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Re-Distribution, Aggregate Demand, and Growth in an Open Economy: The Crucial Interaction of Portfolio Considerations and External Account Constraints

by

Arslan Razmi

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Re-Distribution, Aggregate Demand, and Growth in an Open Economy: The Crucial Interaction of Portfolio Considerations and External Account Constraints.

Arslan Razmi*

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Abstract

A large body of literature inspired by the seminal contribution of Marglin and Bhaduri (1988) has debated the distributional determinants of demand and growth. A general conclusion has been that open economy considerations weaken the potential for a wage-led growth regime. However, this literature has largely ignored asset portfolio considerations and the stock and flow interactions that result from the feedback from savings to wealth and from wealth to the current account. This paper develops a theoretical framework that specifies a fuller system of (instantaneous) flow equilibria embedded in a medium-run framework with stable steady state stocks of real and financial assets. The balance of payments constraint that results ensures that simply raising the wage does not yield a higher stock of real capital. A lower mark-up may increase the steady state stock of capital but only through the relative price channel. These results are much stronger than those derived by existing literature, and more importantly, emerge *regardless* of whether the demand regime is wage-led or profit-led in autarky.

JEL classifications: F32, F43, E64

Key words: Wage-led growth, stagnationism, exhilarationism, neo-Kaleckian models, distribution, accumulation.

*Department of Economics, University of Massachusetts, Amherst, MA 01003; email: arazmi@econs.umass.edu

1 Introduction and Background

Debates centered on the relationship between income distribution and aggregate demand date back to the early days of classical economics. More recently, work inspired by Marglin and Bhaduri (1988) and Bhaduri and Marglin (1990) has shown how the Kaleckian framework with adjusting output/utilization provides a convenient framework to accommodate various facets of this issue. The present paper takes a longer-run open economy view of the debate. Sometimes incorporation of a neglected feature, such as the inclusion of another sector, forces re-consideration of settled conclusions. The introduction of stock-flow considerations in this paper perhaps provides one such instance.

Much of the early literature following Marglin and Bhaduri's insightful contributions focused on the closed economy case. Bhaduri and Marglin (1990), and later, Blecker (1989), however, showed that an open economy that produces goods that are imperfect substitutes for foreign goods is less likely to experience higher demand and growth following a re-distribution of income toward workers. Put differently, international price competition could lead to exhilarationism,[1] since, given the mark-up factor, wage cuts increase international price competitiveness. With a sufficiently strong international demand effect, re-distribution could result in higher aggregate demand and growth, even as domestic demand suffers. Given the focus on the (very) short-run, this body of literature has tended to ignore balance of payments constraints. To the best of my knowledge, it also tends to ignore the evolution of real and financial assets, and their interaction with the real side of the economy. Such portfolio balance considerations would be expected to play a significant role in a capitalist economy with relatively advanced financial markets.

This paper attempts to fill these gaps by introducing real and financial assets to the goods market and tracing their evolution over time as they interact with national saving and wealth to move the economy through a series of instantaneous equilibria. Commodity prices are fixed and resources are less than fully utilized. In this sense, the framework should be seen as "medium-run" in nature. With the exchange rate fixed, the system satisfies the balance of payments (and the current account) constraint in the steady state, so that foreign exchange reserves are constant. In this broad sense, the framework is reminiscent of the Balance of Payments Growth model, although it allows for deviations in the short-run, and explicitly defines demand behavior so that distributional considerations assume a prominent role. The most striking conclusion is that, once an open economy system with stock and flow equilibrium is specified, the steady state level of the capital stock becomes independent of the nature of the demand regime, although growth can be either wage-led or profit-led *during* the transition. This is in dramatic contrast to existing literature. In addition, I show that:

- An economy cannot be open economy exhilarationist in the sense that a

[1] In this paper, I will use the terms stagnationism (exhilarationism) and wage-led (profit-led) demand regime interchangeably. Some authors prefer one term over the other.

rise in the wage raises the steady state capital stock. This is a much stronger result than previous literature.

- Consistent with previous literature, an economy can be open economy stagnationist – in the sense that a decline in the mark-up over variable costs increases steady state capital stock – but *only* if relative price effects are strong. This latter condition violates in spirit much of Post Keynesian literature, including the BPCG tradition, which tends to underplay relative price considerations.

- The evolution of steady state financial wealth, not explored by previous literature in the stagnationist/exhilarationist tradition, depends on the degree of substitutability between real and financial assets, and the effect of changing wealth on consumption.

The next section provides a brief literature review. Sections 3 and 4 develop the basic short-run framework and tease out some implications. Section 5 traces out the workings of the model over time and analyzes the interplay between the nature of the demand regime and the steady state levels of real and financial assets. Section 6 concludes.

2 Brief Literature Review

That the level of aggregate demand and growth sustained by an economy depends crucially on the functional distribution of income, thanks mainly to differences in spending behavior, is a core theme of Post-Keynesian macroeconomics.[2] While most of the post Great Depression demand-led macro models prior to the neo-Kaleckian ones of the 1980s had a strong stagnationist flavor, Bhaduri and Marglin (1990) raised the possibility of "exhilarationism" (their term) with the help of a modified investment function that specified the profit share as an argument instead of the profit rate to avoid a strong accelerator effect. An economy can be stagnationist, in which case a redistribution towards wages boosts consumption demand sufficiently to boost aggregate demand and utilization, or it can be exhilarationist, whereby a redistribution reduces investment demand sufficiently to lower aggregate demand and utilization. If the increase in demand following re-distribution is strong enough, utilization rises adequately to offset the negative direct effect of a lower profit share on investment. Wage-led growth results. Conversely, growth is profit-led.

Bhaduri and Marglin (1990) go on to consider the implications of opening up the economy to trade in goods and services. The framework used is that of the "imperfect substitutes" kind whereby the economy is not a price taker on the export side. With a flexible mark-up, an implication explicitly explored by Blecker (1989), any increase in the real wage is partially passed through to the

[2] Blecker (2002) provides a comprehensive survey of the various strands of relevant literature along with a discussion of open economy issues.

export price, reducing the economy's external competitiveness. If the Marshall-Lerner condition is satisfied, room for stagnationism and wage-led growth narrows.[3] Even if an economy is wage-led in autarky, its open economy incarnation can morph into a profit-led one if a decline in real wages boosts international demand adequately to offset the fall in domestic absorption.[4]

While the earlier literature took income distribution as exogenously given, several recent contributions have modified this assumption. Using a "conflicting claims" set-up, Blecker (2011) shows that the same open economy could exhibit wage- or profit-led behavior depending on the source of shocks. A change in firm pricing power, for example, will have different implications than a change in labor's bargaining position. Cassetti (2012) further considers the conditions under which an economy that is wage-led in autarky is transformed into a profit-led one by international trade. He too incorporates a conflicting claims model of inflation, which introduces feedback from growth and employment into the distributive shares to highlight the importance of institutional factors. Although the paper does not impose a balanced trade condition in a fully specified dynamic framework, it does carry out thought experiments that explore the kinds of income policies that would boost growth while maintaining trade balance. An interesting finding that is reminiscent of Blecker (2011) is that while wage restraint may help a country grow under certain conditions, the same result could be obtained more effectively by restraining mark-ups.

Sasaki et al. (2013) incorporate the effects of wage bargaining in an open economy neo-Kaleckian model with conflicting claims inflation. Employing the familiar imperfect substitutes framework, they demonstrate that, in addition to the demand regime, the effects of a change in the bargaining power on aggregate demand depends also on whether it is workers or capitalists that bear the burden of adjustment to international price competition. The domestic demand regime is not sufficient to identify the group whose increased bargaining power would have a positive impact on aggregate demand.

The neo-Kaleckian literature cited above tends to ignore the balance of payments constraint. A separate strand of Post-Keynesian literature starting with Thirlwall (1979) has focused almost entirely on this constraint on growth. However, like the neo-Kaleckian literature, this body of work has not incorporated portfolio considerations, and has, therefore, ignored important interactions between: (i) the market for goods and services and those for financial assets, and (ii) wealth, demand behavior, and the current account over time. Put differently, the absence of portfolio considerations and an exogenous saving *function* leaves one unable to explicitly consider the evolution of wealth and it's interaction with the external balance constraint.

[3] It is worthwhile to note here that these results follow in the particular case where an increase in international competitiveness occurs through wage suppression. An alternative form of re-distribution that takes the form of a decline in the mark-up over costs generates different results.

[4] Arnim et al. (2014) show that, even if two large economies are profit-led, the world as a whole is likely to be wage-led. The intuition is straightforward. The world as a whole is a closed economy. Any increase in international competitiveness gained by one economy will be nullified by the corresponding decrease in the other economy.

To sum up our brief tour, the neo-Kaleckian approach to distribution and growth has revealed several useful insights, a central one being that differential saving behavior between functional classes matters. However, none of the papers discussed above explore the consequences of higher capitalist saving *over time*. Given different saving propensities between the classes, one would expect distributional shifts to influence wealth accumulation with the passage of time. Moreover, the literature treats saving behavior as unchanging over time in the sense that the marginal (and average) propensity to save out of current income is assumed to be a constant. If agents have a desired level of wealth, a la Metzler (1951), then saving behavior would evolve over time as stocks of wealth change.[5] Finally existing Post-Keynesian literature tends to ignore the portfolio considerations famously highlighted by Tobin (1969). These considerations become important as we evaluate how flows translate over time into stock changes in a multi-asset world. As we will see shortly, the mutual feedback between asset accumulation, savings, wealth, and the current account generates interesting interactions over time which qualitatively affect the results commonly arrived at by existing literature.

3 Basic Model

This and the next two sections develop a framework in which to explore the effects of functional income re-distribution over time. The key building blocks include Bhaduri and Marglin (1990), Tobin (1969), and Metzler (1951) in the form of differential saving rates, unemployed resources, a wealth saving relation and the emphasis on portfolio considerations and their implications over time.

3.1 Asset markets

There are three assets: (internationally) non-tradeable money, debt, and equity or claims on real capital. The country is small in the international bond market so that the return to holding bonds, r^* is given while that to holding claims to capital is r_K.[6] Thus, total real wealth W is the sum of the real values of money balances (M), bonds (F), and equity, (K) all measured in terms of the domestic good:

$$W \equiv M + eF + K \equiv V + K \tag{1}$$

where e is the exchange rate, V ($\equiv M + eF$) is the real value of financial wealth in domestic currency, and F denotes the real *net* domestic holdings of bonds, i.e., domestic holdings of foreign bonds net of foreign holdings of domestic bonds, all nominally valued in foreign currency terms. At a point in time, the

[5] See Maki and Palumbo (2001) for evidence regarding the wealth channel for the US.

[6] I assume that debt is short-term so that its capital value is essentially independent of the interest rate. Assuming that it is indexed in terms of the price level also renders its real value independent of the general price level although, given fixed prices, we do not need such an assumption here.

allocation of a given wealth portfolio across foreign and domestic assets is a stock equilibrium problem. In line with standard specifications, asset market equilibrium conditions are captured by equations (2)-(4).

$$M = H^M(r_K, r^*)W;\ H^M_{r_K}, H^M_{r^*} < 0 \tag{2}$$

$$eF = H^F(r_K, r^*)W;\ H^F_{r_K} < 0, H^F_{r^*} > 0 \tag{3}$$

$$K = H^K(r_K, r^*)W;\ H^K_{r_K} > 0, H^K_{r^*} < 0 \tag{4}$$

Asset demands are homogenous in real wealth and the asset demand functions capture shares that must add up to unity. Moreover, the assets are gross substitutes, as captured by the signs of the partial derivatives.[7]

The justification for using separate notation for the sum of financial assets will now become clear. With a fixed exchange rate, the central bank stands ready to accommodate compositional changes in private financial holdings. In other words, the monetary authorities defend the exchange rate by absorbing any shift within private holdings of financial assets. It is thus the total quantity of financial assets, rather than the composition, that matters, so that equations (2) and (3) can be consolidated into a single equation:

$$V = H^V(r_K, r^*)W \tag{5}$$

Given the wealth constraint expressed by equation (1), eqs. (4) and (5) are not independent, and solving the equity market clearing condition is adequate by Walras's Law to derive the equilibrium solutions.

Equation (6) expresses the equity market clearing condition in (implicit) excess supply form (see the Appendix for the partial differentials).

$$KK(r_K, Y; K, V, M, F, r^*, \tau, e) = 0 \tag{6}$$

where τ is the mark-up factor (more on this below), KK_K $(= \partial(KK)/\partial K)$ and KK_{r^*} are positive, KK_Y and KK_τ are zero (thanks to the absence of transaction demand for assets), while all the remaining partials are negative. An increase in the capital stock or an increase in bond returns both create excess supply of equity (the former since H^K, the portfolio share of equity, is strictly less than unity). Higher stocks of financial capital in either form or increased returns to holding equity, on the other hand, create excess demand, as does an exchange rate depreciation by raising the domestic currency value of wealth.

[7] I have ignored here the transactions demand for money and other assets. Incorporating this argument adds significant complexity without substantively influencing the outcome of the analysis.

3.2 The goods market

The home country produces and consumes a good that is an imperfect substitute for foreign goods. This good is used both for consumption and investment, and supply is perfectly elastic at current prices. As in Bhaduri and Marglin (1990), the real wage and mark-up over (constant) average variable costs are given by factors such as worker bargaining power and the degree of goods market competition. In standard treatments, this enables us to explore the effects of re-distribution on output and growth by plotting the IS- (goods market) curve corresponding to a give income distribution.

The pricing equation can then be written in terms of the mark-up factor τ, the nominal wage w, and the unit labor coefficient a as:

$$P = (1 + \tau)wa \tag{7}$$

or, alternatively, using π $[= \tau/(1 + \tau)]$ to denote the (pre-tax) profit share of output:

$$1 - \pi = \frac{wa}{P} \tag{8}$$

which, in turn, yields total nominal profits R as a proportion of real national income Y times the price level:

$$R = \pi PY \tag{9}$$

Following Blecker (2002), let's relate the mark-up over costs to the level "desired" by firms, ψ, and the real exchange rate, q $(= eP^*/P)$, so that:

$$\tau + 1 = \psi q^{\theta};\ \theta \in [0, \infty) \tag{10}$$

With a given foreign price level, any increase in q (a real depreciation) gets partially passed through to the actual mark-up factor, the degree of pass-through varying positively with the parameter θ. The real wage can be decomposed into two terms: z $(= eP^*/wa)$ that captures domestic competitiveness (or the inverse of unit labor costs in terms of the foreign good), and wa/P (which, from equation (8) equals $1 - \pi$). Using eqs. (7), (8), and (10), the profit share and the real exchange rate then become functions of the target mark-up factor and the unit labor costs:

$$\pi = \frac{\tau}{1 + \tau} = 1 - \psi^{-\frac{1}{1+\theta}} z^{-\frac{\theta}{1+\theta}} = \pi(\psi, z);\ \pi_{\psi},\ \pi_z > 0 \tag{11}$$

$$q = \left(\frac{\psi}{z}\right)^{\frac{1}{1+\theta}} = q(\psi, z);\ q_{\psi} = -z\pi_{\psi} < 0,\ q_z = \frac{z}{\theta}\pi_z > 0 \tag{12}$$

where $\pi_z = \partial\pi/\partial z = [\theta/(1+\theta)]\psi^{-\frac{1}{1+\theta}} z^{-\frac{1+2\theta}{1+\theta}}$ and $\pi_{\psi} = [1/(1+\theta)]\psi^{-\frac{2+\theta}{1+\theta}} z^{-\frac{\theta}{1+\theta}}$.

Workers consume all their wages while capitalists save a proportion s_R of profit income. The former assumption is a typical neo-Kaleckian one although sometimes it is diluted by simply assuming that the saving propensity out of

profit income is higher than that out of wages. Such a move on our part will significantly complicate the analysis without adding much to it. In particular, once we extend the standard neo-Kaleckian framework to track developments over time, it will force us to specify separate asset demand functions for each class of savers. I avoid these complications to focus on the key issue.

Neo-Kaleckian growth models typically normalize output by the level of capital stock in order to express variables in relation to the utilization rate. I eschew this normalization here given the presence of asset markets, which makes it less feasible to normalize quantities. The structure and set-up of the goods market, however, remains essentially neo-Kaleckian up until this point. It is time to introduce the first major modification. Neo-Kaleckian models typically specify s_R as a parameter. A set-up with wealth and varying returns to financial and real assets suggests a modification to this specification. In particular, at a given level of income, saving will plausibly respond to asset returns. Moreover, if, along the lines suggested by Metzler (1951), savers have a target level of wealth, the propensity to save out of income will vary negatively with current wealth.

$$s_R = s_R(r_K, r^*, W);\ s_{r_K},\ s_{r^*} > 0,\ s_W < 0 \tag{13}$$

The presence of equity (claims on real capital) means that investment too needs to be modified. The typical specification following Marglin and Bhaduri (1988) involves a measure of aggregate demand (utilization in the usual case, output in ours), and the profit share. The latter variable captures the ability to utilize retained earning to either directly invest or leverage borrowing from outside sources. I incorporate the return to holding equity r_K as an additional argument. The higher this rate of return, the higher the rate issuers are required to pay savers to hold equity in their portfolios, the lower the incentive to invest in new capital.

$$I = I(\pi, Y, r_K);\ I_\pi,\ I_Y > 0,\ I_{r_K} < 0 \tag{14}$$

Given our assumptions, foreign interactions as represented by the current account, CA, can be specified using the standard imperfect substitutes framework:

$$CA = T(Y, q) + er^*F;\ T_Y < 0,\ T_q > 0 \tag{15}$$

where T represents the trade balance function. The second partial derivative assumes the satisfaction of the Marshall-Lerner condition.

In an open economy, national saving need not equal investment, so that the goods market clearing condition, written in excess supply form, becomes:

$$s_R(r_K, r^*, W)(1-\varphi)\pi Y - I(\pi, Y, r_K) - T(Y, q) - er^*F = 0$$

where φ is the rate at which income is taxed. For the sake of simplicity, I assume a balanced government budget and that new government spending G is tax financed, so that $G = \varphi Y$. This explains the absence of a government

spending term in the goods market equation, which in implicit (excess supply) form is captured by Equation (16).

$$IS(r_K, Y; K, V, M, F, r^*, \psi, z, q) = 0 \tag{16}$$

where IS_Y and IS_{r_K} are positive; a rise in the cost of equity reduces investment and generates excess supply. The traditional Keynesian stability condition requires a similar outcome from an increase in income. A rise in any component of wealth has the opposite effect via the Metzler channel; IS_M, IS_K, IS_F, $IS_V < 0$. A nominal depreciation raises demand through expenditure-switching, through the wealth channel, and by raising the domestic currency value of income from net foreign lending. A rise in the international interest rate on borrowing has offsetting effects. On the one hand, it boosts the saving rate, while on the other, it raises demand thanks to the country's positive net foreign lending position.

The partial with respect to ψ highlights the nature of the demand regime. In a wage-led demand regime – stagnationist in the terminology introduced by Marglin and Bhaduri (1988) – a re-distribution away from workers creates excess supply, because of both lower domestic spending and expenditure switching towards foreign goods ($IS_\psi > 0$). In a profit-led demand regime – exhilarationist in Marglin and Bhaduri's terminology – the expenditure switching is countered by increased domestic spending. If the latter effect dominates, i.e., the economy is *strongly* exhilarationist, excess demand is created. The effect of redistribution in the same direction, but now through a decline in unit labor costs (z) yields qualitatively similar results. Since the effect on international competition is now positive, however, an autarky exhilarationist regime unambiguously yields excess demand while a *strongly* stagnationist regime – one where the dampener on internal demand sufficiently offsets increased external demand – yields excess supply.

4 Reconsidering Stagnationism in an Instantaneous Flow Equilibrium With Asset Markets

With a fixed exchange rate and internationally traded bonds, the system has two adjusting variables, Y and r_K. Assuming satisfaction of the conditions underlying the implicit function theorem, the effects of exogenous shocks can be studied in the neighborhood of the initial equilibrium.

Raising the real wage

A simple increase in the nominal wage (w) – which lowers z and raises the real wage and the worker share of output as long as there is partial pass-through into the mark-up factor – reduces international competitiveness. An excess supply in the goods market emerges if the economy is autarky exhilarationist, leading to a decline in output. Conversely, if the economy is strongly stagnationist in autarky so that $s_R(1-\phi)Y > I_\pi + T_q z/\theta)$, excess demand could develop. There is no direct effect on the asset markets. The end result is a decline in

real income without any change to asset returns in the exhilarationist case, and a rise in income in the strongly stagnationist case.

Linearizing the system consisting of eqs. (6) and (16), and solving yields:

$$-\frac{dY}{dz} = \frac{s_R(1-\phi)Y - I_\pi - T_q z/\theta}{\Lambda}\pi_z \lessgtr 0$$

$$-\frac{dr_K}{dz} = 0$$

where $\Lambda = s_R(1-\phi)\pi - I_Y - T_Y > 0$ (Keynesian goods market stability condition).

Reducing the mark-up

What are the consequences of income re-distribution away from profits and towards workers, but now in the form of a decline in ψ? In mathematical terms:

$$-\frac{dY}{d\psi} = \frac{s_R(1-\phi)Y - I_\pi + T_q z}{\Lambda}\pi_\psi \gtrless 0$$

$$-\frac{dr_K}{d\psi} = 0$$

Reduced profits have no direct effect on the asset market (again, thanks to the simplifying assumption that transactions demand can be neglected). The direct effect on the goods market is to create excess demand in a strongly wage-led demand regime (where $s_R(1-\phi)Y + T_q z > I_\pi$) and excess supply in a profit-led one. Output rises in the former case and declines in the latter. This result is consistent with Bhaduri and Marglin (1990), and up until this point the addition of asset markets does not generate analysis that diverges qualitatively from standard neo-Kaleckian results. This is not surprising given that changes in the profit share leave the equilibrium asset returns unchanged.[8]

Table 1 summarizes these and other results from this section. Our instantaneous flow system does not, of course, yield steady state positions since wealth is changing over time, influencing saving, the current account balance, and other variables. Before we transition to the medium-run, we need to explore the effects of changes in the state variables, V and K. We do so by considering the consequences of "helicopter drop" experiments.

Increased supply of financial assets

An instantaneous increase in V leaves asset holders wealthier and generates excess demand for both equity and goods. The equilibrium return to equity declines while income rises.

$$\frac{dY}{dV} = -\frac{s_{R_W}(1-\phi)\pi Y H^K_{r_K} W - \left[s_{R_{r_K}}(1-\phi)\pi Y - I_{r_K}\right] H^K}{\Lambda H^K_{r_K} W} > 0$$

[8] This would change if transactions demand is incorporated into the asset demand functions, albeit not qualitatively as long as the assets are gross substitutes.

$$\frac{dr_K}{dV} = -\frac{H^K}{H^K_{r_K} W} < 0$$

Increased supply of equity

An instantaneous increase in K leaves asset holders wealthier and generates excess demand for goods, but, given that $H^K < 1$, excess supply of equity. The equilibrium return unambiguously rises, rendering the effect on equilibrium income ambiguous. The direct effect working through increased wealth is to generate demand. The rise in investment costs acts in the opposite direction. If the wealth effect is strong and/or, if the assets are highly substitutable (i.e., low $H^K_{r_K}$ and/or s_W), then the goods market effect dominates and equilibrium income is higher. The opposite combination means that the negative effect of higher r_K dominates and income declines. The intuition is fairly straightforward but is important to highlight as we move to the dynamic analysis. High asset substitutability ensures that a small change in relative returns would suffice to remove the excess supply of equity. This, in turn, means that the positive wealth effect of increased equity dominates. A strong wealth effect on savings also tends to ensure that the direct demand effect of higher wealth in the goods market dominates.

$$\frac{dY}{dK} = -\frac{s_{R_W}(1-\phi)\pi Y H^K_{r_K} W + \left[s_{R_{r_K}}(1-\phi)\pi Y - I_{r_K}\right]\left(1-H^K\right)}{\Lambda H^K_{r_K} W} \gtrless 0$$

$$\frac{dr_K}{dK} = \frac{1-H^K}{H^K_{r_K} W} < 0$$

As we see in the next section, the degree of asset substitutability and/or the strength of the wealth effect play a much more crucial role than the nature of the demand regime in determining changes in the steady state values of financial wealth and capital over time.

5 Keeping track over time

The short-run equilibrium can be summarized using the implicit function theorem. The tilde ($\tilde{}$) symbol over variables denotes (instantaneous) equilibrium values.

$$\tilde{Y} = \tilde{Y}(V, K; z, \psi);\ \tilde{Y}_V > 0,\ \tilde{Y}_z,\ \tilde{Y}_K,\ \tilde{Y}_\psi \gtrless 0 \tag{17a}$$

$$\tilde{r}_K = \tilde{r}_K(V, K; z, \psi);\ \tilde{r}_{KV} < 0,\ \tilde{r}_{KK} > 0,\ \tilde{r}_{Kz} = \tilde{r}_{K\psi} = 0 \tag{17b}$$

Changes in the flow equilibrium value of income and relative returns will impact the current account and capital accumulation. Over time, the additions

Table 1: Comparative statics

Exogenous shocks		Y Stagnationist	Y Exhilarationist	r_K
$\downarrow z$		$(+)^*$	$-$	0
$\downarrow \psi$		$+$	$(-)$	0
$\uparrow V$		$+$	$+$	$-$
$\uparrow K$	High $H^K_{r_K}$ and/or s_W	$+$	$+$	$+$
	Low $H^K_{r_K}$ and/or s_W	$-$	$-$	$+$

*() around a sign means that a strongly stagnationist or exhilarationist regime is required

to the stocks of physical capital and financial assets implied by the short-run equilibrium will affect the medium-run steady state of the economy. The manner in which the system evolves is defined by the equilibrium rates of investment and saving. This section explores these dynamics.

Equations (17a) and (17b) can be substituted into equation (14) to get a reduced form equation for the equilibrium rate of capital formation.[9]

$$I = \dot{K} = \dot{K}(V, K; z, \psi);\ \dot{K}_V > 0,\ \dot{K}_z,\ \dot{K}_K,\ \dot{K}_\psi \gtrless 0 \tag{18}$$

Recall that investment is a positive function of Y and a negative function of r_K. Since an increase in V increases demand through the wealth channel and reduces the cost of investment, the effect on investment is clear. The other partials are ambiguous. The reason in the case of a rise in real capital is obvious. While it boosts demand through the wealth channel it also taketh away by increasing the cost of investment. Highly substitutable assets and/or a relatively strong wealth effect ensure a rise in investment. The converse configuration makes a decline likely.

A rise in the wage hurts competitiveness and the profit share, while leaving the return to equity unperturbed. Investment unambiguously declines if the system is exhilarationist, but rises if the system is strongly stagnationist (to an extent that the increase in income dominates the negative effects on investment). Finally, the sign of the partial with respect to ψ is unambiguous for the standard reasons. Capitalists invest more in response to their increased share. But, if the overall demand response is negative (wage-led demand regime), investment declines. If demand is profit-led, a redistribution towards profits ensures increased investment. It is important to note for our later analysis that, owing to the resulting loss of international competitiveness, the likelihood of the latter scenario is decreasing in trade price elasticity (T_q).

We know from equation (15) that instantaneous changes in income and the stocks of assets affects the current account, which, in turn, leads to accumulation

[9] I have ignored capital depreciation here since it is of little use to the analysis.

or decumulation of assets over time. From balance of payments accounting, the equilibrium rate of financial asset accumulation, $\dot{V}$, is the difference between saving and investment, or the current account balance.

$$\begin{aligned} \dot{V} &= S - I = T(Y, q) + er^*F \\ &= \dot{V}(V, K; z, \psi);\ \dot{V}_V < 0,\ \dot{V}_z,\ \dot{V}_K,\ \dot{V}_\psi \gtreqless 0 \end{aligned} \tag{19}$$

The signs of the partials follow from equation (17a) and Table 1. Rising stocks of financial assets raise income, which has a negative effect on the trade balance, the current account, and financial asset accumulation.[10] Capital accumulation raises (lowers) income and hurts (helps) the current account if assets are highly (weakly) substitutable and/or the Metzler effect is strong (weak).

Redistribution towards workers has ambiguous effects regardless of whether it is done through raising wages or lowering the mark-up. Let's consider the latter first. It certainly helps international competitiveness and through this channel generates external surpluses. If autarky demand is wage-led, however, so that short-run income is higher, the overall effect on the current account depends on the relative strengths of the effects of lower income (T_Y) versus real appreciation (T_q). If the former dominates, the current account improves, otherwise it deteriorates. A similar analysis follows for the case where redistribution occurs through a rise in wages.

As we see below, the relative magnitudes of T_Y and T_q play a much more important role in determining movements in steady state capital stocks than the nature of the demand regime. The steady state level of financial wealth depends crucially, in addition, on asset substitutability and the wealth effect. Indeed, it would be useful from now on to distinguish 2 cases:

Case 1: Low asset substitutability and/or strong wealth effect: $\dot{K}_K < 0$, $\dot{V}_K > 0$

Case 2: High asset substitutability and/or a strong wealth effect: $\dot{K}_K > 0$, $\dot{V}_K < 0$

Equations (18) and (19) define a system of dynamic equations in V and K. In the steady state, the stocks of financial and physical capital are constant, and so is wealth. This implies, from the asset demand equations, that r_K is constant, and hence, from equation (14), that Y is constant. Furthermore, a look at the asset demand functions also reveals that the steady state composition of financial capital is unchanging, i.e., private wealth holders are satisfied with the distribution between liquid money and bonds. The resulting absence of official reserve transactions reflects balance of payments equilibrium. In short, flows are in equilibrium and stocks are unchanging over time.

Figure 1 illustrates the two configurations represented by Case 1 and Case 2. Recall from eqs. (18) and (19) that an increase in financial wealth lowers

[10] An offsetting effect comes from the increase in foreign investment income that results from having more foreign assets, but I follow the typical practice in assuming that the trade balance effect dominates. Making the alternative assumption tends to destabilize the system.

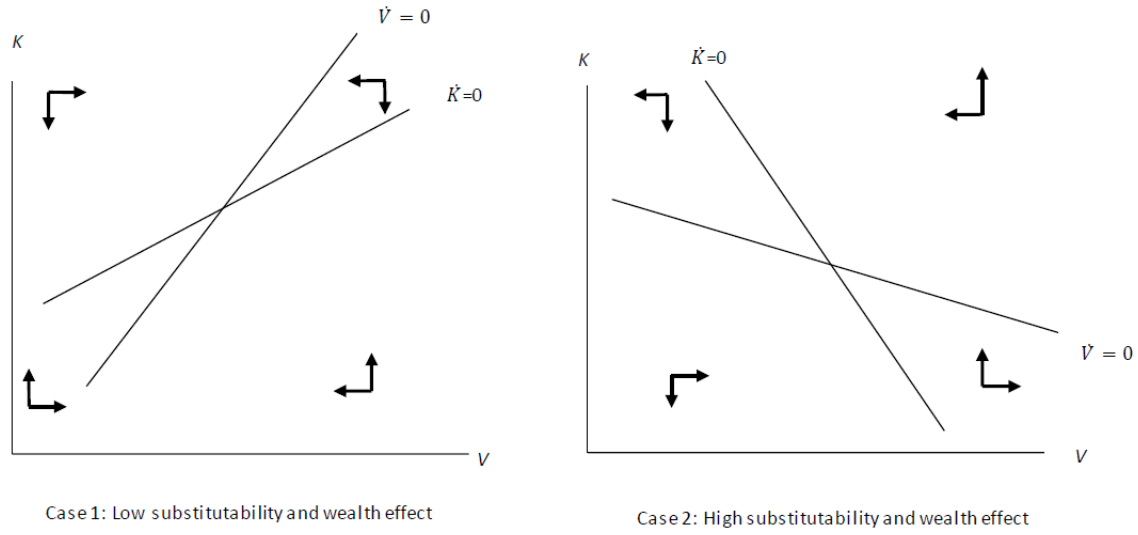

Figure 1: Alternative representations of the system depending on asset substitutability and the (Metzler) wealth effect.

r_K and thus boosts capital accumulation while negatively impacting financial accumulation. In Case 1, where the assets are not highly substitutable and/or the wealth effect is weak, a rise in the capital stock is required to restore both kinds of asset accumulation to their steady state rates via the rise in r_K. In Case 2, where there is high substitutability so that r_K does not significantly change, a *decline* in the capital stock is required to achieve the same end via the wealth effect on savings and, through aggregate demand, on investment. It can be shown mathematically that in Case 1, the $\dot{V} = 0$ isocline is steeper while in Case 2, the opposite is true.[11] This latter statement translates into the endogenous variable Jacobian being positive in both cases yielding dynamic stability.

5.1 The comparative dynamics of a rise in wages

What are the medium-run effects of an exogenous decline in z, say through a higher nominal wage? The new steady state stock of real capital ($\bar{K}$) ends up being lower while the effect on financial capital ($\bar{V}$) is ambiguous. Before we analyze the mechanisms in detail, it may be useful to highlight the reason for the former result: as seen earlier, a wage increase hurts on impact *both* the trade balance and investment. Whether the demand regime is wage-led or profit-led in autarky plays no role.

In mathematical terms, the steady state results are given by:

[11] See the Appendix for the information required to derive the relevant slopes.

$$-\frac{d\bar{K}}{dz} = \frac{\left[\left(\frac{s_{R_W} H^K_{r_K} W}{H^K} - s_{R_{r_K}}\right) I_\pi + \frac{I_{r_K} s_R}{\pi}\right] - \frac{T_q z}{T_Y}\left[\left(\frac{s_{R_W} H^K_{r_K} W}{H^K} - s_{R_{r_K}}\right) I_Y + \frac{I_{r_K} s_R}{Y}\right]}{\frac{I_{r_K} s_{R_W}}{H^K}} \pi_z < 0 \tag{20}$$

$$-\frac{d\bar{V}}{dz} = -\frac{\left[\left(\frac{s_{R_W} H^K_{r_K} W}{1-H^K} + s_{R_{r_K}}\right) I_\pi \pi - \frac{I_{r_K} s_R}{\pi}\right] - \frac{T_q z}{T_Y \theta}\left[\left(\frac{s_{R_W} H^K_{r_K} W}{1-H^K} + s_{R_{r_K}}\right) I_Y Y - \frac{I_{r_K} s_R}{Y}\right]}{\frac{I_{r_K} s_{R_W}}{1-H^K}} \pi_z \lessgtr 0 \tag{21}$$

Since s_{R_W}, $I_{r_K} < 0$, the denominators of both expressions are positive while the numerator of the first expression is unambiguously negative.

Let's take a closer look. Consider first a system that is stagnationist in autarky. Since there is a redistribution from savers to spenders, the effect of a wage increase is to boost demand for the domestic good. Accumulation occurs and output initially rises. But this output rise exacerbates the negative impact of higher domestic wages (and prices) on the current account. The resulting decline in financial wealth acts as a drag on domestic demand that is much stronger when assets are highly imperfect substitutes (since the rise in the return on equity is then much higher). This drag on demand and rise in r_K over time causes decumulation so that, in the new steady state, the economy is left with a lower stock of both types of assets. The result is the same if the assets are highly substitutable, although in this case the initial phase of accumulation lowers output, and hence does not act to enhance the current account deficit. The capital stock is again lower in the steady state but because current account deficits are dampened by the output decline accompanying initial accumulation, the economy ends up with a higher level of financial wealth in the new steady state. 2 captures the difference in transitional dynamics between the two cases.

When the system is strongly exhilarationist, the end result is exactly the same, except for that the re-distribution reduces demand and output on impact. The resulting positive effect on the current account changes the transition path without changing the steady state consequences.

In sum, the economy ends up at a steady state with a lower capital stock, the effects of any initial boost to investment under a stagnationist regime being more than offset over time. The nature of the demand regime does not matter and differences in the degree of asset substitutability and the wealth effect only affect the steady state level of financial wealth.

5.2 Re-distribution through a reduced mark-up

What are the medium-run effects of an exogenous rise in the wage share, now induced by declining firm monopoly power (as captured by a fall in ψ)? The effect on the steady state level of capital stock is now more ambiguous. Again,

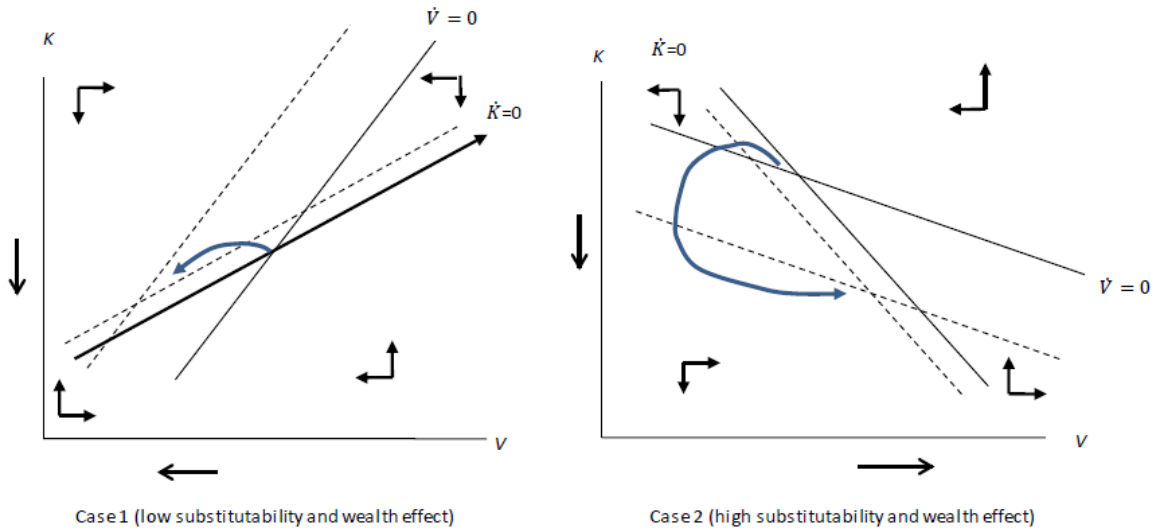

Figure 2: The effect of a rise in the wage

however, the results are independent of whether the demand-regime is wage-led or profit-led in autarky, as is obvious from the mathematical expressions.

$$-\frac{d\bar{K}}{d\psi} = -\frac{\left[\left(\frac{s_{R_W} H^K_{r_K} W}{H^K} - s_{R_{r_K}}\right) I_\pi + \frac{I_{r_K} s_R}{\pi}\right] + \frac{T_q z}{T_Y}\left[\left(\frac{s_{R_W} H^K_{r_K} W}{H^K} - s_{R_{r_K}}\right) I_Y + \frac{I_{r_K} s_R}{Y}\right]}{\frac{I_{r_K} s_{R_W}}{H^K}} \pi_\psi \lesseqgtr 0 \tag{22}$$

$$-\frac{d\bar{V}}{d\psi} = \frac{\left[\left(\frac{s_{R_W} H^K_{r_K} W}{1-H^K} + s_{R_{r_K}}\right) I_\pi - \frac{I_{r_K} s_R}{\pi}\right] + \frac{T_q z}{T_Y}\left[\left(\frac{s_{R_W} H^K_{r_K} W}{1-H^K} + s_{R_{r_K}}\right) I_Y - \frac{I_{r_K} s_R}{Y}\right]}{\frac{I_{r_K} s_{R_W}}{1-H^K}} \pi_\psi \lesseqgtr 0 \tag{23}$$

The denominator in both expressions is positive. The numerator in equation (22) is positive if the income effect on the trade balance is weak (i.e., T_Y is negligible) and negative if the relative price effect on external demand is strong (i.e., T_q is negligible). Thus, strong relative price effects tend to make an increase in the steady state capital stock more likely. The intuition is straightforward: a lower mark-up increases external competitiveness but, thanks to redistribution away from savers, reduces saving net of investment. Given the balance of payments constraint, whichever effect dominates, determines the direction of change in the steady state capital stock. This is in marked contrast to the results in the case of a rise in wages where the effect on the steady state capitalist

stock was unambiguously negative. The reason can be explained succinctly: in the latter case, there is no favorable initial impact on the current account that would sustain accumulation over time.

Turning to equation (23), the numerator is positive if the assets are highly substitutable (and/or if the wealth effect is strong), and T_q is negligibly small. Alternatively, it is positive if assets are weakly substitutable (and/or if the wealth effect is weak) and T_Y is negligibly small. The opposite behavioral assumptions yield a negative sign. Let's take a closer look at the intuition. Consider first the case where relative price effects are negligible so we can focus directly on the effect of income changes on the trade balance. In this case, an increase in income creates a trade deficit, and thus, lowers the steady state value of financial wealth. A decline in income has the opposite effect. So the new steady state stock of financial wealth is essentially determined by the direction of change in income. We know that the steady state stock of capital is lower in this case (i.e., when T_q is negligibly small). Furthermore, we know from Table 1 that a lower steady state stock of capital leads to higher income in the case of low asset substitutability. Putting this information together means that low substitutability corresponds with a lower steady state stock of financial capital when with T_q is negligibly small. The case where T_Y is negligibly small can be similarly analyzed.

Figures (3) and (4) highlight the steady state results and illustrate two main findings: (1) the effect of income re-distribution on the steady state stock of capital depends on the relative importance of income and relative price effects on the trade balance (compare Cases 1 or alternatively, Cases 2 of *each* figure), and (2) the degree of asset substitutability and/or the strength of the wealth effect on saving become additional qualitative determinants when it is the steady state stock of financial capital that we are considering (compare Cases 1 and 2 *within* each figure).

Turning to the transition dynamics, consider the case where T_q is negligibly small (Figure 3). The left panel shows the case where the autarky demand regime is exhilarationist. The initial current account surplus created by a re-distribution-induced decline in demand means that financial wealth is now rising along with capital decumulation. Both the resulting fall in K and the rise in V lower r_K and have a positive effect on output , which gradually turns the current account surplus into a deficit. Continuing decumulation and current account deficits maintain both stocks in their downward trajectories as the economy moves along the most direct path to the steady state. At the new steady state, the stocks of both financial and real capital are lower, as is that of national wealth. Even with a wag-led demand regime, re-distribution reduces the steady state stock of capital.

Consider next the left panel of Figure 4. Here it is income changes that the trade balance is insensitive to, so that the redistribution-induced increase in income no longer matters for the trade balance. Instead, in the exhilarationist case, the negative initial impact on demand and income leads to continuous current account surpluses, and beyond a point, capital accumulation in response to the demand generated by rising wealth. The burst of accumulation leading

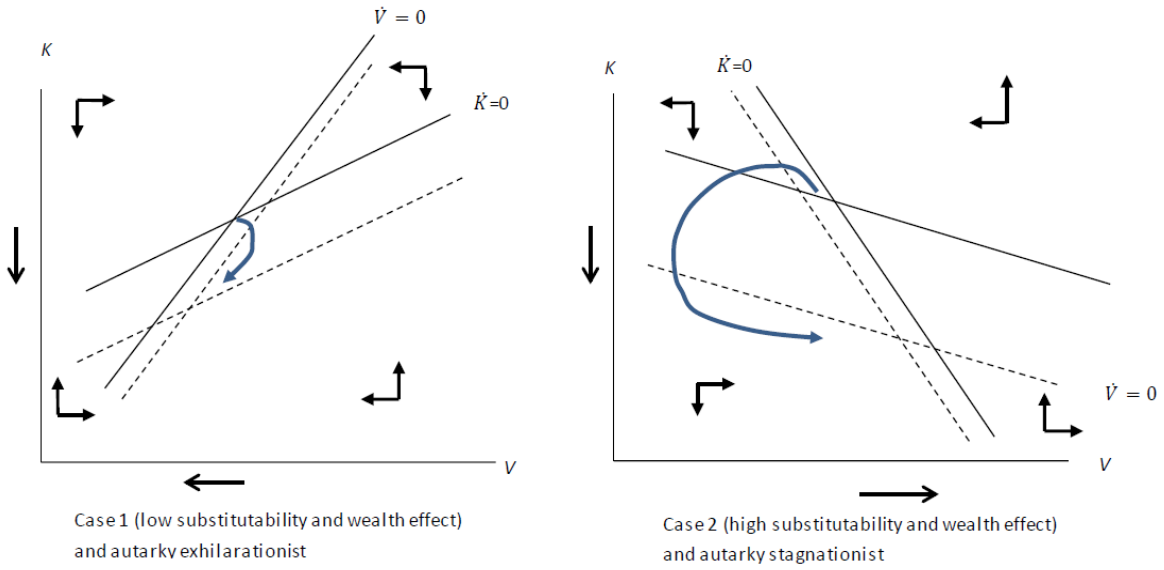

Figure 3: A drop in the mark-up when the trade balance is not sensitive to real exchange rate changes.

to the finish line ensures that the stock of steady state capital is higher.

6 Concluding remarks

Can a direct re-distribution of shares from savers to non-savers boost demand and growth in a capitalist economy with under-utilized resources? This old question has been energetically debated in recent years under the rubric of wage versus profit-led growth. A result that robustly emerges from the analysis is that open economy considerations render wage-led growth less likely for an economy that would otherwise be wage-led in autarky. I incorporate portfolio balance considerations and wealth effects on spending to re-consider the issue. These features allow me to explore interactions between national wealth, output, and the current account as these evolve over time. Furthermore, it helps ensure a medium-run steady state where the stocks are unchanging and the current account is in balance.

The main conclusions arising from the analysis are that: (1) re-distribution through simply raising the wage unambiguously lowers the steady state stock of capital, (2) re-distribution towards non-savers through reduced mark-ups does not lead to a rise in the steady state level of capital stock unless the relative price effects are strong, and, perhaps most importantly, (3) results 1 and 2 are independent of whether the economy is wage-led or profit-led in autarky.

These are more extreme conclusions than those reached by previous liter-

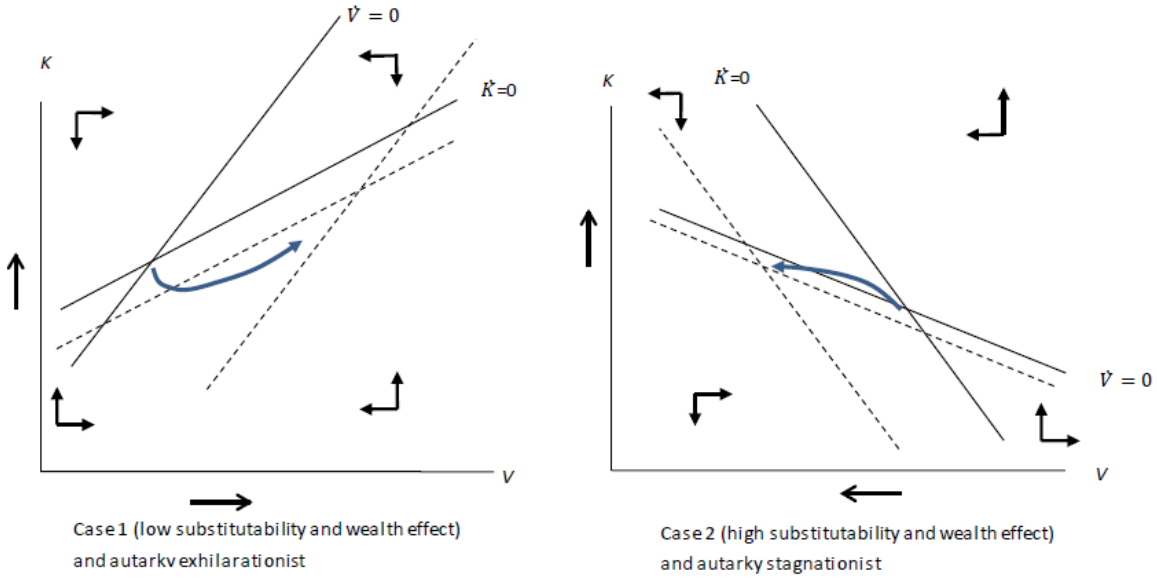

Figure 4: A drop in the mark-up when the trade balance is not sensitive to income changes

ature which finds by way of contrast to (1)-(3) above that, (1) re-distribution through simply raising the wage can result in wage-led growth provided that relative price effects are weak, (2) re-distribution through reduced mark-ups can lead to wage-led growth even if relative price effects are weak, and (3) both 1 and 2 hold *only* if the economy is wage-led in autarky.

The reason underlying this difference is that, unlike previous analysis, I keep track of stocks over time. During the transition, growth can be profit-led or wage-led depending on the demand regime just as in the existing literature. However, depending on the source of the re-distribution and the demand-regime, the transitional change in output leads to current account imbalances. Keeping track of stocks over time enables us to examine how the initial change in output translates into consequences for wealth accumulation and current account positions. The end result is that changes in the steady state stock of physical capital are independent of the demand regime. Whether steady state wealth rises or declines depends, on the other hand, on the degree of asset substitutability and the strength of the wealth effect. Our framework makes it possible to identify the crucial role of these factors which have been ignored by previous analysis.

Does this analysis eliminate the possibility of wage-led growth through an upward jump in wages under all circumstances? The answer has to be a resounding no. First, as we have shown, the steady state consequences depend on the kind of re-distributive policy pursued. Secondly, we have ignored the presence of increasing returns to scale or Verdoorn effects, especially in the industrial

sector. Moreover, real economies have non-tradables as a major proportion of output and consumption. If this sector is capital-intensive, wage-led growth would still be a distinct possibility. Thus, large, developed open economies may have an easier time accessing this route to expansion. Finally, the current account complications that emerge in this paper from re-distributing towards non-savers may be addressed by subsidizing saving out of wages. Something along the lines of the pension fund model of Singapore may serve more purposes than is generally recognized.

In any event, the analysis here underlines the lesson that, with differences in saving behavior, re-distributive policies have consequences for the balance of payments. Sustainable accumulation in an open economy will, therefore, require complementary policies that go much beyond identifying the nature of the demand regime.

7 Mathematical Appendix

Section 3.

The partials associated with equation (6) are as follows:

$KK_{r_K} = -H^K_{r_K} < 0$, $KK_{r^*} = -H^K_{r^*} > 0$, $KK_V = KK_M = KK_F = -H^K < 0$, $KK_K = 1 - H^K > 0$, $KK_e = -H^K F < 0$

The partials associated with equation (16) are as follows:

$IS_{r_K} = s_{R_{rK}}(1-\phi)\pi Y - I_{r_K} > 0$, $IS_Y = s_R(1-\phi)\pi - I_Y - T_Y > 0$, $IS_K = IS_V = IS_M = s_{R_W}(1-\phi)\pi Y < 0$, $IS_F = s_{R_W}(1-\phi)\pi Y - er^* < 0$, $IS_{r^*} = s_{R_{r^*}}(1-\phi)\pi Y - eF \lessgtr 0$, $IS_e = s_{R_W}(1-\phi)\pi YF - T_e - r^*F < 0$, $IS_\psi = [s_R(1-\phi)Y - I_\pi + T_q z]\pi_\psi \lessgtr 0$, $IS_z = [s_R(1-\phi)Y - I_\pi - T_q z/\theta]\pi_\psi \lessgtr 0$.

Section 5.

The partials associated with eqs. (18) and (19) are as follows:

$$\dot{K}_V = -\frac{I_{rK}\left[s_R(1-\phi)\pi - T_Y\right] + I_Y\left(\frac{s_{R_W}H^K_{r_K}W}{H^K} - s_{R_{r_K}}\right)(1-\phi)\pi Y}{\Lambda H^K_{rK} W} H^K > 0$$

$$\dot{K}_K = \frac{I_{rK}\left[s_R(1-\phi)\pi - T_Y\right] - I_Y\left(\frac{s_{R_W}H^K_{r_K}W}{H^K} + s_{R_{r_K}}\right)(1-\phi)\pi Y}{\Lambda H^K_{rK} W}(1-H^K) \lessgtr 0$$

$$\dot{K}_z = \frac{I_\pi\left[s_R(1-\phi)\pi - T_Y\right] - I_Y\left[s_R(1-\phi)Y - T_q z/\theta\right]}{\Lambda}\pi_z \lessgtr 0$$

$$\dot{K}_\psi = \frac{I_\pi\left[s_R(1-\phi)\pi - T_Y\right] - I_Y\left[s_R(1-\phi)Y + T_q z\right]}{\Lambda}\pi_\psi \lessgtr 0$$

$$\dot{V}_V = -\frac{I_{_{rK}} + \left(\frac{s_{R_W} H^K_{_{rK}} W}{H^K} - s_{R_{r_K}}\right)(1-\phi)\pi Y}{\Lambda H^K_{_{rK}} W} T_Y H^K < 0$$

$$\dot{V}_K = \frac{I_{_{rK}} - \left(\frac{s_{R_W} H^K_{_{rK}} W}{H^K} + s_{R_{r_K}}\right)(1-\phi)\pi Y}{\Lambda H^K_{_{rK}} W} T_Y(1-H^K) \lessgtr 0$$

$$\dot{V}_z = -\frac{T_Y\left[s_R(1-\phi)Y - I_\pi\right] - T_q z/\theta\left[s_R(1-\phi)\pi - I_Y\right]}{\Lambda}\pi_z \lessgtr 0$$

$$\dot{V}_\psi = -\frac{T_Y\left[s_R(1-\phi)Y - I_\pi\right] + T_q z\left[s_R(1-\phi)\pi - I_Y\right]}{\Lambda}\pi_\psi \lessgtr 0$$

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