPC growth rule with zero net capital flows and constant relative prices is obtained.¹² The servicing of foreign debt in Phase II (capital outflows) would require a current account surplus on the balance of payments ($\theta > 1$). If, on the other hand, it is assumed that capital outflows are equally offset by other 'compensatory' capital inflows, then $\theta = 1$ in equation (6').¹³ By imposing this restriction, equation (6') states that the economy must adjust its current

¹² Appendix C provides a formal derivation of equation (6') to explicitly show how foreign debt and interest payments feature in this specification.

¹³ Capital inflows during the debt repayment period may, for example, include structural adjustment lending via the International Monetary Fund, debt rescheduling arrangements and debt-equity swaps. These arrangements allow the economy to grow at a faster rate than it otherwise would have done if foreign creditors had insisted on the immediate repayment of foreign loans. In this way, faster growth can help the economy to meet its foreign debt obligations; otherwise, default may be the only option. In addition, policy makers may be forced to relax capital control measures (assuming that strict control measures were in place before the debt crisis) in an attempt to attract portfolio investment and long-term capital flows.

account deficit in Phase I (equation (6)) to an *initial* equilibrium position in Phase II. In addition, to sustain demand growth at its maximum potential rate in Phase II would require a permanent rise in export growth (x') for a given income elasticity of demand for imports (π):

$$(g'_{d/p} = g_{n/p}) = \left(\frac{x'}{\pi} - p \right) \quad (7)$$

Without a permanent increase in export growth, demand growth will have to be constrained below the natural rate ($g_{d/p} < g_{n/p}$) to preserve current account equilibrium on the balance of payments. The predictive ability of equation (7) will depend on the extent to which net capital flows deviate from zero.¹⁴

The essence of the BPC growth model in equation (7) is that exports are the only component of expenditure that can simultaneously sustain demand at its maximum rate and avoid a deteriorating current account deficit over time. Export growth has two effects on demand growth—one direct via Harrod's foreign trade multiplier and the other indirect working through Hicks's super-multiplier (McCombie, 1985). The direct effect of faster export growth is immediately apparent when we think of national income as a weighted average of the growth of consumption, investment and government expenditures and the balance between exports and imports. The indirect effect comes when faster export growth in excess of import growth initially relaxes the balance-of-payments constraint and allows other expenditure components (such as government spending) with import contents to grow faster until income growth has increased enough to restore current account equilibrium. In effect, exports are the only component of autonomous demand that can generate foreign exchange earnings to pay for the import requirements for growth (Thirlwall, 2002).

5. Estimates of the import demand equation

To test the predictions of equations (5)–(7), we need a statistically robust estimate of the income elasticity of demand for imports (π_0) in the following log-level import demand equation:

$$(\ln)M_t = \alpha_0 + \pi_0(\ln)Y_t + \varphi_0(\ln)RPM_t + \varepsilon_t; \pi_0 > 0, \varphi_0 < 0 \quad (8)$$

where M is the quantity of real imports; Y denotes real income; RPM ($=MP/P$) is relative prices in domestic currency, where MP is an import price index and P is a domestic price index; and ε_t is an unobserved error term. Appendix B provides a detailed description of all the variables.

A key proposition of equations (5)–(7) is that relative price changes do not act as an efficient balance-of-payments adjustment mechanism. If relative price changes generate strong import and export volume effects, then the government-led expenditure

¹⁴ Substantial net capital inflows can significantly relax the balance-of-payments constraint on demand. Thirlwall (2011) provides a comprehensive survey of studies that have extended the model to include capital inflows. In addition, Bhaduri (1987) and Gram (1992) develop formal models to outline the macroeconomic conditions that make a developing country's growth rate permanently dependent on foreign borrowing.

strategy in equation (6) may become sustainable, which contradicts the export-led prediction of the BPC model in equation (7).

An indirect way of testing the importance of relative prices in equation (8) is to conduct a unit root test. If it is found that $(\ln)MP$ and $(\ln)P$ are non-stationary $\{I(1)\}$ when tested separately but stationary as a ratio $\{(\ln)MP/P = (\ln)RPM \sim I(0)\}$, then this would indicate that the price indices cointegrate with a unit coefficient. Or put differently, relative prices show no persistent trend over time because the two price indices grow at the same rate in the long term. As a result, the long-term effect of the price ratio in equation (8) would be zero.

To test the underlying hypothesis over the period 1952–2005, we use a standard augmented Dickey–Fuller (ADF) (Dickey and Fuller, 1979, 1981) regression with a lag length of one that includes an intercept but no trend. For a 5% critical value of 2.915, the ADF test statistics of 0.131, 0.897 and 2.986 for $(\ln)MP$, $(\ln)P$ and $(\ln)RPM$, respectively, show that import and domestic prices cointegrate with a unit coefficient. The contention that relative prices do not show a secular trend over time lies at the heart of the simple version of the BPC growth model in equations (5)–(7). The next section analyses the income and relative price effects in equation (8) more rigorously, by providing some econometric evidence.

5.1 Econometric evidence

Consider the following autoregressive distributed lag (ARDL) representation of import demand equation (8):

$$\begin{aligned}
 (\ln)M_t = & \beta_0 + \beta_1 D_t + \sum_{i=1}^2 \beta_{2i} (\ln)M_{t-i} + \sum_{i=0}^2 \beta_{3i} (\ln)Y_{t-i} \\
 & + \sum_{i=0}^2 \beta_{4i} \{(\ln)Y \times D\}_{t-i} + \sum_{i=0}^2 \beta_{5i} (\ln)RPM_{t-i} + \xi_t
 \end{aligned} \quad (9)$$

where D_t is an intercept dummy variable that takes the value of unity in the post-liberalisation period (1991–2005) and zero otherwise (see Appendix B). Based on graphical evidence and preliminary structural stability tests (not reported here), the interactive dummy variable $\{(\ln)Y \times D\}$ is included to capture structural change in the income elasticity of demand for imports.

The ARDL modelling approach in equation (9) has several advantages (Pesaran, 1997; Pesaran and Shin, 1999). First, the ARDL model yields consistent estimates for the long term that are asymptotically normal irrespective of whether all the underlying regressors are $I(1)$, $I(0)$ or integrated of different orders. Second, Pesaran (1997) demonstrates that the ARDL model—even in the presence of endogenous regressors—provides valid asymptotic short- and long-term parameter estimates once an appropriate choice of the lag length is made.

The unrestricted ARDL (2, 2, 2, 2) model in equation (9) is fitted to annual data over the period 1952–2005. Based on Schwartz's (1978) Bayesian criterion, the following parsimonious ARDL (1, 0, 0, 2) model is selected (p -values in parentheses):¹⁵

¹⁵ All the estimation results and diagnostic tests were computed with PcGive 11: vol. I (Doornik and Hendry, 2006).

$$\begin{aligned}
(\ln)M_t = & -0.832 - 1.537 D_t + 0.674(\ln)M_{t-1} + 0.400(\ln)Y_t + 0.376\{(\ln)Y \times D\}_t \\
& - 0.641(\ln)RPM_t + 0.267(\ln)RPM_{t-1} + 0.408(\ln)RPM_{t-2} \quad (10)
\end{aligned}$$

(0.001) (0.020) (0.000) (0.001) (0.017)
(0.000) (0.208) (0.007)

$$R^2 = 0.98$$

LM test (serial correlation): $F[2,44] = 0.68$ (0.51) Standard error $[\hat{\sigma}] = 0.10$

Functional form: $F[1,45] = 0.82$ (0.36) ARCH test: $F[1,44] = 1.87$ (0.17)

Normality: $\chi^2 [2] = 2.13$ (0.34) Number of observations = 54

Heteroscedasticity: $F[13,32] = 1.10$ (0.38)

In equation (10), LM is the Lagrange multiplier test for second-order serial correlation and ARCH is a test for autoregressive conditional heteroscedasticity. Equation (10) is well determined and comfortably passes all the diagnostic tests.

The long-term solution of equation (10) is obtained by dividing the cumulative short-term coefficients through by 0.326 ($= 1 - 0.674$) (p -values in parentheses):

$$\begin{aligned}
(\ln)M_t = & -2.552 - 4.714 D_t + 1.226(\ln)Y_t + 1.153\{(\ln)Y \times D\}_t + 0.104(\ln)RPM_t \quad (11)
\end{aligned}$$

(0.000) (0.004) (0.000) (0.002) (0.747)

The long-term import demand equation for the pre-liberalisation period (1952–90) can be derived from equation (11) by imposing $D_t = 0$ (p -values in parentheses):

$$\begin{aligned}
(\ln)M_t = & -2.55 + 1.23(\ln)Y_t + 0.10(\ln)RPM_t \quad (12)
\end{aligned}$$

(0.000) (0.000) (0.747)

whereas the long-term import demand equation in the post-liberalisation period (1991–2005) is solved by imposing $D_t = 1$ (p -values in parentheses):

$$\begin{aligned}
(\ln)M_t = & -7.27 + 2.38(\ln)Y_t + 0.10(\ln)RPM_t \quad (13)
\end{aligned}$$

(0.000) (0.000) (0.747)

The magnitude of the pre-liberalisation income elasticity of 1.23 in equation (12) is close to Caporale and Chui (1999) and Senhadji's (1998) estimates of 1.15 and 1.33, respectively. The post-liberalisation income elasticity of 2.38 in equation (13), on the other hand, shows a large structural shift from its pre-liberalisation level. As far as relative prices are concerned, equation (10) reports a significant short-term effect: a 1% increase in relative prices reduces import demand by 0.641%. In contrast, the long-term relative price effect in equations (12) and (13) is statistically insignificant, which supports the results of the unit root tests conducted earlier. The finding of negligible long-term relative price effects is consistent with Perraton's (2003) result and Caporale and Chui's (1999) estimate obtained from their dynamic OLS procedure. It is also 'compatible' with Razmi's (2005) empirical results.¹⁶

¹⁶ Razmi (2005, p. 668) reports the following estimates: $(\ln)M_t = 0.611 + 1.466(\ln)Y_t - 1.296(\ln)MP_t + 1.296(\ln)P_t$. Holding constant domestic prices (P), a rise in import prices (MP) will impact negatively on import demand. However, if P and MP cointegrate with a unit coefficient to form a separate long-term relationship—as suggested by the unit root tests conducted earlier—then movements in the two price series will nullify each other in the long-term, so that the relative price effect on import demand becomes zero. In other words, consistent with the results in equations (12) and (13), the price ratio ($RPM = MP/P$) will be statistically insignificant.

6. Fitting the two-regime BPC growth model

The two-regime BPC growth model is represented by equations (5)–(7). To test the empirical relevance of the model, the BPC growth rule (x/π) is fitted over the following subperiods: (I) the slow-growing demand regime in the pre-liberalisation period (1952–79); (II) the fast-growing demand regime in the pre-liberalisation period (1980–90); and (III) the fast-growing demand regime in the post-liberalisation period (1991–2005). The income elasticity of demand for imports in equation (12) is used to fit the BPC growth rule over subperiods (I) and (II), whereas the income elasticity in equation (13) is used for subperiod (III). Table 1 reports the results.

6.1 Slow-growing demand regime (pre-liberalisation period: 1952–79)

Table 1 shows that the predicted value of the BPC growth rule in column (B) provides a close fit of the actual growth rate in column (A), with a difference between the actual and predicted growth rate of 0.53 percentage points in column (C). Given the close fit between the actual and predicted growth rate, equation (5) shows that slow growth during 1952–79 was the result of a balance-of-payments constraint on demand. The equilibrium condition in the slow-growing demand regime is given by point A in Figure 3: $(g_{d/p} = g'_{w/p}) < g_{n/p}$.

6.2 Fast-growing demand regime (pre-liberalisation period: 1980–90)

To shift the Indian economy out of its slow-growing regime at point A into a faster-growing regime at point B in Figure 3 would require a sustained demand shock. The most apparent stylised fact in support of a demand-led growth transition is the large fiscal expansion that occurred during the 1980s. In the 1970s the fiscal deficit-to-GDP ratio averaged around 5%. The surge in the fiscal deficit to an average rate of 9% during the 1980s may have lifted the demand constraint in India's slow-growing regime. Because the natural growth rate is endogenous to demand as the economy moves out of its slow-growing demand regime, India's productivity surge since 1980 is entirely consistent with a government-led expenditure strategy. Moreover, in Section 4 it was stressed that Rodrik and Subramanian's (2005A) test, which is based on changes in the capacity utilisation rate across regimes, cannot capture the contribution of demand

Table 1. Testing the two-regime BPC growth model

Period	(A) Actual steady- state demand growth % ($g_{d/p}^*$)	(B) Predicted growth rate ($x/\pi - p$)	(C): (A) – (B) Difference [$g_{d/p}^* - (x/\pi - p)$]	(D) Export growth (x)	(E) Income elasticity of imports (π)	(F) Population growth (p)
Slow-growing demand regime (pre-liberalisation period)						
1952–79	1.57	1.04	0.53	3.84	1.23	2.08
Fast-growing demand regime (pre-liberalisation period)						
1980–90	3.18	0.91	2.27	3.85	1.23	2.22
Fast-growing demand regime (post-liberalisation period)						
1991–2005	4.18	3.43	0.75	12.50	2.38	1.82

Note: The average (instantaneous) growth rates are derived from log-linear (log-lin) trend models (see the endnote of Figure 1).

growth to productivity growth if the natural growth rate is endogenous to demand. Indeed, government spending via its multiplier effect appears to have played a key role in lifting India's demand constraint. The causality mechanisms in equation (4b) describe the government-led expenditure shift from A to B in Figure 3.

Despite the important role that government spending may have played in lifting India's demand constraint, the BPC model in equation (6) predicts that such a strategy is unsustainable. Although a government-led strategy fulfils the role of raising demand growth to its maximum potential rate (point B in Figure 3), this will come at the cost of an ever-growing foreign debt burden:

$$\text{Government spending} \Rightarrow (g'_{d/p} = g_{n/p}) \Rightarrow \text{Rising foreign debt burden} \quad (14)$$

Table 1 shows that the fitted value of the BPC growth rule in column (B) is much lower than the actual growth rate in column (A), with a difference of 2.27 percentage points over the period 1980–90. The BPC growth model in equation (6) gives an accurate prediction of how the *actual events* unfolded in the Indian economy. Because demand growth was above the rate consistent with current account solvency during 1980–90, foreign debt gradually accumulated over time and eventually led to the balance-of-payments crisis of 1991. The deteriorating current account ratio over time in Figure 2 captures the rising foreign debt burden during the 1980s.

The accurate prediction of the BPC growth model implies that relative prices did not work as an efficient balance-of-payments adjustment mechanism during the 1980s. Negligible import volume effects are consistent with the econometric results presented earlier. On the other hand, export volume effects are contained in the growth of exports variable. Column (D) in Table 1 shows that the difference between pre-liberalisation export growth in the fast-growing regime (1980–90) and slow-growing regime (1952–79) is negligible. However, since we are assuming that everything else remains constant, the difference between average export growth rates across regimes is only a crude indicator. More robust inferences can be drawn from an estimated export demand function. Caporale and Chui (1999) find that the real effective exchange rate impacts insignificantly on export demand. Razmi (2005), in contrast, reports significant price effects. Nevertheless, the important point to stress is that relative price changes could not prevent the accumulation of foreign debt and the eventual balance-of-payments crisis of 1991.

6.3 Fast-growing demand regime (post-liberalisation period: 1991–2005)

If government spending was unsustainable due to a balance-of-payments constraint on demand, how did India manage to sustain demand growth at the natural rate? Consistent with the prediction of the sustainable debt dynamics equations (equations (6') and (7)), Figure 2 shows a permanent improvement in the current account deficit ratio from its 1990 level. In addition, equation (7) states that the only way in which an economy can sustain demand growth at the natural rate is through a permanent rise in export growth. Going back to the empirical results in Table 1, it can be seen from column (D) that export growth surged to an average annual rate of 12.50% in

¹⁷ Razmi's (2005) analysis shows that the trend break in real exports precedes the post-1990 reforms; faster export growth is already visible since the late 1980s. The BPC growth rule, however, is applicable over the medium- to long-term. Over the medium-term (1980–90), export growth averaged 3.85%, which is indistinguishable from its pre-1980 average. The increase in export growth during the late 1980s may reflect an attempt by policy makers at the time—through a depreciation of the real exchange rate and export subsidies—to stabilise the demand-driven deterioration in the current account deficit.

the post-liberalisation period (1991–2005) compared with its pre-liberalisation levels of 3.84% in 1952–79 and 3.85% during the 1980s.¹⁷ The BPC growth rule in Table 1 retains its predictive power in the post-liberalisation period (1991–2005). The difference between the actual and predicted growth rate is now 0.75 percentage points compared with the large difference of 2.27 percentage points in the pre-liberalisation period (1980–90). The empirical evidence supports the main proposition of the BPC growth model in equation (7): namely, that for a given level of capital inflows, exports are the only component of expenditure that can simultaneously sustain demand growth at its maximum rate and avoid a deteriorating current account deficit over time.

As far as government spending is concerned, the immediate response to the balance-of-payments crisis was to cut the fiscal deficit as a percentage of GDP from 10.4% in 1990 to 7.71% in 1991. However, it is striking to note that the average fiscal deficit-to-GDP ratio of 9% during the post-liberalisation period (1991–2005) was not lower than the average rate of 9% ($\approx 8.91\%$) in the 1980s. Within the theoretical framework of the BPC growth model in equation (7), faster export growth allowed government spending to remain at a high level. This is the indirect effect of export growth working through Hicks's super-multiplier mentioned earlier (McCombie, 1985).

The overall effect of faster export growth was to improve the balance-of-payments position of India without contracting demand growth below its maximum potential rate to preserve current account solvency. Through its indirect effect on income growth, export growth seems to have played a crucial role in sustaining demand growth at the natural rate (point B in Figure 3) in the post-liberalisation period (1991–2005):

$$\text{Export growth} \rightarrow \text{Expenditure} \Rightarrow (g'_{d/p} = g_{n/p}) \Rightarrow \text{Current account solvency} \quad (15)$$

where the single arrow (\rightarrow) indicates that export growth 'allowed' rather than 'caused' expenditure (including government spending) to grow at a fast rate.

7. Export growth in the post-1990 period

A major policy question is what exactly caused India's export surge in the post-1990 period. Although the evidence presented thus far is consistent with a demand-led growth transition, it is also informative to analyse whether the post-1990 surge in export growth has a significant demand-side explanation. In this way it may be possible to explain India's growth transition in a 'fully' demand-determined framework. In addition, in the spirit of Kaldor's and Verdoorn's law, this section highlights the importance of the manufacturing sector in India's 1980 growth transition, notwithstanding the impressive growth performance of services and its dominance in the composition of aggregate GDP.

7.1 Post-1990 export growth: a BPC growth model perspective

A useful starting point is to reiterate that India's historical growth experience is consistent with the causality predictions of the demand-constrained balance-of-payments model. Recall that the model predicts causality from the BPC growth rule to demand ($g_{d/p}$) and productivity growth ($g_{n/p}$):

$$\left(\frac{x = \varepsilon \times z}{\pi} - p \right) \Rightarrow g_{d/p} \Rightarrow g_{n/p} \quad (16)$$

where the income elasticity of demand for exports (ε) captures the structural demand characteristics of export goods and services for a given growth rate of world income (z). The empirical results in the previous section support the causality predictions of equation (16): India managed to sustain demand growth at its maximum potential rate by lifting the balance-of-payments constraint on demand through rapid export growth.

On the surface, however, it would appear as if India's export surge in the post-1990 period has an essentially supply-side explanation. The conventional story is that trade liberalisation measures eliminated the anti-export bias through a reduction in the factor costs of exportables, which created more profitable export opportunities and allowed India to utilise its latent comparative cost advantage in software design (see [Trindade, 2005](#)). This interpretation would emphasise the success of pro-market Washington Consensus-type reforms that are primarily concerned with the supply side of the economy. [Goldberg et al. \(2010\)](#) further show that trade liberalisation in India's post-1990 period reduced the cost of imported intermediate inputs, which allowed firms to significantly expand their product scope. Greater product variety may have raised export growth through the channels suggested by [Krugman's \(1989\)](#) 45-degree rule.

Although the supply-side explanations of rapid export growth in India's post-1990 period all have plausibility, it would be highly misleading to disregard the role of demand. Indeed, India's experience with trade liberalisation is the exception rather than the rule (see [Thirlwall and Pacheco-López, 2008](#)). Like India, most developing countries have experienced a sharp rise in their income elasticity of demand for imports during post-liberalisation periods. But unlike India, the majority of developing countries have struggled to match faster import growth with faster export growth. One of the underlying reasons, as propagated by [Thirlwall and Pacheco-López \(2008\)](#), is that the dynamic gains from trade do not materialise if trade liberalisation, based on the comparative cost advantage doctrine, forces countries to specialise in diminishing returns to scale activities, such as primary products. The net result has been a lower BPC growth rate and/or balance-of-payments crises when countries have tried to maintain demand growth at its maximum potential rate.

The gist of the story is that trade liberalisation is not an assured recipe for success if the structural demand features of export goods and services are unattractive to foreign consumers. For policy purposes the challenge, then, becomes how to improve the structural demand characteristics of export goods and services (ε) in equation (16), which in the long term will relax the balance-of-payments constraint on demand and productivity growth. Given the model's assumption of endogenous productivity growth (via the Kaldor–Verdoorn law), structural change in itself would require careful demand management policies.

To show how demand-side measures can generate structural change within the theoretical framework of the BPC model, equation (5) in an economy's slow-growing regime (*SGR*) can be rewritten in the following way:

$$\pi = f(\text{import substitution}) \Rightarrow (g_{d/p})^{SGR} \Rightarrow (g_{n/p})^{SGR} \Rightarrow \text{Trade liberalisation} \Rightarrow \uparrow \varepsilon \Rightarrow \uparrow x \quad (17)$$

Consistent with the BPC model and [Prebisch's \(1950, 1959\)](#) classic centre–periphery model, a low income elasticity of demand for imports (π) is the outcome of an import substitution strategy. A restrictive trade regime, in turn, generates domestic demand $(g_{d/p})^{SGR}$ consistent with current account equilibrium and, via Kaldor's and

Verdoorn's law, faster productivity growth ($g_{n/p}$)^{SGR}. In the long term, trade liberalisation will allow the economy to utilise its policy-induced comparative advantage through a higher income elasticity of demand for exports (ϵ).¹⁸ Faster export growth (x), and hence faster output growth for a given income elasticity of demand for imports in the post-liberalisation period, is therefore the endogenous outcome of protectionist demand-side policy measures.

Equation (17) gives a 'pure' demand-side explanation of structural change and export growth. In addition to import substitution, export-promoting policies can also lift the balance-of-payments constraint on demand. Although these policies are generally associated with supply-side measures, it is important to emphasise that the combination of export promotion and import substitution is consistent with the theoretical framework of the BPC model. Indeed, export promotion, such as targeted research and development (R&D) spending to industries with export potential, together with import substitution is arguably the most efficient way to relax a balance-of-payments constraint on demand and productivity growth. Equation (17), however, serves as a useful starting point from which to analyse whether export growth is the endogenous outcome of demand-side measures.

How well does India's growth experience fit the demand-side explanation of faster export growth in equation (17)? It is well known that India implemented a restrictive trade regime of import substitution over the period 1955–90 and that export-promoting policies were not nearly as prominent as they were in East Asian countries.¹⁹ Together with India's import substitution strategy, the expenditure-led productivity surge during the 1980s, which occurred under increasing effective protection rates, may have played a crucial role in speeding up the process of structural change from the demand side. Rodrik and Subramanian's (2005A) panel data analysis shows that India's productivity surge in the 1980s was largely driven by fast growth in registered manufacturing. Their results suggest that manufacturing growth may have affected economy-wide growth through spillover effects on other sectors of the economy. In particular, the service sector appears to have been the main recipient of these spillover effects, while information technology (IT)-related services may also have benefited from the demand-creating effect of rapid growth in manufacturing. In this way, as argued in Rodrik and Subramanian (2005A), IT companies such as Wipro and Infosys

¹⁸ There are several key differences between the BPC-Prebisch (BPC-P) model of structural change and Krugman's (1989) 45-degree rule (also see McCombie, 2011). First, in the BPC-P model, structural change from the demand side occurs over the long-term, because it takes time to change the structure of an economy out of diminishing returns activities, such as agriculture, into increasing returns activities, such as manufacturing. An exogenous shock to demand growth over the medium-term will therefore lead to balance-of-payments problems. In Krugman's model, on the other hand, the income elasticities (ϵ and π) in the balance-of-payments growth rule adjust endogenously in response to an exogenous supply shock that raises productivity growth and product variety, so that a balance-of-payments constraint is never encountered. Third, it follows that Krugman's model is more relevant in a situation where a relatively strong industrial base already exists, given the model's a priori assumptions of monopolistic competition and increasing returns. The BPC-P model, in contrast, is more applicable to a typical developing country that is in the process of changing its structure of production to increasing returns activities.

¹⁹ For an historical overview of India's trade regime, see Athukorala and Sen (2002) and Panagariya (2005, 2008). Despite some non-trivial policy reforms during the 1980s (Panagariya, 2005, 2008), Goldberg *et al.* (2010), Rodrik and Subramanian (2005A) and Srinivasan (2005) emphasise the highly restrictive nature of India's trade regime during the 1980s compared with the post-1990 liberalisation period. In fact, effective protection rates increased during the 1980s (see Table 6 (p. 207) and Figure 4 (p. 208) in Rodrik and Subramanian (2005A)).

could first establish themselves in the pro-business environment of the 1980s, before venting their services towards export markets in the post-1990 liberalisation period.

Rapid demand-led growth during the 1980s, coupled with fast growth in manufacturing and services, seems to be consistent with a Kaldorian view of the development process.²⁰ There is, however, a main qualification. The service sector (especially IT-related services) in India appears to be an increasing returns to scale activity, rather than a diminishing returns to scale activity, as portrayed by Kaldor's (1966, 1967) growth laws (see Dasgupta and Singh, 2005).

The importance of services in the Indian economy implies that the Kaldor–Verdoorn law should be modified to include services and not only manufacturing as an increasing returns to scale activity. Although manufacturing played the leading role during the 1980s, it most certainly benefited from IT-related services in the post-1990 period. The dynamic role of services in the Indian economy, however, does not weaken the predictive power of the BPC model or undermine its demand-oriented framework, even though the model was originally developed to emphasise the leading role of manufacturing.²¹

To summarise, India's post-1990 export surge can be explained within the demand-oriented framework of the BPC growth model in equation (17). A trade strategy of import substitution over the period 1955–90 together with demand-led productivity growth during the 1980s played a key role in changing the structural demand features of goods and services away from diminishing returns activities, such as agriculture, into increasing returns activities, such as manufacturing and IT-related services, thereby raising the income elasticity of demand for exports (ϵ) in the post-1990 liberalisation period.

India's demand-led growth transition, however, presents an interesting paradox. Although government spending contributed to the balance-of-payments crisis of 1991, which makes the BPC growth rule exogenous in one way, it also played a significant role in improving India's balance-of-payments position through demand-led structural change (via Kaldor's and Verdoorn's law) that preceded the post-1990 liberalisation measures, which makes the BPC growth rule endogenous in another way.

India's unique country characteristics—such as a large domestic market and relatively equal distribution of income during the 1980s—may (among others) explain why its government spending/import substitution strategy was relatively effective in speeding up the process of structural change from the demand side. In a 'typical' developing country with a small domestic market and unequal distribution of income, a government-led expenditure strategy will not generate the necessary structural change,

²⁰ Consistent with the central theme in Rodrik and Subramanian (2005A), the demand-led explanation in this paper stresses the importance of India's growth performance during the 1980s, as opposed to many studies that have focused on the growth effect of the post-1990 liberalisation measures (see the overview in Section 2 and additional studies by Goldberg *et al.* (2010) and Madsen *et al.* (2010) that exclusively focus on the post-1990 period). The main difference, however, is Rodrik and Subramanian's contention that growth during the 1980s was supply driven, whereas this paper emphasises the demand-driven nature of rapid growth in manufacturing and services.

²¹ Recall that the empirical fit of the BPC model captures the role of goods and services and not only goods. As before, faster demand growth, through rapid export growth of goods and services, generates productivity growth in the manufacturing and service sectors. However, because the service sector is now also assumed to be dynamic, productivity growth in this sector is generated through increasing returns, rather than the transference of labour out of services into manufacturing, as hypothesised in Kaldor's (1966, 1967) original growth laws.

but instead create balance-of-payments problems at an early stage of the demand-led growth transition. In contrast, India managed to sustain demand growth in this way for more than 10 years.

Finally, the demand-side explanation of India's export surge does not rule out the importance of supply-side factors in determining the structural characteristics of exports. The most apparent supply-side explanations include India's investment in higher education and R&D subsidies (Madsen *et al.*, 2010). Nevertheless, given the strong evidence of demand-led growth in the Indian economy, these factors are not strictly exogenous to demand but also endogenous. In the spirit of Kaldor's and Verdoorn's law, corporate R&D spending responds to a large and growing domestic market, whereas demand-induced growth in manufacturing and services leads to learning by doing and on-the-job training.

8. Conclusions

This paper has formalised the BPC growth model in a two-regime framework to re-examine India's growth transition in 1980 from a demand-side perspective, as an alternative to the 'supply-oriented' approaches of previous studies. The empirical results provide strong evidence of a demand-led growth transition in the Indian economy. Moreover, the two-regime framework makes it possible to interpret the empirical results in a causal sense. In particular, the evidence suggests that causality runs from the BPC growth rule, via its constraint on demand, to productivity growth. This is in contrast to Krugman's (1989) 45-degree rule, in which supply-induced productivity growth raises the endogenously determined balance-of-payments growth rate. The empirical findings, therefore, support the key predictions of the two-regime BPC growth model and can be summarised as follows.

First, although the large fiscal expansion of the 1980s fulfilled the role of moving the Indian economy out of its slow-growing demand regime (1952–79) into a faster-growing demand regime (1980–90), it also contributed to the deterioration in the current account deficit over time and the eventual balance-of-payments crisis of 1991. Second, in contrast to conventional growth theory, the unsustainable nature of government spending was not the result of demand growth in excess of *fixed* supply capacity, but rather because of a balance-of-payments constraint on demand. Third, India managed to sustain demand growth at its maximum rate in the post-liberalisation period (1991–2005) by relaxing the balance-of-payments constraint on demand through exports. Faster export growth stimulated demand growth indirectly by *allowing* expenditure (including government spending) to remain at a high level in the post-liberalisation period. Fourth, it was argued that the underlying cause of fast export growth in the post-1990 liberalisation period has a significant demand-side explanation. Although trade liberalisation measures created more profitable export opportunities from a cost perspective, these profitable export markets also reflect the attractive structural demand features of export goods and services. From the demand side, these structural changes were brought about by a restrictive trade regime of import substitution and rapid demand-led productivity growth during the 1980s that preceded the post-1990 liberalisation measures.

Paradoxically, although government spending contributed to the balance-of-payments crisis of 1991, which makes the BPC growth rule exogenous in one sense, it also

accelerated the process of structural change from the demand side (via Kaldor's and Verdoorn's law) and improved India's balance-of-payments position in the post-1990 period through faster export growth, which makes the BPC growth rule endogenous in another sense. Superficially, trade liberalisation raised export growth, but in reality it also had a lot to do with import substitution and demand-led productivity growth in the pre-liberalisation period.

Lastly, despite the importance of the service sector in India, it was argued, based on [Rodrik and Subramanian's \(2005A\)](#) panel data analysis, that the registered manufacturing sector played the leading role during the first phase (1980s) of India's growth transition, which, in turn, laid the foundation for the impressive growth performance of services during the second phase (post-1990 liberalisation period). Nevertheless, when interpreting the Kaldor–Verdoorn law in the Indian economy, it should be acknowledged that a part of services also qualifies as an increasing returns activity and not only manufacturing.

The evidence presented in this paper establishes, in general, the primacy of demand growth operating through the balance-of-payments constraint and endogenous productivity growth in India's growth performance. However, it leaves out several important issues for a more complete understanding of India's growth experience. At least three major areas are identified. First, consistent with the theoretical framework of the BPC model, the combination of export promotion and import substitution is arguably the most efficient way to lift a balance-of-payments constraint on demand and productivity growth. The exact reasons why export-led growth did not feature more prominently in India's pre-1991 period compared with East Asian countries would require an in-depth political-economy analysis, which falls beyond the scope of the present paper.²² Second, since India has historically imported more than it has exported, the BPC growth model augmented for capital flows may provide an essential extension. Third, although the focus of this paper has been on growth rather than the interrelationship between growth and the distribution of income *per se*, it is imperative to establish what impact faster growth has had on the position of the poor.²³ [Bhaduri \(2008B\)](#) provides a more balanced political-economy understanding of what rapid growth means in India's post-1990 liberalisation period.

²² For now, it is sufficient to offer the following political-economy explanation. An apparent economic reason is dynamic and static economies of scale associated with India's large domestic market. From a political perspective, India's strained relationship with the USA over the period 1965–81 may explain why the economy went deeper into import substitution, rather than greater integration with the world economy (see [Panagariya, 2008](#)). Furthermore, as an anonymous referee pointed out, several (politically motivated) bilateral trade arrangements between East Asian countries, the USA and Western European countries may have significantly eased their access to foreign markets. India, however, never had such privileged access during any stage of its growth phases.

²³ The saving/investment model proposed in this paper applies to a one-sector economy, so the shift from a slow-growing demand regime into a faster-growing one occurs through income changes and not the redistribution of income (see equations (4a) and (4b)). [Bhaduri \(2008A\)](#), however, generalises the one-sector case to show that adjustment can simultaneously occur through income changes and the redistribution of income from wage earners to profit earners.

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Appendix A

Derivation of the equilibrium growth rate²⁴

The warranted growth rate per person ($g_{w/p}$) is defined as the rate that induces just enough investment demand to match planned saving. When an economy grows at this rate, its capital stock is fully employed, without undercapacity or overcapacity. To formally derive the warranted growth rate per person, first consider plans to save at any point in time, as given by the Keynesian saving function:

$$S = sY \quad (\text{A1})$$

where S is saving, s is the propensity to save and Y is income. The saving equation gives the expected supply of investment goods. The demand for investment is given by:

$$\frac{I}{Y} = c_r (g_{d/p}) \quad (\text{A2})$$

where I/Y is the investment-to-income ratio, $g_{d/p}$ is the growth rate of demand per person and the coefficient c_r measures the required investment to produce a unit increase of output per person at a given interest rate, i.e. $c_r = (I)/(\Delta Y - p)$. Dividing equation (A1) by Y and setting planned saving in equation (A1) equal to planned investment in equation (A2), we have:

$$s = c_r (g_{d/p}) \quad (\text{A3})$$

The warranted growth rate per person ($g_{w/p}$) that keeps planned investment equal to planned saving can be derived from equation (A3) as:

$$g_{d/p} = \frac{s}{c_r} = g_{w/p} \quad (\text{A4})$$

Capital is fully employed when the growth rate of demand per person $g_{d/p}$ is equal to the warranted growth rate per person $g_{w/p}$:

$$g_{d/p} = g_{w/p} \quad (\text{A5})$$

²⁴ This section draws on Thirlwall (2006).

In the long term, a country's maximum *potential* growth rate is given by:

$$g_{n/p} \approx q \quad (\text{A6})$$

where the natural growth rate per person ($g_{n/p}$) approximates labour productivity growth (q) on the assumption that the labour force participation rate remains relatively stable over time. Labour is fully employed (in the sense that the unemployment rate remains constant) when demand per person grows at the same rate as the natural growth rate per person:

$$g_{d/p} = g_{n/p} \quad (\text{A7})$$

From equations (A5) and (A7), the full employment of labour and capital requires:

$$g_{d/p} = g_{w/p} = g_{n/p} \quad (\text{A8})$$

Appendix B

Table B1. *India's variable definitions and sources*

Variable	Description	Source
(ln) Y	Natural logarithm of GDP volume (2000 = 100)	International Financial Statistics
(ln) M	Natural logarithm of real imports. Imports of goods and services deflated by the import unit value series (MP)	International Financial Statistics
(ln) RPM (= MP/P)	Natural logarithm of relative prices	International Financial Statistics
MP	Import prices (unit value of imports)	International Financial Statistics
P	Domestic prices (wholesale prices)	International Financial Statistics
Gross fiscal deficit to GDP (at factor cost)	Consolidated fiscal deficit	1970s, Rodrik and Subramanian (2005A) ; 1980–2005, Reserve Bank of India
Real export growth rate (x)	Exports of goods and services deflated by the export unit value series. The average real export growth rates were derived from log-lin trend models	International Financial Statistics
Population growth rate (p)	The average population growth rates were derived from log-lin trend models	International Financial Statistics
Dummy (D)	Equals 1 in the post-liberalisation period (1991–2005); 0 otherwise	Captures structural change in import demand equation (9) following trade liberalisation measures initiated in 1991

Note: The dataset is annual and covers the period 1950–2005. Due to lagged variables, the sample period is reduced to 1952–2005.

Appendix C

Derivation of the sustainable debt dynamics equation (6')

To explicitly show how foreign debt and interest payments feature in equation (6'), the analysis combines the summary derivation provided in Thirlwall (2011) with the dynamic debt equation in McCombie and Thirlwall (1997A). As a starting point, consider the current account of a country from an initial deficit position:

$$P_d X + F P_d = P_f M E \quad (C1)$$

where P_d is the domestic price of exports; X is the quantity of real exports; F is the current account deficit in real terms; $F P_d$ is nominal capital inflows (C) to finance the deficit ($C > 0$); P_f is the foreign price of imports; M is the quantity of real imports; and E is the nominal exchange rate measured in units of domestic currency per unit of foreign currency.

The export and import demand functions are specified as

$$X = a \left(\frac{P_d}{P_f E} \right)^\eta Z^\varepsilon \quad (C2)$$

and

$$M = b \left(\frac{P_f E}{P_d} \right)^\psi Y^\pi \quad (C3)$$

where Z measures world income; Y measures domestic income; η is the price elasticity of demand for exports (< 0); ε is the income elasticity of demand for exports (> 0); ψ is the price elasticity of demand for imports (< 0); and π is the income elasticity of demand for imports (> 0).

Following McCombie and Thirlwall (1997A), the dynamic debt equation is given by:

$$\Delta D = F = -TB + rD = F_1 + F_2 \quad (C4)$$

where ΔD is the change in real debt; F is real capital inflows that include foreign borrowing to finance the deficit on the trade balance ($M - X = -TB = F_1$) and real interest repayments (r) on accumulated debt ($rD = F_2$).

Transforming equation (C1) into rates of change gives:

$$\theta (p_d + x) + (1 - \theta)(f + p_d) = m + p_f + e \quad (C5)$$

where θ is the export-to-import ratio at nominal prices that measures the proportion of the import bill financed by export earnings and the lower-case letters represent growth rates of variables. Because the economy starts off from an initial current account deficit position in equation (C1), the export-to-import ratio is, by construction, less than one ($\theta < 1$).

Returning to the analysis in Thirlwall and McCombie (1997A), sustainable debt dynamics imply a fixed debt (D)-to-GDP (Y) ratio. In growth rates we therefore have $d = y$. Since $\Delta D = F$ in equation (C4), the growth rate of real debt can be written as $\Delta D/D = d = F/D = y$. From $F/D = y$, and assuming that the growth rate of income (y) is

constant, the growth rate of net capital inflows is equal to the growth rate of real debt: $f = d$. Given $d = y$, the condition for sustainable debt dynamics states that the growth rate of net capital inflows must be equal to the growth rate of real income: $f = y$.

Substituting equations for the growth rate of exports and imports in equations (C2) and (C3) into equation (C5), and using the condition for sustainable debt dynamics ($f = y$), gives:

$$y = \frac{\theta \varepsilon z + (\theta \eta + \varepsilon + 1)(p_d - p_f - e)}{\pi - (1 - \theta)} \quad (C6)$$

If it is assumed that the terms of trade are constant ($p_d - p_f - e = 0$), then on the same assumption we have $\varepsilon z \approx x$. Given these assumptions, the constrained growth rate consistent with a fixed deficit or debt-to-GDP ratio can be written as:

$$y^* = \frac{\theta x}{\pi - (1 - \theta)} \quad (C7)$$

Since the BPC growth rate determines the growth rate of demand ($y^* = g_d^*$), equation (C7) in per capita terms is given by:

$$g_{d/p}^* = \left(\frac{\theta x}{\pi - (1 - \theta)} - p \right) \quad (C8)$$

which is the sustainable debt dynamics equation (6') in the main text. With no deficit, $\theta = 1$ and equation (C8) reduces to the simple BPC growth rule. Alternatively, with a surplus $\theta > 1$, we have the BPC growth rate consistent with a fixed surplus-to-GDP ratio.