Economic constraints and stagnation in the Caribbean: some Theoretical explanations and a way forward.

Dillon Alleyne PhD Deputy Director, ECLAC Subregional Headquarters for the Caribbean,

Port of Spain, Trinidad and Tobago.

Samuel Indalmanie, STATIN Jamaica

Machel Pantin, Economic Affairs Officer, ECLAC Subregional Headquarters for the Caribbean,

Port of Spain, Trinidad and Tobago.

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Abstract

This paper develops a model along neo-Kaleckian lines to examine the relationship between debt accumulation, the external sector deficit and lack of robust growth in the Caribbean. The traditional response to the high debt burden has focused on raising taxes and curbing expenditure, despite sluggish domestic and external demand, in order to reduce government's borrowing requirements and stabilise the debt overhang.

The paper presents a carefully worked through model aimed at determining how the trade deficit drives debt accumulation and its impact on growth and income distribution in the region. The focus is placed on the external imbalance to determine how important it is in relation to the current challenges facing the region. The paper also examines the role of labour productivity in this context.

Introduction

This paper aims to investigate the factors which constrain Caribbean growth and development. These are highlighted by way of a set of stylised facts, and subsequently a model is developed along heterodox lines which provide insights into how the region can respond to these challenges. Since the global economic crisis, Caribbean economies whether as goods producers or service producers have been limping along with average growth of 1.8% in 2011, 0.4% in 2015 and less than 2% expected in 2017(ECLAC, Preliminary Overview of the Caribbean 2016). The low growth challenge arose not just from domestic constraints but also from diminished export earnings arising from falling commodity prices. Low growth has been accompanied by high unemployment with rates varying between 12-15% between 2011 and 2015 and in some countries youth unemployment is twice the national average[1].

At the same time, the region as a whole confronts a high debt burden with debt to GDP ratio of 71% in 2015 on average. While not all countries face the same degree of challenge, the debt overhang has helped to lower regional trade flows as countries have had to adjust and has limited the capacity of Caribbean governments to employ Keynesian counter cyclical fiscal policies in a period of diminished external demand.

It is important to note that when the Caribbean economies are compared with the rest of other small economies, their debt burden and interest costs are much higher than for their comparators. Thus there are unique challenges confronting the region(Alleyne and Pantin 2017).

[11] For countries like Saint Lucia the rate of unemployment was 25%.

The tendency towards debt accumulation is not new and while fiscal consolidation programs have been pursued by many countries, either as home grown or IMF supported programmes, the debt burden has remained stubbornly high. At the same time, debt servicing costs for some countries are also significant and this has affected the fiscal space and limited the capacity of governments to address serious shortfalls in infrastructure which complement private investment. In fact the adjustment to expenditure has been very severe on the capital side for many countries given government's commitment to maintaining employment[2].

Besides the public debt challenge, fiscal deficits are also high and so is the current account deficit. This is the so called twin deficit phenomenon. The traditional response has focused on raising taxes and curbing expenditure where possible in order to reduce government's borrowing requirements. Very often expenditure cuts have not been encourage as part of rationalisation in order to integrate government priorities with spending. At the same time there has been an emphasis on improving the business environment to create better conditions for private investment. It is the objective of this paper to determine whether debt accumulation is linked to deeper structural challenges such as falling competitiveness which generates pressure on governments to maintain spending as the employer of last resort. The paper presents a carefully worked through model along neo-Kaleckian[3] lines in order to provide a basis for determining the factors driving debt accumulation and stagnation in the region. The paper is divided into several sections. The next section provides a brief review of the relevant heterodox literature followed

[2] It is to be noted also that since the global crisis in 2008, private sector activity has not been robust and credit expansion, despite a fair amount of liquidity in the banking system, has not been channelled to the productive sectors (Economic Survey of the Caribbean, various years).

[3] Kalecki, M. (1954), *Theory of Economic Dynamics*, Unwin, London, reprinted New York, Monthly Review Press, 1968

by the assumptions of the model. This is followed by an elaboration of the short run model and the incorporation of the external sector. The next section examines the model in dynamics including stability issues. This is followed by an examination of labour productivity within our modelling framework. The last section concludes.

Brief review of the literature

The heterodox approach is particularly useful since the adjustment programs being undertaken impact on the relative wage and profit shares over time and its impact on long term growth is important as Caribbean countries address the SDG's. The modelling framework used here draws upon several sources, including Dutt (1990), Lavoie (1992), Blecker (1999, 2002), Taylor (2004b), Hein (2008), James (2016) and Harris(1990). It derives from from Kalecki (1954,1971) and is sometimes called 'neo-Kaleckian'. Taylor (1983, 2004b) calls these models 'structuralist' because they can be adapted to a variety of real-world situations, while others (Lavoie, 1992; Hein, 2008) refer to them as 'post-Keynesian'. A key feature of the model, principally attributable to Taylor (1983, 1991) and Bhaduri and Marglin (1990), is the distinction between wage-led and profit-led growth[4][5]. The framework has great flexibility and can be extended to include a banking sector

[4] This distinction gives the model empirical relevance. In wage-led economies, increases in the wage share of income (i.e. decreases in the profit share) raise capacity utilization and growth. In profit-led economies, the reverse holds. Additionally, there is a third category of conflictive economies, in which increases in the wage share raise capacity utilization but lower growth. The wage- vs. profit-led growth distinction has clear and significant policy implications, and it has sparked a growing empirical literature aimed at identifying the three-fold character of economies (Hein and Tassarow, 2009; Stockhammer, 2011; Onaran and Galanis, 2012)

[5] There is an expanding empirical literature in this respect but much of it is for advanced developed countries. Stockhammer and Onaran (2004) estimated vector autoregression (VAR) models for the US, UK and France, and found that shocks to the profit share had no significant overall effects on capacity utilisation. Fernandez (2005) estimated a simultaneous equations model for capacity utilisation and the profit share in the US economy, using instrumental variables methods, for the period 1955-2004. He found that the profit share had a significant positive effect on the utilisation rate, i.e. the US had profit-led demand overall. He also found that the international labour cost competitiveness ratio (import prices relative to domestic unit labour costs) was the only variable that was

and the government accounts for example[6]. Central to this approach is the idea of mark-up pricing however in the world of strong international competition where Caribbean countries are price takers there will be little scope for mark-up pricing for exports but clearly this is possible for the non-tradable sector. The extensions to the model recognise this and papers by Porcile (2016) and Cordero (2002, 2007) among others, model these facts explicitly. While there has been no evidence of this framework being employed strictly in a Caribbean context, important insights have been presented by Harris (1990) in a series of paper investigating issues of export growth and stagnation in Jamaica. From a Caribbean perspective Vanus James (2016) has developed perhaps the most comprehensive theoretical model along non-traditional lines, that is capable of addressing several important issue in Caribbean development.

It is to be noted that the Kaleckian framework is not without controversy and Steadman (1992) has posed a number of challenges to Kaleckians on whether mark-up pricing and other assumptions properly capture modern industrial structures and processes. Criticisms such as these have helped to generate a search for more realistic strategies within the modelling framework.

generally significant in explaining the profit share; a higher ratio (indicating a real depreciation) had a positive effect on the profit share. Barbosa-Filho and Taylor (2006) also found that the US economy was profit-led using a VAR model for 1948-2002 and several sub-periods, and that the wage share was generally an increasing function of utilisation. However, Stockhammer and Stehrer (2009) find that Barbosa- Filho and Taylor's profit-led result is very sensitive to the lag length they used, and that US demand (utilisation) is wage-led using longer lags. Onaran and Stockhammer (2005) estimated VAR models for Turkey and South Korea, and found some evidence of wage-led behaviour in both.

[6] See Cordero for this extension

Model framework:General assumptions.

The model developed here seeks to explore more fully the problems of debt accumulation, its relationship with the external sector and how this impacts investment and growth. Following Cordero(2002) , and Porcile (2016) a number of assumptions are made.

(i)The country is small and is a price taker. It produces only one composite good Y which can be consumed, invested or exported.

(ii) The production takes the form, $Y = Min\{L/a, vK, bM\}$, where Y is produced by fixed coefficients in the production function and L, K and M are labour, capital and Imports of foreign intermediate goods respectively. We assume for simplicity no depreciation and a, v, b are respectively the productivity of labour, of capital and of intermediate imports. The total capital stock *K* is made up of domestic capital and foreign imports such that $K = kK_d + (1-k)K_m$. Note that k is the share of domestic production in total capital goods. A rising k implies increasing competitiveness in domestic production. One can extend this analysis by considering the relationship between domestic and foreign capital in terms of whether they be complementary or competitive, but this issue is not pursued here.

(iii) Prices of Domestic and foreign goods are given as P^d and P^m respectively[7].

(iv) Following the standard Kaleckian approach there are two social classes, workers and firms or capitalists. The first group does not save and spend d of wages on domestic goods and $1-d$

[7] There are no barriers to international trade, so that each good is sold domestically at its world price (converted into domestic currency).This may be restrictive assumption but at this stage we do not account for a mark-up

on imports. This does not imply that individual workers do not save, but only that for workers as a class, the saving of some households is matched by the dissaving of others. Capitalists save at the rate of s out of profits and consume $1-s$ on domestic and intermediate imports.

(V) We do not account for government expenditure and taxes explicitly but given the assumption that there is a trade deficit, government borrows to finance some percentage of the deficit[8] and a portion of which finances domestic investment and the rest consumption. Increased government expenditure shows up as consumption and investment. Thus while we recognise a twin deficit, the government accounts and the monetary sector are not fully developed or integrated for simplicity.

The short run model

Beginning with a consumption function composed of domestic and imported goods, the cost of living index of workers in terms of domestic currency is

$$\Psi_w = (eP^{d*})^{\ell}(eP^{M*})^{1-\ell} \qquad (1)$$

Where e is the nominal exchange rate. Writing $\Psi_w = e\Psi_{w^*}$, where $\Psi_{w*} = (P^{d*})^{\ell}(P^{M*})^{1-\ell}$, then the real wage can be $V = W / e\Psi_{w*}$ (2)

Since W and V are given then we assume a fixed real wage. At the same time the price index of capital stock can be written as[9]

[8] The assumption here is that government targets the trade balance.

[9] Vanus James (2016) has argued that the price of capital (P_k) should not be a constant or the same as the general price level, since much or most of the stock is imported.

$$\Psi_K = e\Psi_{K*}$$

$$\Psi_{K^*} = \left[\phi P^{d*} + 1 - \phi P^{M*}\right] \qquad (3)$$

We are now in a position to derive the profit share. This is

$$\pi = \frac{eP^{d*}Y - WL - eP^M M}{e\Psi_{K^*}K} \qquad (4)$$

Equation (4) is essentially the value of total output after deducting wage costs and intermediate goods divided by the value of capital. This equation can be more conveniently rewritten as

$\pi = \frac{uP^{d*}}{\Psi_{K*}}\left(1 - \frac{V\Psi_{w*}a}{P^{d*}} - \frac{qv}{b}\right)$, where $q = eP^M / P^{d*}$ is the real exchange rate[10] also defined as $\hat{e}$.

The relation in bracket is the variable unit cost which depends on the productivity of labour and foreign intermediate goods (v), the nominal wage level (*W*), the foreign price level P^M and the nominal exchange rate e, defined as the price of the foreign currency in terms of the domestic currency—in such a way that a higher *e* and a higher P^M mean depreciation of the domestic currency, hence a rise in international competitiveness. Conversely, a lower P^d means ceteris paribus an appreciation of the domestic currency (the foreign currency becomes more expensive)[11]. Note that q/b —the cost of one unit of foreign goods in terms of units of domestic goods and is the share of foreign intermediate inputs in total production costs. In economies that

[10]Note that the profit rate is different from Cordero (2002) equation (7) but similar to Porcile (2016) since the profit rate includes the productivity of imports

[11] A fall in real wages will decrease domestic prices relative to foreign prices, which increases international price competitiveness and the demand for exports. In other words, real wage restraint leads, keeping the nominal exchange rate, foreign prices and the domestic mark-up constant, to an increase in the real exchange rate, i.e. a real depreciation.

are BOP constrained, the productivity of imports[12] helps to reduce foreign exchange usage. This has implications for the kinds of firms that are supported in pursuing structural transformation.

Having regard to the assumptions with respect to investment and consumption and the externals sector, the national income identity can be written as

$eYP^d = C_g + dWL + d(1-s)\pi e\Psi_{K*}K + eP^d kI + eP^M(1-k)I + eP^d X - eP^M M$, where the first to third expressions are consumption due to government spending C_g, consumption from wages and capital, followed by investment, exports and imports[13].

Specifying imports $eP^M M$ more fully as consumption on imported and investment goods, we can rewrite the domestic income as

$$eYP^d = C_g + dWL + d(1-s)\pi e\Psi_{K*}K + eP^d kI + eP^M(1-k)I + eP^d X \quad (5)$$

In expression (5) domestic income is utilised for consumption, investment and exports. If we divide this equation by $\Psi_{K*}K$ and simplifying we get,

$$g = \frac{I}{K} = \frac{1}{\phi}\left[u - C_g - \frac{dVau\Psi_{w*}}{P^d} - \frac{\Psi_{K*}d(1-s)\pi}{P^d} - \rho\right], \ where \ \rho = X/K \quad (6)$$

Expression 6 reminds us of the observation by Harris (1990), that over the short period it is possible to have an increasing investment and consumption trade off but with little impact on growth if export/import capacity is not increased and other variables are constant. This would assume that capacity utilisation is constant, trade is unbalanced and borrowed funds do not

[12] This term may be attributed to James but has been used extensively by others.
[13] For simplicity taxes are not explicitly treated in this analysis.

translate into robust growth (Harris 1990)[14] . The fundamental challenge then is how to move along the expansion path to increase import capacity, expand output, capital stock and consumption.

The external sector.

Turning now to the eternal sector and normalising by the price index of capital, we get the expression

$$\hat{e} = \Omega\left(eP^M M - eP^d E\right)/\Psi_{K^*}K \qquad (7)$$

where the real exchange rate is related to the trade deficit through Ω which is the rate or speed of adjustment. Substituting for imports in this equation and solving for exports, we can then further substitute into (6) to get

$$g = s\pi + \hat{e}/\Omega \,^{15} \qquad (8)$$

Here the accumulation g is a function of the amount of profit saved plus savings from abroad or in this case debt accumulation. Recall in our assumption the government borrows to finance the current account deficit so that accumulation is augmented by the inflows but reduced by interest costs due to debt obligations. The higher the interest rate at a given rate of profit and a given debt-capital-ratio the lower will be the savings rate. We want to rewrite this as

[14] This is referred in Harris as the SPCITO or the Short-Period-Consumption-Investment trade-off. In this state domestic productive capacity and import capacity are fixed.

[15] In fact we can write $\hat{e} = F\left(T_d\right)$ and $T_d = F\left(D_t\right)$ where T_d is the trade deficit and D_t is debt.

$$\sigma = s\pi - i\lambda \,, \qquad (9)$$

Where λ is the debt capital ratio or $\frac{D}{\Psi_{K^*}K}$ which is assumed to influence the change in the real exchange rate. This is a formulation similar to that of Hein(2004).

On the other hand desired investment is defined as,

$$g^d = \alpha_0 + \alpha_1\pi + \alpha_2 u - \alpha_3 i\lambda \;,\; \alpha_1, \alpha_2, \alpha_3 > 0 \quad (10)$$

The parameter α_0 stands for the motivation to accumulate which derives from the competition of firms independently of the development of distribution, effective demand, monetary or financial variables. The intensity of the influence of effective demand, or capacity utilisation, is indicated by α_2, while α_3 is the sensitivity of investments to debt and the interest rate. There is some divergence of views as to whether the capacity utilisation should be part of this relationship since the implication is that a wage led regime can also stimulate long term growth.

Cordero(2008) points out that in Rawthorn (1982) and Dutt (1984) desired accumulation is made to depend on the profit rate and capacity utilisation, or the output capital ratio Y/vK, so that the stimulating effect of a higher wage rate on capacity is forced to prevail over the discouraging effect of wages on profits. This is an empirical question, however in the Caribbean excessive wage increases without productivity increases filters into imports through the marginal propensity to import and this also affects debt accumulation as in Jamaica for example, if the system is closed by such means. Guy and Belgrave (2012) and others have also found that fiscal multipliers are weak, fiscal policy is procyclical and in this case growth effects are small. This runs counter to

the functional finance position of Sawyer (2009), based on Keynesian lines along which the impact of fiscal policy of economic growth may be far too optimistic[16]. Other views such as the standard neoclassical position based on Ricardian equivalence may also be too extreme[17]. Still another extreme position was echoed by Worrel (2016) who mindful of the Balance of payments constraint linked the fiscal sustainability to exchange rate crises. It is possible, however, to have a severe fiscal imbalance without a Balance of payments crisis and vice versa. Of course under extreme conditions both can occur especially if the fiscal impulses are driven by the current account imbalance.

The goods market equilibrium can be sought where

$$\sigma = g^d \qquad (11)$$

The goods market is in equilibrium when g (i.e. the aggregate saving to capital ratio) is equal to the desired rate of accumulation g^d (the desired investment to capital ratio).

On the assumption that the profit rate is fixed in the short run and trade is unbalanced then the system is cleared through debt accumulation assuming a current account deficit. Cordero points out that if a small country wants to promote competitiveness by a lower wage share, in the short

[16] This is the perspective of functional finance.

[17] Starting with Barro (1974), the idea of Ricardian equivalence has been used to argue that any change in government budget deficit will be exactly offset in expenditure terms by changes in private expenditure. The approach focuses on changes in the budget position initiated by the government to which the private sector responds, rather than envisaging that it is changes in the behaviour of the private sector (with regard to investment and savings) which causes change in the budget position (as illustrated by the notion of automatic stabilisers as tax revenue falls, budget deficits rise in the face of a slowdown in private demand). Ricardian equivalence suggests a constant level of aggregate demand, or at least a level of demand which is not impacted by government expenditure and budget position. The explanation is quite simple: the far-seeing consumer cecognizcs that the government debt generated through deficit spending will eventually be paid off by increased taxes, the present value of which is exactly equal to the present value of **the** reduction in taxes. Taking the implied increase in future taxes into account, he or she saves the amount necessary to pay them.

run, the rate of profit will not change and with no impact on growth, capacity utilization and employment will decline. If on the other hand competitiveness is raised through a higher real exchange rate, net imports decline, total savings increase, an perhaps, borrowing requirements, increase rates of growth, and profits and employment. This assumption however, is based on whether the Marshall-Lerner conditions hold. In addition if there is increased prices of imports and loss of profitability due to structural factors (non- responsive export capacity) growth may not occur despite the higher real exchange rates.

Following Cordero, recall that in equilibrium we can derive the debt requirement and rate of accumulation. First substituting for $\lambda = \frac{D}{\Psi_{K^*} K}$ in equation (11) we get,

$\alpha_0 + \alpha_1 \pi + \alpha_2 u - \alpha_3 i\lambda = s\pi - i\lambda$, and $\quad \alpha_0 + \alpha_2 u + (\alpha_1 - s)\pi = \alpha_3 i\lambda - i\lambda$

Thus $\alpha_0 + \alpha_2 u + (\alpha_1 - s)\frac{uP^{d*}}{\Psi_{K*}}\left(1 - \frac{V\Psi_{w*}a}{P^d} - \frac{qv}{b}\right) = (\alpha_3 - 1)i\lambda$

At this point we assume that the rate of interest on debt is not different from the domestic interest rate. We are now able to generate the equilibrium for the debt ratio consistent with balance in the goods market using equations 4,9 , 10 and 11.

$$\lambda_E = (\alpha_1 - s)\frac{1}{(\alpha_3 - 1)i}\left(\frac{uP^d}{\Psi_{K*}}\left(1 - \frac{V\Psi_{w*}a}{P^d} - \frac{qv}{b}\right) \right) + W_1 \quad 12$$

If $(\alpha_1 - s)$ is negative then a higher profit rate reduces the trade deficit and by extension borrowing requirements if investment is less responsive than aggregate savings to variations in the profit rate. Of course the profit rate is also affected by the productivity of imports assuming capacity utilisation constant. At the same time interest costs of debt affects the future borrowing requirements. We are also able to work out the equilibrium for g^d by substituting for the rate of profit and it is clear that a higher profit share increases investment and this affects distribution.

The dynamic analysis

We proceed with an analysis of the real wage, the rate of growth of the capital stock and the rate of optimal debt accumulation in order to specify the dynamics of the system. Assuming that workers attempt to increase nominal wage when their targeted wage is above the actual wage (see Blecker 2012). In this case

$$\hat{W} = \beta(V_w - V)^{18} \qquad (13)$$

Where V_w is the targeted wage, V is the actual wage, $\beta > 0$ is the speed of adjustment and $\dot{V}$ is a growth rate or the instantaneous rate of change. Assuming that the wage depends on the

[18] Blecker develops the following wage equation, $\hat{W} = \phi(\psi_w - \psi) + \gamma q$ where q is the real exchange rate . He argues that the real exchange rate does not affect the workers' target wage share but rather influences the degree to which nominal wage increases respond to gaps between any given target and the actual The parameter γ will be relatively large in countries where imports of wage goods are important and labour unions are strong, and low otherwise. He further states that Irrespective of the value of (and even if it is zero), there is also an indirect effect of a depreciation on wages: to the extent that the depreciation allows firms to raise mark-ups and thereby reduces the wage share, nominal wages will rise faster in response to the greater gap between the workers' target and the actual .Blecker (2012) Open economy models of distribution and growth, in Eckhard Hein and Engelbert Stockhammer (eds) . A Modern Guide to Keynesian Macroeconomics and economic policies. Chapter 9, Edward Elgar Publishing (p.224)

bargaining power of workers plus the favourable attitude of government to wage increases such that their bargaining power is increased by the employment rate then[19].

$$V_w = \psi_0 + \psi_1 (L / N) \qquad (14)$$

Where L is the level of employment and N is the labour force. Following Blecker (2012) we assume that the change in real exchange rate $\hat{e}$ responds to the wage gap.

Substituting this equation into 13 and writing L/N in terms of the rate of capacity utilisation, the productivity of labour and the K/N, ratio (k) we get the dynamic motion of V.

$$\hat{V} = \beta\psi_0 + \beta\psi_1 auk - \beta V - \psi_2 \partial\hat{e} \setminus \partial D \quad (15)$$

The augmented term $\psi_2 \partial\hat{e} \setminus \partial D$ is the change in the real exchange rate which could be (appreciate) by the debt inflows which increases the real wage, which is the so called Dutch disease effect and creates a disincentive for the tradable sector. At the same time the productivity of the debt allocated to raising the capacity of the export sector could be a countervailing effect. Changes in the real exchange rate through a depreciation can improve the trade balance only if the Marshall-Lerner conditions hold. This suggests that exchange rate changes have a limited impact on raising exports and there are distributional consequences. Let us develop the following equations of the system as follows:

[19] Vanus James (2016) in his analysis incorporates factors which allow for shirking by way of government's make work and welfare policies. See Annex X: Analytical Framework for Assessing the Strength of Public Finances

Explicitly define X exports as $E = \beta_0 Q + \beta_1 \hat{e} + \beta_2 \varepsilon D$, where Q is global demand, and ε is the effect of the proportion of the debt stock that is allocated to the export sector which we expect to be positive.

The import function can be written as $M = m_1 Y + m_2 \hat{e}$, where Y is domestic income[20]. The identity for the external sector can be written as, $E + F = M + iD$, where the effects of capital inflows is $F = \Delta D$ and costs from increased debt is $iD.$ Substituting in the identity and solving for $\hat{e}$ in the short run we get

$$\hat{e} = \frac{m_1 Y + iD - (D_t - D_{t-1}) - \beta_0 Q - \beta_2 \varepsilon D}{\beta_1 - m_2} \quad (16)$$

When we differentiate equation (16) with respect to the debt level, that is $\partial \hat{e} \setminus \partial D$ the relevant term would be $-\frac{(1 - i + \beta_2 \varepsilon)}{\beta_1 - m_2}$. It is assumed that $\beta_2 \varepsilon > 0$ and $(\beta_2 \varepsilon - i)$ could be either positive or negative. The overall effect is likely to be negative since m_2 <0suggesting that debt inflows are likely to appreciate the real exchange rate. The wage equation is now

$$\hat{V} = \beta \psi_0 + \beta \psi_1 auk - \beta V - \psi_2 \frac{(1 - i + \beta_2 \varepsilon)}{\beta_1 - m_2} \quad (17)$$

This equation is very different from Cordero in one important respect. We are able to retain the term $\frac{(\beta_2 \varepsilon)}{\beta_1 - m_2}$ which it is hoped will be large and positive which means that the proportion of debt invested in the external sector is productive. Recall that this term is the net offset between

[20] Recall that implicit in the net export relationship is the share of domestic capital in total capital and the import productivity relationship.

the negative influence of the revalued exchange rate (the so-called 'Dutch Disease' effect) coming from the denominator and the positive effect of the debt resource allocation to the export sector εD.

The effect on exports, and thus debt service ratio, then depends on the net offset between the negative influence of the revalued exchange rate (the so-called 'Dutch Disease' effect) and the positive effect of the debt resource allocation to the export sector εD. Valpy Fitzgerald (2005) points out that this underlines the importance, of allocating a sufficiently high proportion (ε) of debt funding to the export sector – or at least to traded output such as competitive import substitution – so that the revaluation effect of debt inflows is at least counterbalanced. Otherwise, the debt service burden will be increased both by higher debt interest charges and reduced exports. The marginal propensity to import m_2 can also increase through higher imports if debt spending is allocated to consumption[21].

We now consider the issue of capital accumulation and the growth of the population. We let $\frac{K}{N} = k$ and $\hat{k} = \hat{K} - \hat{N}$, so that $\hat{K} = \dot{K} / K = I / K = \dot{g}$ which is very typical in models of this kind.

Utilising

$$\dot{g} = s\pi - i\lambda$$

$$\dot{g} = (s)\frac{uP^d}{\Psi_{K^*}}\left(1 - \frac{V\Psi_{w^*}a}{P^{d*}} - \frac{qv}{b}\right) - i\lambda + \mathrm{G} \quad (18)$$

[21] The assumption here is that most of the debt is external, implying a future claim on scarce foreign exchange.

Where $\omega_1 = \frac{\Psi_{w*} ua}{\Psi_{K*}}$

Thus $\dot{g} = -sV\omega_1 - iD + G - n$ where G are the constants.

Turning now to the equation of debt accumulation, there are several ways of modelling this relationship. For the moment we assume that $dD = G + iD$ where G is the deficit and i is the interest rate on external debt. Following (Palley 2013) the growth of the government debt can be written as $\hat{L} = \frac{dD}{D} = \frac{G}{D} + i = \frac{b}{D} + i$ and thus

$$\dot{D} = \hat{L} - \hat{K} = \frac{b}{D} + i - \gamma \quad (19)$$

where it is assumed that $\dot{D}$ grows at the same rate as γ and in order to guarantee sustainability [22] $\gamma > i$.

And $\dot{D} = b + (i - \gamma)D$ this is the familiar debt sustainability equation where we have a measure of the primary balance and the difference between interest costs and the growth rate. Noting that savings must equal planned investment plus government expenditure plus interest

[22] The debt-capital ratio can be written as b=B/K. Taking the natural log logarithms and differentiating yields Δb= d/b − g =e/b + i − g. The steady state debt capital condition is obtained by setting Δb = 0 and solving for b. The stability condition is d[Δb]/db < 0.Palley (2013)

payments then $\sigma = g + b + iD$ and substituting for b in equation 19 and assuming full capacity utilization in the long run we have,

$\dot{D} = Z_0 + (\alpha_1 - s)\pi + (i - \gamma)D + iD(\alpha_3 - 1)$, where Z_0 are the sum of constants. Substituting for the profit share π, we get $\dot{D} = Z_0 + (\alpha_1 - s)\frac{uP^{d*}}{\Psi_{K*}}\left(1 - \frac{V\Psi_{w*}a}{P^d} - \frac{qv}{b}\right) + (\alpha_3 i - \gamma)D$ and finally,

$\dot{D} = Z_0 + (\alpha_1 - s)V\omega_1 + (\alpha_3 i - \gamma)D$ (20) where $\omega_1 = \frac{u\Psi_{w*}a}{\Psi_{k*}}$

We now have a system of three differential equations in variables V, g and D. These can be analysed using the Jacobian matrix.

$$\begin{bmatrix} \frac{\partial \dot{g}}{\partial D} & \frac{\partial \dot{g}}{\partial V} & \frac{\partial \dot{g}}{\partial k} \\ \frac{\partial \dot{V}}{\partial D}V & \frac{\partial \dot{V}}{\partial V}V & \frac{\partial \dot{V}}{\partial k}V \\ \frac{\partial \dot{D}}{\partial D}D & \frac{\partial \dot{D}}{\partial V}D & \frac{\partial \dot{D}}{\partial k}D \end{bmatrix} = \begin{bmatrix} -i & -s\omega_1 & 0 \\ -\psi_2\frac{(1-i+\beta_2\varepsilon)V}{\beta_1 - m_2} & -\beta V & \beta\psi_1 auk V \\ (\alpha_3 i - \gamma)D & (\alpha_1 - s)\omega_1 D & 0 \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

The elements of the matrix is set out as follows:

$$a_{11} = -i$$
$$a_{12} = -s\omega_1$$
$$a_{13} = 0$$
$$a_{21} = -\psi_2 \frac{(1 - i + \beta_2 \varepsilon)V}{\beta_1 - m_2}$$
$$a_{22} = -\beta V$$
$$a_{23} = \beta \Psi aukV$$
$$a_{31} = (\alpha_3 i - \gamma)D$$
$$a_{32} = (\alpha_1 - s)\omega_1 D$$
$$a_{33} = 0$$

The $\det(J)$=- $a_{23}\left[(-a_{11} * a_{32}) - (a_{31} * a_{12})\right]$[23] which is negative assuming $(\alpha_1 - s) < 0$; that is savings are more responsive than investment which is the usual Kaleckian assumption and that the rate of growth of output to capital stock $\gamma > \alpha_3 i$. At the same time the $trace(J) = -a_{11} - a_{22}$ which is negative suggesting that the system is stable. There can be stability also if $(\alpha_1 - s) > 0$ provided that there is wage flexibility that is β is big and there is rigidity in the exchange rate which means that ψ_2 is small. A more definitive approach would be to investigate the necessary and sufficient conditions using the Routh–Hurwitz conditions. The three equation system rest on some strong assumptions including that the flexibility of wages, the debt parameter and rigidity in exchange rates.

Suppose we follow Cordero and assume that the current account deficit adjusts quickly in our case through debt accumulation but the long term wage and real exchange rate adjust slowly. Thus a trade deficit triggers debt accumulation and this affects the exchange rate. With respect

[23] This relationship is explicitly, $\left[-(\beta\psi_1 aukV)\left[\ (-is\omega_1 D + i\omega_1\alpha_1 D) - (-s\omega_1\alpha_3 iD + s\omega_1\gamma D\right]\right]$

to the wage equation (17) we adjust for the long run real exchange rate and substitute the debt sustainability equation 20 in its steady state as follows.

$$\hat{V} = \beta\psi_0 + \beta\psi_1 auk - V\left[\beta - \psi_2 \frac{(1 - i + \beta_2\varepsilon)}{\beta_1 - m_2} \frac{(-1)(\alpha_1 - s)w_1}{(\alpha_3 i - \gamma)}\right] \quad (20)$$

Note that this expression shows that the real wage changes as a consequence of the offset between investment in the export sector and the attendant interest costs, mediated by the Marsdhall–Lerner condition, (the real exchange rate effect), the response of savings and investment plus the debt sustainability condition. The equilibrium level for the accumulation is now

$$g_E^d = \alpha_0 + \alpha_1 \frac{uP^d}{\Psi_{K*}}\left(1 - \frac{V\Psi_{w*}a}{P^d} - \frac{qv}{P^d b}\right) + \alpha_2 u - \alpha_3 i\lambda \quad (21)$$

And plugging this into the expression for the growth of the capital stock $\hat{k} = \hat{K} - \hat{N}$ we have

$$\hat{k} = -\alpha_1 u\left(\frac{V\Psi_{w*}a}{\Psi_{k*}}\right) - n + D_3 \quad (22)$$

Where D_3 aggregates the constants and exogenous terms. Equations 20 and 22 form a system of two differential equations with two state variables V and k. Notice that if capacity utilisation were not constant then other terms such as the productivity of imports would matter. We can now write the Jacobian as follows;

$$\begin{bmatrix} \frac{\delta \hat{V}}{\delta V} V & \frac{\delta \hat{V}}{\delta k} V \\ \frac{\delta \hat{k}}{\delta V} k & \frac{\delta \hat{k}}{\delta k} k \end{bmatrix} = \begin{bmatrix} \left[-\beta + \psi_2 \frac{(1-i+\beta_2 \varepsilon)}{\beta_1 - m_2} \frac{(-1)(\alpha_1 - s)\omega_1}{(\alpha_3 i - \gamma)} \right] V & \beta \Psi_1 auV \\ -\alpha_1 u \left(\frac{\Psi_{w^*} a}{\Psi_{k^*}} \right) k & 0 \end{bmatrix}$$

The stability issues can now be considered. The determinant (J) is

$$\det(J) = \alpha_1 u \left(\frac{V \Psi_{w^*} a}{\Psi_{k^*}} \right) k \beta \Psi_1 auV$$

and this is positive provided that V and k are also positive which is likely to be the case as they are at their equilibrium values. The trace is

$$tr(J) = \left[-\beta + \psi_2 \frac{(1-i+\beta\varepsilon)}{\beta_1 - m_2} \frac{(-1)(\alpha_1 - s)\omega_1}{(\alpha_3 i - \gamma)} \right] V$$

We assume that the long term rate of interest is fixed. The stability of this system depends on a number of things. The system would be stable if the trace is negative and this is possible if $\alpha_1 < s$ and $(\alpha_3 i - \gamma) < 0$. This means that the debt is stabilised and the offset between interest costs and the rate of investment in the export sector is positive meaning that debt accumulation stimulates the export sector. The outcome will also be affected by whether the Marshall-Lerner conditions holds which occurs through $(\beta_1 - m_2)$. Stability can also hold if $\alpha_1 > s$ when there is wage flexibility and exchange rate rigidity so that β is large but ψ_2 is small.

Interestingly, if $\alpha_1 > s$ and there is money wage rigidity (beta is small) but ψ_2 is large so that there is exchange rate flexibility the system is unstable. Among the reason is the M-L conditions may not hold and more especially the interest costs may be dominating the effects coming from

export performance due to debt proceeds being poorly invested. This may be generating heavy debt repayment costs depending on borrowing requirements. The amount of debt finance allocated to the export sector may be too small or there may be other structural inefficiencies. This scenario is not atypical of a number of Caribbean countries[24]. The question is how to interpret these results from a macroeconomic policy standpoint.

In the model by Cordero(2002), an expansion of the trade deficit arising from excess demand for example, can lead to a devaluation. This causes the real wage to fall and the rate of profit goes up stimulating accumulation. In our model, there is an expansion of debt accumulation in response to the trade deficit and this can result in a high share of debt finance invested in the export sector. There could be a depreciation as well, causing the real wage to fall and accumulation to increase. Assuming the Marshall-Lerner conditions hold, increased accumulation can lead to a closing of the trade gap. It is also assumed that the debt sustainability conditions will also be maintained such that $(\alpha_3 i - \gamma) < 0$.

In the case in which $(\alpha_1 > s)$ an increase in the trade deficit is followed by appreciation of the currency which is reinforced by too little investment in the export sector. If this is combined with debt instability and lack of wage rigidity, but exchange rate flexibility the trade gap becomes a moving target. The lack of flexibility in wages is enough to depress the profit rate and accumulation, expanding the trade gap. In the next section it will consider the impact of labour productivity on the system.

[24] It is to be noted also that there are implications for the relative shares of surplus going to wage earners and owners of capital.

Issues of labour productivity and growth

The results so far suggest that real exchange rate changes may be a limited strategy to address growth in a debt constrained economy. In this section we consider the role of labour productivity which has been observed to be on the decline in a number of Caribbean countries.

So far we have considered how trade deficits, debt accumulation, real exchange rate changes and wage flexibility affect outcomes in an open economy. It is to be noted however that issues of declining labour productivity must also be considered in addressing long term structural challenges. To address this we specify an appropriate labour productivity function which can take account of domestic and international productivity effects. Within the Kalekian framework a variety of approaches have been suggested but we follow the approach of both Kaldor(1957) and Arrow (1962) and includes learning by doing and its links with the capital labour ratio in an endogenous fashion[25].

We follow a strategy in which $\hat{P}_l = f(z, g)$ where labour productivity $\hat{P}_l$ depends on the capital labour ratio z and g[26]. Cordero (2002) utilises an explicit quadratic function but we utilise a logistic

[25] Storm and Naastepad (2012) specify a linear relationship between labour productivity and the growth of GDP and the real wage such that $\hat{\lambda} = \beta_0 + \beta_1 \hat{g} + \beta_2 \hat{\omega}$. In their formulation $\hat{\lambda}$ is labour productivity growth, $\hat{g}$ is real GDP growth, and $\hat{\omega}$ is real wage growth. They found that coefficients β_1 and β_2 are positive and statistically significantly. In another formulation Hein and Tarassow (2008) suggest the following $\hat{y} = \eta + \varepsilon g - \theta h$ in which case the last term which is negative captures the idea of a negative relationship between the profit rate and the real wage.

[26] According to Verdoorn's law, a higher rate of output growth increases productivity growth because a growing market allows for more specialization.

equation. We also add a term that captures domestic labour productivity relative to some international norm. The function is thus

$$\hat{P} = \lambda_1 g + z\ \lambda_2\left(1 - \frac{\lambda_3}{\lambda_2}\frac{z_l}{\bar{z}_l}\right) \quad 24$$

In this expression, P is defined as $1/a$ and $\bar{z}$, which is fixed, is the average level of productivity of a country to which the Caribbean can aspire as a competitor. We also assume that generally for the Caribbean that $z_i < \bar{z}$ especially since there has been a general decline in productivity. Thus domestic productivity is always lower than international productivity but the gap may increase or decrease over time.

We can reformulate the wage equation such that, W is the real wage, V_E is the exogenous wage share that are targeted by workers and V is that actual wage as follows.

$$\hat{W} = \beta(V_E - V) - \hat{e}\ - \hat{P} \quad (25)$$

We can expand this equation to get $\hat{W} = \beta V_E - \beta V - \hat{e}\ - \lambda_1 g - \lambda_2 z\ + \lambda_3 \frac{z^2}{\bar{z}}$

Expanding further and aggregating the constants and exogenous variables in M we get

$$\hat{W} = \left[-\beta + \left(\frac{(1 - i + \beta\varepsilon)(\alpha_1 - s)}{(\beta_1 - m_2)i} + \lambda_1\alpha_1\right)\frac{\psi_{w^*}}{\Psi_{K^*}}u\right]W - \lambda_2 z + \lambda_3\frac{z^2}{\bar{z}} + M$$ where we assume that long run interest rate is fixed and we replace $\hat{e}$ with the change in the real exchange rate in response to debt accumulation and the short term debt accumulation equation (12).

We can link the motion of $\hat{P}$ to $\hat{z}$ by noting that z is a function of the capital labour ratio. The K/L ratio can be rewritten as $K/Y * Y/L = uP_l$ and as u is fixed in this scenario $\hat{P} = \hat{z}$.

We can rewrite the growth in labour productivity (equation 24) as $\hat{z} = \lambda_1 g + z\,\lambda_2\left(1 - \frac{\lambda_3}{\lambda_2}\frac{z}{\bar{z}}\right)$

and substituting for g we have $\hat{z} = -\lambda_1\alpha_2 W\frac{\psi_{w*}}{\Psi_{K*}}u + z\lambda_2 - \lambda_3\frac{z^2}{\bar{z}} + S$ where S is an aggregate of constants and exogenous terms.

One interesting aspect of this relationship is that if we make $\hat{z}_l = 0$ in the long run, the stationary state, then the growth rate g depends on the K/L ratio and the productivity gap. Note, however, even if z is large but the gap between domestic and international productivity is also large then this affects the growth rate. The implication is that for open economies competitiveness matters.

The 2*2 system can now be organised to assess under what conditions there can be stability.

$$J = \begin{bmatrix} \frac{\partial\hat{W}}{\partial W} & \frac{\partial\hat{W}}{\partial z} \\ \frac{\partial\hat{z}}{\partial W} & \frac{\partial\hat{z}}{\partial z} \end{bmatrix} = \begin{bmatrix} \left(-\beta + \frac{(1-i+\beta_2\varepsilon)(\alpha_1 - s) + \lambda_1\alpha_1}{(\beta_1 - m_2)i}\right) & -\lambda_2 + 2\lambda_3\frac{z}{\bar{z}} \\ -\lambda_1\alpha_2\frac{\psi_{w*}}{\Psi_{K*}}u & \lambda_2 - 2\lambda_3\frac{z}{\bar{z}} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

The determinant of the Jacobian is $Det(J) = a_{11}a_{22} - a_{21}a_{12}$ and looking first at a_{11}, if s is large relative to α_1 and provided the relationship between the rate of interest and the offset from

debt investment is small including $\lambda_1\alpha_1$ then a_{11} can be negative. In addition if wage flexibility is very high so that β is large it can offset other elements in the bracket. The denominator will also matter with respect to the Marshall-Lerner conditions. Turning to the other elements, it is likely that $a_{22} < 0$ and so $a_{12} > 0$ in a Caribbean situation in which the productivity gap is generally large. This is likely to be true for both high and low levels of capital-labour ratio given our experience. In this case one can have stability even though productivity levels are low because the determinant is positive and the trace is negative. Of course a lot depends on the size of λ_3. or the speed with which the productivity gap is closed. We can examine how the system works in relation to a shock which increases domestic demand for example. We assume for the purpose of this analysis that excess demand for goods, due to fiscal expansion, causes deterioration in the trade deficit which we assume could be addressed thorough debt accumulation and this could cause the real exchange rate to appreciate[27]. Such an appreciation affects distribution, by increasing the wage share and makes the export sector uncompetitive. Changes to the nominal exchange rate will not address the problem as it may make imports expensive; create pressure for raising wages and the Marshall-Learner conditions may not hold[28].

If the deficit is due to structural factors, it could also be addressed alternatively, by investing debt accumulation in the export sector to raise export productivity and reduce the productivity gap. In yet another scenario suppose the productivity gap can be closed through technical change, that is (λ_3), then the rise in labour productivity reduces labour costs and this can expand output

[27] The excess demand can come from increased investment but it can also come from expanding government spending which boosts incomes and not productive investment.
[28] This is the optimistic scenario suggested by Cordero (2012)

and the profit share, but again a lot depends on what happens to the real exchange rate as this feeds back on labour productivity.

Conclusion

This paper develops a well specified model to explain the structure of Caribbean economies utilising a Kaleckian framework. This is pursued especially in light of the emphasis on the SDGs and the concerns with the distribution of income with can be addressed by examining the wage/profit shares over time. The model is also developed to understand the impact of debt accumulation on economic growth in light of the high debt burden facing the region. The results do suggest that real exchange rate changes, plus the economic structure are important determinants of the performance of Caribbean economies. Unfortunately the data sets necessary to test this model were not available for this analysis.

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