DEPARTMENT OF ECONOMICS

Working Paper

Does the demand regime matter over the medium run? Revisiting distributional issues in a portfolio framework under different exchange rate regimes.

by

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Working Paper 2015-11

UNIVERSITY OF MASSACHUSETTS AMHERST

Does the demand regime matter over the medium run? Revisiting distributional issues in a portfolio framework under different exchange rate regimes

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February 17, 2017

Abstract

Is growth in capitalist economies wage-led or profit-led? Empirical studies have found conflicting results for different countries and periods. Possible reasons may include the endogeneity of distributional shares, differences in the monetary policy/exchange rate regimes across countries, and divergence between macro behavior in the short- and medium-runs. I theoretically explore these possibilities using a portfolio balance framework to keep track of asset stocks and wealth effects over time. With fixed exchange rates, the Central Bank's need to intervene in the asset market via official reserve transactions results in assigning a crucial role to the current account in constraining accumulation and output. The binding nature of this constraint vanishes with flexible exchange rates. Regardless of the exchange rate regime, the most important message that emerges is that, once we impose plausible constraints on dynamic behavior, the demand regime ceases to determine the effect of redistribution on the steady state levels of utilization,profit rates, capital, and wealth.

JEL classifications: F32, F43, E25, E42, E64

Key words: Demand regime, wage-led growth, stagnationism, exhilarationism, neo-Kaleckian models, portfolio balance model, wealth effects.

This is a revised version of WP 2015-11 originally published under the title "Is the nature of the demand regime relevant over the medium run? Some thoughts on the dynamic interaction between the exchange rate and demand regimes."

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1 Introduction

Broadly speaking, growth in Keynesian models is demand-led. In a closed economy, this means that, barring an overwhelmingly strong investment response to profitability, redistribution in favor of spenders should boost growth. As pointed out by Blecker (1989) and others, open economy considerations complicate the picture. The effect of re-distribution in a large open economy depends on the response to real exchange rate changes. An increase in the profit share through a higher mark-up results in real appreciation and a decline in external competitiveness. Demand suffers as a result. If this decline in demand combined with lower consumption, dominate the positive effect of a higher mark-up on investment, the economy exhibits a wage-led demand regime. A decline in the wage too increases the profit share but now makes the economy more competitive, which facilitates profit-led demand and growth. Prospects for wage- or profit-led demand growth ("stagnationism" and "exhilarationism" in the words of Marglin and Bhaduri (1988)) in an open economy, therefore, depend crucially on the source of the re-distribution. Moreover, an economy that is wage-led when insulated from the rest of the world may metamorphose into a profit-led open economy.

The effect of redistribution on competitiveness is only one potential source of differences between open economies. The resulting consequences for the saving-investment balance, the evolution of financial wealth, and variation in exchange rate regimes between countries that peg their currencies to a fixed standard and others that let their currency values float in the market – to take polar extremes – are some other factors that complicate open economy behavior. Differences may also emerge between short- and longer-run responses of macroeconomic aggregates. In fact these and other factors may at least partly explain the mixed empirical results regarding the nature of the demand and growth regimes.[1]

The above discussion makes clear that the traditional mechanism through which redistribution influences the scope for wage-led or profit-led growth in an open economy works through the trade balance. Since capacity utilization is the adjusting variable in such models, a loss of competitiveness results in downward pressure on demand and income. An obvious constraint that is missing from the picture is that of the balance of payments. What follows once redistribution creates a trade surplus or deficit? With fixed exchange rates, the Central Bank will have to defend the value of the currency through official reserve transactions, in the process accumulating or decumulating foreign exchange reserves. This process cannot be expected to last for ever. With flexible exchange rates, the exchange rate would be expected to move in response either to the trade imbalance or the asset accumulation or decumulation entailed by the current account imbalances. Moreover, as private and official asset holdings change, one would expect consumption behavior to be impacted through wealth effects. A careful examination of the relationship between income distribution and demand should, therefore, take these dynamic aspects into account. The present paper is an attempt to fill these gaps in the literature.

In order to analyze dynamic processes, I incorporate wealth effects á la Metzler (1951)

[1] See, for example, Barbosa-Filho and Taylor (2006) and Hein and Vogel (2008) for conflicting evidence regarding the US economy, and Onaran and Galanis (2012) for an empirical study involving a host of other countries.

and portfolio considerations in the spirit of Tobin (1969). This enables the analysis to incorporate balance of payments constraints over time while exploring the stock-flow relationships alluded to earlier. Unlike previous analysis, the main results pertaining to the relationship between income distribution and the nature of the demand regime are derived not only for demand and output changes, but also in terms of steady state stocks of real (capital) and financial assets. Perhaps three of these results can be highlighted as the most important contributions to existing literature:

1. The nature of the demand regime becomes irrelevant in determining how income redistribution affects the steady state levels of the profit rate, output, utilization, capital, and wealth once one extends the basic neo-Kaleckian framework to incorporate plausible constraints on behavior over time. Other factors such as trade and saving behavior assume a pivotal role instead.

2. The nature of the binding constraint on output varies with the exchange rate regime. With fixed exchange rates, the steady state stock of capital following a re-distribution toward wages declines, as does steady state wealth. With a floating (or flexible) exchange rate, by way of contrast, the steady state stock of capital may be unmoved by re-distribution.

3. Depending on the exchange rate regime, redistribution toward wages either reduces steady state utilization or leaves it unchanged. Redistribution *towards* profits through a higher mark-up will have similar consequences.

The next section presents a brief literature review. Section 3 then describes the broad conceptual details of the framework. Sections 4 and 5 analyze the effects of re-distribution under different exchange rate regimes. Section 6 concludes.

2 Broad Overview of Literature

Investigating the nature of aggregate demand is a core theme of Post-Keynesian macroeconomics. Not surprisingly, differences in saving behavior between economic classes makes the relationship between functional income distribution on the one hand, and demand and growth on the other a crucial issue in this regard. In a closed economy, distribution towards capitalists – who are assumed to save more relative to workers – lowers consumption demand but may raise overall demand if the effect on investment demand is positive thanks to a strong profitability effect on investment. In this case, the economy has an exhilarationist/profit-led demand regime in the sense that redistributing income towards profits raises aggregate demand. In the converse case, the demand regime is stagnationist/wage-led. While most of the neo-Kaleckian models prior to the late 1980s had a strong stagnationist flavor, Blecker (1989) and Bhaduri and Marglin (1990) raised the possibility of exhilarationism.[2] The latter study achieved this with the help of a modified

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

investment function that specified the profit share as an argument instead of the profit rate to avoid a strong accelerator effect. The former study, which is more relevant to the present paper given its open economy focus, considers 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 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 domestically wage-led, 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.

The neo-Kaleckian literature following (and including) the early studies 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.[4] 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, an exogenous saving *function* and the absence of portfolio considerations leaves one unable to explicitly consider the evolution of assets and their interaction with the external balance constraint.

An alternative approach to incorporating the balance of payments constraint, one that addresses some of the weaknesses cited above, originates from Tobin (1969). Subsequent extensions of the portfolio balance approach to incorporate open economy considerations have explored the interactions between asset and good markets, between the current account, wealth, and savings, and between fiscal/monetary policy and the balance of payments under different exchange rate regimes.[5] While some of this literature has explored aggregate demand issues (e.g., fiscal policy), the implications of different saving behavior between functional income classes has been ignored. To the best of my knowledge, only one paper, Razmi (2016), looks at issues pertaining to wage versus profit-led growth in this framework. However, this paper limits the analysis to fixed exchange rates, and does not contrast the behavior of macro aggregates under fixed versus floating regimes.[6]

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 changed capitalist saving *over time* and in terms of the balance of payments accounts. Given different saving propensities between the classes, one would expect distri-

[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 involves a decline in the target mark-up over costs generates somewhat different results.

[4] See Oreiro et al. (2015) for an attempt to combine these different strands of literature.

[5] See, for example, Dornbusch (1975), Kouri (1976), and Branson (1975). Branson and Henderson (1985) provide a comprehensive survey of the literature.

[6] Other papers look at asset and good market interactions but either without explicit portfolio considerations (see, for example, Malikane and Semmler (2008)), or focus, in addition, on closed economy analysis (see, for instance, Palley (2012)).

butional shifts to influence wealth accumulation with the passage of time. Moreover, the literature treats saving behavior as unchanging over time. If agents have a desired level of wealth, a la Metzler (1951), then saving behavior would evolve over time as stocks of wealth change.[7] Finally existing Post-Keynesian literature tends to ignore portfolio considerations. More mainstream models that incorporate portfolio behavior in open economies, on the other hand, ignore differences in saving behavior between different functional classes. 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, saving behavior, wealth, and the current account generates interesting interactions over time which qualitatively affect the results commonly arrived at by existing neo-Kaleckian literature.

3 Basic framework

We will start with a look at the asset side and then develop the goods markets side, before analyzing the two together.

3.1 Asset markets

There are three assets: (internationally) non-tradable money that pays no return, 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 equity is r_K.[8] The real value of nominal wealth W is the sum of the real values of nominal money balances (M), net domestic holdings of foreign bonds (F),[9] and equity (K), all measured in terms of the domestic good:

$$W \equiv M + eF + QK \equiv V + \frac{\pi v}{r_K} K \tag{1}$$

where e is the nominal exchange rate (the domestic currency price of a unit of foreign currency), P^* is the foreign price level, which is normalized to unity without loss of generality, and V ($\equiv M + eF$) is the value of financial wealth in domestic currency. The term Q captures the market valuation of capital. Assuming static expectations for simplicity, the market value is the expected present discounted value of future profit streams. Ruling out speculative bubbles, using π to denote the profit share in the goods market and v to represent some "normal" or "desired" rate of capacity utilization that is expected to prevail over time, the capital gains-inclusive valuation of capital, is given in the standard manner by:

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

[8] I assume that debt is short-term so that its capital value is essentially independent of the interest rate. Assuming that equity is internationally traded will render the composition of asset portfolios indeterminate.

[9] That is, the domestic holdings of foreign bonds net of foreign holdings of domestic bonds, nominally valued in foreign currency terms

$$Q = \int_0^\infty \pi v e^{-r_K t} dt = \frac{\pi v}{r_K}$$

Table 1, which represents an accounting matrix, illustrates the sources of issue and ownership of various assets. Firms finance their purchases of real (physical) capital, i.e., investment, entirely through equity; one share per unit of physical capital. In the spirit of Keynesian models, firms issue claims on real capital, while owners of wealth employ their savings to hold this equity.

The columns represent budget constraints. Since receipts and outlays must coincide, the columns add up to zero. The row sums capture excess demands for each asset or good. These too sum to zero as the *ex-post* quantity demanded must necessarily equal the *ex-post* quantity supplied, given that one sector's asset is another sector's liability.

Table 1: Accounting matrix for real and financial flows

	Households	Firms	Central Bank	ROW	$\sum$
Bonds	$\Delta(eF)$	–	$\Delta(eF_{CB})$	$\Delta(eF + eF_{CB})$	0
Cash	ΔM	–	ΔM^{CB}	–	0
Equities	$\Delta(QK)$	$\Delta(QK^f)$	–	–	0
Goods	$-S$	I	–	CA	0
$\sum$	0	0	0	0	

*Superscripts denote the source of issue. "ROW" abbreviates "Rest of the world."

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

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

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

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

Asset demands are homogenous in real wealth and the asset demand functions capture shares that must add up to unity ($H^M + H^F + H^K = 1$). The signs of the partial derivatives indicate that the assets are gross substitutes; $H^K_{r_K} = -(H^M_{r_K} + H^F_{r_K})$.[10] For the floating exchange rate case, I impose the further restriction that portfolio holders are equally sensitive to changes in r_K when deciding their holdings between money and bonds.

[10] To keep things simple, these asset demand specifications ignore transactions demand for assets. Relaxing this assumption will significantly complicate the analysis without adding much in the way of substance.

This simplifying assumption that has no qualitative effect on the results, has the plausible implication that the own-price elasticity of assets (with respect to r_K) is greater than the cross-price elasticity, and renders the analysis more compact without loss of generality.

3.2 The Goods Market

In the analysis that follows, I will consider trade openness in an "imperfect substitutes" framework. The country, in other words, exports a good that is an imperfect substitute for the foreign-made goods that it imports. Thus, the country is not a price-taker in international markets. This assumption, which is in keeping with previous literature and the spirit of the demand-led neo-Kaleckian framework, leads to a simple specification where the trade balance is a negative function of domestic real income Y and, as long as the Marshall-Lerner condition is satisfied, a positive function of relative prices q (i.e., in this context the real exchange rate). Thus,

$$T = T(Y, q);\ T_Y < 0,\, T_q > 0 \tag{5}$$

where q $(= eP^*/P = e/P)$ is the ratio of the foreign and domestic price levels. When later normalized by the capital stock, the trade balance function will be expressed with capacity utilization u $(\equiv Y/K)$ as an argument instead of Y, so that $T/K = t(u, q)$. This specification assumes homogeneity with respect to output. Although conceptually problematic,[11] we will use this notation to stay as close to the traditional neo-Kaleckian specification as possible.

Domestic price level behavior is defined in the neo-Kaleckian manner as a mark-up over average variable costs. That is,

$$P = (1 + \tau)wa \tag{6}$$

where τ is the mark-up factor, w is the nominal wage, and a is the unit labor coefficient. The profit and wage shares of output, π and $1 - \pi$, are then given by:

$$\pi = \frac{\tau}{1+\tau},\ 1 - \pi = \frac{1}{1+\tau}$$

In the presence of international competition, firms are likely to be constrained in their ability to pass through changes in unit labor costs. In line with earlier work,[12] I employ a specification that assumes that the higher domestic prices rise relative to the international level, the lower the mark-up charged by firms in order to cushion the effect on their international competitiveness.

$$1 + \tau = \psi q^{\theta};\ \tau,\, \psi,\, \theta > 0 \tag{7}$$

[11] For example, the assumption of homogeneity has the troubling implication that doubling both output and the capital stock does not affect the magnitude of imports (recall that, in the one country imperfect substitutes framework, output affects the trade balance through imports).

[12] See, for example, Blecker (1989) and Razmi (2009).

where ψ is a constant that represents a measure of the mark-up factor that equates the domestic and foreign price levels. Using the definition of q and employing eqs. (6) and (7), we can express the real exchange rate as a function of e, ψ, and unit labor costs.

$$q = \left(\frac{e}{\psi wa}\right)^{\frac{1}{1+\theta}} \tag{8}$$

The goods market equilibrium condition involves saving and investment behavior. One could specify investment in the traditional way as a function of the profit share and demand (proxied by income). In our case, however, we have the additional presence of an equity market. Investment would, therefore, be expected to vary negatively with the cost of issuing equity, i.e., the rate of return firms are required to pay savers to purchase equity.[13] Employing the general form of the Marglin-Bhaduri specification,

$$\frac{I}{K} = i(r_K, \pi, u);\ i_{r_K} < 0,\ i_{\pi,}\ i_{u,}\ > 0 \tag{9}$$

Only capitalists save and savings are specified as a proportion of profits in the traditional manner. However, the introduction of asset markets and wealth now makes it reasonable to include asset returns and wealth as arguments in the saving function. These arguments determine the proportion of profits that is saved.

$$\frac{S}{K} = s(r_K, r^*, W)\left(\pi u + er^*\frac{F}{K}\right);\ s_{r_K},\ s_{r^*} > 0,\ s_W < 0 \tag{10}$$

One would expect higher asset returns to encourage more saving. Moreover, if, as suggested by Metzler (1951), savers have a target level of wealth, the propensity to save out of current income will vary negatively with current wealth (and will open up another channel through which asset returns positively influence savings via the discounted effect on wealth).

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

$$s(r_K, r^*, W)\left(\pi u + er^*\frac{F}{K}\right) - i(r_K, \pi, u) - t(u, q) - er^*\frac{F}{K} = 0 \tag{11}$$

or, in implicit form,

$$IS(r_K, u, K, M, F, r^*, e, w) = 0 \tag{12}$$

As we will see shortly, the current account balance equals zero, i.e., $T + r^*F = 0$ in the steady state. The initial net foreign asset position could in theory be positive, zero, or negative ($F \gtreqless 0$). Each of these scenarios would lead to further sub-cases, a detail that is tangential to our analysis here. In the interest of brevity, I, therefore, suppose that

[13] Put slightly differently, the investment decision would be expected, in the standard manner, to be influenced by the gap between the current profit rate, which is a function of the profit share and utilization on the one hand and the rate of return required to persuade savers to hold equity on the other.

r^* is initially negligibly small.[14] Starting in a steady state where the current account is balanced, this means that trade too is initially balanced.

At this point it would help follow the later comparative static analysis to consider the relevant partials captured by equation (12). In order to avoid unnecessary detours, I will consider here, and for the remainder of the main text, the definition of wealth that does not incorporate capital valuation effects, i.e., $W \equiv M + eF + K$ with Q fixed at unity. The version with capital gains is dealt with in Appendix B. As demonstrated there the main result, i.e., that the steady state values of our variables of interest are independent of the nature of the demand regime, are unaffected by this change.

Higher cost of equity reduces investment and generates excess supply. The traditional Keynesian stability condition requires a similar outcome from an increase in income. Thus, IS_{r_K} $(= s_{r_K}\pi u - i_{r_K})$, IS_u $(= s\pi - i_u - t_u) > 0$. A rise in any component of wealth has the opposite effect via the Metzler channel; $IS_M = IS_K (= s_W \pi u) < 0$ and IS_F $(= s_W e \pi u)$ < 0, where again r^* is initially assumed to be negligibly small. A nominal depreciation affects demand for goods through expenditure-switching, and through the wealth channel, and by re-distributing income toward capitalists (via an increased mark-up). The first effect is positive as long as the Marshall-Lerner condition is satisfied. The second effect is unambiguously positive. Finally, the third effect is negative. Thus, IS_e $= [s_W \pi u F + (su - i_\pi)\theta(1-\pi)/q - t_q] \frac{1}{1+\theta} \frac{q}{w} \gtrless 0$.

The partial with respect to w spotlights the nature of the demand regime. Consider $IS_w = -[(su - i_\pi)\theta(1-\pi) - t_q q] \frac{1}{(1+\theta)w}$. In a wage-led (or stagnationist) regime where $(su - i_\pi)\theta(1-\pi) - t_q q > 0$, so that $IS_w < 0$, a higher nominal wage creates excess demand, because of both increased domestic spending and expenditure switching towards foreign goods. In a profit-led (or exhilarationist) regime, where $(su - i_\pi)\theta(1-\pi) - t_q q < 0$, the expenditure switching is more than offset by reduced domestic investment demand so that $IS_w > 0$.

The previous discussion sums up the general contours of the short-run part of the framework. The stocks of assets and thus wealth are pre-determined variables for this time window. Income (or, equivalently, utilization) and equity returns vary, along with the exchange rate (in a floating regime) and the stock composition of privately-held financial assets (in a fixed regime).

Over time, the stocks of assets evolve in response to flows. The stock of financial assets grows (declines) with current account surpluses (deficits) while the stock of capital changes with investment. I assume away capital depreciation for simplicity although including it will have no qualitative effect on the analysis. The steady state involves constant shares of total wealth being allocated to financial and real assets. It also ensures no net accumulation or decumulation of foreign exchange assets by the country or the Central Bank. Insofar as wages are exogenous, and there is no adjustment of utilization rates towards a desired level, the steady state is better seen as existing over the "medium-run" rather than the long-run. Thus, the analysis involves steady state stocks of assets over the medium-run punctuated by a continuum of short-run equilibria in which asset stocks may deviate from their steady state values but income and asset returns have adjusted to their equilibrium values.

[14] This assumption also avoids the issue of keeping track of the central bank's use of investment income.

Thus far we have summarized the broad contours of our analysis. The devil is in the details which will vary with the exchange rate regime over the next two sections. Most importantly, with a fixed exchange rate regime, the Central Bank is committed to maintaining the exchange rate, in the process satisfying domestic demand for foreign assets through balance sheet operations. With flexible exchange rates, the absence of such a commitment means that the exchange rate can do some of the heavy lifting involved in adjustment to income re-distribution. The two polar cases give rise to interesting contrasts.

4 Redistribution with fixed exchange rates

With a fixed exchange rate, and at a given level of wealth, the central bank stands ready to accommodate excess private demand for financial assets. In other words, the monetary authorities defend the exchange rate by absorbing any compositional shift within private holdings of financial assets.[15] It is thus the total quantity of financial assets, $V = M + eF$, rather than the composition, that matters, so that eqs. (2) and (3) can be consolidated into one equation:

$$V = H^V(r_K, r^*)W \tag{13}$$

Given the wealth constraint expressed by equation (1), which can be re-written as $W \equiv V + K$, eqs. (4) and (13) are not independent, and solving the equity market clearing condition (equation (4)) is adequate by Walras's Law to derive the equilibrium solution for r_K. Once r_K is known, equation (12) then pins down the solution for u. Thus, r_K is determined in the asset markets while u is determined in the goods market. The system defined by eqs. (4) and (12) is recursive.

4.1 Short-run comparative statics

Three thought experiments are the most relevant for the purposes of our analysis, the effects of changes in: (i) income distribution, (ii) the stock of financial assets, and (iii) the capital stock. It is important to bear in mind that the experiments involving exogenous asset stock changes here are in the nature of "helicopter drop" actions rather than increases over logical time (the latter are analyzed in the next section). Detailed solutions for these comparative static exercises are provided in Appendix A at the end of this paper. These solutions, expressed in implicit form, are as follows:

$$\bar{r}_K = r_K(V, K, w);\ \bar{r}_{KK} > 0,\ \bar{r}_{KV} < 0,\ \bar{r}_{Kw} = 0 \tag{14}$$

$$\bar{u} = u(V, K, w);\ \bar{u}_V > 0,\ \bar{u}_K,\ \bar{u}_w \gtrless 0 \tag{15}$$

[15] Put differently, the monetary authority defends the exchange rate by absorbing any shift within private holdings of financial assets. If there is excess demand for international securities, for instance, the authority will supply foreign assets in exchange for money.

where overbars indicate short-run equilibrium values. Let's take a look at the intuition underlying each comparative static result.

An expanded supply of financial assets puts downward pressure on return to equity. A lower r_K is required, in other words, to remove excess supply of financial assets through portfolio substitution. This in turn encourages investment and lowers savings. Thus, a higher level of V boosts income through two channels: (i) by boosting investment relative to savings through a lower r_K, and by directly increasing wealth and, therefore, reducing savings through the Metzler wealth effect.

In terms of Figure 1 below, an increase in V shifts the goods market curve (equation (12))to the right and the asset market curve (equation (4)) downward.

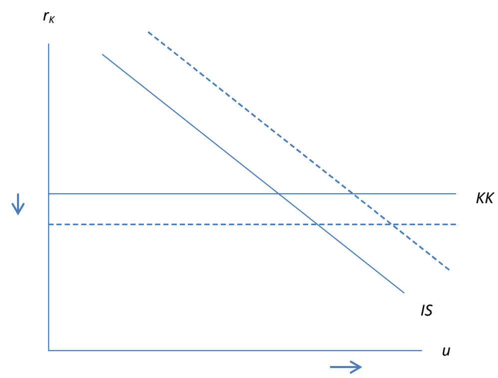

Figure 1: The effects of an increase in the stock of financial assets.

Increased supply of real assets (K) too lowers saving via the wealth effect but has the opposite effect on r_K. The intuition is simple. Portfolio switching is now required *toward* equity rather than away from it to remove the excess supply of K. The net effect on u is, therefore, ambiguous, and depends on the relative strengths of the wealth and investment cost effects. In terms of Figure 1, both curves shift upwards.

Finally, income re-distribution toward wages has no effect in the asset markets.[16] Thus, equilibrium r_K is unchanged. The only effect is on the goods market where we are now back to the analysis of Marglin and Bhaduri (1988). If the demand-regime is stagnationist (i.e., $(su - i_\pi)\,\theta(1 - \pi) - t_q q > 0$), excess supply is generated, so that u declines. An exhilarationist regime produces the opposite result. The IS-curve could shift in either direction, depending on the nature of the demand regime, while the KK-curve does not shift.

[16] This would change if I introduce transactions demand for money and other assets.

4.2 Evolution over time

Thus far we have established that $\bar{u}(t)$ and $\bar{r}_K(t)$ define instantaneous (moving) equilibria. As far as the rate of utilization is concerned, the short-run framework delivers analysis and conclusions similar to the traditional neo-Kaleckian one. Non-zero values of saving and investment mean, however, that the stocks of wealth, capital, and financial assets are continuously changing.

Consider now the evolution of asset stocks over time. Capital accumulation over time follows the flow of investment defined by equation (9). The path of financial assets, by definition, follows the net foreign asset position, which in turn is defined by the path of the current account flows over time. Thus, the change in financial assets between any two periods is given by, $\dot{V} = S - I = T(Y, q) + er^*F$. Recalling the assumption that $r^* \approx 0$,

$$\begin{aligned} \hat{V} &= \frac{S-I}{V} = \frac{K}{V}\left(\frac{S}{K} - \frac{I}{K}\right) = t(u,q)\frac{K}{V} \\ &= \hat{V}(V, K; w) \end{aligned} \tag{16}$$

$$\begin{aligned} \hat{K} &= \frac{I}{K} = i(r_K,\, \pi,\, u) \\ &= \hat{K}(V, K; w) \end{aligned} \tag{17}$$

where "^" indicates that the associated variable is expressed in growth rate form, and the right hand side of each equation makes use of eqs. (14) and (15). Appendix A provides more detailed expressions for these partials and for the derivation of the steady state changes in the variables.

The wealth shares of financial and real assets are bound from both the lower and upper ends. Over an extended period of time, it is therefore reasonable to assume that these shares are stable. This consideration helps define the steady state as characterized by $\hat{V} = \hat{K} = 0$. Setting $\hat{V} = 0$ also has the additional advantage of ensuring that, over the medium run, the current account is balanced and saving equals investment. Furthermore, this ensures that the Central Bank is not accumulating or decumulating foreign exchange reserves in the steady state. This is realistic since there is a floor to the foreign exchange reserves (in theory zero, but in practice, much higher) that a Central Bank must be mindful of in order to credibly maintain the exchange rate. Finally, from equation (1), national wealth is also constant in the steady state. With the stock of wealth held constant, so is r_K (see equation (13)). Constant asset stocks and returns to assets then ensure, via the goods market equilibrium condition (equation (12)), that output and the rate of capacity utilization too are unchanging. In sum, the steady state is characterized by:

$$\hat{V} = \hat{K} = \hat{W} = \hat{M} = \hat{F} = \hat{Y} = \hat{r}_K = \hat{S} - \hat{I} = \hat{S} = \hat{I} = 0$$

Is the system dynamically stable? Intuitively, the answer appears to be affirmative. If, in an initial instantaneous equilibrium, $(\bar{u}, \bar{r}_K)$ deliver positive investment, this raises

K, and hence r_K, thus dampening investment. Similarly, if $(\bar{u}, \bar{r}_K)$ deliver current account surpluses, the resulting financial asset accumulation lowers r_K, which has the effect of dampening this accumulation. As seen earlier in Section (4.1), however, the wealth effect complicates matters. This is because accumulation of real and financial assets through investment and external surpluses also increases wealth over time, which tends to increase spending and, therefore, to further magnify investment.

More formally, denoting the reciprocal of the traditional Keynesian multiplier by Λ $(= s\pi - i_u - t_u) > 0$, the determinant of the endogenous variable Jacobian is given by:

$$\Delta_L^{Fixed} = \begin{vmatrix} \hat{V}_V & \hat{V}_K \\ \hat{K}_V & \hat{K}_K \end{vmatrix} = -s_W \pi t_u u \frac{i_{r_K}}{\Lambda H^K_{r_K} W} \frac{K}{V} > 0$$

which is unambiguously positive. The trace is given by:

$$\begin{aligned} Tr^{Fixed} \quad = \quad & -\frac{\overbrace{(t_u + i_u)\, s_W \pi u}^{+/-}}{\Lambda} + \frac{\overbrace{t_u(s_{r_K}\pi u - i_{r_K}) \frac{H^K}{H^K_{r_K} W}}^{-}}{\Lambda} \\ & -\frac{[\overbrace{i_u(s_{r_K}\pi u - i_{r_K})}^{+} - \overbrace{i_{r_K}(s\pi - t_u)}^{-}] \left(\frac{1-H^K}{H^K_{r_K} W}\right)}{\Lambda} \end{aligned}$$

which is very likely to be negative. Notice that only the first term in the numerator on the right hand side is ambiguously signed. The remaining terms are negative. More specifically, a *sufficient* (but not necessary) condition for a negative trace is that $|t_u| > |i_u|$, i.e., that trade respond more than investment, in absolute terms, to changes in income. The necessary condition is, of course, much less stringent, and highly likely to be satisfied.

4.3 Increasing the wage share

What are the consequences of a policy-induced re-distribution that favors the wage share through nominal wage increases? As shown in the analysis in Section 4.1, the short-run equilibrium will correspond to a higher or lower level of output and utilization, depending on whether the demand-led regime is wage-led or profit-led in the short-run. This is the traditional neo-Kaleckian result. Unlike most existing literature, however, our analysis here is interested in the *steady state* stocks of capital and the corresponding levels of output and utilization. We are interested, in other words, in the longer run prospects for wage-led or profit-led growth.

Before we discuss the comparative dynamics in more detail, let's take a quick look at the mathematical expressions for changes in the steady state stocks of capital and financial assets, $\tilde{K}$ and $\tilde{V}$ respectively, based on eqs. (16) and (17):

$$
\begin{aligned}
\frac{d\tilde{K}}{dw} &= -\frac{\left[t_q i_u - t_u i_\pi \frac{\theta(1-\pi)}{q}\right] s_W \pi u H^K_{rK} W}{\Lambda s_W \pi t_u u i_{r_K}} \frac{q}{(1+\theta)w} + \\
&\quad \frac{\pi \left[(s_{r_K} i_\pi \pi - s i_{r_K}) t_u \frac{\theta(1-\pi)}{q} - (s_{r_K} i_u u - s i_{r_K}) t_q\right] H^K}{\Lambda s_W \pi t_u u i_{r_K}} \frac{q}{(1+\theta)w} \\
&< 0
\end{aligned}
\tag{18}
$$

$$
\begin{aligned}
\frac{d\tilde{V}}{dw} &= \frac{\left[t_q i_u - t_u i_\pi \frac{\theta(1-\pi)}{q}\right] s_W \pi u H^K_{rK} W}{\Lambda s_W \pi t_u u i_{r_K}} \frac{q}{(1+\theta)w} - \\
&\quad \frac{u \left[(s_{r_K} i_\pi \pi - s i_{r_K}) t_u \frac{\theta(1-\pi)}{q} - (s_{r_K} i_u u - s i_{r_K}) t_q\right] \left(1 - H^K\right)}{\Lambda s_W \pi t_u u i_{r_K}} \frac{q}{(1+\theta)w} \\
&\gtreqless 0
\end{aligned}
\tag{19}
$$

The steady state stock of capital $\tilde{K}$ is unambiguously lower while that of financial assets may be higher (if the wealth effect on savings is strong) or lower (if this effect is weak). What mechanisms underlie these results?

The key relationship driving the steady state results is the current account balance expression on the right hand side of equation (16). With a fixed exchange rate, internationally determined bond returns, and negligible investment income, there is only one degree of freedom here. For the current account to be balanced following a real appreciation (i.e., a rise in q), utilization must be lower in the new steady state. Stated differently, for equation (16) to hold from one steady state to another,

$$
\frac{d\tilde{u}/\tilde{u}}{dw/w} = \frac{t_q \frac{q}{(1+\theta)w}}{t_u \tilde{u}} \ (< 0)
\tag{20}
$$

This relationship determines the proportional decline in utilization required to maintain the current account as we move from the old steady state to the new one following redistribution. Given the lower profit share and the lower steady state rate of utilization, equation (9) then tells us that the steady state returns to equity must be lower. This, in turn, implies via equation (10) that the steady state stock of wealth must have declined. The equity market clearing condition (equation (4)) then implies a lower stock of capital. Since we already know that $\tilde{W}$ is lower, this means that the stock of financial assets could be lower or higher. More specifically, if the wealth effect on savings is strong relative to the effect of r_K on savings, then the positive effect of lower wealth on saving dominates the negative effect of lower returns to equity, and $\tilde{V}$ is higher. In the converse case, this stock is lower.

To sum up, with a fixed exchange rate, the current account imposes a binding constraint on output and the steady state level of capital stock. Steady state utilization unambiguously declines to maintain current account balance in response to redistribution-induced real appreciation. As one can tell from eqs. (18) and (19), the nature of the demand regime, that is whether $(su - i_\pi)\,\theta(1-\pi) - t_q q \lesseqgtr 0$, does not matter. Table 2 summarizes the steady state results.

Table 2: Comparative dynamics of redistribution toward workers. Tildes represent steady state values.

	Fixed exchange rate	Floating exchange rate
$\widetilde{K}$	$-$	0
$\widetilde{V}$ or $\tilde{F}$	$+/-^*$	$-$
$\widetilde{W}$	$-$	0
$\widetilde{u}$	$-$	0
$\widetilde{r}_K$	$-$	0
$r = \pi\widetilde{u}$	$-$	$-$
$\widetilde{Y}$	$-$	0
$\widetilde{e}$		$+$

*Depends on the strength of the wealth effect relative to the effect of changes in r_K on savings and investment .

5 A floating regime

Unlike the fixed exchange rate case, the Central Bank no longer commits to defending the value of the currency. This removes the role of the current account as the determinant of output changes following redistribution. As we will see shortly, this role is now played by steady state investment behavior. Note that this happens in spite of the fact that the exchange rate is not assumed to adjust to balance the external account. Rather, it is determined here in the asset markets.

The basic set-up, as defined by equation (1)-(12) remains the same as before. In order to focus on comparing exchange rate regimes, I assume static expectations, so that, with uncovered interest parity holding, the domestic interest rate on bonds continues to be tightly bound to the international one. One can specify, in other words, the *expected* exchange rate change to be zero without loss of generality. Given the change of exchange rate regime, some variables undergo a functional identity change. Since the Central Bank does not intervene in the foreign exchange market, the nominal exchange rate replaces M as the endogenous variable, and liquid money and net holdings of foreign assets can no longer be amalgamated into a single variable. Two out of the three asset market equilibrium conditions (2)-(4) are now independent. The exchange rate adjusts along with r_K to maintain equilibrium in these markets. Income is then determined in the goods market by equation (12). The short-run model retains its recursive nature.

5.1 Short-run adjustments

Again, three thought experiments help carry out the short-run analysis for this section:

(i) Increased net holdings of foreign assets has no effect on returns to equity, thanks to the homogeneity embedded in equation (3). The exchange rate adjusts downward instead, proportionally to the initial change in F (i.e., $de/dF = -e/F$). This is a standard result in open economy macro literature. The real appreciation, in turn, causes reduced demand for domestic goods as long as the Marshall-Lerner condition is satisfied. With partial pass-through of exchange rate change into prices, the appreciation also shifts distribution toward wages, which, in turn, could have the effect of boosting demand for good if the regime is wage-led. Unlike the fixed exchange rate case, therefore, the total effect on utilization is ambiguous.

(ii) Unlike the case of increased foreign asset holdings, the exchange rate does not bear the entire burden of adjustment in the asset markets when the stock of physical capital increases. Rather, the excess supply of equity puts upward pressure on r_K. This means that the effect on the exchange rate and utilization are both ambiguous. Consider first the former. Increased r_K creates an excess supply of foreign assets which tends to appreciate the exchange rate. The increase in wealth resulting from the higher K, on the other hand, generates increased demand for foreign assets, which tends to depreciate the exchange rate. The net effect is determined by the relative strengths of the two effects. Mathematically,

$$\frac{d\bar{e}}{dK} = \frac{H^F - H^M}{1 + H^M - H^F}\frac{1}{F}$$

The denominator is always positive. The numerator is negative if domestic residents hold a greater share of liquid money than foreign assets in their wealth portfolio. I assume this to be true from now on, on grounds of both plausibility and simplicity, although this does not affect any of the steady state results. Thus, $d\bar{e}/dK < 0$. This is consistent with the Balassa-Samuelson and the Bhagwati-Kravis-Lipsey effects.

To understand why the effect on output is ambiguous, recall again that output is pinned down in the goods market once e and r_K have been determined in the asset markets. This means that the higher r_K lowers the equilibrium value of output while the appreciated equilibrium value of the exchange rate has ambiguous effects. The increase in wealth, by contrast reduces savings, generates demand, and boosts output. Equilibrium output rises in the presence of a strong wealth effect and/or if demand is strongly profit-led and falls otherwise.

(iii) Finally redistribution in favor of wages has no effect on the asset markets. The effect on output is exactly identical to that in the fixed case, i.e., negative if the demand-regime is profit-led and positive otherwise. As in the fixed exchange rate case, the demand regime matters in the short-run.

The discussion above can be encapsulated by equations (21)-(23). More detailed mathematical expressions are provided in Appendix A.

$$\bar{r}_K = r_K(F, K, w);\ \bar{r}_{KK} > 0,\ \bar{r}_{KF} = 0,\ \bar{r}_{Kw} = 0 \tag{21}$$

$$\bar{e} = e(F, K, w);\ \bar{e}_K < 0,\ \bar{e}_F\ (= -e/F) < 0,\ \bar{e}_w = 0 \tag{22}$$

$$\bar{u} = u(F, K, w);\ \bar{u}_F,\ \bar{u}_K,\ \bar{u}_w \gtrless 0 \tag{23}$$

Before, we turn to exploring the evolution of income flows and asset stocks over time, it would be useful to look at the current account again. Recall that it is given by $t(u,q)+er^*F$. With e pre-determined under a fixed exchange rate, and international investment income flows negligible (because $r^* \approx 0$), a real appreciation has to be offset by a fall in utilization to maintain current account balance. This is no longer true under a flexible exchange rate regime since now changes in stocks and asset returns influence the path of the exchange rate. As pointed out earlier, the current account, therefore, no longer directly constrains output and accumulation. In terms of steady state analysis, this is a major difference between the two exchange rate regimes.

5.2 Back to the medium-run

Since the Central Bank now foregoes official reserve transactions, it is the stock of net foreign holdings rather than that of all financial assets that evolves in line with current account imbalances. The other equation of motion remains the same as in the fixed case.

Again, capital stock accumulation over time follows the flow of investment defined by equation (9). The net foreign asset position evolves in line with the saving-investment gap.

$$\begin{aligned} \hat{F} &= \frac{S-I}{F} = \left(\frac{S-I}{K}\right)\frac{K}{F} = \left[t(u,q) + er^*\frac{F}{K}\right]\frac{K}{F} \\ &= \hat{F}(F, K; w) \end{aligned} \tag{24}$$

$$\begin{aligned} \hat{K} &= \frac{I}{K} = i(r_K, \pi, u) \\ &= \hat{K}(F, K; w) \end{aligned} \tag{25}$$

Again, the steady state is characterized by stock and flow equilibrium so that

$$\hat{K} = \hat{W} = \hat{F} = \hat{Y} = \hat{r}_K = \hat{S} - \hat{I} = \hat{S} = \hat{I} = 0$$

The determinant of the endogenous variable Jacobian is given by:

$$\Delta_L^{Flex} = -\frac{\overbrace{s_W \pi u \frac{dW}{dK}}^{-} + \overbrace{(si_{r_K} - s_{r_K} i)\frac{dr_K}{dK}}^{+}}{\Lambda}\ \frac{\overbrace{t_u i_\pi \theta(1-\pi) - t_q i_u q}^{-}}{1+\theta} \tag{26}$$

which is positive as long as the wealth effect is not too strong (for reasons discussed intuitively in the fixed exchange rate case).[17] The presence of a sufficiently strong wealth

[17] Appendix A provides detailed expressions for dW/dK and drK/dK.

effect would lead to saddle path (in)stability. Since the aim here is to compare regimes and steady states, I focus on the stable case. Loosening the assumption of static expectations would make the saddle path case an interesting one for future work to pursue. The trace is given by:

$$
\begin{aligned}
Tr^{Flex} \quad = \quad & \frac{\{s\overbrace{(t_u u\theta(1-\pi) - t_q q\pi)}^{-}\}\frac{1}{(1+\theta)F} + \overbrace{[i_{r_K}(s\pi - t_u) - s_{r_K}\pi i_u u]\frac{dr_K}{dK}}^{-}}{\Lambda} \\
& - \frac{\overbrace{s_W \pi i_u u\frac{dW}{dK} - s(i_\pi \pi - i_u u)\theta(1-\pi)}^{+/-} + \overbrace{[t_u i_\pi \theta(1-\pi) - t_q i_u q]}^{-}\frac{1}{(1+\theta)}\frac{1}{eF}\overbrace{\left(e + F\frac{de}{dK}\right)}^{+/-}}{\Lambda}
\end{aligned}
$$

The terms in the first line are negative while the rest are ambiguous. A not too strong wealth effect on savings (which is also a sufficient condition for $\Delta_L^{Flex} > 0$) along with a low pass-through of cost changes into the mark-up (i.e., a low θ) help ensure a negative trace.

5.3 The comparative dynamics of re-distribution – again

As shown in the analysis in Section 5.1, the system yields the traditional neo-Kaleckian result in the short-run equilibrium, whereby the change in output depends on whether the demand regime is profit- or wage-led. As we saw earlier, this result does not carry through to the medium-run in the fixed exchange rate case. Are things different under a flexible regime?

Before we discuss the comparative dynamics in more detail, let's take a quick look at the mathematical expressions for the changes in the steady state stocks of capital and financial assets. Based on eqs. (24) and (25),

$$\frac{d\tilde{K}}{dw} = 0 \tag{27}$$

$$\frac{d\tilde{F}}{dw} = -\frac{F}{w} \tag{28}$$

The major difference from the fixed case is that the steady state level of capital stock is immune to income re-distribution. Why is that the case? To understand the intuition, recall that the current account no longer directly constrains the level of output. That burden now falls on investment behavior. Income re-distribution and output change affect both saving and investment in the same direction but changes in returns to equity affect them in the opposite direction.[18] This implies that the saving and investment behavior requires a given steady state level of r_K. Finally, recall from the previous sub-section that

[18] See eqs. (9) and (10).

the equilibrium level of r_K changes in response to changes in the capital stock but remains unchanged following changes in net foreign assets. In other words, an unchanged steady state level of r_K requires an unchanged steady state level of capital stock (although the stock of financial assets can change). This explains the striking result encapsulated by equation (27).

With the steady state level of K unchanged, and as shown earlier, the steady state level of the exchange rate moving proportionately and inversely with the stock of foreign assets, the definition of wealth from equation (1) tells us that the steady state level of wealth too is unmodified. Furthermore, since W and r_K are unchanged in the new steady state, eqs. (9) and (10) tell us that utilization and the profit share also maintain their original levels. The current balance condition, as captured by equation (24) implies further that, with u unchanged, the real exchange rate too is at its original steady state level. Finally, notice that the nominal wage and stock of foreign assets both influence the rate of utilization in the same direction through the nominal exchange rate. Since $\tilde{u} = u(\tilde{F}, \tilde{K}, w)$, and the steady state utilization and capital stock are unchanged, the stock of financial assets must, therefore, change in the opposite direction (and in proportion to) the nominal wage, as captured by equation (28).

The right half of Table 2 summarizes these results.

6 Implications and concluding remarks

The seminal contributions of Marglin and Bhaduri (1988) and Blecker (1989) showed that the nature of the demand regime determines the effects of exogenous changes in income distribution on output and growth. The analysis presented here qualifies those results by demonstrating that while this is likely true in the very short run, the evolution of asset stocks and returns over time in the presence of plausible constraints on aggregate behavior render the nature of the demand regime irrelevant. I then compare the short- and medium-run consequences of income re-distribution under different exchange rate regimes. In each case, the outcome in terms of the steady state values of output, utilization, asset stocks, and wealth depend on factors other than the nature of the demand regime. Moreover, with flexible exchange rates, income re-distribution may have no impact on the steady state levels of capital and wealth in the medium-run.

A note of caution before concluding. One can see from Table 2 that re-distribution towards wages results either in a decline or no change in steady state utilization regardless of exchange rate regime. Does this mean that demand in the medium-run is always profit-led? The answer is no. Indeed, one would get the same results were one to re-distribute towards profits through a higher mark-up factor. The key take away here is that the demand regime and the form that re-distribution takes do not matter over time. Other structural constraints prevail instead.

The analysis carried out here is highly stylized; the aim was to analyze steady state changes under different exchange rate regimes in the most direct way, after minimizing the number of moving parts that would add useful, but only tangentially interesting detours to the analysis. Noteworthy assumptions include: (i) only capitalists save, (ii) a negligibly low international interest rate on short term bonds, ($r^* \approx 0$), (iii) no transactions demand for money or other assets, and (iv) static expectations. Perhaps it would be useful to briefly re-visit these assumptions to explore the robustness of our results. The first assumption is a standard one in neo-Kaleckian literature and weakening it by assuming a non-zero saving rate out of wages will make the analysis substantially more complicated, since one would have to separately keep track of wealth by ownership. Relaxing the second and third assumptions *could* qualitatively affect some of the results, which will now depend on the interactions between the money market and the goods market and on whether the country starts out as a net foreign debtor or creditor (i.e., whether $F \gtreqqless 0$). One should note, however, that for most economies, investment income flows constitute a relatively small portion of the current account. Relaxing assumption (iv), finally, will not affect the analysis in the case of a credibly fixed exchange rate. It may affect the analysis in the case of a floating regime, in terms of the stability of the steady state. Future work should explore some of these avenues. It should be emphasized again, however, that none of these extensions will affect the most striking result of the paper, i.e., that plausible restrictions on the evolution of stock variables render the nature of the demand regime, classified as wage-led or profit-led, irrelevant to steady state outcomes.

7 Appendix A

This Appendix presents the detailed mathematical results from the main text in cases where they were not provided earlier.

Section 4: Fixed exchange rates

From the definitions of q and π,

$$\frac{\partial q}{\partial w} = -\frac{q}{(1+\theta)w} < 0$$

$$\frac{\partial \pi}{\partial q} = \frac{\theta}{q}(1-\pi) > 0$$

The detailed expressions for the various comparative static results, as captured by eqs. (14) and (15) are as follows (where $\Lambda = s\pi - i_u - t_u > 0$ is the reciprocal of the traditional Keynesian multiplier term):

$$\frac{d\bar{r}_K}{dV} = -\frac{H^K}{H^K_{rK} W} < 0$$

$$\frac{d\bar{u}}{dV} = -\frac{s_W \pi u - \left(s_{rK} \pi u - i_{rK}\right) \frac{H^K}{H^K_{rK} W}}{\Lambda} > 0$$

$$\frac{d\bar{W}}{dV} = 1$$

$$\frac{d\bar{r}_K}{dK} = \frac{1-H^K}{H^K_{rK} W} > 0$$

$$\frac{d\bar{u}}{dK} = -\frac{s_W \pi u + \left(s_{rK} \pi u - i_{rK}\right) \frac{1-H^K}{H^K_{rK} W}}{\Lambda} \gtrless 0$$

$$\frac{d\bar{W}}{dK} = 1$$

$$\frac{d\bar{r}_K}{dw} = 0$$

$$\frac{d\bar{u}}{dw} = \frac{(su - i_\pi)\theta(1-\pi) - t_q q}{\Lambda} \frac{1}{(1+\theta)w} \gtrless 0$$

$\frac{d\bar{W}}{dw} = 0$

For the comparative dynamics part, the following partials follow from equations (16) and (17):

$\hat{V}_V = \left(t_u \frac{\partial u}{\partial V}\right) \frac{K}{V}$
$\hat{V}_K = \left(t_u \frac{\partial u}{\partial K}\right) \frac{K}{V}$
$\hat{V}_w = \left(t_u \frac{\partial u}{\partial w} + t_q \frac{\partial q}{\partial w}\right) \frac{K}{V}$
$\hat{K}_V = i_{r_K} \frac{\partial r_K}{\partial V} + i_u \frac{\partial u}{\partial V}$
$\hat{K}_K = i_{r_K} \frac{\partial r_K}{\partial K} + i_u \frac{\partial u}{\partial K}$
$\hat{K}_w = i_\pi \frac{\partial \pi}{\partial q} \frac{\partial q}{\partial w} + i_u \frac{\partial u}{\partial w} + i_{r_K} \frac{\partial r_K}{\partial w} = i_\pi \frac{\partial \pi}{\partial q} \frac{\partial q}{\partial w} + i_u \frac{\partial u}{\partial w}$

Now, for the steady state comparative dynamics,

$$\frac{d\tilde{K}}{dw} = \frac{\begin{vmatrix} \hat{V}_V & -\hat{V}_w \\ \hat{K}_V & -\hat{K}_w \end{vmatrix}}{\Delta_L^{Fixed}} \tag{A1}$$

and,

$$\frac{d\tilde{V}}{dw} = \frac{\begin{vmatrix} -\hat{V}_w & \hat{V}_K \\ -\hat{K}_w & \hat{K}_K \end{vmatrix}}{\Delta_L^{Fixed}} \tag{A2}$$

Plugging in the values of the partial derivatives from above, cancelling out terms, employing Δ_L^{Fixed} as derived in Section 4.2, and simplifying yields the solutions presented by eqs. (18) and (19) in the main text.

The steady state changes in the other variables of interest are derived as follows:

From equation (16),

$$\frac{d\tilde{u}}{dw} = \frac{t_q \frac{q}{(1+\theta)w}}{t_u} < 0$$

From equation (4),

$$\frac{d\tilde{r}_K}{dw} = \left(\frac{d\tilde{K}}{dw} - H^K\right) \frac{1}{H_{r_K}^K} < 0$$

From the definition of wealth,

$$\frac{d\tilde{W}}{dw} = \frac{d\tilde{V}}{dw} + \frac{d\tilde{K}}{dw}$$

We know from eqs. (18) and (19) that the second term is negative while the first term is also negative barring a strong wealth effect on saving.

And, since $r = \pi u$,

$$\frac{d\tilde{r}}{dw} = \frac{1}{(1+\theta)w}\left[\frac{\pi t_q q}{t_u} - \theta(1-\pi)u\right] < 0$$

Finally,

$$\frac{d\tilde{Y}}{dw} = u\frac{d\tilde{K}}{dw} + K\frac{d\tilde{u}}{dw} < 0$$

Table 2 in the main text summarizes these results.

Section 5: Flexible exchange rates

For floating exchange rates, let's start again with the short-run comparative statics as summarized by eqs. (21) - (23) in the main text..

$\frac{d\bar{r}_K}{dF} = 0$

$\frac{d\bar{e}}{dF} = -\frac{e}{F} < 0$

$\frac{d\bar{u}}{dF} = \frac{[(su-i_\pi)\theta(1-\pi)-t_q q]}{\Lambda}\frac{1}{(1+\theta)F} \gtrless 0$

$\frac{d\bar{W}}{dF} = 0$

$\frac{d\bar{r}_K}{dK} = -\frac{H^M}{(1+H^M-H^F)H^F_{rK}W} > 0$

$\frac{d\bar{e}}{dK} = \frac{H^F-H^M}{(1+H^M-H^F)F} < 0$ as long as $H^F < H^M$ as assumed in the main text.

$\frac{d\bar{u}}{dK} = -\frac{s_W\pi u-\left(s_{rK}\pi u-i_{rK}\right)\frac{H^M}{H^F_{rK}W}+[(su-i_\pi)\theta(1-\pi)-t_q q]\frac{1}{(1+\theta)e}\frac{(H^F-H^M)}{F}}{\Lambda(1+H^M-H^F)} \gtrless 0$

$\frac{d\bar{W}}{dK} = \frac{1}{1+H^M-H^F} > 0$

$\frac{d\bar{e}}{dw} = 0$

$\frac{d\bar{r}_K}{dw} = 0$

$\frac{d\bar{u}}{dw} = \frac{[(su-i_\pi)\theta(1-\pi)-t_q q]}{\Lambda}\frac{1}{(1+\theta)w} \gtrless 0$

$\frac{d\bar{W}}{dw} = 0$

Note that, since, unlike the fixed exchange rate case, changes in asset stocks now affect the nominal exchange rate, which in turn affects the real exchange rate and income distribution, therefore,

$\frac{d\pi}{dF} = -\frac{\theta}{1+\theta}\frac{1-\pi}{F} < 0$

$\frac{d\pi}{dK} = \frac{\theta}{1+\theta}\frac{1-\pi}{e}\frac{H^F-H^M}{(1+H^M-H^F)F} < 0$ as long as $H^F < H^M$.

Notice also that, with $\theta = 0$, i.e., a fixed mark-up, $\frac{d\pi}{dF} = \frac{d\pi}{dK} = 0$.

For the comparative dynamics part, the following partials follow from equations (24) and (25):

$\hat{F}_F = \left(t_u\frac{\partial u}{\partial F} + t_q\frac{\partial q}{\partial F}\right)\frac{K}{F} - t\frac{K}{F^2}$

The last term on the RHS is zero since the initial trade balance is assumed to be zero. Similarly,

$\hat{F}_K = \left(t_u \frac{\partial u}{\partial K} + t_q \frac{\partial q}{\partial K} \right) \frac{K}{F}$
$\hat{F}_w = \left(t_u \frac{\partial u}{\partial w} + t_q \frac{\partial q}{\partial w} \right) \frac{K}{F}$
$\hat{K}_F = i_u \frac{\partial u}{\partial F} + i_\pi \frac{\partial \pi}{\partial F} + i_{r_K} \frac{\partial r_K}{\partial F}$
The last term on the RHS equals zero.
$\hat{K}_K = i_u \frac{\partial u}{\partial K} + i_\pi \frac{\partial \pi}{\partial K} + i_{r_K} \frac{\partial r_K}{\partial K}$
$\hat{K}_w = i_u \frac{\partial u}{\partial w} + i_\pi \frac{\partial \pi}{\partial w}$
Now,

$$\Delta_L^{Flex} = \begin{vmatrix} \hat{F}_F & \hat{F}_K \\ \hat{K}_F & \hat{K}_K \end{vmatrix}$$

which yields equation (26) , after substituting in the partials from above, and simplifying.

Again,

$$\frac{d\tilde{K}}{dw} = \frac{\begin{vmatrix} \hat{F}_F & -\hat{F}_w \\ \hat{K}_F & -\hat{K}_w \end{vmatrix}}{\Delta_L^{Flex}} \tag{A3}$$

and,

$$\frac{d\tilde{F}}{dw} = \frac{\begin{vmatrix} -\hat{F}_w & \hat{F}_K \\ -\hat{K}_w & \hat{K}_K \end{vmatrix}}{\Delta_L^{Flex}} \tag{A4}$$

Plugging in the values of the partial derivatives from above, cancelling out terms, and simplifying yields the solutions presented by eqs. (27) and (28) in the main text.

The steady state changes in the other variables of interest are derived as follows:

From equation (21), given that the steady state level of the capital stock is unchanged, and since $\bar{r}_{KF} = 0$ and $\bar{r}_{Kw} = 0$,

$$\frac{d\tilde{r}_K}{dw} = 0$$

Since $\tilde{K}$ is unchanged, and from the partials above, we know that e varies equiproportionately (and in the opposite direction) with the stock of financial assets, therefore, based on equation (1), $\frac{d\tilde{W}}{dw} = 0$.

And, from eqs. (9) and (10),

$$\frac{d\tilde{u}}{dw} = \frac{d\pi}{dw} = 0$$

And, since $r = \pi u$,

$$\frac{d\tilde{r}}{dw} < 0$$

Finally,

$$\frac{d\tilde{Y}}{dw} = u\frac{d\tilde{K}}{dw} + K\frac{d\tilde{u}}{dw} = 0$$

8 Appendix B

This Appendix presents the steady state results for the more general portfolio framework that includes capital gains and valuation effects on equity. We return, in other words, to the definition of wealth and the equity market clearing condition, as encapsulated by eqs. (1) and (4) in the main text, before we made the assumption that $Q = \frac{\pi v}{r_K}$ is fixed at unity.

A Fixed Exchange Rate Regime

The short-run comparative static results comparable to those reported in Section 4.1 and Appendix A become:

$$\frac{d\bar{r}_K}{dV} = -\frac{H^K}{\Gamma} < 0$$

$$\frac{d\bar{u}}{dV} = -\frac{s_W \pi u\left[1+\frac{\pi v}{{r_K}^2}\frac{K}{H^K_{rK}W}\right]-\left(s_{rK}\pi u - i_{rK}\right)\frac{H^K}{H^K_{rK}W}}{\Lambda\Gamma/H^K_{rK}W} > 0$$

$$\frac{d\bar{W}}{dV} = \frac{\frac{\pi v}{{r_K}^2}K + H^K_{rK}W}{\Gamma} > 0$$

$$\frac{d\bar{r}_K}{dK} = \frac{\left(1-H^K\right)}{\Gamma}\frac{\pi v}{r_K} > 0$$

$$\frac{d\bar{u}}{dK} = -\frac{s_W \pi u H^K_{rK}W + \left(s_{rK}\pi u - i_{rK}\right)\left(1-H^K\right)}{\Lambda\Gamma}\frac{\pi v}{r_K} \gtrless 0$$

$$\frac{d\bar{W}}{dK} = \frac{H^K_{rK}W}{\Gamma}\frac{\pi v}{{r_K}^2} > 0$$

$$\frac{d\bar{r}_K}{dw} = -\frac{\left(1-H^K\right)}{\Gamma}\frac{vK}{r_K}\frac{\theta}{1+\theta}\frac{1-\pi}{w} < 0$$

$$\frac{d\bar{u}}{dw} = \frac{\left[(su-i_\pi)-t_q\frac{q}{\theta(1-\pi)}\right]\Gamma + \left(s_{rK}\pi u - i_{rK}\right)\left(1-H^K\right)\frac{vK}{r_K} + \frac{s_W \pi u v K}{r_K}H^K_{rK}W}{\Lambda\Gamma}\frac{\theta}{1+\theta}\frac{1-\pi}{w} \gtrless 0$$

$$\frac{d\bar{W}}{dw} = -\frac{\pi v K}{{r_K}^2}\frac{d\bar{r}_K}{dw} > 0$$

where $\Gamma = (1-H^K)\frac{\pi v}{{r_K}^2}K + H^K_{rK}W$ captures the direct effect of changes in returns to equity on excess supply/demand in the equity market. Without capital gains, this term reduces to $H^K_{rK}W$, which is what we have in the solutions in the main text.

For the comparative dynamics, eqs. (16) and (17) continue to govern. With valuation effects included, the detailed solutions become more complicated. The determinant of the endogenous variable Jacobian is now given by:

$$\Delta_L^{Fixed} = \begin{vmatrix} \hat{V}_V & \hat{V}_K \\ \hat{K}_V & \hat{K}_K \end{vmatrix} = -\frac{\pi v}{r_K}s_W \pi t_u u \frac{i_{r_K}}{\Lambda\Gamma}\frac{K}{V} > 0$$

which is unambiguously positive. The trace is given by:

$$
\begin{aligned}
Tr^{Fixed} \quad = \quad & -\frac{t_u \left\{ \overbrace{\left[s_W \pi u \left(\frac{\pi v}{{r_K}^2} K + H^K_{rK} W \right) - \left(s_{r_K} \pi u - i_{r_K} \right) H^K \right]}^{-} \frac{K}{V} + \overbrace{i_{r_K} (s\pi - t_u) \left(1 - H^K \right) \frac{\pi v}{r_K}}^{-} \right\}}{\Lambda\Gamma} \\
& - \frac{\overbrace{i_u \left[s_{r_K} \frac{\pi^2 uv}{r_K} \left(1 - H^K \right) + s_W \frac{\pi^2 uv}{r_K} H^K_{r_K} W \right]}^{+/-}}{\Lambda\Gamma}
\end{aligned}
$$

which is very likely to be negative. As in the main text, a *sufficient* (but not by any means necessary) condition for the trace to be negative is that the wealth effect on savings not be too strong.

The steady state solutions equivalent to eqs. (19) and (18) in the main text become:

$$
\begin{aligned}
\frac{d\tilde{K}}{dw} \quad = \quad & -\frac{\left\{ \left[t_q i_u - t_u i_\pi \frac{\theta(1-\pi)}{q} \right] \left(\frac{\pi v}{{r_K}^2} K + H^K_{rK} W \right) - \frac{vK}{r_K} i_{r_K} \right\} s_W \pi u}{\Lambda s_W \frac{\pi^2 uv}{r_K} t_u i_{r_K}} \frac{q}{(1+\theta)w} \\
& + \frac{\left[(s_{r_K} i_\pi \pi - s i_{r_K}) t_u \frac{\theta(1-\pi)}{q} - (s_{r_K} i_u u - s i_{r_K}) t_q \right] H^K}{\Lambda s_W \frac{\pi^2 uv}{r_K} t_u i_{r_K}} \frac{q}{(1+\theta)w} \\
< \quad & 0
\end{aligned}
$$

$$
\begin{aligned}
\frac{d\tilde{V}}{dw} \quad = \quad & \frac{\left[t_q i_u - t_u i_\pi \frac{\theta(1-\pi)}{q} \right] s_W \frac{\pi^2 uv}{r_K} H^K_{rK} W}{\Lambda s_W \frac{\pi^2 uv}{r_K} t_u i_{r_K}} \frac{q}{(1+\theta)w} \\
& - \frac{\left[u(s_{r_K} i_\pi \pi - s i_{r_K}) t_u \frac{\theta(1-\pi)}{q} - (s_{r_K} i_u u - s i_{r_K}) t_q \pi \right] \left(1 - H^K \right) \frac{\pi v}{r_K} H^K}{\Lambda s_W \frac{\pi^2 uv}{r_K} t_u i_{r_K}} \frac{q}{(1+\theta)w} \\
\gtrless \quad & 0
\end{aligned}
$$

which are identical to the solutions in the main text except for the capital gains/valuation terms. The steady state changes in the other variables of interest are derived as follows:

From equation (16),

$$
\frac{d\tilde{u}}{dw} = \frac{t_q \frac{q}{(1+\theta)w}}{t_u} < 0
$$

From equation (4),

$$\frac{d\tilde{r}_K}{dw} = \left(\frac{d\tilde{K}}{dw} - H^K\right)\frac{1}{H^K_{r_K}} < 0$$

From the definition of wealth,

$$\frac{d\tilde{W}}{dw} = \frac{d\tilde{V}}{dw} + \frac{d\tilde{K}}{dw}$$

The second term is negative while the first term is also negative barring a strong wealth effect on saving.

And, since $r = \pi u$,

$$\frac{d\tilde{r}}{dw} = \frac{1}{(1+\theta)w}\left[\frac{\pi t_q q}{t_u} - \theta(1-\pi)u\right] < 0$$

Finally,

$$\frac{d\tilde{Y}}{dw} = u\frac{d\tilde{K}}{dw} + K\frac{d\tilde{u}}{dw} < 0$$

The results are qualitatively the same as in the case of no capital gains or valuation effects. Notice that all these results are independent of whether demand is wage-led or profit-led in the short run, i.e., whether $d\bar{u}/dw \gtrless 0$.

A Flexible Exchange Rate Regime

The short-run comparative static results comparable to those reported in Section 5.1 become:

$$\frac{d\bar{r}_K}{dF} = \frac{\frac{\theta}{1+\theta}(1-\pi)\frac{vK}{r_K}H^M}{\Delta_s^{Flex}} < 0$$

$$\frac{d\bar{e}}{dF} = -\frac{(H^K H^M_{rK} - H^M H^K_{rK})W - \frac{\pi v K}{{r_K}^2}H^M}{\Delta_s^{Flex}}e < 0$$

$$\frac{d\bar{u}}{dF} = -\frac{s_W \pi u e - \left\{s_W \pi u \frac{v}{r_K}K + (su - i_\pi)\theta(1-\pi) - t_q q\right\}\frac{1}{(1+\theta)e}\frac{de}{dF} + \left(s_{rK}\pi u - i_{rK} - s_W\frac{\pi^2 uvK}{{r_K}^2}\right)\frac{dr_K}{dF}}{\Lambda} \gtrless 0$$

$$\frac{d\bar{W}}{dF} = e - \frac{v}{r_K}K\left(\frac{\pi}{r_K}\frac{d\bar{r}_K}{dF}\right) + \left(F + \frac{v}{r_K}K\frac{\theta}{1+\theta}\frac{1-\pi}{e}\right)\frac{d\bar{e}}{dF} \gtrless 0$$

$$\frac{d\bar{r}_K}{dK} = \frac{\frac{\pi v}{r_K}\left[\frac{vK}{r_K}\frac{\theta}{1+\theta}(1-\pi)H^K - H^M\right]F}{\Delta_s^{Flex}} \gtrless 0$$

$$\frac{d\bar{e}}{dK} = \frac{\frac{\pi v}{r_K}\left(H^F - H^M\right)H^F_{rK}W}{\Delta_s^{Flex}} < 0 \text{ as long as } H^F < H^M \text{ as assumed in the main text.}$$

$$\frac{d\bar{u}}{dK} = -\frac{s_W \pi u \frac{d\bar{W}}{dK} + \left(s_{rK}\pi u - i_{rK}\right)\frac{d\bar{r}_K}{dK} + [(su - i_\pi)\theta(1-\pi) - t_q q]\frac{1}{(1+\theta)e}\frac{d\bar{e}}{dK}}{\Lambda} \gtrless 0$$

$$\frac{d\bar{W}}{dK} = \frac{\pi v}{r_K}\left(1 - \frac{K}{r_K}\frac{d\bar{r}_K}{dK}\right) + \left(F + \frac{v}{r_K}K\frac{\theta}{1+\theta}\frac{1-\pi}{e}\right)\frac{d\bar{e}}{dK} \gtrless 0$$

$$\frac{d\bar{r}_K}{dw} = \frac{\frac{vK}{r_K}\frac{\theta}{1+\theta}\frac{1-\pi}{e}H^M F}{\Delta_s^{Flex}} < 0$$

$$\frac{d\bar{e}}{dw} = -\frac{\frac{vK}{r_K}\left(H^F - H^M\right)\frac{\theta}{1+\theta}\frac{1-\pi}{w}H^M_{rK}W}{\Delta_s^{Flex}} > 0$$

$$\frac{d\bar{u}}{dw} = -\frac{s_W \pi u \frac{d\bar{W}}{dw} + \left(s_{rK}\pi u - i_{rK}\right)\frac{d\bar{r}_K}{dw} + [(su - i_\pi)\theta(1-\pi) - t_q q]\frac{1}{(1+\theta)w}\frac{d\bar{e}}{dw}}{\Lambda} \gtrless 0$$

$\frac{d\bar{W}}{dw} = \frac{vK}{r_K}\left(\frac{d\pi}{dw} - \frac{1}{r_K}\frac{d\bar{r}_K}{dw}\right) + F\frac{d\bar{e}}{dw}$

where $\Delta_s^{Flex} = -\left\{\left[\frac{\pi vK}{{r_K}^2}H^M + (H^M H^K_{rK} - H^K H^M_{rK})W\right]F + \frac{\theta}{1+\theta}\frac{1-\pi}{e}\frac{vK}{r_K}\left[H^F H^K_{rK} - (1-H^K)H^F_{rK}\right]W\right\} =$
$-\left\{\left[\frac{\pi vK}{{r_K}^2}H^M + (H^M H^K_{rK} - H^K H^M_{rK})W\right]F + \frac{\theta}{1+\theta}\frac{1-\pi}{e}\frac{vK}{r_K}(H^M - H^F)H^F_{rK}W\right\} < 0$

For the comparative dynamics, eqs. (24) and (25) continue to govern. $\hat{F}_F = \left(t_u\frac{\partial u}{\partial F} + t_q\frac{\partial q}{\partial F}\right)\frac{K}{F} - t\frac{K}{F^2}$

The last term on the RHS is zero since the initial trade balance is assumed to be zero. Similarly,

$\hat{F}_K = \left(t_u\frac{\partial u}{\partial K} + t_q\frac{\partial q}{\partial K}\right)\frac{K}{F}$

$\hat{F}_w = \left(t_u\frac{\partial u}{\partial w} + t_q\frac{\partial q}{\partial w}\right)\frac{K}{F}$

$\hat{K}_F = i_u\frac{\partial u}{\partial F} + i_\pi\frac{\partial \pi}{\partial F} + i_{r_K}\frac{\partial r_K}{\partial F}$

The last term on the RHS equals zero.

$\hat{K}_K = i_u\frac{\partial u}{\partial K} + i_\pi\frac{\partial \pi}{\partial K} + i_{r_K}\frac{\partial r_K}{\partial K}$

$\hat{K}_w = i_u\frac{\partial u}{\partial w} + i_\pi\frac{\partial \pi}{\partial w} + i_{r_K}\frac{\partial r_K}{\partial w}$

The determinant of the endogenous variable Jacobian is now given by:

$$\begin{aligned}\Delta_L^{Flex'} &= \begin{vmatrix}\hat{F}_F & \hat{F}_K\\ \hat{K}_F & \hat{K}_K\end{vmatrix}\\ &= -t_u\frac{s_W\pi u\left[i_{r_K}\left(\frac{dW}{dF}\frac{dr_K}{dK} - \frac{dW}{dK}\frac{dr_K}{dF}\right) + i_\pi\left(\frac{dW}{dF}\frac{d\pi}{dK} - \frac{dW}{dK}\frac{d\pi}{dF}\right)\right] + (s_{r_K}i_\pi - sui_{r_K})\left(\frac{dr_K}{dF}\frac{d\pi}{dK} - \frac{d\pi}{dF}\frac{dr_K}{dK}\right)}{\Lambda}\\ &\quad -t_q\frac{s_W i_{\mathrm{u}} u\pi\left(\frac{dW}{dK}\frac{dq}{dF} - \frac{dW}{dF}\frac{dq}{dK}\right) - i_{r_K}(s\pi - ius_{rK})\left(\frac{dr_K}{dK}\frac{dq}{dF} - \frac{dq}{dK}\frac{dr_K}{dF}\right)}{\Lambda}\end{aligned}$$

which is independent of the nature of the demand regime, i.e., of whether $(su - i_\pi) - t_q q\theta(1-\pi) \gtrless 0$.

$$\begin{aligned}\frac{d\tilde{K}}{dw} &= t_u\frac{s_W\pi u\left[i_{r_K}\left(\frac{dW}{dF}\frac{dr_K}{dw} - \frac{dW}{dw}\frac{dr_K}{dF}\right) + i_\pi\left(\frac{dW}{dF}\frac{d\pi}{dw} - \frac{dW}{dw}\frac{d\pi}{dF}\right)\right] + (s_{r_K}i_\pi - sui_{r_K})\left(\frac{dr_K}{dF}\frac{d\pi}{dw} - \frac{d\pi}{dF}\frac{dr_K}{dw}\right)}{\Delta_L^{Flex'}\Lambda F/K}\\ &\quad +t_q\frac{s_W i_{\mathrm{u}} u\pi\left(\frac{dW}{dw}\frac{dq}{dF} - \frac{dW}{dF}\frac{dq}{dw}\right) - (i_{r_K}s\pi - ius_{rK})\left(\frac{dr_K}{dw}\frac{dq}{dF} - \frac{dq}{dw}\frac{dr_K}{dF}\right)}{\Delta_L^{Flex'}\Lambda F/K}\end{aligned}$$

$$\begin{aligned}\frac{d\tilde{F}}{d\pi} &= t_u\frac{s_W\pi u\left[i_{r_K}\left(\frac{dW}{dw}\frac{dr_K}{dK} - \frac{dW}{dK}\frac{dr_K}{dw}\right) + i_\pi\left(\frac{dW}{dw}\frac{d\pi}{dK} - \frac{dW}{dK}\frac{d\pi}{dw}\right)\right] + (s_{r_K}i_\pi - sui_{r_K})\left(\frac{dr_K}{dw}\frac{d\pi}{dK} - \frac{d\pi}{dw}\frac{dr_K}{dK}\right)}{\Delta_L^{Flex'}\Lambda F/K}\\ &\quad +t_q\frac{s_W i_{\mathrm{u}} u\pi\left(\frac{dW}{dK}\frac{dq}{dw} - \frac{dW}{dw}\frac{dq}{dK}\right) + (i_{r_K}s\pi - ius_{rK})\left(\frac{dr_K}{dw}\frac{dq}{dK} - \frac{dq}{dw}\frac{dr_K}{dK}\right)}{\Delta_L^{Flex'}\Lambda F/K}\end{aligned}$$

Again, from the comparative static results above, it is clear that none of the terms depends on the nature of the demand regime (i.e., $d\bar{u}/dw \gtrless 0$). Moreover, we can see from Appendix A that the same conclusion carries over to the steady state levels of utilization and the profit rate.

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