Analytical Foundations of Income, Employment and Money in a Caribbean Economy

Vanus James*

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The paper is still in draft form.

Many issues raised still have to be clarified.

Abstract

This paper sets out a macroeconomic model for Caribbean economies. It establishes that the short term impact multiplier is a product of two sector multipliers, one based on the profit share that is leaked out of the income cycle, and the other based on the rate of recycling of domestic capital in production, that is *the share of output that is leaked out of the basic capital creation stream.* It is shown that variations in these factors also lead to specific levels of output that deviate from planned (long-run) output under the influence of unique sector multipliers. We draw on these elements of the model to show that, typically, income and employment is not restrained by any inherent problem of imbalance in the domestic monetary system, other than that introduced via the balance of payments constraint. The key issues are therefore the causes and consequences of variations in sales, the stuff of effective demand theory, the causes and consequences of changes in the distribution of income and the rate of use of domestic capital output for reinvestment, and the causes and consequences of imbalances in the earnings of, and demand for, foreign exchange. In all three cases, the implications for income and employment are quite disturbing.

Keywords: Investment; Effective demand; Supply-side adjustment; Balance of payments constraint

JEL classification: F3; F4

* *E-mail address:* jamesvj@hotmail.com

1. Introduction

This paper proposes a model of income, employment and money that explains the evolution of a Caribbean economy. Our broad characterization of a Caribbean economy is as an open economy, still grappling with the problem of development and commercial utilization of its domestic capital forms and with import-intensive production, the speed of work, and the limits set by the balance of payments on domestic consumption and employment, and ultimately on capital production and accumulation. Of special importance are the terms of incorporation into the international order that lead to exogenous price determination for most import-intensive activity, a high rate of leakage of profit incomes out of the income cycle,[1] and the characteristic tendency for households to have minimal or no discretion over a large share of domestic incomes and hence over saving. The model clarifies how these characteristics are manifested in a "macroeconomics."[2]

We adopt the general classical/post-Keynesian technique of modeling actual (or short run) capital accumulation and development of related supply-side adjustment capabilities in a specific long-run context - a development context we might say. Dominance of import-intensive production and its vulnerability to negative price shifts make it is wise to monitor the wage and employment capacity of the system in terms of its output potential and price. In contrast to the methods of mainstream "microeconomics," the approach provides adequate room to deal with the institutional specifics of Caribbean society. The method of exploring the significance of sales - effective demand - for the cyclical dynamics of the system remains important, but along the way three other factors play a crucial role: the

state of the balance of payments, which is central to the theory of money; the distribution of income, which leans on the theory of class, race, and politics; and the rate of absoption of domestic capital into domestic production, which leans on the psychology of self-confidence.

The model presented assumes a developing monetary system in the sense that production and exchange must increasingly be financed. The economy has three factors of production. One is capital, the set of means of production produced within the domestic sociology. Capital can be either tangible (good) or intangible (service). Its most general pervasive "physical" form is knowledge and technology, but it includes embodiments such as supportive institutions and physical means of production. Its general form is as a fund of value. Capital contrasts with primary factors, which are not produced within the local sociology but are available to it. These primary factors are of two types, both heterogeneous. One is labor power, conceived as the basic ability to labor, which is typically augmented by the other accumulated capacities. The other comprises imports of means of production, including knowledge, institutional supports and equipment and tools.[3]

The monetary analysis is based on a specific understanding of the behavior of firms and of the interdependence of the economy. There are three types of firms in the economy. One type produces capital and/or use it intensively in industrial production. These firms set prices strategically and adjust to variations in effective demand mainly on the supply side or through the creation of productive assets overseas. Another type uses a mix of imports and labor intensively, and for various reasons is a price taker. The third is the "subsidiary" of the foreign-owned/controlled international corporation, that uses imports intensively to exploit the domestic natural resource base. In general, this yields an economy

with two broadly defined sectors, one (sector a) which is make capital and is capital intensive and one (sector b) which uses primary inputs intensively and whose output determines the domestic capacity to consume and to employ labor. With respect to interdependence, the evolution of the economy is increasingly focused on production and relative expansion of its unique forms of capital. The transformational growth of capital is constrained by the employment capacity created by the sector that uses imports and/or labor intensively and by the balance of payments on the current account.

One consequence of the development of capital is that the economy is becoming increasingly interdependent.[4] However, like labor, capital is not usually fully employed (absorbed). We show that this condition has major consequences for the way the economy works. One principal theorem of the model is that the rate of accumulation of capital per worker is not driven simply by the influences of sales. There is now a clear role for the rate of recycling (reabsorption) of capital and the distribution of income, with the latter affected directly by the speed of work. These variables ensure that matters such as the sharing of decision-making power, the socio-political currency of class, race and democratic participation all remain in the analysis. The other key theorem is that the imbalance of payments is the main source of imbalance in the monetary circulation process. There is no other major inherent domestic reason for imbalances between the demand and supply of money to arise.

The paper is set out in 3 sections. Section 2 describes the long run setting of employment and income creation in both real and monetary terms. The link to productivity growth is established, and productivity growth is then linked to the accumulation of capital per worker, the central issue in the paper. Here,

several aspects of the process of creating increasing returns are clarified in terms of technological progress in an interdependent system and in terms of the dynamic relationship between growth of capital and the employment of labor. The long run path of capital per worker is set out via the solutions or gravitational centers of the system of production and prices (and of purchases and sales) implied by the capital and the imported productive capacity that has been financed *by the financial sector and the balance of payments* and installed by businesses, and by existing labor 'contracts'.

In Section 3, we set out a short run model (as implicit DEs) of income and employment consequent on investment for capacity utilization and implementation of long run plans. The key variable forces here are (1) effective demand, (2) *the share of output that is leaked out of the basic capital creation stream, (3) the share of income that is leaked out of the basic income stream, and (4) the associated multipliers they generate.* It is shown that variations in these factors lead to specifiable levels of output that deviate from the planned (long-run) output under the influence of unique sector multipliers that are derived from the basic balance conditions inherent in the underlying data of the economy, and under the influence of an associated **money multiplier**. We draw on these elements of the model to show that, typically, income and employment are not restrained by any inherent problem of imbalance in the domestic monetary system other than that introduced via the *sectoral structure and level* of the balance of payments. The monetary analysis must concentrate its attention elsewhere. One key set of issues are the causes and consequences of variations in sales, the stuff of effective demand theory about which the literature has much to teach, some of which is quite disturbing. More important, we show that attention must also focus on

the causes and consequences of changes in three other key aspects of capitalism that affect the level and quality of activity and employment: the distribution of income; the rate of absorption domestic capital output for reinvestment in capital production; and the imbalances of the supply of foreign exchange claims relative to the demand by the productive sectors. Here, we are on less familiar terrain and when it comes to the prospects for either long term development or short-term income and employment, the issues raised are likely to prove to more disturbing than those raised by effective demand.

2. The Long Run Setting: Income and Productivity Growth

A major concern of all development is growth of consumption per capita, inclusive of consumption of education and health services, financed in the long run by growth of real income per capita ($\frac{dv}{v}$). A central factor in the growth of real incomes is the growth of productivity ($\frac{dy}{y}$). Let P be an index of the prices of domestic products, P^* be an index of the prices of imports, and b be the share of domestic output in domestic absorption. Also, let n be the employment rate and η be the labor force participation rate. A straightforward exhibit of this relationship between income growth and productivity growth is

$$\frac{dv}{v} = \frac{dy}{y} + (1-b)[\frac{dP}{P} - \frac{dP^*}{P^*}] + \frac{dn}{n} + \frac{d\eta}{\eta} \tag{1}$$

That is, per capita real income growth depends on the rate of productivity growth, the rate of change of the terms of trade multiplied by the share of imports in total GDP, the rate of growth of the employment rate, and the rate of growth of the labor force participation rate. Notice that the structure of the weight on the growth of the terms of trade implies that as the share of domestic consumption

(and hence domestic output) rises, the smaller will be the influence of growth in the terms of trade on the growth of per capita income (ul Haque, 1995).

When used in production, imports claim a rate of return, j, a real rental premium built into the user price charged in the country. Let ω be the real wage rate and r be the rate of return on capital. Assume a reference standard worker who is paid the real wage, and a transformation function $\phi(t)$ that converts a heterogenous set of employees, N, with knowledge and skills, into a flow of work per unit of time. So the effective number of workers, $N(t) = \phi(t)N$, is homogeneous. Then, in value terms, output per worker can be written as

$$y = \omega\phi(t) + rk + jm \tag{2}$$

where the k is the value of capital per worker and m is the value of imported equipment and tools per worker. The total derivative of (2) implies that

$$\frac{dy}{dk} = r + \omega\frac{d\phi}{dk} + \phi\frac{d\omega}{dk} + k\frac{dr}{dk} + j\frac{dm}{dk} + m\frac{dj}{dk} \tag{3}$$

So strictly speaking, $\frac{dy}{dk} = r$, and the rate of profit can be treated as a price much like any final commodity price, iff

$$\frac{d\omega}{dr} = -\frac{1}{\phi}[k + j\frac{dm}{dr} + m\frac{dj}{dr} + \omega\frac{d\phi}{dr}] \tag{4}$$

Even if we ignore all matters relating to the complicating role of variables such as the exchange rate implied in the specification of m, in an interdependent multisectoral system such as we describe below, in which k is made routinely and so cannot be scarce, and imports and labor are the primary factors of production, it would be quite accidental for a condition such as (4) to hold in practice. And even if it were to hold, it is inconceivable that such a condition as (4) would prevail for very long.

The variable y is an average of all sectors in the economy, with weights defined by the share of sector employment, n_i, in total employment. As we shall see, the differentiation among sectors holds much of the key to productivity growth.[5] Write

$$y = \sum n_i y_i, \text{ with } \sum n_i = 1, \text{ and } i \in \{a, b\} \text{ in this application.} \tag{5}$$

Further,

$$\frac{dy}{y} = \sum \frac{n_i y_i}{y} \frac{dy_i}{y_i} + \sum \frac{n_i y_i}{y} \frac{dn_i}{n_i} \tag{6}$$

with $\frac{n_i y_i}{y}$ being the employment weighted contribution of sector i to total productivity. The term $\sum \frac{n_i y_i}{y} \frac{dy_i}{y_i}$ is the weighted average growth (or decline) of sectoral productivity. The term $\sum \frac{n_i y_i}{y} \frac{dn_i}{n_i}$ is the weighted average of changes (growth or decline) in the employment share of the sectors. So, if we use the total derivatives of (2) to find suitable expressions for the rate of productivity growth in each sector, the growth of average productivity is given by

$$\begin{aligned} \frac{dy}{y} = & \sum [\frac{n_i y_i}{y} \frac{\omega_i \phi_i}{y_i} (\frac{d\omega_i}{\omega_i} + \frac{d\phi_i}{\phi_i}) \\ & + \frac{n_i y_i}{y} \frac{r_i k_i}{y_i} (\frac{dk_i}{k_i} + \frac{dr_i}{r_i}) \\ & + \frac{n_i y_i}{y} \frac{j_i m_i}{y_i} (\frac{dm_i}{m_i} + \frac{dj_i}{j_i})] \\ & + \sum \frac{n_i y_i}{y} \frac{dn_i}{n_i} \end{aligned} \tag{7}$$

Note that $\frac{\omega}{y}$ is the traditionally defined wage share in output, $\frac{rk}{y}$ is the share of capital and $\frac{jm}{y}$ is the share of imports.

2.1. *Increasing Returns*

Equation (7) assumes that n and k are independent. They are not, and their interdependence is one aspect of the theory of increasing returns. Growth of capital occurs primarily through expanded production, changing technical coefficients, and the creation of new sectors and related interdependencies that raise the demand for capital relative to that of labor. For the economy as a whole, and for any sector or firm, we postulate a relation between the growth in capital per worker (dk) and the flow of work ($N(t)$), as follows:

$$N(t) = N(t)^{\beta} dk \tag{8}$$

with $\beta \neq 1$ a parameter that changes over time as the process of capital formation and production develops from one that relies heavily on N, to one that increasingly pursues displacement of workers. Note that β is not a mere scale factor, but rather a coefficient of increasing returns that links the flow of work to the investment in capital and technology.

On reorganizing terms, then logs and time derivatives, we get

$$\frac{dN(t)}{N(t)} = \frac{1}{1-\beta}\frac{d^2k}{dk} \tag{9}$$

Then, recalling that n_i is an employment share, we can write

$$\begin{aligned} \frac{dn_i}{n_i} &= \frac{dN_i}{N_i} - \frac{dN}{N} \\ &= \frac{1}{1-\beta_i}\frac{d^2k_i}{dk_i} - \frac{d\phi_i}{\phi_i} + \frac{d\phi}{\phi} - \frac{1}{1-\beta}\frac{d^2k}{dk} \end{aligned} \tag{10}$$

A sector that does not create increasing returns will have its β_i tending to zero. Substituting from (10) into (7) gives

$$\begin{aligned}\frac{dy}{y} = & \sum[\frac{n_i y_i}{y}\frac{\omega_i \phi_i}{y_i}\frac{d\omega_i}{\omega_i} \\ & +\frac{n_i y_i}{y}\frac{r_i k_i}{y_i}(\frac{dk_i}{k_i}+\frac{dr_i}{r_i}) \\ & +\frac{n_i y_i}{y}\frac{j_i m_i}{y_i}(\frac{dm_i}{m_i}+\frac{dj_i}{j_i})] \\ & +\sum(\frac{n_i y_i}{y}\frac{w_i \phi_i}{y_i}-\frac{n_i y_i}{y})\frac{d\phi_i}{\phi_i} \\ & +\sum\frac{n_i y_i}{y}\frac{1}{1-\beta_i}\frac{d^2 k_i}{dk_i} \\ & +(\frac{d\phi}{\phi}-\frac{1}{1-\beta}\frac{d^2 k}{dk})\end{aligned} \tag{11}$$

since $\sum \frac{n_i y_i}{y} = 1$. So, on these assumptions, the rate of productivity growth depends directly on the acceleration, growth and share of the capital per worker, on related technological progress (including product diversification) generally, and on the extent of increasing returns in firms, sectors and the economy.

In terms of international comparisons, even if the coefficients of increasing returns are the same, two economies will experience different growth paths if the rates of acceleration and growth of capital per worker and related worker efficiency and associated technological progress were different. The economy that performs worse on these variables could stagnate even if its coefficient of increasing returns were identical to that of another.[6]

Our analysis is primarily concerned to clarify the path of capital per worker in these equations. This requires exploration of the dynamics of employment (of all factors), income and money as a result of the utilization of domestic capital. We present this below analysis in a multisectoral framework.

2.2. Money and Capital Accumulation

To implement plans, businesses must produce or purchase various specific forms of capital and other assets. Typically, this means outlays that create commitments beyond its self-financing capacity, so specialized financing from the financial sector is necessary. Businesses therefore put forward plans, some of which are sufficiently credible to convince the financial sector that the risks involved are worth taking and that necessary "credit" lines should be provided.[7] Plans cover matters such as the product quality, quantity and technology, terms of "collaboration" with international corporations, the commitments, obligations and expectations of households, businesses and government, acceptable loan or equity-participation arrangements, business location, marketing plans, and employment contracts (Best, 1968; 1980; Best and Levitt, 1969; Nell, 1988). We assume a financial sector that is sufficiently wealthy to have the collective asset base (including insurance pool) to secure necessary funding, the institutional capacity and savvy to evaluate the credit risk of applicants, and discern and finance prospects for successful (profitable) participation in domestic and international markets. There are other specifics, including the fact that weak proposals may have to be backed by "collateral" and the fact that "weakness" is often based on discrimination against many firms involved in capital production. Such details are also beyond the scope of this analysis but they do matter for proper specification of the responsiveness of the supply of money to the demand triggered by business plans.

Being capital intensive, the firms in sector a establish credit lines with the financial sector (which it might own in part). Being import intensive, sector b initiates production with two sources of funding - the domestic financial sector and the international sources of balance of payments supports that might funnel

funds to local operators. Domestic capital capacity is assumed to be created with technical capital coefficients (a_{aa}, a_{ab}). Production of capital, X_a, must meet the demand of the productive sectors a and b, $(a_{aa}X_a, a_{ab}X_b)$, exports, E_a, and government G_a. Such production *and* sale of capital is backed by the socialization of knowledge and development of appropriate institutions (James, 1993). One implication of this equation is that as long as there exists an active process of financing business proposals and of converting knowledge into equipment, tools and services, capital ultimately cannot be scarce. It can be made the abundant resource of the society, abetted by increasing returns - product and process innovation - and decreasing unit costs, and by manipulation of the tastes and needs of domestic and foreign consumers to meet its expansion initiatives.

Production also features socio-technical labor coefficients $(\phi_a b_a, \phi_b b_b)$, indicating need for so many workers for a period, delivering a corresponding flow of work linked to the disposition of hearts and minds (Best, 1968, 1975; Hamilton, 1994; James, 1993, 1994).[8] It is assumed that the production of sector b, X_b, sets the key limits on domestic consumption and employment. Thus, X_b anticipates allocations $c(\phi_a b_a X_a, \phi_b b_b X_b)$ to employees in each productive sector in the light of the going real wage and the projected flow of work, and allocations to exports and government.

The economy also has import coefficients (m_a, m_b), with sector b relying on a high rate of imported productive inputs per unit of output. In contrast to a country such as the USA, a Caribbean country cannot produce and accumulate capital per worker without regard to its international financial obligations.[9] In the absence of an international currency that allows the society to borrow unlimited supplies of imports, sector plans also require a definite supply of foreign currency

to procure imports - a capacity to import whose importance was featured in Best (1968) and Best and Levitt (1969). Presence of this monetary constraint in the model means that the economics of production cannot be described solely in real terms.

Let $\bar{d} = (\delta + d)$, where d is the differential operator describing the rate of growth and δ is the rate of capital *depreciation in the sense of replacement necessitated by capacity utilization.* Since δ is itself a change operator, $\bar{d}$ is a gross growth operator with the property $d \leq (\delta + d) \leq (1 + d)$. For simplicity, it is often useful to work with the maximum value $(1 + d)$, which is to say with a circulating capital model. Also, let c be the consumption rate per worker, π_a and π_b be the foreign price of exports of X_a and X_b respectively, π_M be the price of imports and M_i be the imports of various unproductive requirements by consumers and government. Then, production and sale are adequately modeled as

$$\begin{aligned} X_a &= \bar{d}(a_{aa}X_a + a_{ab}X_b) + E_a + G_a \\ X_b &= c(\phi_a b_a X_a + \phi_b b_b X_b) + E_b + G_b \\ \mathrm{B}_T^* &= -\pi_M \bar{d}(m_a X_a + m_b X_b) + \pi_a E_a + \pi_b E_b - \pi_M(M_C + M_G) \end{aligned} \tag{12}$$

The balance of payments and the flow of work (or primary sector output per unit of consumption) are the main constraints on capital accumulation. Notice also that this formulation does not deny the usefulness of writing production functions $X_i = f_i(a_{ij}X_j, \phi_i b_i X_i, m_i X_i)$, however any such substitution must still be consistent with the accounting and production restrictions implied by sales, work and the availability of imports on the RHS of (12).

The system in (12) indicates the structure of the economy as if plans are fully financed and implemented. Also, given the sequencing of financing, sequences of linear difference equations of production and the balance of payments $\begin{pmatrix} X_{at} \\ X_{bt} \\ (M_C + M_G + \mathrm{B}^*_T)_t \end{pmatrix}$ are inherently associated with the socio-technical coefficients of (12). The qualitative or quantitative behavior of ($\frac{d(a_{aa}X_a)}{dt}$ and) the underlying infinite sequence $\begin{pmatrix} X_{at} \\ X_{bt} \\ (M_C + M_G + \mathrm{B}^*_T)_t \end{pmatrix}_0^\infty$ is strictly dependent on the underlying eigenvalues and eigenvectors of the matrix of coefficients and can be studied in those terms.

It is immediately obvious from division of the second equation by c that this is the employment constraint of the economy. The equation does not assume full employment. Its form indicates that domestic private demand, exports and government procurement combine to stimulate employment. The third equation of (12) indicates that growth of foreign demand is expansionary, slackening the balance of payments constraint and boosting the supply of money. However, subject to the technical import coefficients, the growth of import demand by producers, consumers and government is contractionary. During a production period, this growth of imports tightens the balance of payments constraint and restrains the expansion of credit and capital accumulation to levels below planned amounts. It is a matter about which we must be acutely aware in deriving a macroeconomics.

There is an implied point of inflexion in any production possibilities curve constructed out of the data in (12). In sharp contrast to mainstream thinking, domestic capital makes consumer tastes variable and shapes it to meet the needs

of accumulation. In the context of underutilized potential to create capital and shape tastes, and in the context of increasing returns, the standard Ricardian notion of comparative advantage cannot apply. Instead, the quantity of capital is variable *and* creates its own competitive advantage by introducing a set of market penetrating businesses that change the structure of production and tastes, lowers unit costs, and create niches (monopolies) that can win necessary import capacity (foreign exchange for importing). Thus, there exists a production combination such that as the economy expands its production of X_a relative to X_b, it actually creates increasing returns and decreasing costs possibilities, along with a reshaping of tastes and expansion of import capacity to meet its exporting needs.[10]

The specification in (12) recognizes the importance of developing interdependence by taking account of capital accumulation in the traditionally import-intensive sector. It also recognizes the interdependence of production and pricing - **which is to say, absence of the duality assumed in mainstream modeling.**

The accumulation of capital per worker is properly investigated by considering the data on the socio-technical requirements of production and the balance of payments per worker. Let $x = \frac{cX_a}{X_b}$. Then, (12) can be rewritten as

$$\begin{aligned} x &= \bar{d}(a_{aa}x + a_{ab}c) + \frac{cE_a}{X_b} + \frac{cG_a}{X_b} \\ 1 &= (\phi_a b_a x + \phi_b b_b c) + \frac{E_b}{X_b} + \frac{G_b}{X_b} \\ c\frac{B_T^*}{X_b} &= -\pi_M \bar{g}(m_a x + m_b c) + \pi_a \frac{cE_a}{X_b} + \pi_b \frac{cE_b}{X_b} - \pi_M c(\frac{M_C}{X_b} + \frac{M_G}{X_b}) \end{aligned} \tag{13}$$

Notice that $(a_{aa}x)$ is the quantity of capital per worker used in sector a, and $(a_{ab}c)$ is the quantity of capital per worker of sector b. The equation is implicitly a partial differential equation that sets out the behavior in the economy required to achieve

the goal of growth of capital per worker in sector a at the rate $\frac{d(a_{aa}x)}{dt}$ and the quantity of capital per worker in sector b at the rate $\frac{d(a_{ab}c)}{dt}$. These growth rates are affected by the rate of technological progress, institutional development, the efficiency of labor, and various forms of final demand, including government. It is tedious but straightforward to show from (13) that the nexus of the quantity of capital per worker, consumption per worker and the balance of payments per worker is given by

$$x = \frac{c[\bar{da}_{ab} + (\frac{E_a}{X_b} + \frac{G_a}{X_b})][\pi_a \frac{E_a}{X_b} + \pi_b(1 - \frac{G_b}{X_b}) - \frac{B_T^*}{X_b} - \pi_M \bar{dm}_b - \pi_M(\frac{M_C}{X_b} + \frac{M_G}{X_b})]}{\pi_M \bar{dm}_a \bar{da}_{ab} + c(\pi_b \phi_b b_b - \pi_b \phi_b b_b \bar{da}_{aa} + \pi_b \phi_a b_a \bar{da}_{ab}) + (\frac{E_a}{X_b} + \frac{G_a}{X_b})(c\pi_b \phi_a b_a + \pi_M \bar{dm}_a)]} \quad (14)$$

2.2.1. Technological Progress and Structural Change

The structure of production is determined solely by the first equation of (12) or (13), as

$$x^* = \frac{X_a}{X_b} = \frac{\bar{da}_{ab} + \frac{E_a}{X_b} + \frac{G_a}{X_b}}{(1 - \bar{da}_{aa})} \quad (15)$$

Note that $\frac{1}{1-\bar{da}_{aa}}$ represents a long term structural change multiplier that depends on the rate of change of the technical coefficient (da_{aa}). Equation (15) suggests many key factors that can be influenced directly to restructure the economy. One of these is the rate of utilization of the domestic capital, as mirrored in the rate of depreciation, δ. Another choice is to set the effort at endogenous development of technology to favor a rise in the rate of capitalisation by the import-intensive sector, da_{ab}, and by the capital producing sector itself, da_{aa}. For development, both sectors of the economy should grow but the capital producing sector should grow relatively faster.

Relationship (15) is useful in setting conditions for exploring the role of money in the macroeconomic (implementation) process, which determines whether or not,

and why, the economy stays on its planned development path. For this purpose, we will assume a given (or planned) economic structure. If, in addition, the structure of export and government $(\frac{E_a}{X_b} + \frac{G_a}{X_b})$ support for sector a and a specific rate of development of capital by sector a, $\bar{da}_{aa}$, are targeted by policy, then the rate of change of technology in sector b, $\bar{da}_{ab}$, will follow.

Under such a policy scenario, the remaining unknown on the LHS of (14) is domestic consumption rate c. Here, we introduce the pivotal assumption that household savings are an inconsequential residual when compared to savings out of the retained earnings of businesses. In the historical circumstances, neither domestic retained earnings nor profit incomes going abroad ever come under the discretionary purview of household. Even in the case of small household-firms, there is a substantive separation of the business operations and savings from the more secondary agenda of consumption. Similarly, consumption out of retained earnings are not a significant influence on capital per worker. Thus, we set gross consumption equal to gross "real wages." That is

$$c = \omega \tag{16}$$

The remaining unknowns on the RHS of the nexus in (14) exhibit the difficulty of managing a typical Caribbean economy. Within the context of total government spending, we also assume $\frac{G_b}{X_b}$ and $\frac{M_G}{X_b}$ can be set by policy, as can be $\frac{M_G}{X_b}$. Further, π_M and π_b are exogenous to the economy and π_a is determined by the price system. Given the technical data, there are four remaining unknowns - $\frac{B_T^*}{X_b}$, $\bar{dm}_b$, $\bar{dm}_a$, ϕ_b, ϕ_a, long known to be thorns in the sides of Caribbean social and economic managers, and entrepreneurs. Even if the rate of growth of imports, $\bar{dm}_a$, $\bar{dm}_b$ are admitted as data, and management of $\frac{B_T^*}{X_b}$ is left to Central Bank, there is still

the difficult task of setting either ϕ_b or ϕ_a. Put differently, equation (14) describes the quantity of capital per worker implied by the "equilibrium" rate(s) of accumulation of capital, $(\bar{da}_{aa})$ and $(\bar{da}_{ab})$, by business behavior matching the plans and relationships underlying the capacity installed, including those characterizing the terms of incorporation into the international economy and exchange process, the commitments, obligations and expectations of households, businesses and government, technology, loan arrangements, business location, marketing plans, and employment contracts (Nell, 1988), and policy implied by the need to regulate the balance of payments. However, the nexus of the balance of payments, the rate of consumption and the capital per worker is indeterminate unless there is a specific and implementable policy regime for setting either ϕ_b,or ϕ_a.

One approach to setting $\bar{da}_{ab}$ in (15) is through "technology policy" focused on $\bar{da}_{aa}$. The long run path of the capital per worker that is financed and established is influenced by the rate of technological and institutional progress, which influences the structure of production. In society, capital production, especially knowledge production, is always an initial condition for other production. Thus, (14) actually reveals that the path of capital per worker is influenced by a path of technological progress, which is known to involve several aspects. One aspect, most crucial for understanding increasing returns, is that technological progress creates entirely new sectors (commodities and processes) that demand capital from sector a or broaden its internal composition of activities. This is exhibited by $\bar{da}_{ab}$, which expresses both the reproduction of the old technology δa_{ab} and the development of new techniques (da_{ab}), most often associated with the emergence of new types of commodities. Another aspect is the interplay of improvement of the speed (i.e. efficiency) of labor and the *social* relationship between capital and labor that

is embodied in $d(a_{aa}\phi_b b_b)$ and $(da_{ab}\phi_a b_a)$. Institutional progress is a necessary *complement. This multidimensional structural change is led by the explosion of* local knowledge, evident in sectors such as music and entertainment, which generate a sequence of investments that change capital per worker and the structure of the economy up to some limit. After that there is slowdown of investment until another spurt of knowledge development, innovation and investment. Schumpeter described the process as leading "up to a new neighborhood of equilibrium, in which enterprise will start again" (Schumpeter, Business Cycles, 1939:137).

It is necessary to capture these aspects with a sequence of equations that describes all types of changes simultaneously and such a sequence is beyond the scope of this paper. We opt for a somewhat simplistic formulation that captures only the key consequences of these processes for the growth of the quantity of capital used by sector a itself. Considering (12), it is as if technological change is ultimately reflected in the techniques, institutions and capital that are financed and established for the sector that *makes* capital. One vital consideration that must be expressed is the potential for this sector to stagnate technologically over time and prove unprofitable to reproduce when insufficient effort is devoted to capital creation. The threshold of depensation is likely to depend on the level and quality of affordable foreign capital alternatives. For the growth of capital due to technological progress, we define $\gamma = a_{aa}X_a$, the quantity of capital used by sector a, and write

$$\frac{d\gamma}{dt} = -\beta_1(1-\frac{\gamma}{\gamma_1})(1-\frac{\gamma}{\gamma_2})\gamma^{*\alpha} + \psi_1\gamma\ln(\frac{\gamma_3}{\gamma}) \tag{17}$$

where β_1, γ_i and ψ_1 are constants. The first term on the right hand side of (17) captures the productivity effects of physical/social capital development, including

intangible services, by sector a, including the creation of new sectors. The second term captures institution building.[11] Thus, the long run path of technical change can be influenced by targeting a specific growth of capital capacity, $\frac{d\gamma}{dt}$, through targeting of ratios $\frac{\gamma}{\gamma_1}$, $\frac{\gamma}{\gamma_2}$ and $\frac{\gamma_3}{\gamma}$, such that the economy avoids depensation and enters a path of logistic growth or better.[12]

2.2.2. Money and the Price System

Proposals for credit contain a specific pricing proposal and credit is approved subject to such proposals. Typically, prices are not set as reflections of the utility gleaned from consumption by the majority of the population; and, they never were (Best, 1968). We adopt a markup pricing system that reflects the growing dominance of the capital-producing sector, as follows:

$$\begin{aligned} p &= \bar{\pi}_{\hbar_K} p a_{aa} + \bar{j}^{\hbar_M} \frac{p_M}{p_b} m_a + \omega \phi_a b_a \\ 1 &= \bar{\pi}_{\hbar_K} p a_{ab} + \bar{j}^{\hbar_M} \frac{p_M}{p_b} m_b + \omega \phi_b b_b \\ \frac{p_M}{p_b} &= \frac{\pi_M}{\pi_b} = \pi \end{aligned} \tag{18}$$

where $p = \frac{p_a}{p_b}$, $\omega = \frac{w}{p_b}$ is the ratio of the money wage to the price of the import-intensive commodity and p_M is the price of imports. The prices p_a and p_b are assumed to be stable for reasons that are worth exporing.

Since sector b is import-intensive, its technology and the main elements of costs are largely beyond the control of the domestic entrepreneur. Unit costs fall only when technological improvement can be financed but such financing relies on earnings of foreign exchange, which tend to be in limited supply. Just as

important, the historical legacies of social turmoil and the dependence on imports for consumption, makes the option of widespread layoffs and output variations inaccessible in the short run. Profitability must bear the adjustment when demand conditions change. In any case, output is sold wholly or mainly in export markets in which domestic unit costs has no bearing on price formation. Thus, p_b is set exogenously and is subject to related shocks. In any production period, therefore, it makes sense for firms to maximize work and production and for unit costs to be regulated to meet price over the long term, typically yielding a profit residual at a rate just equal to the interest rate on credit. If p_b falls exogenously in a given period, even the normal profit target might not be realized. In analytical terms, negative price shocks show up as increases in $\frac{p_M}{p_b}$ and ω, and in unit costs due to the terms $\bar{j}^{\hbar_M}\frac{p_M}{p_b}m_b$ and $\omega\phi_b b_b$.[13] Thus, in the second equation of (18), there must be a corresponding fall of profit, $\bar{r}_{\hbar_K}pk_b$, resulting often in losses and the reduction of the value of the firm's capital. Positive price shocks yield the opposite effects. In either scenario, it makes sense for the firms and industries of sector b to improve (lower) m_b or $\phi_b b_b$. Lower $\phi_b b_b$ requires a rise in work effort even in the face of productivity increases and is not guaranteed by the existing social system. Firms therefore plan on the *hope* that exogenous forces would sustain p_b at a level required to yield sufficient foreign exchange to finance lowering of m_b. The historical experience is that such hope is typically not realized in the long run and technological stagnation is the norm.[14]

In the case of sector a price is stable for entirely different reasons. The prices of the capital-intensive sector a are more predictably set to cover all costs, with anticipation of a substantial markup in excess of unit prime costs. Specifically, these prices seek to allow recovery of the variable outlays on labor and imported

inputs, as well as capital. However, in the context of capital intensity, pa_{aa} is the dominant factor in price formation and the costs of the capital fixtures and services are usually large relative to own financing capacity. Thus, installation or use of capital must be financed and the principles of amortization invoked. Sector price must therefore yield a sufficient profit, a markup over the costs of capital fixtures and services, and the interest on the financing secured (Nell, 1988:88).[15] Pricing is therefore a long term matter, designed partly to cover utilization and interest costs of assets that are committed for the long term, and in relation to which the crucial calculations of profit are made. Thus, prices are kept stable in the case of sector a as part of the guarantee to creditors that commitments can be met and as part of the effort to avoid spoiling the credit market. This principle applies even when the financing is achieved through own-account credit or "self-financing."

Thus, only changes in the technology embodied in pa_{aa} and in the associated relationship between the three socio-technological coefficients $(a_{aa}, m_a, \phi_a b_a)$ will warrant a change of price. As implied by the first equations of (12) and (18), these changes are usually validated by changes in the scale of the market (Kaldor, 1967; Nell, 1998:88),[16] in the underlying distribution of income, or in the rate of re-employment of the output of sector a as capital. Changes in short run demand or production conditions with respect to these variables are therefore met by changes in work effort, employment, and output. There is a growing trend for the crises of exogenous price formation and profitability in sector b to result in a relative movement of resources towards sector a and the accumulation of the value of capital (accumulation) per worker, $d(p[a_{aa}x + a_{ab}c])$. It is this trend that is ultimately reflected in the overall characterization of the economy as an economy driven by demand, the distribution of income, the recycling of domestic

capital into the creation and development of more capital, and the slackening of the balance of payments constraint.

2.2.3. Relative Prices

The long run accumulation of capital, which is to say the relative growth of the capital producing sector, is validated by the associated adjustment of relative prices, especially in the context of international specialization. It can be shown from (18), that relative prices take the form

$$p = \frac{m_a + \{\phi_a b_a m_b - \phi_b b_b m_a\}\omega}{m_b + \bar{r}_{b_K}(a_{ab}m_a - a_{aa}m_b)} \tag{19}$$

where, from (14) and (16), it is readily shown that the real

$$\omega = \frac{x[\pi_M \bar{d}m_a \bar{d}a_{ab} + (\frac{E_a}{X_b} + \frac{G_a}{X_b})\pi_M \bar{d}m_a)]}{(\pi_b\phi_b\bar{b}_b - \pi_b\phi_b b_b \bar{d}a_{aa} + \pi_b\phi_a b_a \bar{d}a_{ab})x - H} \tag{20}$$

with

$$H = [\bar{d}a_{ab} + (\frac{E_a}{X_b} + \frac{G_a}{X_b})][\pi_a \frac{E_a}{X_b} + \pi_b(1 - \frac{G_b}{X_b}) - \frac{\mathbf{B}^*_T}{X_b} - \pi_M \bar{d}m_b - \pi_M(\frac{M_C}{X_b} + \frac{M_G}{X_b})] \tag{21}$$

It is immediately obvious from consideration of the reciprocal of ω in (20) that the real wage varies inversely with the quantity of capital per worker. Thus, *ceteris paribus*, a rise in the quantity of capital per worker also lowers **relative** prices.

A caution to those with a mainstream orientation is that here, as hinted at in equations (6) to (9), the value (quantity) of capital is independent of the rate of profit only if $a_{ab}m_a = a_{aa}m_b$ or capital earns no profit in the domestic economy. Moreover, relative prices are only independent of relative quantities under very stringent and unlikely conditions, including when $\phi_a b_a m_b = \phi_b b_b m_a$ and the same primary technologies are applied in both the capital producing and import-intensive sectors.

The result provides for a proper formulation of the principle of comparative advantage, which arises when relative prices differ, or are made to differ, from those of trading partners. Specifically, equations (19) and (20) indicate that relative prices can differ from those of another country because of the following factors:

(1) structural differences resulting from differences in the speed of work, the rate of return on imports, and the rate of profit (or interest), and hence in the distribution of income between labor, capital and imports.

(2) differences resulting from the existing and changing technical conditions of production, including the ratio of technical coefficients in the sectors, all associated in part with domestic technological change, the associated rate of development of new commodities, and the associated extent of increasing returns.

(3) the terms of trade and the balance of payments, and through these variables the relative rate of production of capital per worker adjusted for the speed of work and the rate at which capital output is recycled into the creation of new capital.

Of course, in stating the principle more fully, it would be necessary to trace carefully the role and effects of international money flows, but that is somewhat beyond our scope at this time. Because of the dynamism of the economy, and because the return on capital itself is a function of the dynamism of capital, relative prices are primarily dependent on changes in technical conditions induced by capital development and growth in the supply of capital, not on the price of labor and price of imports. Put differently, since a Caribbean country produces increasing amounts of its own versions of capital, so that capital is not scarce, it would generate both relative factor costs and other technological conditions and balance of payments that increasingly allow cheaper and more attractive supply of the commodities produced by intensive use of that capital.[17] Thus, the pricing

structure of (19) validates increased development of the capital producing sector whether one looks at trade by the principle of comparative advantage or at the domestic economy in (13).

3. Shortrun Dynamics and the Evolutionary Path

Considering the third equations of (12) and (18), a key point can now be made that when short run demand or production conditions change, the interdependencies of the system will transmit the effects throughout the production *and* pricing system. One set of these interdependencies is in the production system, but vital interdependencies exist between production and pricing that are not addressed in mainstream modeling. A change in activity in one sector will normally cause substantial changes in production in the other sector *as well as* structural price changes, a fact which informs study of the effects of perturbation of the level and structure of government taxation and spending, general sales and, perhaps more important, the distribution of income, the rate of recycling of capital to create capital and the strictures of the balance of payments.

In investigating the effects of perturbation of these variables, it is necessary to consider several key relationships inherent in the long run path defined by existing capacity. These relate to the balance of demand/expenditure or supply/incomes necessary for the economy to be on the implied long run path. Imbalances can be seen as sectoral or economy wide deviations of capacity utilization from the long run path caused by the perturbations, which have practical consequences some of which can be unfavorable. Adjustments of capacity utilization to imbalance characterize the actual (shortrun) path of the economy. Analysis proceeds by considering the sequence of related decisions about employment to use capacity

and to accelerate investment.[18]

Considering plans described in (20), firms in the capital-intensive sector a draw down on negotiated credit lines to install capacity that allows them to produce their own capital needs, run their operations to produce the capital needs of sector b, and supply government and foreigners with the amount they are projected to demand. Firms in sector b similarly negotiate and draw on credit to install capacity that allows satisfaction of demand anticipated from their workers, the workers of sector a, and demand projected from government and foreigners. To run operations these firms must also employ the planned amount of labor and imports in the first instance, just enough to produce the planned (expected) value of output and apportion anticipated incomes.

The total output of X_a is predicated on this anticipated flow of revenues, $\bar{d}a_{aa}pX_a + \bar{d}a_{ab}pX_b + pE_a + pG_a$, built into which is a provision for normal growth of capacity and demand. The incomes anticipated are $\bar{r}_{h_K} pa_{aa}X_a + \bar{j}^{h_M}\frac{p_M}{p_b}m_aX_a + \omega\phi_a b_a X_a$. To see this, multiply the first equation of (20) (relating to the capital intensive sector) by p to get the value of the output (supply) and hence expenditures at the price of production. Multiply the first equation of (21) by X_a to get the total claims (incomes or demand) to be distributed against the output on the scale defined. Equating expenditures (supply) and income (demand) gives the condition of balance in the production system as

$$\bar{r}_{h_K} pa_{aa}X_a + \bar{j}^{h_M}\frac{p_M}{p_b}m_aX_a + \omega\phi_a b_a X_a = \bar{d}a_{aa}pX_a + \bar{d}a_{ab}pX_b + pE_a + pG_a \quad (22)$$

Equation (22) says that burden of generating targeted gross wages and profit incomes as claims associated with employment, work and ultimately supply in the capital-intensive sector must be borne by expenditure (demand) for capital

formation in both the capital-intensive sector and import/labor-intensive sector, net exports of the capital intensive sector, and government spending to create externalities in support of the output of the capital intensive sector. Whatever component of these claims is spent will create further demand for the output of the both sectors, adjusted (boosted or slowed) by the level and structure of collective and coordinated (government) intervention, whether spending-related, distribution-related or related to the rate at which domestic capital is deployed. The equation embodies several degrees of freedom because openness implies the existence of a rate of return on capital that is different from the rate of growth of productive capacity. Specifically, we could write

$$\omega\phi_a b_a X_a + pa_{aa}X_a(\bar{r}_{\hbar_K} - \bar{d}) = \bar{d}pk_b X_b + (pE_a - \bar{j}^{\hbar_M}\pi m_a X_a) + pG_a \quad (23)$$

which reduces to the more familiar condition that

$$\omega\phi_a b_a X_a = \bar{d}pk_b X_b + (pE_a - \bar{j}^{\hbar_M}\pi m_a X_a) + pG_a \quad (24)$$

if

$$\bar{r}_{\hbar_K} = \bar{d} \quad (25)$$

This is a production-related condition that is unlikely to hold as long as $\bar{j}^{\hbar_M} \neq 0$, since the latter condition is based on a tendency for imports to earn relatively high rentier profits under conditions of tight foreign exchange supplies while the possibilities of moving investment into the import market are tightly circumscribed by historical monopolies and credit market restrictions. Thus, a simple condition such as (24), which tends to hold in certain economies that have solved the problem of low capacity development and utilization, does not hold in the Caribbean and many other areas of the world in which the task of building up the domestic capital

intensive sector has not yet been accomplished. The possibilities of imbalance are correspondingly greater in the Caribbean economies. For any given wage rate and any given net profit from growth of investment, an imbalance might arise from some combination of inadequate government spending, inadequate net exports of capital intensive output, or inadequate use of domestic capital by the traditional import or labor intensive sector. Or, keeping in mind (16), for any given flow of domestic spending a rise in wages could lead to a growth in imports if domestic capacity could not grow competitively to supply successfully competing domestic output to satisfy the demand created by the growth of wages.

Now, with respect to the flow of funds, banks supply the negotiated credit lines, and the initial supply-demand for credit in sector a is

$$\mathbf{C}_a^S(X_a) = \bar{d}p_a a_{aa} X_a + \omega\phi_a b_a X_a + \bar{j}^{h_M}\frac{p_M}{p_b} m_a X_a \tag{26}$$

where $\mathbf{C}_1^M$ defines the supply of money provided by the banking sector in response to the justified credit needs of sector a. Reorganizing (22) to isolate $\bar{r}_{h_K} p a_{aa} X_a$ indicates that when wages and import needs are met out of the revenues, the remainder is the profit residual (usually earnings before interest and taxes are paid). That is, the profit on capital is

$$\bar{r}_{h_K} p a_{aa} X_a = (\bar{d} a_{aa} p X_a + \bar{d} a_{ab} p X_b + pE_a + pG_a) - (\omega\phi_a b_a X_a + \bar{j}^{h_M}\frac{p_M}{p_b} m_a X_a) \tag{27}$$

The result is vital to a cogent determination of the subsequent monetary and other dynamic effects of the expenditures initiated by sector a. The equation also validates our interpretation of increasing returns. Subject to its wage and import costs, if the activities of sector a results in the growth of absorption of capital by another sector, such as $da_{ab}pX_b$, and to lower ϕ_a, which lowers the effective wage costs, the result will be growth of profits for sector a.

The total output of X_b is correspondingly predicated on anticipated revenues of $\omega(\phi_a b_a X_a + \phi_b b_b X_b) + p_b E_b + p_b \dot{G}_b$, where ω has a built in rate of growth of the real wage anticipated by business and labor alike. The associated initial supply-demand relation for credit to sector b is

$$\mathbf{C}_b^S(X_b) = \bar{d}a_{ab} p X_b + \bar{j}^{\bar{h}_M} \pi m_b X_b + \omega \phi_b b_b X_b \tag{28}$$

Here too, when the wages and import needs are met out of revenues, the remainder is the profit residual.

Again, multiplying the second equation of (18) by X_b and equating with the second equation of (12) gives, the balance equation as

$$\omega \phi_a b_a X_a + \omega \phi_b b_b X_b + E_b + G_b = \bar{r}_{\bar{h}_K} p k_b X_b + \bar{j}^{\bar{h}_M} \pi m_b X_b + \omega \phi_b b_b X_b \tag{29}$$

or

$$\omega \phi_a b_a X_a + G_b + E_b = \bar{r}_{\bar{h}_K} p k_b X_b + \bar{j}^{\bar{h}_M} \pi m_b X_b \tag{30}$$

The equation indicates that the profits of the import/labor-intensive sector are generated by its net exports and by the demand for its output that is generated by the consumption expenditure of the workers in the capital-intensive sector, and by government spending to use the traditional sector's output for consumption purposes. This equation provides the basis for specifying the multiplier describing output and employment dynamics when plans are being implemented, and the link of this relation to the distribution of income. On reorganization of (30), we get the anticipated profit as

$$\bar{r}_{\bar{h}_K} p k_b X_b = \omega \phi_a b_a X_a + (E_b - \bar{j}^{\bar{h}_M} \pi m_b X_b) + G_b \tag{31}$$

a result which is also needed to follow the money trail. Notice that, in the absence of an inherent capacity to transform the technology of production, the principle of increasing returns *is not pervasive in sector b.*

A crucial conclusion is possible here. Wage expenditures from sector a are critical, but cannot alone account for the profits on capital employed in sector b. Exports and government spending make a positive contribution, while imported inputs make a vital negative contribution. Caribbean economies are substantially more complex than envisaged by the economics of certain other economies. Furthermore, for the same reason, investment spending in the economy is not sufficient to explain profit income. To see this, we use (27) and (31), add the profit estimates, and get

$$\begin{aligned} \bar{r}_{\hbar_K} p a_{aa} X_a + \bar{r}_{\hbar_K} p k_b X_b &= \bar{d} a_{aa} p X_a + \bar{d} a_{ab} p X_b + p G_a + G_b \\ &\quad + (p E_a + E_b - \bar{j}^{\hbar_M} \frac{p_M}{p_b} m_a X_a - \bar{j}^{\hbar_M} \pi m_b X_b) \end{aligned} \tag{32}$$

So total profit is explained by a substantially more complicated process than mere investment. Specifically, it is also explained by exports net of the value of imported inputs and by government spending. Businesses on aggregate might get more than they spend or they might get less, all depending on whether net exports are positive or negative, and on how government spending is aligned to the net exports.

3.1. Tracing the Effects of Spending

Our immediate challenge is to draw on these results to trace all the key effects of the spending. We must therefore delve more deeply into monetary, employment, production and income dynamics, and we can reasonably expect these

dynamics to be substantially more complicated than the usual textbook interpretations, including the portrayals of traditional postkeynesian economics. The entire analysis is presented in a somewhat dynamic form. However, we need some other preliminaries relating to production and work, and to the understanding of the leakage-injection process.

3.1.1. Production, Work and Investment for Capacity Utilization

For short run output dynamics, we need to keep in mind the relationship linking capital and work, with work serving as the indicator of the rate of capacity utilization. We begin by reminding that based on (12), the link between the number of workers and the use of capacity in sector a is mediated by the flow of work and is given by

$$N_i = \phi_i b_i X_i \tag{33}$$

Recall that ϕ_i re-scales the number of workers in the sector downwards to generate a given output, which equates to raising the efficiency of labor. If increasing returns prevails as utilization increases and output expands, then for given technical conditions, this could only be achieved through a tendency for ϕ_i to adjust downwards. Thus, assuming the technical conditions fixed in the short run, so that b_i is fixed, we get

$$dN_i = \phi_i b_i dX_i + b_i X_i d\phi_i \tag{34}$$

Equations (34) indicate the options of a firm in sector a faced with short run changes in market conditions, whether in terms of effective demand, the rate of capital recycling, or the profit share. Short run variations of production come

from either of two types of responses, both integral to the design and construction of existing capacity and to the social and institutional structure of capitalist employment practice. One is change in the rate of growth of the productivity of work effort and the efficiency of workers (the transformation function) and the second is the change in the rate of employment of workers. The change in the employment of workers is the focus of the important "utilization function" introduced by Nell (1988:106). But it is clear from the actual practice of business that layoffs and increases in employment response to changing demand, production or distribution conditions are a last resort in this scheme. Were demand to rise suddenly, distribution conditions to move in favor of wages and imports, or capital recycling to improve, management would press workers to improve performance in two distinct ways. One is to improve individual and collective worker performance, a move which might involve reorganization to put the best workers in the best positions to meet the specific demand challenges or other internal pressures arising from a change in the share of income going to profit or imported inputs.

The different pressures that disturb the system tend to trigger different responses from management. If sales conditions in the form of orders do not change but accountants report a falling profit/imports share, especially in a context in which orders cannot be filled on time, management would surely move to find the individual workers who tend to shirk or are simply incompetent and do not contribute much to surplus relative to the pay they receive. On some pretext relating to worker performance, these workers would be replaced, hopefully by more efficient hirees, in an effort to deal with lagging profits without expanding the employment roles. If management is convinced that the problem is not the individual worker, then it might move to reorganize work and the work place,

moving around workers to different jobs or changing the specific assignments to optimize the work flow and raise the overall productivity of work effort without increasing the number of workers or replacing them. However, faced with large scale variations in sales, production or distribution, these responses would prove insufficient. The firm must ultimately run extra shifts, $(\frac{dN}{N})$, in order to meet the changing conditions.

In the presence of constant returns to variable capacity utilization, the option does not exist to vary ϕ_i. Thus we get

$$dN_i = \phi_i b_i dX_i \tag{35}$$

3.1.2. Leakages vs Injections

It will pay us to invest some time to understand the multiplier, $(1 - \bar{d}a_{aa})(1 - \omega\phi_b b_b - \bar{j}^{h_M}\frac{p_M}{p_b}m_b)$, by investigating the underlying sequences. The expression identifies the leakage as the surplus accruing to profit and the leakage resulting from failure to recycle capital to produce the means of production used to expand capacity. We concentrate on the employment and output effects, and assume that the only injections and leakages relate to wages and profits.

The term $(1 - \omega\phi_b b_b - \bar{j}^{h_M}\frac{p_M}{p_b}m_b)$ indicates that in a Caribbean economy, two forms of spending are primary to the operation of the system. One is spending for sustenance of the workforce - consumption; the other is necessary imported primary inputs (themselves produced means of production) needed for production to occur. In the normal operations of the economy, these form of spending must always be injected into the income and expenditure cycle of the society, even if the vital payments do not go into the hands of domestic households. The term $(1 - \bar{d}a_{aa})$ indicates that basic form of (secondary) produced means of production

necessary for the system to develop is that produced in sector a.

When businesses receive incomes in their stage of the total cycle of receipts that drive the domestic economy, wages, material costs, and import rentals are passed on. These are variable costs and priority claims. That is, labor, material and import costs must be covered. The case of labor and material costs is clear; for production to occur, business must pay them. Imported inputs also establish primary claims on sales receipts. In a Caribbean economy, payments to imported inputs, even when the import is a fixed productive asset. Payments for such means of production amount to a priority import rental, licenses and fees and other payments that must be guaranteed priority claim on receipts if these primary imports are to be made available and maintained to allow the production system to work. These are rental incomes to households who control the process of importing. On the other side of the system, purchase of necessary labor and imports must be complemented by installation of some amount of domestic produced means of production.

The withdrawals from the stream of circulation are the residual forms of surplus, including the share going to profits, interests on local finance and payments and charges to foreign direct investment that appear either as factor incomes going abroad in the balance of payments, and other fixed commitments such as those relating to depreciation. These are not passed on to households or to rentiers earning rent on import. They account for the share describe by the expression $(1 - \omega\phi_b b_b - \bar{j}^{h_M} \frac{p_M}{p_b} m_b)$,[19] are retained in the enterprises and are not the subject of household decisions, whether local or foreign.

Similarly, the business sector makes all decisions about the recycling of domestic output of means of production. No savings decisions are made about these

factors by households. The retained earnings are elements in business accounts that are never paid out and never come under the purview of household discretion. The type and quantity of produced means to be used as capital is a decision made in "board rooms" about business practice; it is not settled in the home.

3.1.3. A Dynamic Analysis of Monetary Circulation

Suppose now an increase in the level of activity. Two sets of effects must be studied. One relates to the dynamics of production set up in sector a, the other to the dynamics of production set up in sector b. We note that in the case of the external stimulation of output in sector a, growth of output is driven by a direct expansion of investment in sector b that is not mediated by the growth in the labor force of that sector. Put differently, sector b creates no increasing returns and passes on no stimulus of increasing returns to sector a. Recall that from (12) and (18), we can write

$$\begin{aligned} X_a(\omega\phi_a b_a + \bar{r}_{\hbar_K} p a_{aa} + \bar{j}^{\hbar_M}\pi m_a) &= pX_a \qquad (36)\\ &= \bar{d}pa_{aa}X_a + \bar{d}pa_{ab}X_b + pE_a + pG_a \end{aligned}$$

So, if we assume the initial stimulus comes from sector b, then when total supply is considered in the light of the competitive imports used by consumers and government and expressed in the LHS of the third equation of (12), the initial growth of demand for capital is $\bar{d}a_{ab}dX_b$.

When these orders are received by sector a, output must be expanded, by the

amount

$$dX_a^0 = \bar{d}a_{ab}dX_b \tag{37}$$

a rate that clearly depends on the technical coefficients of sector b and its growth rate, that is $\bar{d}a_{ab}$. Expansion of production in sector a is triggered by its own growth of production, so in reaction to the burst of demand from sector b, and hence the growth dX_a^0, we get

$$\begin{aligned} dX_a^1 &= \bar{d}a_{aa}dX_a^0 \\ &= \bar{d}a_{aa}\bar{d}a_{ab}dX_b \end{aligned} \tag{38}$$

an expansion of output governed by the rate of growth and the technical coefficient $\bar{d}a_{aa}$. Notice that since $0 < \bar{d}a_{aa} < 1$, only a fraction of the expanded output dX_a^0 is recycled to produce more capital. The rest is clearly sold to sector b. This expansion triggers further expansion within sector a in the light the second round of growth of output, yielding further expansion

$$\begin{aligned} dX_a^2 &= \bar{d}a_{aa}dX_a^1 \\ &= \bar{d}a_{aa}\bar{d}a_{aa}\bar{d}a_{ab}dX_b \end{aligned} \tag{39}$$

This process is enormously simplified, since the reactions to the initial burst of demand may be in the form of provision of new methods. No firm in sector a is guaranteed the opportunity to sell its specific output. Typically, it must win sales by tinkering with the methods and the products and draw these changes to the attention of firms in sector b. This continuous process means that new sectors are created from time to time, along with new methods. Nevertheless, we stick with

the simplification and observe that the process continues as an infinite sequence, yielding total output growth of the form

$$dX_a^1 = \bar{da}_{ab} dX_b (1 + B + B^2 ...) \tag{40}$$

where $B = \bar{da}_{aa}$.With $\bar{da}_{aa}$ a suitable fraction describing the portion of any increase in output that is retained for use in producing more output of capital, the sequence of partial sums converges to the expression

$$dX_a = \frac{\bar{da}_{ab} dX_b + d(E_a - M_a) + dG_a - X_a d(1 - \bar{g}a_{aa})}{(1 - \bar{da}_{aa})} \tag{41}$$

because a share of the output of the sector is leaked out of the stream of capacity creation to service the needs of other capital users. Notice that

$$1 - \bar{da}_{aa} = \frac{\bar{da}_{ab} X_b + E_a - M_a + G_a}{X_a} \tag{42}$$

describes the share of the output of the capital intensive sector that does not go to creation of additional capacity in the sector but rather is sold to other sectors, government and foreigners. In substance, it is the share of the output of the sector that is leaked out of the stream of capacity creation in that sector, and hence from the process of creation of domestic produced means of production (capital).

Equation (42) holds one set of keys to an understanding of how increasing returns fit into the short run picture. Suppose sector h was a newly created capital-intensive sector invented by the research of the capital-producing sector, and for which businesses have decided to establish capacity in the short run. Then it would operate by demanding the output of capital from sector a. The demand for capital would grow by the extra amount $\frac{\bar{da}_{ah} dX_h}{(1 - \bar{da}_{aa})}$, an amount that is dependent on the technical coefficients of the new sector, $\bar{da}_{ah}$, the multiplier $\frac{1}{(1 - \bar{da}_{aa})}$, and the scale dX_h at which the sector is established, and which is boosted by the

sector's own need for additional capital to meet the demand for capital created by the initial burst. The creation of the new capital-intensive sector implies expansion of capital output from sector a by the amount

$$dX_a = \frac{\bar{da}_{ab}dX_b + \bar{da}_{ah}dX_h + d(E_a - M_a) + dG_a - X_a d(1 - \bar{da}_{aa})}{(1 - \bar{da}_{aa})} \tag{43}$$

which exceeds the initial demand because $\frac{1}{(1-\bar{da}_{aa})} > 1$.

Beyond the demand from sector b, however, firms in sector a must activate additional amounts of the credit lines negotiated and use that to finance faster work, greater employment and the higher import bill. We must therefore follow the trails of these expenditures. Workers receive and deposit their wages in a series of rounds, but depending on the sector involved, there are substantial differences that matter for the analysis of monetary circulation. We must disaggregate as usual.

The credit supplied to run current facilities (with normal growth) at a faster rate is

$$\mathbf{C}_a^S(dX_a) = \pi m_a X_a(1+d) + \omega\phi_a b_a X_a(1+d) \tag{44}$$

where, as usual, d is the change operator. Businesses in the sector draw on these credits, make the wage and import payments, $\omega\phi_a b_a X_a(1+d)$ and $\bar{j}^{h_M}\pi m_b X_b(1+d)$, which yielding deposits of

$$\mathbf{D}_w(dX_b) = \omega\phi_a b_a X_a(1+d) + \bar{j}^{h_M}\pi m_a X_a(1+d) \tag{45}$$

The increase in investment in sector a triggers the increase in output through a convergent series of interactions throughout the economy. The increase in investment will first facilitate the improvements in management that bring better worker efficiency and a higher productivity of work among all workers. However,

this would ultimately lead to an increase in employment at a rate that depends on the current labor coefficients and worker efficiency of production in the capital-intensive sector, that is on $\phi_a b_a$ and on the extent of increasing returns. Specifically,

$$dN_a = \phi_a b_a dX_a \tag{46}$$

Employment therefore increases by

$$dN_a^0 = \phi_a b_a dX_a \tag{47}$$

Given the high capital intensity of sector a, and given that most of the capital is heavily embodied in workers who possess special skills and tacit knowledge, the growth of capital will result in a pattern of growth of employment of workers reflective of this particular form of capital existence. Put differently, the effect on workers is not the same as the effect on primary labor, since some of the workers who must be hired are also carriers of critical human capital. If we assume that the real wage in the capital-intensive sector is fixed, then the wage bill therefore increases by

$$dW_a^0 = \omega dN_a^0 = \omega \phi_a b_a dX_a \tag{48}$$

Further, profit and output would grow accordingly. The wages directly create more demand for the output and more receipts for the businesses of sector b. Businesses satisfy this demand by organizing extra production (that also caters to extra government demand and exports). Specifically, for sector b, the credit now supplied to run the same facilities (with normal growth) at a faster rate is

$$\mathbf{C}_b^S(dX_b) = \pi m_b X_b(1+d) + \omega \phi_b b_b X_b(1+d) \tag{49}$$

where d is the change operator. Businesses in the sector draw on these credits, make the wage and import payments, $\omega\phi_b b_b X_b(1+d)$ and $\pi m_b X_b(1+d)$, which are then deposited by workers and importers, yielding deposits of

$$\mathrm{D}_w(dX_b) = \omega\phi_b b_b X_b(1+d) + \bar{j}^{\hbar_M}\pi m_b X_b(1+d) \tag{50}$$

These deposits are then spent by workers and importers during the production cycle, with the wage turning up as receipts in sector b. These businesses deposit the sales receipts in the banks to repay the loans drawn down. At the same time, they draw still more credit equal to the non-profit proportion of the sales on additional imports and work effort or workers to run the expanded system. Employment in sector b is driven by growth of demand for its output resulting from the growth of employment in sector a, so in reaction to the first burst of demand we get

$$dN_b^1 = (\omega\phi_b b_b + \bar{j}^{\hbar_M}\pi m_b)\phi_a b_a dX_a \tag{51}$$

a change of employment in sector b which now depends directly on the wage rate in addition to the productivity of labor, the extent of increasing return in sector a, etc. For example, the faster the growth of the efficiency of work, the slower will be the growth of employment in the import/labor-intensive sector (b), which, remember is not purely export specialized in modern times. Similarly, the higher the wage, the faster the growth of employment. The associated growth of the wage in the import/labor-intensive sector is

$$dW_b^1 = \omega dN_b^1 = (\omega\phi_b b_b + \bar{j}^{\hbar_M}\pi m_b)\omega\phi_a b_a dX_a \tag{52}$$

The wage component of this new round of spending is further deposited and spent by workers, repeating the effects. The further impact of this extra demand,

$1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b$. Furthermore, if we assume that there are no inflationary processes at work and price changes due to innovation are not occurring for the moment, then profit will also grow (value of capacity will accelerate) by the exact amount of growth of investment, thereby validating the investment and financing decisions (Nell, 1988:112).

Keeping in mind the equation of demand and incomes, it is straightforward to see that the multipliers and gross income/output, and as we have seen the total loan withdrawals and payment redeposits are identical to that implied by the gravitational centers in (12) and (18). That is, note that

$$1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b = \bar{r}_{\hbar_K} p k_b \tag{59}$$

Now, taking into account competitive imports of X_b as reflected in the RHS of the third equation of (12), noting that capital is in value form, using the technical coefficients to represent the productivity of labor as necessary, substitute from (59) into the LHS of (31) to get

$$\omega\phi_a b_a X_a + G_b + (E_b - M_b) = X_b(1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b) \tag{60}$$

where M_b are the gross imports associated with sector b, that is competitive imports for consumption by consumers and government and noncompetitive factor imports used for production in sector b. Thus,

$$X_b = \frac{\omega\phi_a b_a X_a + G_b + (E_b - M_b)}{1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b} \tag{61}$$

In dynamic form,

$$dX_b = \frac{\omega\phi_a b_a dX_a + dG_b + d(E_b - M_b) - X_b d(1 - \omega\phi_b b_b - j^{\hbar_M}\pi m_b)}{1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b} \tag{62}$$

which is an equation describing the growth of production of X_b in terms of a multiplier that is $\frac{1}{1-\omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b}$. As the RHS of (62) indicates, this dynamic

convergent process operates entirely within sector b, especially in the component that creates consumer commodities directly, and continually strengthens and expands the domestic financial system to meet the need of production. The process raises no specific problem of a gap between credit and deposit, that is, of a shortage or surplus of funds.

The recipients of income from the purchase of imported inputs are the rentier-import businesses. With the expansion of production, there is now need for an increased amount of imports, so these businesses must now spend to procure additional imports to meet orders placed by the producers of sector b. To procure such supplies, they draw on the credit line for imports, convert them into foreign exchange that will be provided by the sale of exports by businesses in sector b. The accounting in equation (31) therefore requires that we contrast these expended receipts from sale of imports, along with the contribution to retained earnings, $\bar{j}^{h_M}\pi m_b dX_b$, with the proceeds from sale of exports, E_b, i.e., as $(E_b - \bar{j}^{h_M}\pi m_b dX_b$. The receipts from sale of imports are therefore an indirect way to pay for the exports of b, and thus are legitimately part of the domestic spending stream. Once the imports are procured and delivered to producers in sector b, the total rents collected by the rentier-import businesses, $\bar{j}^{h_M}\pi m_b dX_b$, are deposited to repay the debt that was drawn down and cover future loans. Not all deposits are used to repay debt since, recalling that $\bar{j}^{h_M} = (1 - j^{h_M})$, the portion $j^{h_M}\frac{p_M}{p_b}m_b dX_b$ of $\bar{j}^{h_M}\pi m_b dX_b$ was never borrowed and is held as retained earnings. It would serve to underwrite the current and further expansion of credit. Delivery of orders allow an expansion of production in collaboration with the labor employed by businesses. Since the earnings of importers are spent indirectly on exports, they can stimulate an expansion of exports that would complement the expenditure of wages in

boosting domestic production. The further expansion due to the expenditure of wages and rents then stimulate further demand for the output of sector b and the process continues on a convergent path, with the final flow of imports and wages dependent on the share of total receipts accounted for by profit and the retained earnings of importers.

However, the earnings of importers are *only spent indirectly on exports*; they only facilitate an expansion of exports and do not represent a direct demand for exports and domestic output. It is here that the cycle of production and income can be broken and genuine possibilities of a disjuncture between the supply and demand for funds introduced. Expenditure on imports only translate into expenditure on exports if the producers of sector b can so compete and manipulate the domestic production process and product, and the domestic and foreign demand, as to ensure adequate sale at prices, p_b, sufficient to cover domestic costs and yield the going profit rate or better. This is a supply-side capability that is relatively independent of the decisions of the importers (which is partly why the importers can be safely labeled rentiers). The issue reduces to a supply side capacity to ensure that production method, costs and selling strategy can combine to yield

$$E_b - \bar{j}^{\hbar_M} \frac{p_M}{p_b} m_b X_b \geq 0 \tag{63}$$

representing a positive contribution of the production-importing process to a balance of payments surplus and expansion of domestic credit and stimulus potential, to meet the needs of the expanding economy. In the light of the low capital-intensity of firms in the second equation of (12), it is clear that this condition only tends to hold when imports and labor are highly productive and exports receive a suitably favorable price in the international markets. The alternative would be to

raise the capital-intensity of the production process along with necessary market management capacity. Failure on either score could result in

$$E_b - \vec{j}^{h_M} \frac{p_M}{p_b} m_b X_b < 0 \tag{64}$$

as $p_b E_b$ falls below appropriate levels, creating an inadequate contribution to the foreign exchange flow to meet import needs. This would lower the capacity to import by limiting the ability of importers to convert domestic credit into necessary foreign exchange.

Potentially just as important, there is a substantial additional endogenous potential for imbalance in the credit-deposit cycles of the domestic system. For, if as compared to capital, imports are paid relatively high rentier profits under conditions of tight foreign exchange supplies, while the opportunities for moving investment into the import market are tightly circumscribed by historical monopolies and credit market restrictions, then it is possible that the contribution of $j^{h_M} \frac{p_M}{p_b} m_b X_b$ to the leakage rate can be very high, resulting in a low impact multiplier that causes domestic production to settle as levels that are below the planned rate, and yielding (64).

The crucial conclusion with respect to the circulation of money is that the scenario of (64) creates a crisis of credit non-repayment for the domestic financial sector. Businesses that borrow to import find themselves in a situation in which the flow of foreign exchange is not adequate to facilitate procurement of imports to service their clients. The consequence is that the sales of these businesses fall short of plans and deposits to cover debt fall short, creating problems of bad debt in the banking system. Even worse, failure to deliver on commitments means that the producers in sector b cannot obtain the imports needed to expand production and

meet commitments on contracts. Their sales fall short, creating problems of inadequate deposits to cover debt. These consequences spiral further as employment plans are abandoned, wages payments fall, all multiplied throughout the system in an exact reversal of the scenarios presented above. The consequence is crisis of production, income and debt spread throughout the production and banking system. The presence of a sector such as b clearly implies that in the monetary circulation of commodities in a Caribbean economy, there can arise problems of shortage of funds even when financial constraints are not imposed as a matter of policy and even when financial institutions are sufficiently sophisticated to mobilize funds rapidly enough and without any error to meet credible demand.

Similarly, the additional investment needs of sector b cannot be met by wages alone. Equation (31) indicates that businesses in sector b must also draw on credit calculated to equal $(E_b - \bar{j}^{h_M}\pi m_b X_b) + G_b$ in order to match the profits needed to underwrite their investment demand identified in (27). This immediately raises the problem identified immediately above of a potential performance disjuncture due to the balance of payments created by sector b. If sector b firms can compete effectively in domestic and international markets, then the sales will be forthcoming to complement the wage expenditures of sector a workers in generating the profits needed to fund the extra investment. Success then brings additional sales of capital to sector a that allows it to service its credit lines. In such a case, with no foreign exchange problems created by sector b, any desired level of circulation financed by the domestic banking can be operationalized by the production and sales machinery of the economy. But failure on any of the front identified so far restricts profits (on capital) in sector b and limits the capacity to financial its expanded investment in capital. This means that sector a will experience a shortfall

in sales that makes it unable to services its credit lines and will add to the crisis created by failure of sector b to perform adequately in the export markets. The consequence will be a downward spiral of demand as workers are laid off in sector a, wages fall, demand for sector b output falls, and so on, all magnified by the multiplier.

To elaborate the international dealings of sector a, note that if success in sector b allows sector a to expand, then demand for imports will increase as indicated, to $\bar{j}^{h_M}\pi m_a X_a(1+d$. The importers who supply this demand then draw on the domestic credit lines identified above, $\pi m_a X_a(1+d)$, to finance purchase of the necessary imports. Again, this requires conversion into foreign exchange that will be provided by the sale of exports by businesses in sector a. Following the accounting in equation (27), the effort is justified if adequate foreign exchange is available. Following the logic of the derived demand argument relating to sector b, this requires consideration of $pE_a - \bar{j}^{h_M}\frac{p_M}{p_b}m_a X_a$. The potential for a production disjuncture and financial sector crisis once again exists because the cycle of production, income and deposits can be broken if the producers of sector a cannot compete and manipulate the domestic production process and product, and the domestic and foreign demand to ensure adequate sale at relative price, p, sufficient to cover domestic costs and yield the going profit rate or better. The particular supply-side capability required is to ensure that production method, costs and selling strategy can combine to yield

$$pE_a - \bar{j}^{h_M}\frac{p_M}{p_b}m_a X_a \geq 0 \tag{65}$$

The capital intensity of the sector means that this condition tends to hold when domestic capital enables firms in sector to develop processes and products that

can win a relevant share of domestic and international markets under suitable price-making arrangements and necessary market management capacity. Failure on any of these scores could result in

$$pE_a - \bar{j}^{h_M} \frac{p_M}{p_b} m_a X_a < 0 \tag{66}$$

as pE_a falls below appropriate levels, creating an inadequate contribution to the foreign exchange flow to meet import needs. This would lower the capacity to import by limiting the ability of importers to convert domestic credit into necessary foreign exchange. The alternative would be for sector b to compensate by earning sufficient surpluses from exporting to meet the needs of sector a. However, this raises the prospects that compared to capital, importers operating the historical import monopolies will be able to charge sector a capitalists a relatively high rental rate, j^{h_M} in a relatively tight foreign exchange market. This would raise the leakage of profits through the surplus, $j^{h_M} \frac{p_M}{p_b} \frac{p_M}{p_b} m_a X_a$ and result in a low impact multiplier that causes domestic production to settle as levels that are below the planned rate, and yielding (66), and associated problems of debt repayment.

The scenarios of (64), involving foreign exchange shortage for sector b, and (66) involving foreign exchange shortage for sector a, can combine to create a debt crisis for sector a and the domestic financial sector. Once again, in the monetary circulation of commodities in a Caribbean economy, there can arise problems of shortage of funds even when financial constraints are not imposed as a matter of policy and even when financial institutions are sufficiently sophisticated to mobilize funds rapidly enough and without any error to meet credible demand. In contrast to certain economies that have solved the problem of low capital development development and utilization, or of mechanisms that make domestic currency

international, Caribbean countries and many other areas of the world in which the task of building up the domestic capital intensive sector has not yet been adequately accomplished must earn foreign exchange from imports and this creates possibilities of production and demand led imbalance in the domestic credit system that can trigger slumps in the production system.

The results so far extends the argument developed by Nell (1988) by showing that different but complementary forces underlie the multiplier in the two productive sectors of the economy. When the sector-based results in (41) and (62) are combined to identify the total multiplier of the economy, we get

$$dY = \frac{\begin{array}{c}(1-\omega\phi_b b_b-\bar{j}^{\hbar_M}\pi m_b)[\bar{d}a_{ab}dX_b+d(E_a-M_a)+dG_a-X_a d(1-\bar{d}a_{aa})] \\ +(1-\bar{d}a_{aa})[\omega\phi_a b_a dX_a+dG_b+d(E_b-M_b)-X_b d(1-\omega\phi_b b_b-\bar{j}^{\hbar_M}\pi m_b)]\end{array}}{(1-\bar{d}a_{aa})(1-\omega\phi_b b_b-\bar{j}^{\hbar_M}\pi m_b)} \quad (67)$$

As we have seen, the result in (67) is the gravitational center, the product of the limit points of convergent sequences of income, production, and monetary expenditures and deposits in the system. But, in the fully aggregated case, the multiplier driving the sequences is a composite of the sector multipliers, taking the form $\frac{1}{(1-\bar{d}a_{aa})(1-\omega\phi_b b_b-\bar{j}^{\hbar_M}\pi m_b)}$.

4. New Insights About the Dynamics of Output

It would be worth our while to examine the details under this result, keeping in mind the possibilities that the underlying sequences of the multipliers might not be convergent after all, might not be mainly about financial decisions, and might have to be analyzed accordingly. We postpone for another place any further discussion of the causes and consequences of changes in the distribution of income and the share of the output of the capital-producing sector. However, equation

(67) already tells a related and extremely important story, which also allows us to discern other fundamental distinctions between the economies of the Caribbean and other capitalist economies. The story is that if the (capital-intensive) sector producing capital and other capital-intensive output is leaking this product out of capital formation at the same rate as the import-intensive and labor-intensive sector is leaking profits out of the income stream, so that

$$1 - \bar{d}a_{aa} = 1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\frac{p_M}{p_b}m_b \tag{68}$$

or

$$\frac{\bar{d}pa_{ab}X_b + p(E_a - M_a) + pG_a}{X_a} = \bar{r}_{\hbar_K}pk_b \tag{69}$$

then the multiplier takes the simple form derived as in Nell(1988), that is

$$dY = \frac{\begin{array}{c}(1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b)\{\bar{d}a_{ab}dX_b + d(E_a - M_a) + d(E_b - M_b) \\ +dG_a + dG_b + \omega\phi_a b_a dX_a - (X_a + X_b)d(1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b)\}\end{array}}{(1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\pi m_b)} \tag{70}$$

with its special form as in Keynes. One could of course easily opt to eliminate $1 - \omega\phi_b b_b - \bar{j}^{\hbar_M}\frac{p_M}{p_b}m_b$, so that the considerations raised by Harrod take center stage, since the multiplier would take a growth form.

However, if

$$\frac{\bar{d}pa_{ab}X_b + p(E_a - M_a) + pG_a}{X_a} \neq \bar{r}_{\hbar_K}pk_b \tag{71}$$

then (67) remains the general form. Even more important, when as in Caribbean economies, we have

$$\frac{\bar{d}pa_{ab}X_b + p(E_a - M_a) + pG_a}{X_a} > \bar{r}_{\hbar_K}pk_b \tag{72}$$

then we are dealing with a class of economies which, for reasons often linked to the legacies of colonial history and the absence of self-knowledge and self-esteem, fails

to recycle its capital outputs into production of capital at a sufficiently high rate to match the leakage of profit out of the import/labor-intensive sector. This large class of economies, including those with a plantation history as in the Caribbean, generates such a low rate of recycling of its capital output, and in relation to this such a high share of profit in output, as to lower the multiplier to levels that are too low to drive the rate and content of output and profitable sales to competitive levels.

The multiplier in (67) is larger than that normally associated with effective demand theory, implying that the Caribbean-type economy might undergo much *larger swings* of behavior than those that are usually associated with economies in which only the principle of effective demand applies. Note that this is an endogenous result that is dependent only on the internal structural features of the economy *and is completely independent of any assumptions about vulnerability to exogenous shocks.*

Development of the multiplier directly from the balance conditions reinforces one of the core findings of Nell (1988:114): "In this formulation, the multiplier no longer depends on anyone's psychological propensity to consume. The multiplier here is based on the structural and institutional features of capitalism." The key basic structural elements are the real wage and the productivity of work in each of the production sectors, the rate of return to imports and the productivity of import.

In an expanded version of the model, we raise other major insights about the role of consumption, government and trade, but these are outside our scope here. However, we choose to address one central result about government. Equation (67) indicates that government can affect the level of employment and output by

the increase or decrease of effective demand - which is to say spending more or less than it taxes. However, some of the central concerns of the analysis of effective demand relate to the structure of government spending. In this regard, observe that the effect of a change in spending on the output of the sector producing domestic capital, dG_a, is different to that of a change in spending on the output of the traditional sector, dG_b. Partly because of the weight created by the leakage $(1-\omega\phi_b b_b-\bar{j}^{\hbar_M}\pi m_b)$, itself highly dependent on wage and trade policy, the initial effect of spending on the capital producing sector would generate expansion of output through a multiplier that ultimately equals $\frac{1}{1-\bar{d}a_{aa}}$. On the other hand, the effect of spending on the output of the traditional sector is felt through a multiplier equal to $\frac{1}{1-\omega\phi_b b_b-\bar{j}^{\hbar_M}\pi m_b}$. Government can therefore alter the level of output and employment by varying the structure of its expenditures.

Equation (66) also implies that government can affect the level of employment and output in Caribbean economies by means other than the increase or decrease of effective demand or the variation in the structure of effective demand. The variations of the key elements forming the multiplier, $d(1-\bar{d}a_{aa})$ and $d(1-\frac{w}{p_b}\phi_b b_b-\bar{j}^{\hbar_M}\pi m_b)$ are also subject to the influence of government policy. If it is kept in mind that capital includes disembodied knowledge, whether tacit or codified, it is clear that government can directly influence the quantity of domestic capital that is reused to produce more domestic capital and that this can in fact be done during the business cycle. Further, government can also influence the profit share by specific policies adopted with respect to the accessibility of domestic firms to cheaper foreign imports and the duties on imported inputs generally.

Finally, the numerator of (67) exhibits a clear and distinct role for "exogenous" changes in the distribution of income and the share of the output of the capital-

to recycle its capital outputs into production of capital at a sufficiently high rate to match the leakage of profit out of the import/labor-intensive sector. This large class of economies, including those with a plantation history as in the Caribbean, generates such a low rate of recycling of its capital output, and in relation to this such a high share of profit in output, as to lower the multiplier to levels that are too low to drive the rate and content of output and profitable sales to competitive levels.

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In an expanded version of the model, we raise other major insights about the role of consumption, government and trade, but these are outside our scope here. However, we choose to address one central result about government. Equation (67) indicates that government can affect the level of employment and output by

producing sector that is recycled for capital formation. *Just as Keynes' principle of effective demand raised fundamental and disturbing questions about the role of "animal spirits" and "confidence" and other psychological factors in causing sudden, sometimes unfavorable changes in economic fortunes, so do these two new features raise very fundamental and disturbing questions about how the underlying sociology of the Caribbean economy might lead to sudden changes in efforts to influence the distribution of income or the rate of utilization of domestic capital, which might have debilitating consequences for the development efforts of these economies. Perhaps even more disturbing, exogenous forces affecting the demand for Caribbean exports and the supply of imports to the region may also lead to severe short run imbalances in the balance of payments, and the domestic monetary cycles, that may have debilitating consequences for employment and income.* It would be fundamentally misleading to explain variations in capacity utilization in Caribbean economies without adequately addressing the roles of these factors. Investment decisions have specific pricing and cost determination counterparts as expressed in (18). The endogenous pricing of the first equation of (18) is linked to all varieties of capital budgeting matters that arise inherently in the investments to create and use domestic capital according to the first equation of (12). It is also linked to all related efforts at marketing and sales campaigns for market penetration at home and abroad. Investment to use existing capacity for expansion of capacity or for the satisfaction of other existing demand will not take place unless there are reasonable grounds on which to expect that sales will grow. But they are also linked to critical matters associated with the distribution of income, the rate of absorption of domestic capital in capital production, and the balance of payments. *The conflict with workers over peace and compliance on the job, and ultimately*

over the speed of work tends is vital, for it influences the level of profits directly. And, even if both sales and work-effort are forthcoming, the competitive quality of capital might not be assured. Therefore, investment may also not take place unless the flow of work and the associated distribution of income, the absorption of domestic capital, and the flow of foreign exchange can reasonably be expected to remain favorable.

The factors fostering volatility here are likely to emerge from three underlying legacies of slavery and strict indenture: the terms of incorporation into the international economy; the problems of self-doubt and low self-esteem that attend the history of exclusion from capital creation of entrepreneurs in many of the Caribbean's communities; and the unrealism about the permanence of the privileges and rights of existing class positions that are rooted in the social structures of the colonial past - not the least of which is the perceived excessive dominance of "government." Whereas the state of mind of the business community is the focus of effective demand theory, the state of mind and the power plays of all social classes involved in production, including foreigners, are relevant to the theory of the causes of sudden changes in the distribution of income, the rate of use of domestic capital, and the availability of foreign exchange. Thus, the nature and range of collective policy interventions necessary for self-sustaining growth clearly go beyond fiscal initiatives and incentives to the business community to include consensus, strategies, initiatives and incentives to all others, and may be much greater and more profound than have been imagined to date under the guidance of all existing economic thought.

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