Revisiting Latin America’s debt crisis: some lessons for the periphery of the eurozone

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A Domar–Pasinetti model of an emerging-market open economy with output growth endogenous to aggregate demand is presented, with foreign debt, interest and exchange rates playing a relevant role in the dynamics of the debt-to-GDP ratio \(d\). The model is used to assess the macroeconomic effects of the orthodox policy (fiscal austerity) implemented by policy makers to cope with the foreign debt crisis of Latin America in the 1980s. Such policy involved high costs in terms of welfare, job and output losses to no avail, since the region’s financial fragility remained largely unresolved, in the end resulting in the so-called ‘lost decade’. The main policy insight of Domar’s and Pasinetti’s analysis, we argue, posits a pro-growth expansionary policy as the most efficient strategy to abate and bring \(d\) to a sustainable path. Finally, we contend that Latin America’s experience provides insight for dealing with the ongoing crisis of the periphery of the eurozone.

**Key words:** Sustainable fiscal balance, Crisis, Europe, Latin America

**JEL classifications:** E32, E43, O520, O540

1. Introduction

Domar (1944) presents a dynamic model of public debt where the net income of the non-bondholders and the tax rate are the main variables for understanding the debt conundrum. Pasinetti (1997), in turn, elaborating on Domar’s contribution, maintains that the dynamics between growth and interest rates is the main aspect in the analysis of debt evolution and growth. While Domar and Pasinetti dealt with a closed system, this paper develops a model of an emerging-market open economy. It is aimed at both evaluating the macroeconomic consequences of the orthodox policy adopted to cope with Latin America’s foreign debt crisis of the 1980s and deriving some lessons for dealing with the ongoing crisis in the eurozone. The paper also aims to show that the conventional policy stance of Latin American governments, mainly focused on fiscal austerity, was extremely costly in terms of welfare and economic growth. We argue that conventional policy made it more difficult for the region to stabilise the...
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debt-to-GDP ratio \( (d) \); it involved large costs in terms of productivity, welfare and institutional losses. Further, we contend that Latin America’s experience may also be a source of lessons for some euro countries currently undergoing financial distress and facing a set of austerity policy responses akin to those popular in Latin America at the onset of the debt crash.

As is generally known, the major Latin American countries experienced a foreign debt crisis that erupted on 13 August 1982 and lasted for the rest of 1980s, thus producing the infamous ‘lost decade’. Orthodox views traced the origin of the debt crisis to some domestic factors in Latin America, such as the mismanagement of public finances and exchange rates, whereas unorthodox analysis stressed various international variables, such as interest rate hikes resulting from the Fed’s tight monetary policy implemented to cope with the US stagflation calamity of the 1970s, deteriorating terms of trade and declining export volumes associated with the world economic recession (cf. Cline, 1984; Enders and Mattione, 1984; Pastor, 1987).

By and large, both inside and outside factors combined to produce the most dramatic financial crisis in Latin America since the Great Depression of the 1930s. It can be said, with hindsight, that the appropriate response to that financial convulsion was not based on an accurate analysis of both its nature and deep causes. At the onset of the debt crisis, Latin America found itself trapped between the Scylla of fiscal consolidation and the Charybdis of expansionary government intervention. Policy makers faced a dilemma: either fiscal deficits caused the crisis or, on the contrary, fiscal deficits were just the consequence of other more fundamental factors. The first hypothesis suggests fiscal austerity imparts expansionary effects and rebalances the budget (Alesina and Ardagna, 1998, 2009; Perotti, 2011), whilst the second view favours Keynesian pro-growth strategies. The first option implies a debt-deflation route towards stabilisation; the Keynesian alternative implies debt stabilisation is best served by fiscal stimulus when monetary policy loses all its traction at near zero interest rates (Keynes, 1936; Minsky, 1986; Palley, 2010; Eggertsson and Krugman, 2012).

Latin American policy makers, with the advice of the International Monetary Fund (IMF), took the first choice in the 1980s. Although empirical assessments revealed fiscal deficits were much less significant than external variables at causing the financial crash (Khan and Knight, 1982; Pastor, 1987), fiscal profligacy was officially perceived as the origin of the crisis (cf. Balassa et al., 1986; Díaz-Alejandro, 1984; Wiesner, 1985, p. 191). Debtor governments then turned to the IMF for support to handle the debt crisis and rescue them out of the financial commotion. The IMF’s canonical model envisages irresponsible public borrowing as the main source of the crisis; it makes financial support to insolvent emerging market governments conditional upon the adoption of restrictive fiscal and monetary policy rules, with primary fiscal surplus and exchange rate as two key policy instruments for the achievement of the inflation target and balance-of-payments stability (Mussa and Sevastano, 1999; FitzGerald, 2005). The reliance on fiscal austerity is taken to elicit the required domestic private sector response to the orthodox course of action for the resumption of sustainable long-term output growth. The question is whether the proponents of so-called expansionary fiscal adjustment address the effects rather than the causes of the debt crisis. Aglietta (2011), for example, has argued that the fiscal consolidation approach mistakes the symptom for the disease.

Our empirical analysis is based on data for Argentina, Brazil and Mexico and the periphery of the eurozone. The Latin American countries stuck to IMF policies and
were the most affected by the foreign debt crisis of the 1980s. We argue that those countries’ governments’ attempts to get a grip of the debt problem through conventional policies worsened the conditions for debt stability, because such policies reduced the growth rate of the economy. As Domar (1944, p. 822) put it, ‘the problem of the debt burden is essentially a problem of achieving a growing national income’. Indeed, in a steadily and vigorously growing economy, the debt-to-GDP ratio \(d\) can be stable indefinitely as long as output outgrows debt. This was not the case for Argentina, Brazil and Mexico during the whole 1980s.

Following Domar (1944), Professor Luigi Pasinetti (1997) emphasised the role of the interest rate in public debt sustainability. He derives three possible cases for the relationship between the rate of interest \(i\) and the growth rate of output \(g\): if \(g > i\), \(d\) will tend to zero; if \(g = i\), \(d\) will remain constant and, finally, if \(g < i\), \(d\) keeps growing constantly. Clearly, in Pasinetti’s view the rate of interest is the key variable to determine both the evolution of \(d\) and the tax that must be imposed ‘in order to pay for the interests’, thus keeping \(d\) constant.

Domar (1944) and Pasinetti (1997) deal with a closed economy where debt is denominated in domestic currency. The situation is somewhat different when dealing with a small open economy where debt is denominated in foreign currency and potential economic growth is endogenous to aggregate demand fluctuations. In this case the model must be extended to include the following: the exchange rate as a key determinant of the growth rate of total debt (in particular, the foreign debt); the interest rate as an exogenous variable (exogenous to the national monetary authority); aggregate demand variables, such as government spending, wages, etc.; and the trade balance of goods and services and the external asset–liability position of the economy.

The present paper introduces some analytical innovations vis-à-vis the existing relevant literature. It extends the Domar–Pasinetti analysis for the case of open emerging economies facing distressing foreign debt and lack of autonomous monetary policy. We assume potential growth is endogenous to aggregate demand,\(^1\) thereby fiscal austerity (stimulus) adds to negative (positive) impact on economic recovery and unsustainable (sustainable) trajectories of fiscal balance and public debt. Our model goes beyond that of Marquetti et al. (2010), in that it derives a warranted growth rate of output that keeps the debt-to-GDP ratio stable. Also, our model implies that the fiscal consolidation approach aimed at reducing the public debt-to-GDP ratio, as applied in the past (1980s) in Latin America and in the present time in Greece and other peripheral economies of the eurozone, simply makes it more costly for such countries to cope with the macroeconomic effects of a financial crisis and, above all, to recover the pre-crisis output and employment paths as the hysteresis effect of recessions tend to generate persistent output, productivity and employment losses in the longer term (Ros, 2013).

\(^1\) Needless to say, the growth rate of output also depends on the supply of capital, land and labour and, certainly, capacity constraints prevent higher levels of economic activity when supply happens to be inelastic as all productive resources are fully utilised. On the other hand, supply is said to be elastic under less than full employment of productive capacity, in which case aggregate economic activity will react to fluctuations in effective demand. At the more observable level, excess productive capacity and surplus labour are two known stylised facts of developing economies (Lewis, 1954; Kaldor, 1967; Kalecki, 1976; Thirlwall, 2002; Ros, 2013). In particular, productive resources become unutilised during economic recessions; hence supply constraints are not there in crisis times. The relevance of aggregate demand in long-term output growth is consistent with empirical evidence, albeit demand is ruled out in mainstream growth theory. For example, in the aftermath of the debt crisis of the 1980s, demand constraints averted the full utilisation of productive capacity in Latin America; the same is true of the current crisis in the periphery of the eurozone.
Apart from very few exceptions (see Aspromourgos et al., 2010; Marquetti et al., 2010), the critical analysis of Domar and Pasinetti on the stabilisation of public debt has been wholly overlooked in the ongoing debate on the debt crisis. While stating the plausibility of Keynes’s theory of the rate of interest and demand-determined growth, Aspromourgos et al. (2010) reappraise the path of debt sustainability as determined by the nominal interest rate and the nominal growth rate of the economy. On the other hand, Marquetti et al. (2010) build an open-economy version of the Domar–Pasinetti analysis, with the aim of discussing the dynamics of the exchange and interest rates for the case of the Brazilian economy. While Aspromourgos et al. (2010) study a closed economy with domestic debt, in Marquetti et al. (2010) output growth is assumed exogenously determined, in which case fiscal austerity need not hurt the growth rate of economic activity and employment. We, instead, provide an open-economy extension of the Domar–Pasinetti model for the emerging economy with foreign debt and demand-constrained output growth, where fiscal adjustment is shown to induce contractionary effects rather than expansionary ones as entertained by Alesina and Ardagna (1998, 2009) and Perotti (2011).

Greece, Portugal, Spain and other eurozone economies have plunged into recession since early 2010. Their governments are embracing fiscal austerity policies under the presumption that the convulsion was caused by fiscal profligacy. On the basis of both our model and the Latin American experience, it seems reasonable to maintain that fiscal austerity will only worsen the position of the eurozone countries, since income reductions tend to outstrip budget cuts. The composition of the paper is as follows. Section 2 presents an open-economy version of what we call the Domar–Pasinetti model, from which the dynamic conditions for financial stability are obtained. Section 3 summarises the main economic consequences of the Latin American debt crisis. Section 4 contains some final remarks that refer to lessons derived from Latin America’s experience for the eurozone periphery facing a financial crisis.

2. An open-economy Domar–Pasinetti model

A formal definition of the primary fiscal deficit, splitting public debt into its domestic and foreign components is:

\[
(G - T) = a(D_d + eD_f) - i(D_d + eD_f)
\]

where \( G \) denotes the current public expenditure net of interest payments; \( T \) is the tax revenue collection defined as \( T = tY + T_0 \), where \( t \) is the tax rate, \( Y \) is a two-period average level of nominal output that captures the Olivera–Tanzi effect and \( T_0 \) is autonomous taxation; \( D \) denotes the level of public debt; \( D_d \) and \( D_f \) are debt denominated in local and foreign currency, respectively; \( i \) denotes the interest rate on outstanding debt; and \( e \) is the exchange rate defined as units of domestic currency per one unit of foreign currency. Equation (1) implies that, ceteris paribus, rising interest payments...
may require new debt \((D_d + e D_f)\). If fresh loans are not available, taxes will rise or
government spending will diminish with a view to producing a primary fiscal surplus.

Changes in the debt-to-GDP ratio, \(d = (D_d + e D_f) / Y\), assuming \(D_d\) and \(e\) are con-
stant,\(^5\) are as follows:

\[
\frac{\dot{d}}{d} = \frac{D_f}{Df} - g
\]  

(2)

where \(g\) stands for the growth rate of nominal GDP. Solving equation (1) for \(\dot{D}\) and
reorganising equation (2) yields:

\[
\frac{\dot{d}}{d} = \frac{G - (t \dot{Y} + T_o) + e \dot{D}_f - D_d}{aD} - g
\]  

(3)

What is interesting about equation (3) is that it hints the required or warranted rate
of economic growth \((g_w)\) that keeps \(d = D/Y\) constant:

\[
g_w = \frac{T}{aD} + (\delta_d + e \delta_f) \dot{g} \]  

(4)

\(d\) is constant, since \(\dot{d} = 0\). \(\delta_d\) and \(\delta_f\) stand for the domestic debt share and
the foreign debt share in total public debt, respectively; \(\tau\) is the primary fiscal
deficit-to-GDP ratio.

Now, in Figure 1, \(g_w\) is upward sloping in \((g, i)\) space. This means that the economic
growth rate needed to keep \(d\) constant increases as \(i\) rises. \(g_w\) shifts with changes in the
primary fiscal deficit: \(g_w\) moves to the right (left) when the primary fiscal deficit goes
down (up); this means that, given the output growth rate, an interest rate \(i\) increase
(decrease) will keep \(d\) constant. This is shown in Figure 1: the warranted growth rate
function moves from \(g_w\) to \(g_w'\). On the other hand, exchange rate movements will
modify the slope of the warranted growth rate. Figure 1 shows the effect of currency
devaluation: the warranted growth rate function shifts from \(g_w\) to \(g_w''\).

Our Domar–Pasinetti equation can also be derived from the national income identity:

\[
Y + T + M = C + I + G + X
\]  

(5)

where \(Y\) is GDP, \(T\) denotes taxation, \(M\) is imports, \(C\) denotes consumption, \(I\) is invest-
ment, \(G\) is primary government expenditure and \(X\) denotes exports. Manipulation of
equation (5) obtains:

\[(G - T) = (S - I) + (M - X)\]  

(5')

where \(S\) stands for savings.

\(^4\) A dot over a variable denotes changes in its level with respect to time.

\(^5\) Otherwise, if \(D_d\) and \(e\) change, the following applies: \(\frac{\dot{d}}{d} = (\delta_d \dot{D}_d + \delta_f \dot{e} + \delta_e \dot{D}_f - g)\) (2'). Yet, this
does not alter the analysis below.
Now replacing equation (5′) in equation (3) yields:

\[
\frac{\dot{d}}{d} = \frac{(s-ip)+(m-x)}{ad} + (\delta_d + e\delta_f) i - g
\]

where \(s = S/Y\) is the propensity to save, \(ip = I/Y\) denotes the propensity to invest, \(m = M/Y\) is the propensity to import and \(x = X/Y\) is the propensity to export. This equation says that an increase in the fiscal deficit must be met by either foreign savings or domestic savings, or both. Clearly, equation (6) shows that increasing next exports and/or diminishing \(m\) tend to diminish \(d\). Equations (3) and (6) convey the double-transfer problem associated with the negative impact of fiscal austerity on income distribution, domestic growth and the sustainability of the debt-to-GDP ratio: on the one hand, austerity redistributes income from taxpayers (with a high propensity to consume) to domestic bond holders (with a lower propensity to consume); on the other hand, when \(\varepsilon D_t > 0\), interest payments on foreign debt will redistribute income from domestic taxpayers to foreigners,\(^6\) thereby aggravating the contractionary effect of fiscal austerity on domestic economic growth and employment (Bacha, 1992).

Next, assuming \(\dot{d} = 0\) and solving equation (6) for \(g\) yields:

\[
g_y^{w} = \frac{(s-ip)+(m-x)}{ad} + (\delta_d + e\delta_f) i
\]

Equation (6′) says that an increase in the propensity to export will reduce the growth rate needed to keep \(d\) unchanged.

The model cannot be complete without the determination of the rate of interest \(i\), the exchange rate \(e\), the current account or trade balance \((CA)\), the wage rate \(w\) and the labour market \(l\).\(^7\) Consider an open economy with imperfect substitution between national and foreign assets; the domestic interest rate is equal to the

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\(^6\) According to the IMF (1986, pp. 219, 232), Latin America’s interest payments increased from US$26.5 billion in 1980 to US$41.3 billion and US$36.5 billion in 1985 and 1986, respectively.

\(^7\) See the Appendix for a cumulative causation growth model of an open economy.
international interest rate \((i^*)\) plus a premium risk that depends on the growth of debt \((\dot{d})\), the rate of exchange rate devaluation \((\dot{e})\) and a vector \(\phi(\theta)\), which, in turn, depends on market participants’ conventions (Keynes, 1936):

\[
i = i^* + b_0 \dot{e} + b_1 \dot{d} + \phi(\theta), \text{ with } bi > 0, i = (0,1)
\]  

(7)

The spread tends to change with expectations of currency depreciation and the perceived risk of public debt defaults.

Exchange rate fluctuations are positively related to the gap between an equilibrium exchange rate—conventionally defined by market participants—and the effective exchange rate, to the discrepancies between the national and international interest rates and to the growth rate of public debt:

\[
\dot{e} = c_0 (\ddot{e} - \epsilon) + c_1 (i^* - i - \phi(\theta)) + c_2 \dot{d}, \text{ with } ci > 0, i = (0,1,2)
\]  

(8)

The trade balance of the balance of payments (measured in current dollars) is given as:

\[
CA = P_m^* [(Px/P_m^*)X(q_x,Y^*) - M(q_m,Y)]
\]  

where \(X\) and \(M\) are the quantities of exports and imports, respectively. \(q_x\) and \(q_m\) stand for the relevant real exchange rates for exports and imports, respectively (see the Appendix). Imports are negatively related with \(q_m\) and positively related with the level of domestic output, and exports are positively related with both \(q_x\) and \(Y^*\); \((p_x/P_m^*)\) are the terms of trade measured in dollars.

The labour market depends on the level of economic activity and on income distribution (Keynes, 1936; Sraffa, 1960; Okun, 1962). Thus, wage rate adjustments take place via income distribution conflicts:

\[
\dot{w} = \pi_c + h(\bar{w} - \frac{W}{P_c})
\]  

(10)

\[
\bar{w} = \Omega(l - n)
\]  

(11)

where \(\dot{w}\) is the variation of the nominal wage, \(\bar{w}\) is the real wage target, \(P_c\) is the consumer price index (a weighted index of prices; see the Appendix), \(\pi_c\) denotes the variations in \(P_c\), and \(h\) is the coefficient of the adjustment speed between the real effective wage and the wage target. The nominal wage, \(W\), in equation (10) remains fixed during one period and changes at the beginning of the next one; variations of the real wage target in equation (11) are a positive function of the discrepancy between the growth rate of employment \((l)\) and the active economic population \((n)\). Thus, following Okun’s law, the growth rate of employment depends on the real growth rate of the economy:

\[
l = \Theta gr
\]  

(12)
where $gr$ denotes the growth rate of real GDP and $\varphi$ is the Okun coefficient.

Finally, the growth rate of real GDP is given as follows (see the appendix for a thorough derivation):

$$
g = \left[ K_0 \dot{c} + K_1 \pi^* + K_2 \pi^* + K_4 n + K_5 \frac{W}{P_C} - K_6 e + K_7 gr^* + K_8 f + K_9 I_0 - K_{10} (i - \pi^*) \right] 1 / A \tag{A.12}
$$

where $gr$ is the long-run growth rate of real GDP, $\dot{c}$ is the rate of change of the exchange rate, $\pi^*$ is world inflation, $gr^*$ is the growth rate of the world economy, $f$ is the growth rate of public spending and, as before, $i$ is the rate of interest. According to equation (A.12), function $g$ is negatively sloped ($K_{10} > 0$) on $(g, i)$ space as shown in Figure 2. Equilibrium between the warranted and the effective growth rates is reached at the intersection (equilibrium point 1).

The long-term effect of the foreign debt crisis on Latin America’s macro economy can be analyzed using equations (1-12) and (A.12).

3. The Latin American debt crisis and its aftermath

In this section some macroeconomic consequences ensuing from the financial crash of the early 1980s are dealt with. The behaviour of some relevant variables in the model is described and their relationship with the debt-to-GDP ratio is highlighted on the basis of data gathered from Argentina, Brazil and Mexico. The fiscal adjustment policy implemented in the region, which was supposed to resolve the problem, produced, instead, unexpected results that are here presented as stylised facts of the debt crisis.

The public debt of the main Latin American economies was indexed to international interest rates. Argentina, Brazil and Mexico were subjected to three adverse foreign shocks, namely sharp increases in interest rates, sharp deterioration of the terms of trade of their exports (in particular, Argentina and Brazil) and sudden capital reversals in the financial markets (Díaz-Alejandro, 1985; Eichengreen et al., 2004; Calvo et al.,

![Fig. 2. Equilibrium between the warranted growth rate and the effective growth rate.](image)
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2006), contributing to unsustainable increases in public deficits and debt ratios (see equations (1), (3) and (6)). A ‘debt crisis’ started in Latin America when the Mexican government defaulted on its debt in late 1982, rising in turn, prompted local interest rate hikes and exchange rate devaluations (see equations (7) and (8)), thus configuring a vicious circle as interest rate volatility and devaluations triggered new increments in . It can be seen from equations (3) and (6) that exchange rate fluctuations bear a positive effect on . Also, the fact that debt-ridden countries were forced to adjust their fiscal deficits reveals that exchange rate devaluations did not suffice to adjust the Latin American economies. Moreover, forced fiscal adjustment effects were compounded by the double-transfer problem, which also operated to the detriment of debtor economies.

Policy makers decided to control through fiscal austerity and exchange rate devaluations, as the canonical model of the IMF had recommended and local governments agreed to implement. Yet, at least in Latin America, this wrong approach was responsible for escalating what initially was a manageable commotion into the worst crisis of the region since the Great Depression, very much like what is going on in the periphery of the euro area.

The direct effect of sudden capital stops and rising interest rates on the primary fiscal deficit and the dynamics of the debt ratio can be verified by inspecting equations (1), (3) and (7): if new loans from international financial markets are not forthcoming (i.e. ), must be reduced in order to bridge the financial gap induced by rising interest payments and/or diminishing capital inflows. Similarly, the effect on stemming from sudden capital stops and/or deteriorating terms of trade associated with declining net exports can be readily seen from equations (5) and (6): substituting equation (9) in equation (6) yields an inverse relationship between the terms of trade (defined as ) and the growth rate of public debt . Therefore, leads to a current account deficit and, thereby, puts upward pressure on public debt. If, for whatever reason, the indebted country is unable to raise fresh loans from the international financial markets, then must be reduced.

Latin America’s experience can be illustrated using Figure 3. Starting from an equilibrium point at 1, corresponding to and , an increase in the international rate of interest triggers upward movements in the local interest rate (see equation (7)) until the latter reaches a new higher level at . This new interest rate imposes a higher warranted growth rate, but the effective growth rate has declined: . Therefore, , and start growing again. Fiscal austerity does not appear to deliver the

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8 Actually, Argentina (and Chile and Uruguay) had been running a crisis since 1981, associated with their capital account liberalisation initiatives (cf. Díaz-Alejandro, 1985; Palma, 2012).

9 Latin America’s debt imbrolio accounted for nearly 50% of total Third World debt (US$1 trillion at the time); the combined debt of Argentina, Brazil and Mexico was over US$250 billion.

10 The aforementioned substitution yields

\[ \frac{d}{d} = \left( s - ip \right) - \frac{P_x}{P_m} \left[ \frac{P_x}{P_m} \right] \left( X(qx,Y^*) - M(qm,Y^*) \right) \frac{1}{ad} + (\delta + \epsilon) i - g. \] (6*)

11 Net external borrowing for Latin America and the Caribbean declined from US$60.6 billion to US$3.7 billion between 1981 and 1986 (IMF, 1986, pp. 219, 232). According to Ros (2013, p. 301), the debt shock led to a decline of foreign lending to the Mexican government from 1.7% to −0.7% of potential output.
expected results: a fiscal deficit reduction shifts $g^w$ downwards; suppose austerity shifts $g^w$ down to point 2. Yet, economic activity slows down as a result of contractionary fiscal policy (output growth is endogenous to demand); $g$ moves to the left and, with the interest rate at $i_2$, the $d$ ratio increases again, which will, sooner or later, induce new movements in $i$ and $e$. Fiscal austerity can only achieve stabilisation at low equilibrium levels, i.e. what we have called stagnation (stagnation *cum* low inflation). Suppose the intersection point at 1 (Figure 3) is a full-employment position. Now, if the growth rate of the economy is brought down to, for example, $g_3$, the rate of unemployment will rise, paving the way for transfers of labour into employment in low-productivity sectors of the informal market. As productive resources move out of the formal economy and into the informal sector, tax revenue collection will shrink, making it more difficult for the government to meet fiscal deficit and debt-to-GDP ratio targets.

Overall, fiscal austerity produced unsustainable trajectories of both fiscal balance and public debt: growth-slowing and debt-deflation adjustments did not resolve the debt conundrum: rather than diminishing, Latin America’s external debt increased from US$287 billion to US$381.8 billion between 1981 and 1986; the external debt-to-GDP ratio rose from 36.2% to 46% and interest payments as a percentage of the debt service grew from 59.4% to 63.9% during the same period (IMF, 1986). The above narrative represents a dramatic example of Keynes’s (1936, p. 84) ‘paradox of thrift’ during times of debt deflation (Fisher, 1933): if policy response to a debt crisis seeks increases in marginal propensity to save across all income levels in the presence of a recession and a widespread process of balance-sheet deleveraging, an economy will attain aggregate demand and supply equilibrium at lower levels of output, income, employment, savings and investment as households, real and financial sector businesses and the government are simultaneously pulling back on consumption, investment and assets. As Keynes (1936, p. 84) put it, ‘every such attempt to save more by reducing consumption will so affect incomes that the attempt necessarily defeats itself’. The paradox of savings results from the fact that ‘the attempt’ (the official policy...
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stance) relies on a set of assumptions that are unwarranted in the presence of a complex dynamics of high debt, liquidity preference and balance-sheet deleveraging.

It can be argued, at this point, that the main policy insight one can derive from the Domar–Pasinetti analysis maintains that the so-called sovereign debt crisis (and the fiscal constraint, for that matter) can be dealt with in at least two ways (this insight contradicts the received orthodoxy, which neglects methods other than contractionary fiscal policy). First, a reduction in the debt-to-GDP ratio to a sustainable path can be accomplished through fiscal austerity (cuts in government spending, rising taxes); second, such a goal can also be attained via pro-growth expansionary policies. The first strategy relies on the ‘expansionary fiscal adjustment’ hypothesis (Giavazzi and Pagano, 1990), while the second one calls for interest rates consistently lower than output growth rates (Pasinetti, 1997). Latin American governments followed the first strategy throughout the 1980s and the indisputable result—seemingly forgotten nowadays—was the infamous lost decade featuring stagflation, increasing unemployment rates, rampant income inequality and high poverty rates that, incidentally, the ‘growth-enhancing’ structural reforms introduced in the late 1980s–1990s failed to abate (Birdsall and Székely, 2003, pp. 56–62). At any rate, the fiscal austerity strategy fares poorly when confronted with Latin America’s experience. Moreover, the alleged benefits of IMF programmes—price, exchange rate and current account stability—were not delivered.

Available statistical data on recent economic performance, unemployment rates and fiscal balances show that the periphery of the eurozone is currently following the footsteps of the Latin America of the 1980s. Hence, the eurozone appears to be headed towards its own Latin America-like lost decade.

3.1 Debt and real exchange rate

The exchange rate has played a fairly important role in the debt crisis of Latin America, and the same is true of the role of the euro in the cases of Greece, Ireland, Italy, Portugal and Spain. While in the presence of a trade deficit Latin American countries could exert a real devaluation of the exchange rate, within the eurozone, given the common currency, deflation (internal devaluation) is the only choice available for the deficit countries.

While trying to confront the fiscal and foreign constraints, the governments of Argentina, Brazil and Mexico relied on nominal and real exchange rate devaluations in an attempt to reduce and bring their debt-to-GDP ratios back to sustainable paths; the average devaluation of their nominal exchange rates was 397%, 157% and 121%, respectively, in 1982–83. Inspection of Figure 4A–C reveals a positive relationship between the debt-to-GDP ratio \(d\) and the real exchange rate \(q\). Seemingly, this correlation became stronger since the outbreak of the debt crisis, in particular for Brazil.

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12 That is, Say’s law (supply creates its own demand at any rate), the Pigou effect (higher propensity to save stimulates demand through real balance effects from falling prices and wage deflation) and the loanable funds hypothesis (higher savings tend to lower interest rates and lead to subsequent increases in lending, investment and aggregate demand).

13 In a book co-edited by John Williamson (author of the term ‘Washington Consensus’) and P. P. Kuczynski, Birdsall and Székely (2003, p. 63) assessed the social impact of fiscal adjustments in Latin America as follows: ‘By the end of the 1980s, there was an increasing evidence of growing inequality and, most worrying, of substantial increases in poverty.’ See also Cornia et al. (1987).
and Mexico. Equations (6) and (9) in our model show that currency devaluations tend to increase interest payments, fiscal deficits and exports, and reduce imports. Their net effect on \( d \) depends on the relative strengths of these particular impacts. As the data in Figure 4A–C show, the exchange rate devaluation increased \( d \), since its effect on foreign debt outweighed the expansionary impact on output resulting from increasing net exports. From equation (6) we gather that real exchange rate devaluations increase interest payments: while Mexico’s oil exports compensated the increasing interest payments’ impact of currency depreciation, somewhat improving its fiscal constraint, in the cases of Argentina and Brazil this effect was not offset by the positive effect of higher exchange rates on net exports. Actually, exchange rate devaluations exacerbated Argentina’s and Brazil’s asset balance constraints on government expenditure, contributing to balance-of-payments disequilibria and hyperinflation and persistent growth slumps (Krugman and Taylor, 1978; Ros, 1987, 2013).

### 3.2 The primary fiscal surplus

The primary fiscal surplus target was one of the main cornerstones of orthodox adjustment programmes coping with the Latin American debt crisis; the governments of Argentina, Brazil and Mexico also relied on primary fiscal surplus as the panacea to the financial distress. An increase of the primary surplus (or a reduction of the primary fiscal deficit) imparts a direct and an indirect effect on \( d \). Equation (3) shows the direct effect: an increase of the primary surplus will improve \( d \). However, a reduction in the public deficit (fiscal austerity), aimed at reducing \( d \), need not lead automatically to a lower debt-to-GDP ratio. Moreover, it is possible that a reduction (increase) in government expenditure turns out to increase (reduce) \( d \). By and large, it all depends on the value of the multiplier effect of government expenditure.

It is worth mentioning that on the eve of the debt crisis, none of the three Latin American economies here considered was under any serious budget difficulty before the interest rate and the sudden capital reversal shocks of the beginning of the 1980s (Diaz-Alejandro, 1984; see Figure 5). The fiscal situation of Mexico, as shown in
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Figure 5C confirms the harmful effect of interest rate shocks on the budget balance: Mexico moved from a primary fiscal deficit of 4% of GDP in 1982 to a primary surplus of 5% in 1983. In spite of reducing its public expenditure sharply and consistently throughout the 1980s, in order to eliminate the primary fiscal deficit, only in the 1990s was Mexico able to fix its public finance after huge resource transfers (14.2% of GDP during 1982–89) and as a result of debt-relief agreements (Abud, 1997; Moreno-Brid and Ros, 2009), triumphant heterodox disinflation (Moreno, 1993; Ros, 1993; Damill and Fanelli, 1994; Winograd, 1995) and declining international interest rates (Ros, 2013).

Perusal of Figure 5A–C will reveal the influence of sharp increases in the interest rate on public deficits. As Pasinetti (1997) argues, interest rates become the true ‘social burden’ when they exceed the growth rate of output. In this sense, the ‘social burden of the interest rate’ was the counterpart of the fiscal austerity approach to solve the debt crisis in Latin America. As mentioned, prior to the outbreak of the crisis the ‘burden of the debt’ did exist, but it became explosive under the influence of sharp interest rate shocks. Available statistical data show that the same is true of the current eurozone: Figure 8 further below reveals that the primary fiscal deficit was not an issue before the sharp increase in long-term interest rates in 2010.

3.3 Public investment

One of the most pervasive effects of the procyclical fiscal policy response to the debt crisis was the remarkable cutback on public investment. Argentina’s public investment rate declined from an annual average of 10% of GDP in 1976–79 to 6% in 1983–86. Mexico experienced a similar drop in its public investment rate, from 8.3% of GDP in 1977–81 to 5.6% during 1983–87. Brazil also suffered a contraction in public investment at the beginning of the crisis. None of these countries returned to the public investment ratios that were normal in the pre-crisis period (see Figure 6), and drastic cuts in private investment followed suit under the compound effect of exchange rate instability and hyperinflation (Argentina and Brazil) and fiscal constraints (Argentina, Brazil and Mexico); hence, the intermittent growth slumps and the lost decade.
The observed long-period of slow growth (about 30 years) and the patterns of stop–go that the Latin American economies have occasionally followed are associated with such low investment rates and exchange rate instability phenomena that came to prevail ever since Argentina, Brazil and Mexico adopted the orthodox fiscal austerity approach to cope with a debt crisis that, in essence, was a by-product of the aforementioned three foreign adverse shocks.

### 3.4 GDP per capita

According to data from the World Bank, the long period of economic stagnation has caused the exponential growth rate of GDP per capita of Argentina, Brazil and Mexico to decline sharply. As shown in Figure 7, Brazil’s rate fell from 4.9% in 1960–80 to 1.1% in 1983–2010 and Mexico’s decreased from 3.4% to 1.1%. Argentina experienced a smaller drop, from 1.9% to 1.6% in the same periods.
4. Final remarks: the crisis of the euro area and some lessons from Latin America

The eurozone is in the midst of the most severe recession in its history. While the so-called sovereign debt crisis plaguing Greece, Italy, Ireland, Portugal and Spain appears to be the most salient feature of the crash, other phenomena affecting the economy at a deeper level risk the future viability of the European Monetary Union: real GDP per capita fell in Greece (15%), Ireland (13%), Italy (7%), Portugal (5%) and Spain (5%) last year; job loss and unemployment rates keep rising everywhere. What are the main causes behind the Great Recession in the periphery of the euro area?

According to the European Central Bank (ECB), the European Commission (EC) and the IMF, fiscal profligacy and high levels of sovereign debt are to blame. In the official narrative, no direct reference is made to the fact that a great deal of the sharp increase in current public liabilities originated in costly bailouts orchestrated by governments aimed at averting financial panics and asset meltdowns, compounded by drastic increases in the interest rate of government securities in 2009–10 (see Figure 8).

Although neglected in conventional diagnoses, the origin of the European crash can be traced back to the downfall of the subprime mortgage market in the USA, in the first place, and, most importantly, to more fundamental factors, such as the economic policy model, prevailing in the global economy at least since the early 1980s. This economic model fuels economic expansion using excessive debt, asset price inflation and substitution of loans for (waning) wages; output recessions and banking crises, when bubbles burst, are dealt with using fiscal consolidation, wage deflation, inflation targeting and pro-laissez-faire structural reforms.

Recently, such a model has been plagued by boom-bust cycles fed by debt-led consumption, capital assets speculation, stock market bubbles and high concentration

![Fig. 8. Eurozone, selected countries: long-term interest rates of central government benchmark 10-year bonds.](http://cje.oxfordjournals.org/)

of wealth. The boom phase is then followed by a financial crash, leading to balance sheet deleveraging, excess liquidity and a period of debt-deflation recessions. This long-lasting financialisation process began in the early 1980s; it evolved as a chain of speculative manias involving private debt, derivatives and other very risky financial innovation assets that have poorly substituted for declining real wages in order to support both debt-led consumption booms and real-estate speculation in the context of financial deregulation. From this perspective, the Latin American debt crisis of the 1980s, the meltdown of the US subprime mortgage sector and the ongoing eurozone crisis are part and parcel of the same dynamics of post-modern ‘financialised’ capitalism.

Close inspection of major stylised facts of the eurozone crisis along with data in Figures 8–11 lead us to disregard the fiscal profligacy hypothesis entertained by the EC/ECB/IMF ‘troika’ and other commentators. Such a hypothesis is at variance with empirical evidence. Therefore, the conventional policy response (‘expansionary fiscal consolidation’) based on it is groundless and risks imparting unnecessary higher costs on taxpayers and the population at large.

The diagnosis by the EC/ECB/IMF concludes that the trigger of the eurozone crisis was fiscal profligacy in terms of exacerbated public debt and primary fiscal deficit ratios. This is the rationale behind the fiscal austerity policy response currently applied by the governments of the eurozone periphery (see EC, 2012A, 2012B). The ‘expansionary fiscal consolidation hypothesis’ is back in fashion (Perotti, 2011). Greece and Portugal have undertaken adjustment macroeconomic programmes very similar to the ones in vogue in Latin America during 1982–88.

**Fig. 9.** Primary fiscal deficit (−)/surplus (+).

*Note:* Primary fiscal result: total general government revenue (AMECO-code URTG) minus total general government expenditure excluding interests (AMECO-code UUTGI).

*Source:* AMECO.
The periphery of the euro area is required to build a primary fiscal surplus: Greece substantially reduced her general government deficit from 15.75% of GDP in 2009 to 9.25% in 2011, but will continue on a budget consolidation path because the long-term goal of the programme ‘is anchored’ at a primary surplus of 4.5% of GDP in 2014 (EC, 2012A). Portugal has also signed a similar agreement, as the 2009 interest rate shock caused her foreign debt-to-GDP ratio and her primary income deficit to rise to 110% and 3.5% of GDP, respectively (EC, 2012B; Panico and Purificato, 2010).
It is worth bearing in mind that fiscal austerity in Latin America paved the way for the next stage of the Washington Consensus reforms, i.e. the so-called ‘growth-enhancing’ structural reforms that were said to re-establish the fundamentals for sustainable fast growth (see Williamson, 1990, 2003, 2004; Lora, 2001). Interestingly, the Economic Adjustment Programme adopted by Greece and Portugal states that ‘Greece’s [and Portugal’s] medium-term economic performance will crucially depend on the implementation of structural reforms’ (EC, 2012A, p. 2). The observed short-term effect of such adjustment programmes on the periphery of the euro area mirrors almost exactly what happened in Latin America: the tensions between fiscal consolidation and internal devaluation (price and wage deflation relative to those of competitors) surface in the form of deepening the recession. While the Greek economy contracted by more than 11%, unemployment soared to 20% and actual utilisation of its potential productive capacity ranged somewhere around 66% during the ‘expansionary fiscal consolidation’ of 2009–11, Portugal is expected to contract 3% in 2012, with unemployment exceeding 15%. Spain is suffering a sharp downturn, with unemployment of more than 25% of the population of working age in 2012 and a fiscal surplus of 2.4% of GDP turned into a fiscal deficit of −9.2% between 2006 and 2010. Yet, once again like the Latin American experience, fiscal austerity calls for further episodes of ‘expansionary fiscal consolidation’; since fiscal consolidation is not ‘expansionary’ and ‘the economy continues to contract’, the EC (2012A, p. 3) itself is predicting a ‘cumulated fiscal gap in 2013–14 of 5.5% of GDP’ for the Greek economy. Unsurprisingly, additional ‘expansionary fiscal consolidation’ (substantial expenditure cuts) will be required in the near future. This does not come as a surprise: no less than in Latin America, fiscal austerity in the eurozone has cut back on public investment: Greece’s average public investment declined from 3.5% of GDP in 2000–05 to 2.3% in 2009–11 (i.e. 34.3%), whereas Portugal’s public investment rate declined 23% in the same period. Clearly, the policy response to the current eurozone convulsion shares remarkable similarities with Latin America’s experience three decades ago. The short-to-medium-term deleterious effect of fiscal austerity on the periphery of the euro area is captured by our equation (A.12), where the relationship between (i) growth and (ii) wages, government expenditure and investment is shown to be positive, on the one hand, and the correlation between growth and interest rate shocks is shown to be negative, on the other. Figures 9 and 10 show that fiscal profligacy was not the real source of rising fiscal deficits and unsustainable trajectories of the debt-to-GDP ratio.

Figure 9 illustrates that before the break of the eurozone crisis only Greece (and Portugal, not in Figure 9) had a primary fiscal deficit above the threshold defined by
the eurozone treaties. Apart from the fact that Greece and Portugal account for a very small share of the whole eurozone GDP (2% each), neither the magnitude of the fiscal deficit nor that of the debt-to-GDP ratio represented a genuine and insurmountable difficulty for the stability of the Greek and Portuguese public budgets. Like Latin America in the 1980s, the real difficulty in the current eurozone was the sharp impact of increasing foreign debt servicing on public finance due to the external interest rate shock (see Figure 8). After the increase in the premium on government bonds, the primary fiscal deficit became a real issue, meaning that it was the effect, not the cause, of the crisis. The Pasinetti element explaining why Greece’s and Portugal’s $d$ ratio rose is self-evident: the Greek interest rate rose on average from 4.9% in 2008 to 15.7% in 2011, keeping an upward trend in 2012; the Portuguese interest rate increased from 4.5% to 10.24% in the same period.

As Figure 10 illustrates, Portugal, Spain, Ireland and even—to a great extent—Greece and Italy had managed to somewhat get the debt problem under control: before the interest rate shock, i.e. during 1999–2008, $d$ does not appear to be on an upward trend. Yet, $d$ rises sharply (particularly for Greece) straight after the rate of interest external shock. Thus, unfortunately, the policy response mistakes the effect for the cause. Hence, if the diagnosis crafted by the EC/ECB/IMF got it wrong, why should the policy response based on such judgement get it right?

Clearly, the main cause of the eurozone crisis is not fiscal profligacy; therefore, its solution cannot be fiscal austerity. Among other important elements, such as the institutional asymmetries of the European Monetary Union, there are tremendous macroeconomic imbalances in the euro area, which mirror current account imbalances (Pérez and Vernengo, 2012; Chen et al., 2012). According to Zezza (2012, p. 52), ‘the real problem of the euro area is the lack of mechanisms for correcting, or at least financing’ such imbalances. If so, then one main contradiction that a correct policy response would address is the divergence trend of unit labour costs in the euro area (Bibow, 2012). Such divergent trends (Figure 11) must impart deleterious effects when countries lack mechanisms for offsetting such imbalances while sharing a common currency and monetary policy targets.

Yet, rather than addressing the cause of the European crisis, the EC/ECB/IMF is pushing the periphery of the euro area towards the same ‘growth-enhancing structural reforms’ over and over again, as tried and failed in Latin America in the aftermath of the 1980s debt crisis. Such reforms include export-led growth in lieu of domestic-demand led growth, privatisation of government assets, downsizing of public administration, fiscal consolidation, labour market flexibility, wage deflation (euphemistically called ‘reforms in the wage-setting system’), pension reforms, etc. (see EC, 2012A, 2012B).

Latin America’s experience in the 1980s proved the ‘expansionary fiscal consolidation’ hypothesis wrong. Moreover, export-led growth—a fallacy of composition idea—and wage deflation strategies cannot work in a situation where debt deflation, combined with the deleveraging behaviour of debt-constrained agents, depress effective demand and lead to debt-induced growth slumps. Stagnant Latin America has proven that fiscal austerity and a growth agenda conflict with each other, leaving unsustainable commodity bubbles as the short-term exit.

The Domar–Pasinetti model presented here shows an alternative way of dealing with a debt-driven slump environment. Equation (3) emphasises three key variables: the rate of interest, public spending and the economic growth rate. The Pasinetti element of the model explains that the periphery of the euro area became
financially unstable mainly because of the ‘social burden of the interest rate’. The policy response in the euro area has been the same policy that led Argentina, Brazil and Mexico to price instability, high unemployment and balance-of-payments disequilibria in the short-run. In the longer-term, that policy produced stagflation, the so-called lost decade and stagbilisation. As Eggertsson and Krugman (2012, p. 1472) maintain, paradoxically enough, ‘more debt can be the solution to a debt-induced slump’ and, we conclude, the solution to avoid lost decades in the euro area.

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Appendix: A cumulative causation growth model of an open economy

The growth rate of nominal GDP ($g$) is given as the sum of the growth rate of real GDP ($gr$) plus the variation in the price level ($\pi_c$):

$$g = gr + \pi_c$$  \hspace{1cm} (A.1)

In equation (A.2), $gr$ depends on the growth rate of domestic demand ($dd$) and net exports ($x_n$), with their respective elasticities $\phi$ and $\gamma$:

$$gr = \phi dd + \gamma x_n,$$

with
There are three different kinds of goods: good 1 (b1) is produced internally under perfect competition conditions both for domestic consumption and export, and its price \( P_x^* \) is determined in the international market; good 2 (b2) is produced and consumed locally in an imperfect competition market and exported to a market where domestic firms face a downward-sloping demand curve; and good 3 (b3), which is an imported capital good.

Equation (A.3) is the growth rate of real net exports, where \( j_i \) is the relative participation of its component elements:

\[
x_n = j_1 x^D(\cdot) - j_2 m^D(\cdot)
\]

Equations (A.4) and (A.4') represent the demand for real exports and their growth rate, respectively, which depend positively on the nominal exchange rate \( e \) and the international price \( P_x^* \) of good b1, with elasticity \( \delta_0 \); they are negatively related with the domestic price level of good b2, \( P_x' \), with elasticity \( \delta_1 \). Exports are positively related to the international income level, \( Y^* \):

\[
X^D = \left( \frac{eP_x^*}{P_x'} \right)^{\delta_0} (Y^*)^{\delta_1},
\]

with

\[
\delta_i > 0, i = (0,1,2)
\]

\[
x^D = \delta_0 (e + \pi_x^*) - \delta_1 \pi_x + \delta_2 gr^*
\]

Imports depend negatively on the nominal exchange rate and the international price and positively on the domestic level of income:

\[
M^D = (eP_m^*)^{-\psi_0} (Y)^{\psi_1},
\]

with

\[
\psi_i > 0, i = (0,1)
\]

\[
m^D = -\psi_0 (e + \pi_m^*) + \psi_1 gr
\]

The price of b2 is determined by equations (A.6) and (A.6'), where \( C \) is the markup added to unit costs by imperfectly competitive firms; unit costs include nominal wages \( (W) \) and the unit cost of imported intermediary goods \( (eP_m^*) \). Equation (A.6) also shows that b2 is produced under increasing returns conditions and its price goes down with labour productivity increases \( (R) \):

\[
P_x = \frac{CW^* (eP_m^*)^\epsilon}{R},
\]

with
Equation (A.7) is the growth rate of labour productivity, which depends on the autonomous component \((r_0)\) and \((\lambda gr)\); \(\lambda\) is the Kaldor–Verdoorn coefficient. The process of cumulative causation implies acceleration of economic growth causes productivity to increase and the price of \(b2\) to diminish; this leads to growing exports and a new round of economic expansion. The limit to this process is given by rising wages, which depend on the level of employment (see equations (10) and (11)):  

\[
\pi' = c + \pi w + \varepsilon (\dot{e} + \pi_m^*) - r \tag{A.6'}
\]

Equation (A.7) is the growth rate of labour productivity, which depends on the autonomous component \((r_0)\) and \((\lambda gr)\); \(\lambda\) is the Kaldor–Verdoorn coefficient. The process of cumulative causation implies acceleration of economic growth causes productivity to increase and the price of \(b2\) to diminish; this leads to growing exports and a new round of economic expansion. The limit to this process is given by rising wages, which depend on the level of employment (see equations (10) and (11)):  

\[
r = r_0 + \lambda gr ,
\]

with  

\[
\lambda > 0 \tag{A.7}
\]

Equation (A.8) is the growth rate of internal demand of domestic goods \((dd)\) determined by \(f\) (growth rate of public spending), \(\frac{I}{Y}\) (rate of investment) and \(MS\) (growth rate of the wage bill):  

\[
dd = \alpha_1 f + \alpha_2 \frac{I}{Y} + \alpha_3 MS ,
\]

with  

\[
\alpha_i \geq 0 ,
\]

with  

\[
i = (1,2,3) \tag{A.8}
\]

\(\frac{I}{Y}\) in equation (A.9) is negatively related with both the real rate of interest and the international price of \(b3\), and it is positively related with both an exogenous variable \((I_0)\)—which is taken to be the coefficient of public investment—and the growth rate of the economy:  

\[
\frac{I}{Y} = I_0 + u_{g}gr - u_{1}(i - \pi_c) - u_2 (eP_m^*) ,
\]

with  

\[
u_i > 0 ,
\]

with  

\[
i = (1,2,3) \tag{A.9}
\]

Equations (A.10) and (A.10') define the wage bill and its growth rate, respectively; the wage bill depends on the nominal wage \((\omega)\), the level of the consumer price index \((P_c)\) and the level of employment \((L)\). Equation (A.10) is derived using equations (10) and (11):  

\[
MS = \frac{\omega}{P_c} L \tag{A.10}
\]
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\[ MS = (\dot{w} - \pi_C) + l = (1 + h\Omega)l - h(\Omega + \frac{W}{P_C}) \]  

Equations (A.11) and (A.11') define the level and the growth rate of consumer prices, respectively, where \( \Gamma_i \) is the relative share of b1 and b2 in the consumption basket. In equation (A.11) it is assumed that \( R \) varies at the beginning of the period and then it is given at every moment in time. Therefore, along with the assumption made for \( W \) in equation (10), \( \frac{w}{P_C} \) depends only on exogenous variables at any moment in time:

\[ P_C = P^{x*}_x P^{x*}_x = C^{x*} W^{x*} (eP^*_m)^{x*} R^{x*} (eP^*_x)^{x*}, \Gamma_1 + \Gamma_2 = 1 \]  

Equation (A.12) represents the real growth rate of the economy. The endogenous variables in this equation are the growth rate, the exchange and the interest rates. The condition \( A > 0 \) implies that both the Kaldor–Verdoorn and the Okun coefficients are positive though not too big. Similarly, since \( K_{10} > 0 \), function \( g \) is negatively sloped in Figures 2 and 3. While determining the equilibrium between the effective growth rate and the warranted growth rate, the *ceteris paribus* assumption was made for the exchange rate. Therefore, \( \dot{e} = 0 \). This obtains a system with two equations [(A.12) and (4)] and two unknowns (the growth rate of the economy and the rate of interest):

\[ gr = \left[ K_0 \dot{\lambda} + K_1 \pi_x + K_2 \pi_m + K_3 r_0 + K_4 \nu + K_5 \frac{W}{P_C} \right] / A, \]

with

\[ A = 1 - \phi \left[ \alpha_2 \nu_0 + \alpha_3 (1 + h\Omega) \Theta \right] - \gamma \left[ j_1 \dot{\lambda} - j_2 \nu_1 + \frac{(h\Omega - \alpha_1 \lambda)}{\zeta} \right] > 0 \]

and

\[ \zeta = (1 - z\Gamma), \]

where

\[ 0 < \zeta < 1 \]  

**Notes:**

18. 

\[ K_0 = \gamma \left[ j_1 (\delta_1 - \delta_1) + j_1 \psi_0 - \delta_1 z (Q \Gamma_1 + \Gamma_2 \pi^{x*}_m) \right] - \phi \alpha_2 \nu_0; K_2 = \gamma (j_1 - \delta_1 z \Gamma_2 \pi^{x*}_m); \]

\[ K_2 = \gamma \left[ j_2 \psi_0 - j_1 \pi^{x*}_m - \delta_1 (Q \pi^{x*}_m) \Gamma_2 \right] - \phi \alpha_2 \nu_2; K_3 = \gamma \delta_1 (j_1 - z \Gamma_1 \pi^{x*}_m); \]

\[ K_4 = (\gamma \delta_1 z h \Omega - \zeta) - (\phi \alpha_3 \h \Omega); K_5 = (\gamma \delta_1 z \pi^{x*}_m - \h \Omega); K_6 = \gamma (j_1 \delta_1 + \delta_1 z \Gamma_1 \pi^{x*}_m); \]

\[ K_7 = \gamma j_1 \delta_2; K_8 = \phi \alpha_1; K_0 = \phi; K_10 = \phi \alpha_2 \nu_1. \]