Report on UN Sabbatical Leave 2016

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

February 2017

Abstract

This paper develops a model of Caribbean growth and development along heterodox lines and addresses how the region responds to the challenge of sustainable development. Since the global economic crisis, Caribbean economies whether as goods or service producers have been limping along posting average growth of 1.8% in 2011, 0.4% in 2015 and less than 2.4% anticipated 2017(ECLAC, Preliminary Overview of the Caribbean) assuming robust growth among its major trading partners.

At the same time, the region as a whole has had to confront a very high debt burden with debt to GDP ratio of 71% in 2015 on average. The tendency to debt accumulation is not new and while fiscal consolidation programmes have been pursued by several countries, either as home grown or IMF supported programmes, the debt burden remains stubbornly high.

The traditional response has focused on raising taxes and curbing expenditure, despite sluggish domestic and global demand, in order to reduce government's borrowing requirements and stabilise the budget deficits. The paper presents a carefully worked through model along neo-Kaleckian[1] lines aimed at determining the factors driving debt accumulation, stagnation and income distribution in the region. The model will also be tested using available data for two Caribbean countries within a structural VAR framework.

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

Acknowledgement

I would like to thank the office of human resources for affording me the opportunity to conduct four months of continuous research and the acting Director and Staff of the Sir Arthur Lewis Institute of Social and Economic Research (SALISES), Mona Jamaica , for their hospitality and the facilities afforded me to conduct this research. I also thank my colleagues Machel Pantin at ECLAC, Port of Spain and Samuel Indalmanie at the Statistical Institute of Jamaica(STATIN), for their valuable contributions in the development of this paper.

Introduction

This paper aims to investigate some key 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 provides useful insights on 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 2.5% 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, in recent times, especially due to 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[2].

At the same time, the region as a whole has had to confront a very 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 an 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.

[22] 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. 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).

In addition, the Caribbean relies heavily on FDI for technical capacity and foreign exchange inflows for growth, but FDI has not increased significantly and has actually fallen in the case of the goods producers since the precipitous decline in commodity prices. Interestingly for some countries the ratio of GFCF to GDP is fairly high which suggests that low growth may be linked to low investment productivity rather than mere accumulation (Harris 1990). The need for structural change to diversify the economies of the region and the building a technological capacity for a knowledge economy are important considerations which are not discussed here.

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. In addition, countries like Trinidad and Tobago, Suriname and Guyana which experienced considerable revenue expansion during the

period of the commodity super cycle are beginning to confront fiscal deficits due to revenue decline arising from lower export earnings.

The traditional response has focused on raising taxes and curbing expenditure where possible in order to reduce government's borrowing requirements. 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. This initial model formulation will be expanded upon later to answer a broader range of development problems in the Caribbean and will hopefully provide a more rigorous basis for policy guidance to address some of these issues.

Framework of analysis.

The search for answers to serious economic problems, including those facing the Caribbean, requires the employment the full suite of relevant approaches to properly help guide policy making. This means that we must not ignore any approach that can provide rich insights into urgent challenges. In fact the global financial crisis of 2008 made clear that exploring a variety of approached may lead us to better policy outcomes.

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

It is in this spirit that this paper employs heterodox thinking to address long standing problems and the ambition is to bring fresh insights into the analysis. Much of the analysis draws heavily on the standard Kaleckian approach and recognises two important facts. The economies of the Caribbean are highly open and this means that claims on external resources must be met through increasing import capacity, debt accumulation or some kind of adjustment to address the external imbalances. Secondly, policy prescriptions are not distribution neutral and adjustment policies, which affect the wage and profit shares, can have long term consequences for growth and accumulation[4].

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). This framework derives more 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

[4] In term of focus, the emphasis is not solely for the moment on the fiscal challenge although these are regarded as the root causes of the current crisis. Some initial assessment of causation between the fiscal balance and the Current account balance has shown that purely fiscal adjustment is a limited strategy to address long term structural issues (Alleyne et al 2011).

between wage-led and profit-led growth[5]. The framework has great flexibility and can be extended to include a banking sector and the government accounts for example. 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 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.

[5] 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)

This paper will also conduct empirical tests, within a structural VAR framework , of the model using data that are available for Caribbean countries[6].

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Model framework:General assumptions.

The model developed here seeks to understand more fully the problems of debt accumulation, its relationship with the external sector and the distributional consequences. 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

[6] 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 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.

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 $1-d$ 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 this finances domestic investment and the rest consumption. Increased government expenditure shows up as consumption and investment and we do not consider taxes. Thus while we recognise a twin deficit the government accounts are not fully developed or integrated for simplicity.

The short run model

[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

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

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

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

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

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[9] also defined as $\hat{e}$.

[9]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

The relation is 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)[10]. 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 are BOP constrained, the productivity of imports[11] 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[12].

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

[10] 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.

[11] This term may be attributed to James but has been used extensively by others.

[12] For simplicity taxes are not explicitly treated in this analysis.

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

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 translate into robust growth. See further discussions in Harris[13] (1990). 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

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

[13] 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.

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

$$g = s\pi + \hat{e}/\Omega \quad (8)$$ [14]

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 that 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

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

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

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

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 pro-cyclical 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[15]. Other views such as the standard neoclassical position based on Ricardian equivalence may also be too extreme[16]. Still another extreme position was echoed by Worrel

[15] This is the perspective of functional finance.

[16] 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.

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

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 cost to debt affect 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

$$\hat{W} = \beta(V_w - V)^{17} \qquad (13)$$

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 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[18].

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

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.

[17] Blecker develops the following wage equation . 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 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 . Open economy models of distribution and growth, in Eckhard Hein and Engelbert Stockhammer (eds) 2012. A Modern Guide to Keynesian Macroeconomics and economic policies. Chapter 9, Edward Elgar Publishing (p.224)

[18] 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

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 increased(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. Changes in the real exchange rate can improve the trade balance only if the Marshall-Lerner conditions hold. At the same time the productivity of the debt allocated to raising the capacity of the export sector could be a countervailing effect. 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:

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[19]. The identity for the external sector can be written as, $E + F = M + iD$, where the effects of capital inflows F from increased debt is ∂D. Substituting in the identity and solving for $\hat{e}$ in the short run we get

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

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

When we substitute for $\partial \hat{e} \setminus \partial D$ in equation 15 relevant terms would be $-\frac{(1 - i + \beta_2 \varepsilon) D}{\beta_1 - m_2}$ and it is assumed that $\beta_2 \varepsilon > 0$ and that $(\beta_2 \varepsilon - i)$ could be either positive or negative affecting $\hat{e}$. Thus the wage equation is now

$$\hat{V} = \beta \psi_0 + \beta \psi_1 auk - \beta V - \psi_2 \frac{(1 - i + \beta_2 \varepsilon)}{\beta_1 - m_2} \quad (17)$$[20]

This equation is very different from Cordero in one important respect. We are able to retain the term $\psi_2 \frac{(\beta_2 \varepsilon)}{\beta_1 - m_2}$ 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 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.

[20] It is expected that if $\frac{\partial \hat{e}}{\partial D} < 0$ then increased debt is causing the real exchange rate to appreciate.

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

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

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

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

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

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

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 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,

$\dot{D} = Z_0 + (\alpha_1 - s)V\omega_1 + (\alpha_3 i - \gamma)D$ (19A) 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.

[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)

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

The elements of the matrix is set out as follows:

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

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 the 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. A more definitive approach would be to

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

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.

Observe that λ_E in equation (12) declines with the rate of profit (increases with the real wage) if $\alpha_1 - s$ is negative. That is, a higher π reduces the trade deficit if investment is less responsive than aggregate saving to variations in π. It is clear that the equilibrium rate of growth is determined by the desired rate of accumulation.

We now insert equation (12) into the wage equation (17) as follows

$$\hat{V} = \beta\psi_0 + \beta\psi_1 auk - V\left[\ \beta - \psi_2 \frac{(1-i+\beta\varepsilon)}{\beta_1 - m_2} \frac{(s-\alpha_1)}{(1-\alpha_3)i} \frac{\Psi_{w^*} au}{\Psi_{K^*}}\right. \quad (20)$$

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 (the real exchange rate effect), the response of savings and investment. The equilibrium level for the accumulation is now

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

Utilising the equation for the growth of the capital stock then we have

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

Where D_3 aggregates the constants and exogenous terms. Equations 20 and 21 are a 2*2 two system and we have substituted out the debt equation at the optimal value. 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;

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

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

$$tr(J) = \left[-\beta + \psi_2 \frac{(1-i+\beta\varepsilon)}{\beta_1 - m_2} \frac{(\alpha_1 - s)}{(1-\alpha_3)i} \frac{\Psi_{w^*} au}{\Psi_{K^*}} \right] V$$

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 the real exchange rate expression is positive. This can occur if the offset between interest costs and the rate of investment in the export sector is positive and small meaning that the country has a stable debt profile. It will also be affected by whether the Marshall-Lerner

conditions holds which affects the sign on the denominator through $(\beta_1 - m_2)$. If on the other hand $\alpha_1 > s$ we can have exchange rate flexibility so that β is large but ψ_2 is small and stability continues to hold. Interestingly, if $\alpha_1 > s$ and there is money wage rigidity (beta is small) but ψ_2 is large that is 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 shares may be too small or there may be other structural inefficiencies. This scenario is not atypical of a number of Caribbean countries. It is to be noted also that there are implications for the relative shares of surplus going to wage earners and owners of capital. The model suggests a long run adjustment process when the equilibrium is stable. Based on the setup excess demand affects the trade deficit which could lead to a devaluation which causes the real wage to decline and profits rates to increase. Of course the wage equation is less affected if the offset between interest and investment is narrowed and thus we have improved efficiency and less impact of a shifting exchange rate. The next section will consider the impact of labour productivity on the system.

Issues of labour productivity and growth

The results so far suggest that real exchange rate changes may represent 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 accumulation and the real exchange rate changes 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. We can address this by specifying 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[24].

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[25]. Cordero (2002) utilises an explicit quadratic function but we modify this further to incorporate a logistic equation. We also add a term that captures domestic labour productivity relative to some international norm. The function is thus

[24] 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.

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

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

where P is defined as $\frac{1}{a}$ and $\bar{z}$ is the average level of productivity of a country to which we must 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, D is the real wage, V_E is the exogenous wage share that are targeted by workers and V is that actual wage share as follows.

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

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

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

$\hat{D} = \left[-\beta + \left(\frac{(1 - i + \beta\varepsilon)(\alpha_1 - s)}{(\beta_1 - m_2)i} + \lambda_1\alpha_1\right)\frac{\psi_{w^*}}{\Psi_{K^*}}u\right]D - \lambda_2 z + \lambda_3\frac{z^2}{\bar{z}}$ + 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.

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 $\hat{z} = \lambda_1 g + z\,\lambda_2\left(1 - \frac{\lambda_3}{\lambda_2}\frac{z^2}{\bar{z}}\right)$

and substituting for g we have $\hat{z} = -\lambda_1\alpha_2 D\frac{\psi_{w^*}}{\Psi_{K^*}}u + z\lambda_2 - \lambda_3\frac{z^2}{\bar{z}}$ + 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.

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

The determinant of the Jacobian is $Det(J) = a_{11}a_{12} - a_{21}a_{22}$ 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 for the change of sign. 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 the Caribbean 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 $\lambda_{3.}$ or the speed with which the productivity gap is closed. It would be interesting to link the productivity of labour with import productivity as well.

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[26]. Such an appreciation affects distribution, by increasing the wager 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[27].

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 $(\lambda_3 = 0)$ then the rise in productivity reduces labour costs and this can expand output

[26] The excess demand can come from increased investment but it can also come from expanding government spending which boosts incomes and not productive investment.
[27] 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.

The Next steps: empirical estimation

This paper models some key issues in explaining the stagnation of Caribbean economies with a heterodox context. The model is built along Kaleckian lines and examines how the economy can respond to various shocks and its impact on distribution. These can be examined within a VAR framework to trace out the impact of each of the variables on the system. There are a number of examples of the use of VARs in this context and among these are Stockhammer and Onaran (2001,2003), and Hiroshi Nishi (2012). The SVAR methodology is employed to determine how each of the variables impact on the overall system and it is a flexible way of modelling since it allows all past variables to affect any present variable.

Thus it does not force a certain theoretical structure upon the data (as far as past values are

concerned). Second, it is a systems approach that takes into account the interaction of

the variables of interest. In particular the impulse responses calculated from the VAR trace an innovation to one variable through the entire system. In addition, the SVAR analysis is a convenient tool, when one has doubts about the order of integration of the variables, as is often the case with macro-economic data. Unsurprisingly, these advantages come at a price. First, the number of variables that can be included in the VAR is limited because due to its unrestricted nature the model runs out of degrees of freedom quickly.

The variables of interest for estimation within the structural VAR framework are the profit share π, the investment rate g, the real effective exchange rate R and the debt to capital ratio λ. No data are available for the real wage and as a result the profit share was used. In an alternative formulation the wage share was also used. The structural VAR model can be written as,

$$\begin{pmatrix} \pi_t \\ g_t \\ \lambda_t \\ R \end{pmatrix} = C + B(D) + A(L)\begin{pmatrix} \pi_t \\ g_t \\ \lambda_t \\ R \end{pmatrix} + \begin{pmatrix} u_{\pi_t} \\ u_{gt} \\ u_{\lambda t} \\ u_{Rt} \end{pmatrix}$$

Where C is a constant vector, B is a coefficient matrix of contemporaneous relationship among the variables and D is the vector of variables of interest. A is a coefficient matrix which includes lags of the variables of interest with L being the lag operator. Note that u_t is a 4*1 vector of shocks. Rewrite the vector $x = (\pi_t, g_t, \lambda_t, R_t)^T$ and the structural VAR can now be written as

$$Bx_t = C + A(L)x + \varepsilon_t$$

In order to allow estimation of the structural model we first need to derive its reduced-form representation. This involves expressing x_t as a function of lagged x_t only. To derive the reduced form representation, we pre-multiply both sides of the structural VAR representation by the matrix B^{-1}.

The central question now is how to recover elements of B^{-1} from consistent estimates of the reduced form parameters since knowledge of B^{-1} would allow us to reconstruct u_t from $u_t = B^{-1}\varepsilon$ where $B_i = BA_i$. At the same time the variance of $\varepsilon_i = E\left(\varepsilon_t \varepsilon_t^{/}\right)$ can be seen as a system of nonlinear equations whose parameters can be estimated consistently provided that the number of parameters in B^{-1} is no greater than the numbers of equations. Such restrictions may take the form of exclusion restrictions, proportionality restrictions, or other equality restrictions. The most common approach is to impose zero restrictions on selected elements of B^{-1}. Generally the number of restrictions for a unique solutions is $n(n+1)/2$ and in the present case there are 10 restrictions (See Appendix A).

The structural var (SVAR) results

The variables for the two countries were tested for Unit roots and found to be nonstationary at conventional levels[28]. In the case of Jamaica, Granger causality tests were first carried out to examine the line of causation among the variables[29]. The results showed that when the profit share is the variable of interest the external debt, investment and the profit share are significant factors in explaining its movement. On the other hand, investment is explained by all the variables except for the real exchange rate. Meanwhile, when the debt is the variable of interest, all other factors except the profit share and debt itself explain movement in the debt to capital ratio. This is not unexpected with debt being highly significant in Jamaica. Finally, movement in the real exchange rate is affected by all the variables of interest. In the case of the

[28] Variables were then differenced to be made stationary. In addition there no cointegration was detected.
[29] The so called "block exogeneity" test were conducted to account for interactions among all the variables. The variables are the changes in profit share to the capital stock, investment to the capital stock, the real exchange rate and external debt to capital stock.

Bahamas, the profit share is affected by the profit share itself and investment, while for investment and debt variables, none of the variables are explanatory at conventional levels of significance. In the case of movement in the real exchange rate, however, both the profit share and the real exchange rate are influential at conventional levels of significance.

The Choleski decomposition which is an approach to identifying shocks in the VAR was not reported because of its tendency to bias the results in relation to the ordering of the variables. The figures in Appendix 2 plot the impulse responses for the four shocks on the change in the profit share (pshareK), the change in the eternal debt ratio (edk), the change in the real exchange rate (reerj) and the change in investment (InvestK) for Jamaica and the Bahamas respectively[30]. The figures give the accumulated response in each endogenous variable to one standard deviation structural shocks. Impulse responses are useful in gauging the signs and magnitudes of responses of the endogenous variables to specific shocks in the VAR system.

Starting with Jamaica, a shock to the profit share is accompanied by co-movement with the investment share. An expanding profit share causes a rise in investment and of course this may also imply a falling wage share in the first period. We also see a close movement between a rising debt ratio and an initial appreciating real exchange rate. The real exchange rate soon rises (depreciates) which is not unexpected. In the case of the shock to investment, again the profit share follows closely but with less amplitude. A falling investment share also causes an appreciation of the real exchange rate and an initial fall in debt accumulation. By the third period investment and the profit share rise, accompanied by a rising debt ratio and a depreciating real exchange rate. Thus, with an investment shock the link between the real

[30]The K at the end of the variables suggested that they are takes as the ratio of the capital stock.

exchange rate and the debt ratio seems not to follow the path of the "Dutch disease" syndrome, after the first period. The explanation might be due to the source of the shock whether through the structural factors or fiscal impulses.

In the case of the real exchange rate shock, the investment and profit share fell after the first period and the real exchange rate appreciation accompanies a rise in the debt ratio. Turning to debt accumulation, a shock to the debt ratio causes and initial rise in the investment and an expanding profit share initially, but these fall by the second period despite real exchange rate depreciation and a rising debt ratio. Again one expected that a real depreciation would make investment positive. Investment was not positive for about four periods.

Turning to the Bahamas it is important to remember that debt accumulation and sustainability has not been a major issue over the period of interest. A shock to the profit share also affects the investment share but the investment share is far less volatile than the profit share and also the results are more persistent. In fact debt accumulation flows move more closely with investment which suggests that debt accumulation may be more effective than in Jamaica. In addition the real exchange rate appreciation and depreciation affect the profit share. This regularity may reflect an economic structure based on a major activity as tourism and the stability of the nominal exchange rate such that movements in the real exchange rate reflect relative price changes[31]. A shock to investment results in both investment and the profit rate moving together and the initial shock causes the exchange rate to depreciate as the debt ratio falls. A shock to the real exchange rate has a considerable effect on the profit share, but the

[31] The Bahamian dollar has been pegged to the US dollar at parity since 1973 and there is strong commitment to maintaining the peg.

investment rate moves with the debt accumulation. This may reflect the impact of government in investment as well. Finally a shock to the debt does case an increase in investment but the profit share is negatively affected. Also the real exchange rate appreciates then depreciates over time.

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 which 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. One interesting insight is that in the case of The Bahamas debt accumulation has positive effects on the economy and may be linked to how such investment takes place over time. The results do suggest that real exchange rate changes are of considerable importance especially in high debt constrained economies like Jamaica and that the response to the debt challenge, apart from fiscal management, must also be the need to address the economic structure. The ambition is to further develop and fine tune this framework and to test the model for a larger number of Caribbean countries.

Appendix A

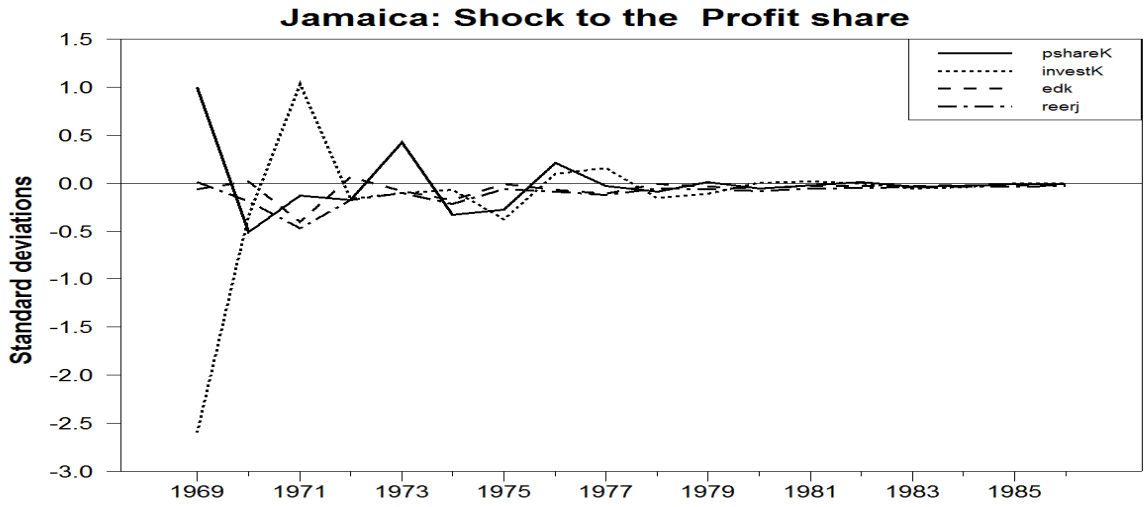
The data sets for the variables come from a variety of sources. The investment variable, the capital stock and the real effective exchange rate are from the World Bank's World Development Indicators Bank's data base while the profit share comes from the CARICOM. At the moment we are only able to get annual data for Jamaica (1969-2014) and Trinidad and Tobago (1990-2009) and the Bahamas (1990-1914) with respect to the profit share as all other Caribbean countries only report the gross value added. In addition, a VAR on the basis of 19 observation in the case of Trinidad and Tobago, may not be robust and only data for Jamaica and the Bahamas were investigated.

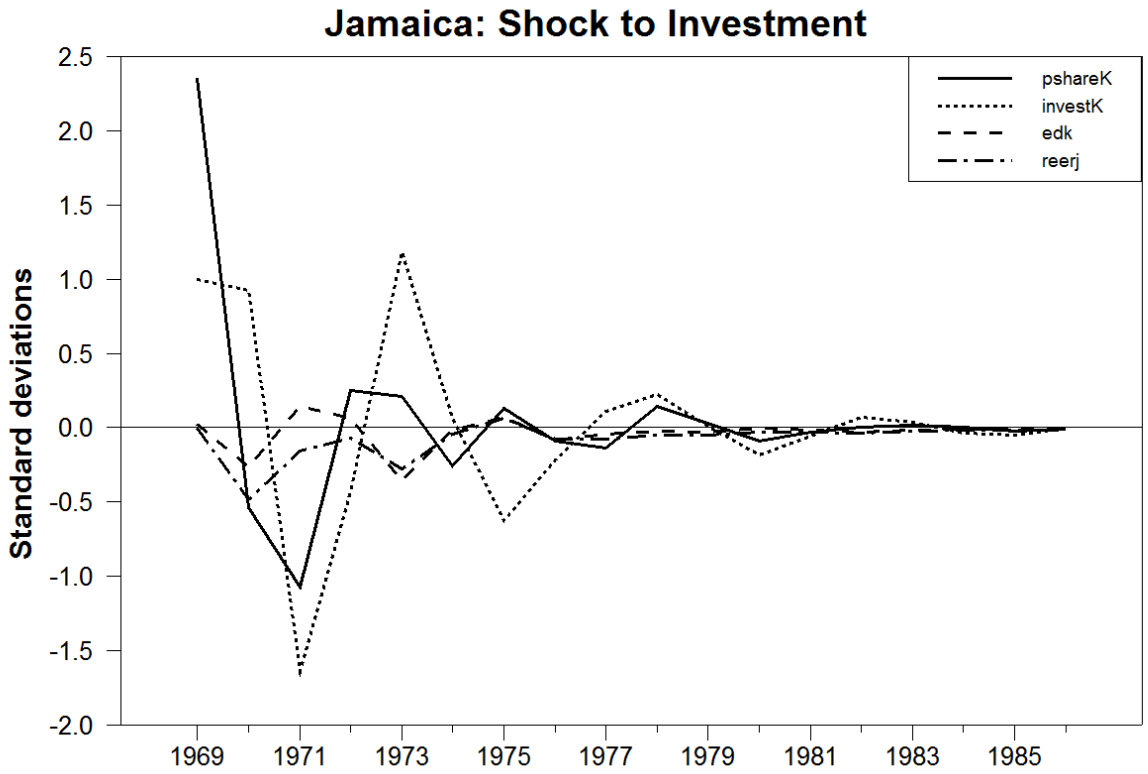
The relationship between residuals and the reduced forma of the VAR and structural shocks may be expressed by the following equations as expressed by the matrix B such that $B\varepsilon_t = Cu_t$ where ε_t represents a reduced form residual vector and u_t represents the structural shock vector. The previous equation can be rewritten as

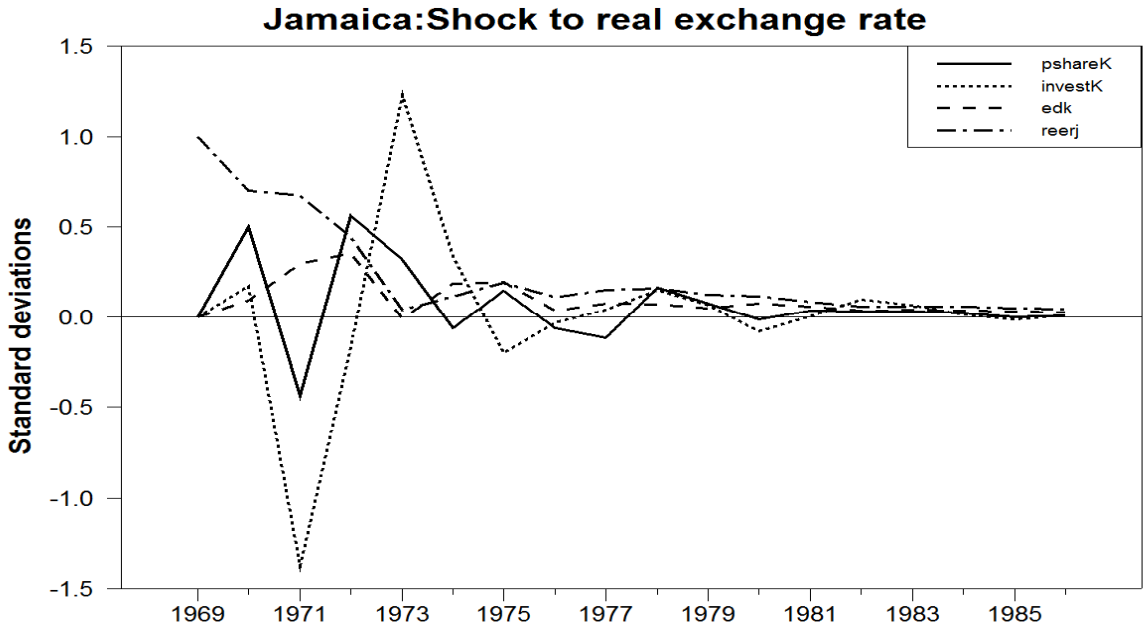
$$\begin{pmatrix} 1 & g_{12} & 0 & 0 \\ g_{21} & 1 & g_{23} & 0 \\ 0 & g_{32} & 1 & 0 \\ 0 & 0 & g_{43} & 1 \end{pmatrix} \begin{pmatrix} \varepsilon_{\pi t} \\ \varepsilon_{gt} \\ \varepsilon_{\lambda t} \\ \varepsilon_{Rt} \end{pmatrix} = C \begin{pmatrix} u_{\pi t} \\ u_{gt} \\ u_{\lambda t} \\ u_{Rt} \end{pmatrix}$$

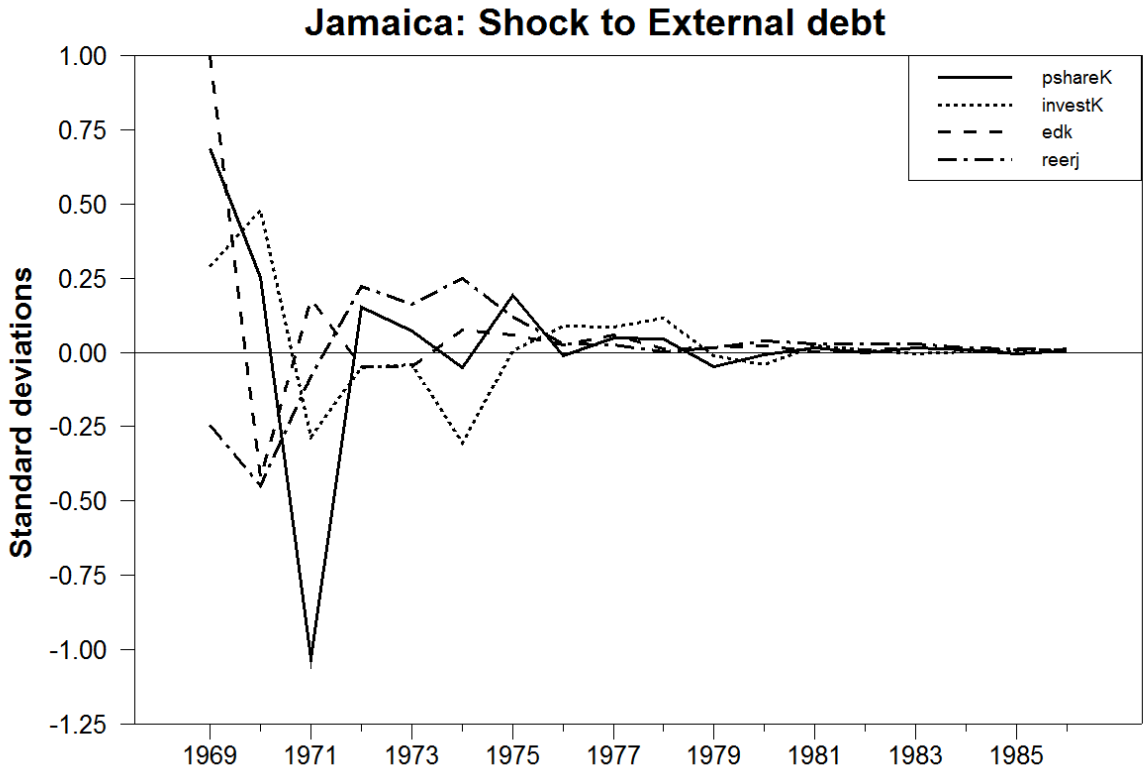
and these are the structural shocks that were used throughout the analysis.

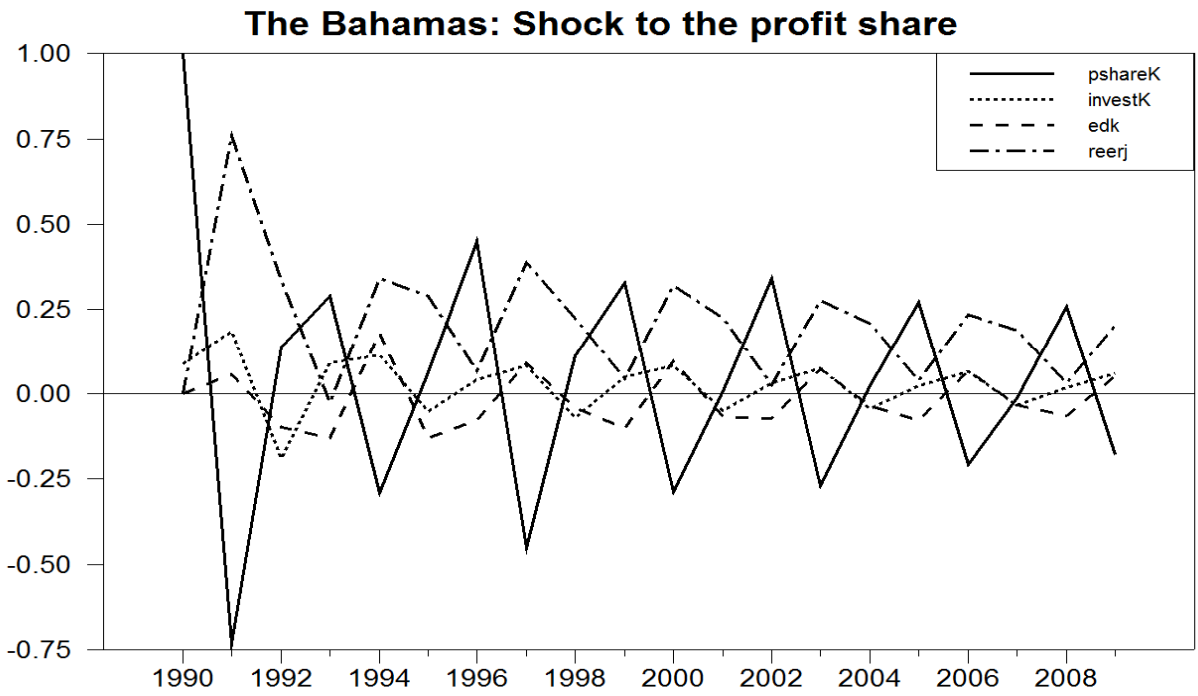
Appendix 2

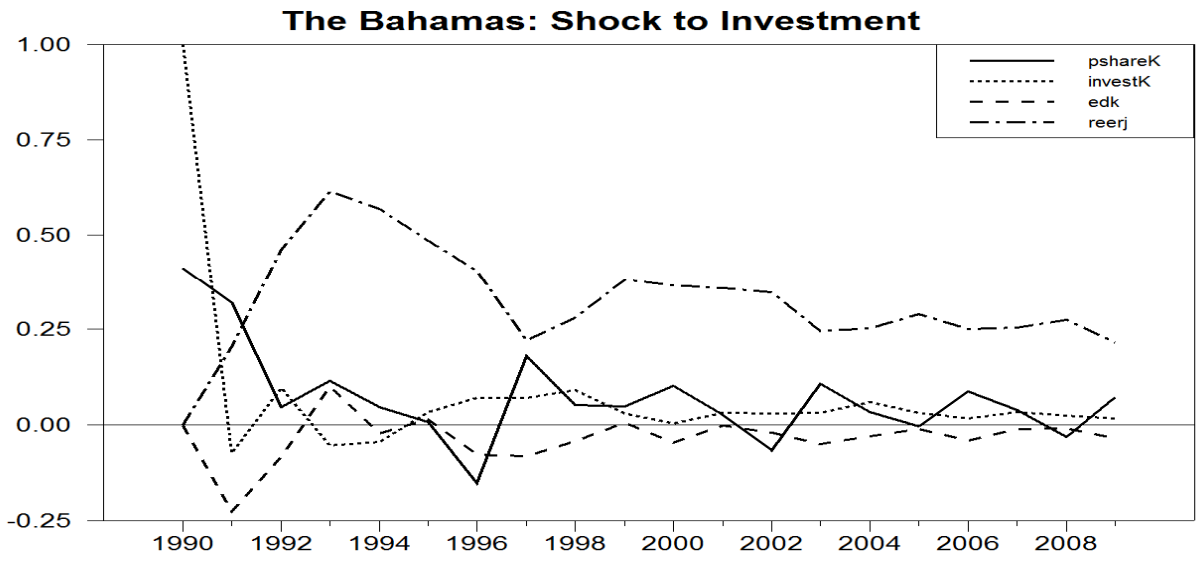

Jamaica: Shock to the Profit share
Standard deviations
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
1969
1971
1973
1975
1977
1979
1981
1983
1985
pshareK
investK
edk
reerj

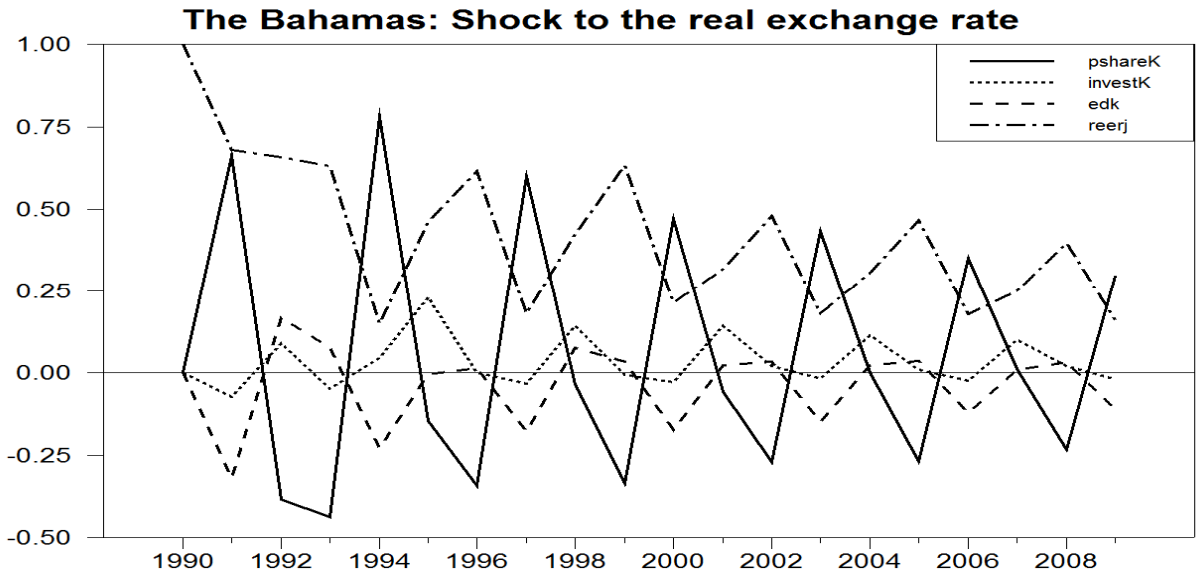

Jamaica: Shock to Investment
Standard deviations
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
1969
1971
1973
1975
1977
1979
1981
1983
1985
pshareK
investK
edk
reerj

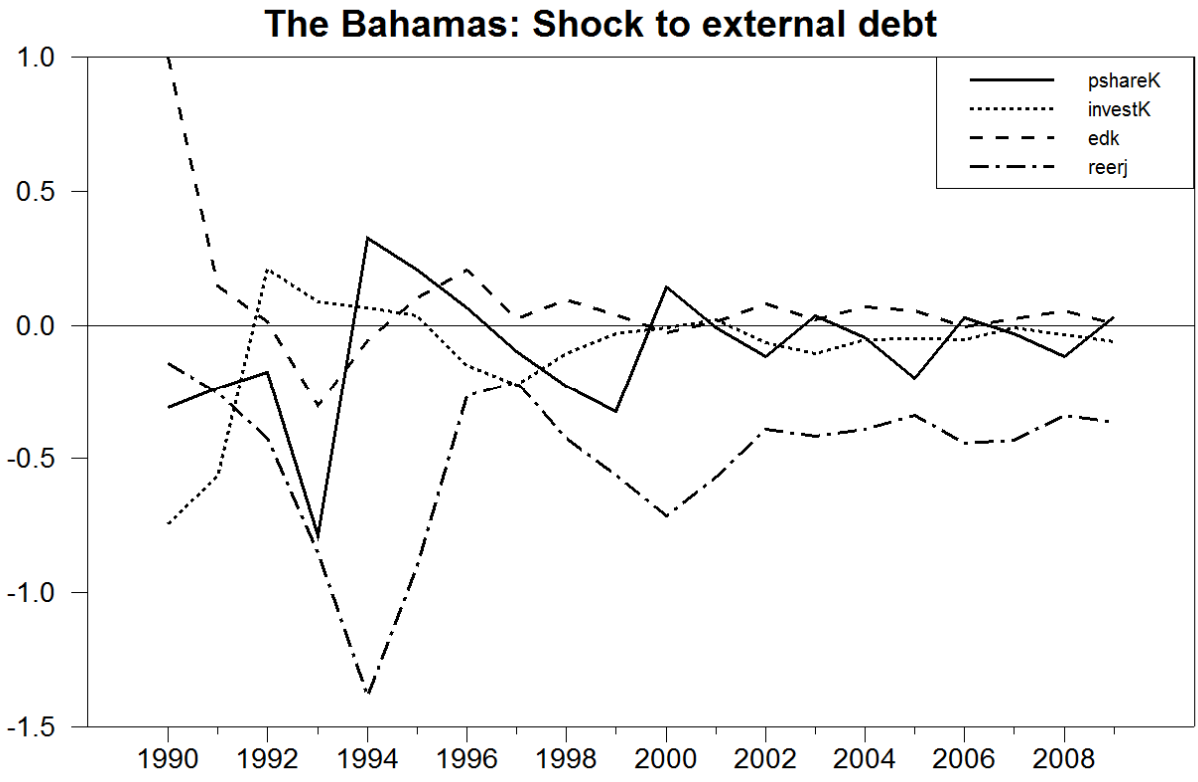

Jamaica:Shock to real exchange rate
Standard deviations
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
1969
1971
1973
1975
1977
1979
1981
1983
1985
pshareK
investK
edk
reerj


Jamaica: Shock to External debt
Standard deviations
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
-1.00
-1.25
1969
1971
1973
1975
1977
1979
1981
1983
1985
pshareK
investK
edk
reerj


The Bahamas: Shock to the profit share
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
pshareK
investK
edk
reerj


The Bahamas: Shock to Investment
1.00
0.75
0.50
0.25
0.00
-0.25
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
pshareK
investK
edk
reerj


The Bahamas: Shock to the real exchange rate
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
pshareK
investK
edk
reerj


The Bahamas: Shock to external debt
1.0
0.5
0.0
-0.5
-1.0
-1.5
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
pshareK
investK
edk
reerj

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