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Walking the Tightrope of Real Exchange Rate Policy for Development: the Roles of Targets, Instruments, and Saving Rates

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Abstract

Real exchange rate policy can potentially be utilized to target the trade balance and/or development through capital accumulation. However, the presence of distributional conflict and the trade-off between current and future trade imbalances complicates matters. I show that policy assignment matters for dynamic stability. Moreover, the relative saving behavior of different functional income groups influences dynamic behavior. The analysis sheds light on why real exchange rate policy may often be unfeasible, even if desirable from a developmental perspective.

JEL classifications: F43, F63, O16, E63.

Key words:Policy assignment, real exchange rates, investment subsidies, external balance.

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1 Introduction and Background

Real exchange rate policy has traditionally been understood as most directly relevant to the balance of payments of a country. A relatively recent body of literature suggests, in addition, that the level and trajectory of the real exchange rate matters for long-run growth, investment, and development. History and empirical analysis have shown, however, that real exchange rate policy also matters for social stability and political longevity.[1] The relative stakes ensure that, in any clash between these sets of considerations, the latter is likely to win hands down more often than not. This paper analyzes the underlying tensions that lead to dynamic instability. Building on previous literature, I model the tension between distributional conflict, external account constraints, and development to make the case that saving behavior and assignment of instruments to objectives matters. This underlines the need to take policy design seriously.

Let's turn first to the role of exchange rate adjustment in managing a country's external accounts. The traditional version of the Mundell-Fleming model leads to the "principle of effective market classification," which requires that the use of an instrument be directed towards the target that it can most influence. In general this implies that monetary policy should target the balance of payments while fiscal spending targets the internal balance (i.e., full employment) in fix-price frameworks. With global financial liberalization in the eighties and nineties, interest in the external balance – as defined by the current account – waned until the advent of the Asian crisis of 1997-98, and even more generally, the global financial crisis in 2008-09 re-awakened policy concerns. An interesting exception was the Balance of Payments-Constrained (BPCG) family of models in the Post-Keynesian tradition. While this framework puts the spotlight on the external balance as the ultimate long-run constraint on growth, it de-emphasizes the role of real exchange rate adjustments. Current accounts continue to matter and, evidence suggests, so do real exchange rate adjustments.

Consider next the relationship between real exchange rate and growth. Here the time horizon under consideration becomes important. As pointed out by Diaz-Alejandro (1963), Krugman and Taylor (1978), Lizondo and Montiel (1989), Razmi (2007), and others, nominal devaluations can be contractionary in the short run. One reason stands out from the perspective of this paper; nominal devaluations, which in the short run turn into real devaluations, tend to shift income away from low saving groups and toward high saving ones, negatively impacting demand for domestic goods in the short-run. A higher economy-wide saving rate, on the other hand, can be a blessing for long-run growth, especially for economies in their early stages of industrialization. It may have facilitated England's take-off in the first half of the eighteenth century

[1] As noted by (Cooper (1971), p. 3) in their classic study of large exchange rate changes in developing countries, devaluations are "one of the most dramatic – even traumatic – measures of economic policy that a government may undertake." Steinberg and Malhotra (2014) calculate that, between 1973-2006, military dictators lost power during 17 percent of their forty-eight devaluation episodes and democratic leaders did so in 38 percent of their seventy-nine devaluations.

and may also have been important in other cases of industrial catch-up.[2]

Recent literature that has focused on *long-run* associations has found a positive relationship between real exchange rate undervaluation on the one hand, and output growth and capital accumulation on the other. Examples include Levy-Yeyati and Sturzenegger (2007), Gala (2008), Rodrik (2008), Razmi et al. (2012), and Libman et al. (2019). The evidence tends to be particularly robust for developing countries, although the jury is still out as to the relative importance of the specific mechanisms in play. East Asia is a much-discussed exemplar in this regard. This makes one wonder why, if real undervaluation generates long-run benefits, do developing countries in general tend to pursue policies that generate either (i) overvaluation over extended periods of time, or (2) volatility with exchange rate cycles?

The electoral business cycle literature may help provide some answers.[3] In the absence of real wage rigidity, nominal and real undervaluations lower the real wage and boost tradable sector profitability. The tradable sector, especially the parts that are not agriculture or primary commodity related tend to be relatively small in the initial stages of economic development. Thus, a major reason why policy makers cannot sustain real undervaluations has to do with distributional concerns. As Damill and Frenkel (2017) point out in the context of recent Latin American experience, the tendency towards appreciation is appealing. It facilitates increase in tradable goods' consumption while allowing real wages to grow without generating inflation. This consideration gains further salience if the proportion of tradables in the consumption basket increases as one moves down the income distribution.[4]

I explore the dynamic interaction between distributional conflict and the role of the real exchange rate in the presence of developmental goals and an external balance constraint. In addition to the real exchange rate, policy makers have another instrument, i.e., the mix of government spending on consumption and investment subsidies. I introduce distributional considerations through two channels: (1) distributional conflict that emerges in a bargaining environment, (2) differential saving behavior out of profits and wages. The analysis demonstrates that the assignment of instruments matters for stability. In particular, it highlights the tension between easing the external constraint today versus taking steps that address it over time while promoting investment. Unpopular measures that generate trade surpluses may consequently lead to destabilizing fiscal measures. Finally, it shows that low differentials between saving rates among

[2] See Allen (2009) for a detailed exploration of the English case and Broadberry et al. (2015) for a study of Japanese catch-up.

[3] See, for example, Stein and Streb (2004) who consider the timing of devaluations relative to the election cycle. Frieden et al. (2001) belongs to the literature that concludes that governments tend to maintain appreciated exchange rates up until after the elections in order to keep purchasing power high. Dornbusch (1996) considers the political factors that prevent authorities from correcting overvaluations, often in the face of impending crisis. Frieden and Broz (2006) surveys the literature on the political economy of exchange rate regimes.

[4] For example, Cravino and Levchenko (2015) found that, following the 1994 Mexican devaluation, the cost of living for the bottom income decile rose 1.48 to 1.62 times more than for the top income decile, mainly because lower deciles consume a larger share of tradables.

different functional income groups act to stabilize the system. A decade ago, Rodrik (2009)[p. 23] argued that, in the presence of trade balance constraints, "industrial policy can be assigned to the structural transformation target while the exchange rate is assigned to the external balance." The present paper can partly be interpreted as a formal development of this argument. I find that using real exchange rate policy to target the trade balance directly while using subsidies to target investment helps generate stability, especially when the saving rates do not significantly differ between functional income groups.

Razmi et al. (2012) is perhaps the paper that is closest in spirit to the present one. That paper develops a framework in which policy makers have two targets, an accumulation target and a trade balance one, and two instruments, the real exchange rate and investment subsidies. The framework is static so the stability properties and transitional dynamics of the system with alternative instrument assignments cannot be analyzed. Moreover, distributional conflict is not formally investigated.

The discussion here and later assumes that authorities typically influence the path of the real exchange rate over time. This may or may not be a plausible assumption, depending on various factors such as the degree of capital account openness and the monetary/exchange rate regime. As the analysis in later sections indicates, the degree to which policy can influence the real exchange rate in a developing economy may itself be a function of the constraints involved.

The next section develops the basic framework. Section 3 analyzes the trade-offs and stability issues that come with each set of policy assignments. Finally, Section 4 concludes.

2 Basic Framework

I will develop the simple framework in this section to later argue that policy assignment and saving rates matter for the sustainability of development policy. The basic framework here consists of an economy with two sectors; the "traditional" N-sector produces non-tradable goods such as informal services and lower quality agricultural goods while the modern/advanced T-sector produces industrial and high quality agricultural goods that are internationally tradable. In addition there is a government that spends out of tax revenues. The spending is apportioned between consumption spending and subsidies for investment. This enables us to directly analyze the effects of policy directed at promoting capital accumulation.

The non-tradable good requires labor (L_N) and land for its production while the tradable sector utilizes both labor (L_T) and (accumulable) capital (K) to produce using a fixed coefficients technology. Labor and land are internationally non-tradable while capital goods can be traded across borders. To avoid unnecessary notation, the unit factor coefficients in the modern sector are normalized to unity. Under these assumptions, eqs. (1)-(5) capture the output side of the economy (unless stated otherwise, all the relevant variables are expressed in terms of the price of the non-tradable good, P_N):[5]

$$Y_N = \upsilon L_N^{\gamma};\ \gamma < 1 \tag{1}$$

$$w_N = \gamma \upsilon L_N^{\gamma-1} \tag{2}$$

$$R_N = (1-\gamma)\upsilon L_N^{\gamma} \tag{3}$$

$$Y_T = \min(K_T, L_T) \tag{4}$$

$$L_T = K_T \tag{5}$$

where Y_i and w_i $(i = N, T)$ denote sectoral outputs while R_N represents land rents. As discussed shortly, the modern/industrial sector employs workers who are relatively skilled and scarce, and therefore have sufficient bargaining power to maintain a constant real product wage in the steady state. Nominal wage stickiness in the short run can also be justified by the efficiency wage argument in the context of scarcity of the skills that are required in the modern sector.

Aggregate private consumption C is the sum of consumption out of landlord, profit, and wage income after adjustment for taxes. The rate of saving out of wages s_W will generally be higher than that out of profit and rental income s_R.

$$C = [(s_R - s_W)\gamma + (1 - s_R)]\, \upsilon L_N^{\gamma} + [(s_R - s_W)w_T + (1 - s_R)q]\, K_T - T \tag{6}$$

To keep things simple, and to facilitate analysis of policy assignment, I assume that the total amount of taxes collected T is constant.[6] Moreover, I assume that the fiscal deficit/surplus is zero. The evolution of stocks of foreign or domestic assets over time is not the focus here.

Notice that, if $s_R = s_W = s$,

$$C = (1-s)(\upsilon L_N^{\gamma} + qK_T) - T$$

Specifying Cobb-Douglas preferences makes the expenditure shares of consumption of the two goods constant in real terms. Let's denote the share and volume of tradable consumption by α and C_T, so that, defining the real exchange rate q as the relative price of tradables, i.e., $q \equiv P_T/P_N$,

$$C_T = \frac{\alpha}{q} C \tag{7}$$

$$C_N = (1-\alpha)C \tag{8}$$

[5] Table 1 provides a dictionary of the main variables for reference.

[6] As discussed shortly, over time, it is the *ratio* of tax revenues to the capital stock that is constant. This assumption can be easily relaxed by specifying a constant tax *rate*, but that adds significant clutter without changing the substance of the argument.

The price of tradables is internationally given by the small country assumption, so that $P_T = EP_T^*$, where E is the nominal exchange rate (the price of foreign currency in domestic currency terms).

The government either consumes non-tradable goods or subsidizes investment in the tradable sector. The latter is designed to boost accumulation in the modern/capital-using tradable sector. The relevant shares of the tax revenues falling on consumption G_N and subsidies S are μ and $1-\mu$, respectively. Policy makers shift the spending mix in light of changing economic conditions. In the later dynamic analysis, μ will, therefore, play the role of a policy instrument that adjusts with a lag.

$$G_N = \mu T \tag{9}$$

$$S = (1-\mu)T \tag{10}$$

Investment depends on tradable sector profitability, which in turn is a function of the real output wage. It also depends on the amount of investment subsidies provided by the government.

$$\begin{aligned}\frac{\dot{K}_T}{K_T} &= \frac{S}{K_T} + f\left(\frac{P_T Y_T - W_T L_T}{P_T K_T}\right) \\ &= \frac{S}{K_T} + f\left(1 - \frac{w_T}{q}\right) \end{aligned} \tag{11}$$

where I substituted from eqs. (4) and (5) in going from the first line to the second. Unlike non-tradables, domestic spending on tradables does not have to equal domestic output of tradables, and any excess supply translates into a trade surplus.

$$TB = Y_T - C_T - \dot{K}_T$$

Substituting from eqs. (4), (5), (6), (7), (10), and (11) yields,

$$\begin{aligned} TB &= K_T - \frac{\alpha}{q}\left\{\left[(s_R - s_W)\gamma + (1-s_R)\right]\upsilon L_N^{\gamma} + \left[(s_R - s_W)w_T + (1-s_R)q\right]K_T - T\right\} \\ &\quad -(1-\mu)T - f\left(1 - \frac{w_T}{q}\right)K_T \end{aligned} \tag{12}$$

Finally, the non-traded good market clearing condition completes the short-run framework. Recall that the non-tradable good is used for private and government consumption.

$$Y_N = C_N + G_N$$

Plugging in the relevant expressions from eqs. (1), (6), (8), and (9),

$$\upsilon L_N^{\gamma} = \frac{(1-\alpha)\left[(s_R - s_W)w_T + (1-s_R)q\right]K_T + [\mu - (1-\alpha)]T}{1-(1-\alpha)[(s_R-s_W)\gamma + (1-s_R)]} \tag{13}$$

Equation (13) captures the demand-driven nature of output in the N-sector. The reciprocal of the term in the denominator represents the traditional multiplier effect. Any expansion of the tradable sector raises demand for non-tradables, and hence Y_N. Moreover, any increase in government spending raises demand and output as long as $\mu > 1-\alpha$, i.e., as long as the proportion of government spending on non-tradables is larger than that of private consumption. The intuition for this latter result is simple. A rise in tax revenues increases government spending at the expense of private consumption. If the government spends a larger proportion of its income on non-tradables compared with private consumers, total demand will rise. Given that public spending is typically tilted heavily toward services, this condition is likely to be satisfied.

We can now summarize our short-run system with the help of two equations. The right side of equation (14) expresses the magnitude of excess supply in the non-tradable sector while that of equation (15) captures trade deficits. In order to facilitate later dynamic analysis, I have normalized all quantity variables by the capital stock. Thus $t \equiv T/K_T$ and $tb \equiv TB/K_T$. Also, to avoid clutter, I use the symbol δ for the saving rate differential (i.e., $s_R - s_W$) and λ for $1 - s_R$.

$$NN(L_N, tb; \chi) = \frac{\upsilon L_N^{\gamma}}{K_T} - \frac{(1-\alpha)(\delta w_T + \lambda q) + [\mu - (1-\alpha)]t}{1-(1-\alpha)(\delta\gamma + \lambda)} \tag{14}$$

$$\begin{aligned} TT(L_N, tb; \chi) \quad &= \quad tb - 1 + \frac{\alpha}{q}\left[(\delta\gamma + \lambda)\frac{\upsilon L_N^{\gamma}}{K_T} + (\delta w_T + \lambda q) - t\right] \\ &\quad + \left[(1-\mu)t + f\left(1 - \frac{w_T}{q}\right)\right] \end{aligned} \tag{15}$$

The two endogenous variables, tb and L_N, adjust to ensure simultaneous equilibrium, while χ represents a vector of exogenous variables, state variables, and parameters.

The next section specifies and explores policy assignment, stability, and trade-offs. Before we end this section, however, it would be useful to look at some of the relevant properties of the system. Specifically, let's analyze some of the comparative statics that become useful later.

To the extent that the saving rate out of wages is lower (i.e., $\delta > 0$), an increase in the nominal wage in the tradable sector (W_T) raises demand for non-tradables, generating employment in that sector. In the absence of such a saving rate differential, N-sector output and employment are unchanged, for intuitively obvious reasons. The effects on the trade balance are less unambiguous. Consider first the case where there is no saving rate differential. In this case, the decline in profitability and investment caused by the higher wage generates a trade surplus. In the case where $\delta > 0$, this is offset by a rise in consumption spending. If the saving rate differential is adequately high, a trade deficit results.

These comparative static changes, expressed in mathematical terms, are as follows:

$$\frac{dL_N}{dW_T} = \frac{(1-\alpha)\delta}{[1-(1-\alpha)(\delta\gamma+\lambda)]\gamma P_N \upsilon L_N^{\gamma-1}} K_T \gtrless 0 \tag{16}$$

$$\frac{dtb}{dW_T} = \left\{ f' - \left[\frac{(1-\alpha)(\delta\gamma+\lambda)}{1-(1-\alpha)(\delta\gamma+\lambda)} + P_N \right] \alpha\delta \right\} \frac{1}{P_N q} \gtrless 0 \tag{17}$$

Notice that, if $s_R = s_W$, the right hand side of the latter simplifies to $f'/P_N q$. Only the investment effect is operative now and the trade balance unambiguously improves.

Turning to the real exchange rate, by switching domestic demand towards non-tradables, a rise in q generates higher non-tradable employment and output. The effects on the trade balance are again multidirectional. On the one hand, consumption of tradables declines, due both to expenditure-switching and income effects, as well as to the re-distribution of income towards savers. On the other hand, consumption of non-tradables, the real value of government spending, and investment increase, which all work to generate a trade deficit. Assuming that the Marshall-Lerner-Bickerdike-Robinson condition is satisfied, the former effect should dominate and the net result is a trade surplus. Mathematically,

$$\frac{dL_N}{dq} = \frac{(1-\alpha)\lambda}{[1-(1-\alpha)(\delta\gamma+\lambda)]\,\gamma \upsilon L_N^{\gamma-1}} K_T > 0 \tag{18}$$

$$\frac{dtb}{dq} = \frac{\alpha}{q^2} \left\{ \frac{(\delta\gamma+\lambda)\upsilon L_N^{\gamma}}{K_T} + \delta w_T - t - f' \frac{w_T}{\alpha} - \frac{(1-\alpha)(\delta\gamma+\lambda)\lambda q}{1-(1-\alpha)(\delta\gamma+\lambda)} \right\} \gtrless 0 \tag{19}$$

Finally, what's the effect of a change in the composition of government spending? This question is central to the later analysis. Suppose the government, in order to encourage investment, increases subsidies (i.e., lowers μ). The resulting cut in public consumption spending reduces non-tradable output and employment. Less obviously, the effects on the trade balance are to create a trade deficit (q has been normalized to unity in equation (21) without loss of generality). Intuitively, a shift in the fiscal mix towards more investment subsidies raises investment, and in spite of lower government consumption spending, generates a trade deficit.[7]

$$\frac{dL_N}{d\mu} = \frac{t}{[1-(1-\alpha)(\delta\gamma+\lambda)]\,\gamma \upsilon L_N^{\gamma-1}} K_T > 0 \tag{20}$$

[7] This result is contrary to the typical outcome in the literature where a decline in government consumption generates a trade surplus The reason for the difference is simple. The thought experiment here involves a shift in the mix rather than an absolute decline in government spending. Since government consumption only indirectly affects the trade balance while investment subsidies do so directly, the outcome follows.

$$\frac{dtb}{d\mu} = \frac{1 - (\delta\gamma + \lambda)}{1 - (1 - \alpha)(\delta\gamma + \lambda)} t > 0 \tag{21}$$

To summarize our analysis, we can use the implicit function theorem to express our short-run (local) equilibrium solutions for the endogenous variables as follows:

$$L_N = L_N(W_T, q, \mu);\ L_{NW} \gtrless 0, L_{Nq}, L_{N\mu} > 0 \tag{22}$$

$$tb = tb(W_T, q, \mu);\ tb_W, tb_q, tb_\mu > 0 \tag{23}$$

The next section builds on the solutions derived here to explore the policy trade-offs and the dynamics involved over time.

3 Visiting the Trade-offs

Our short-run framework allows us to carry out several interesting thought experiments. In particular, let's consider the trade-offs faced by development-focused policy-makers who face two constraints: (1) they must maintain the trade balance at a target level over time to avoid prolonged external account imbalances, and (2) although nominal wages are sticky in the short-run, workers in the modern tradable sector have enough bargaining power to keep distribution stable over time. Keeping the (after-tax) income share of T-sector workers below a certain threshold may accelerate investment but at the cost of generating political instability and conflict, setting in motion processes to reverse course.

Policy makers have trade balance and development (capital accumulation) targets, $\overline{tb}$ and $\bar{I}$, respectively (both expressed as proportions of the capital stock). Policy attempts to meet the targets using two instruments, the real exchange rate q and the mix of fiscal policy, captured by μ. Achievement, if it occurs, is not instantaneous. More realistically, one would expect lags both in design and execution. I, therefore, utilize partial adjustment mechanisms in the following sub-sections.

3.1 A simple beginning without distributional inertia

In order to isolate the relevant mechanisms, let's start with a simpler set-up that ignores distributional considerations by assuming a constant real wage (in terms of non-tradables). We consider two possible assignments of instruments, call them Scenarios A and B.

3.1.1 Scenario A: Real exchange rate (RER) policy targets accumulation

Consider first Scenario A, where policy makers assign the real exchange rate to the development target and fiscal spending to the trade balance target. Specifically, policy makers react to below par investment by allowing the real exchange rate to rise (depreciate) over time. In the face of a trade deficit, fiscal policy responds by shifting the mix to subsidizing investment for future tradable production in order to reduce the deficit over time.

$$\begin{aligned} \dot{q} &= h_1(\bar{I} - \dot{K}_T) \\ &= \psi(q, \mu; \bar{I}, \overline{tb});\ \psi_q < 0,\ \psi_\mu > 0 \end{aligned} \tag{24}$$

$$\begin{aligned} \dot{\mu} &= h_2(tb - \overline{tb}) \\ &= \lambda(q, \mu; \bar{I}, \overline{tb});\ \lambda_q > 0,\ \lambda_\mu > 0 \end{aligned} \tag{25}$$

where h_1 and h_2 are positive constants that capture the speed of adjustment of the relevant variable in response to any shock. In subsequent analysis, I normalize these to unity without loss of generality. The Appendix provides the mathematical expressions for the partial derivatives associated with eqs. (24) and (25). It may be worthwhile to briefly visit the intuition underlying the signs before we explore stability issues.

Starting with equation (24), the signs of the partials with respect to q and μ are straightforward and follow directly from equation (11). Intuitively, a positive change in the real exchange rate has a positive impact on profitability and investment, while an increase in investment subsidies raises the level of investment. Turning to equation (25), the signs follow from the discussion in the previous section, as summarized by equation (23). Consider a change in q. Starting with balanced trade, a real overvaluation generates trade deficits, leading policy makers to react by cutting fiscal consumption and enhancing subsidies for investment in the tradable sector. This means that policy makers face an intertemporal trade-off. The *immediate* impact of raising investment subsidies is to generate a trade deficit due to increased investment. Recall, however, that higher subsidies lead to greater investment and tradable output over time. This tension between immediate and longer-run effects, as we see shortly, contributes to dynamic instability.

A quick look at the signs of the partials reveals that the determinant of the endogenous variable Jacobian is negative. The system exhibits saddle point instability. Why? To understand the intuition, suppose policy makers decide to raise the investment target, and proceed, as a result to depreciate the real exchange rate. This creates a trade surplus, which then invites fiscal loosening (increased government consumption). The accompanying cut in investment subsidies undermines the actual investment rate, pushing it further away from the initial gap that opened up as a result of the policy change. The tension between targeting investment (which requires raising investment subsidies now) and maintaining the external balance (which requires raising government consumption now at the expense of investment subsidies) creates dynamic instability. If raising subsidies immediately boosted tradable output and reduced trade deficits, i.e., if λ_μ were negative, the assignment of instruments will be much less likely to deliver instability.

3.1.2 Scenario B: RER policy targets external account stability

Consider next a different policy assignment, call it Scenario B, where policy makers assign the real exchange rate to the external account target and fiscal spending to the development/accumulation target. Specifically, they react to below par investment by redirecting fiscal spending to investment subsidies over time. In the face of a trade deficit, policy responds by allowing for real depreciation.

Again, the new system of eqs. (26) and (27) constitute a 2×2 system of non-linear differential equations.[8]

$$\begin{aligned} \dot{q} &= h_1(\overline{tb} - tb) \\ &= \psi(q, \mu; \bar{I}, \overline{tb}, \Lambda);\ \psi_q < 0,\ \psi_\mu < 0 \end{aligned} \tag{26}$$

$$\begin{aligned} \dot{\mu} &= h_2\left(\dot{K}_T - \bar{I}\right) \\ &= \lambda(q, \mu; \bar{I}, \overline{tb}, \Lambda);\ \lambda_q > 0,\ \lambda_\mu < 0 \end{aligned} \tag{27}$$

The system is now dynamically stable. The steady state could either be characterized by monotonic or cyclical adjustment. The intuition is simple. To see this, let's analyze again the consequences of an exogenous shock such as a rise in the investment target. Now that policy makers are manipulating the mix between consumption spending and investment subsidies, they respond by increasing the share of the latter. Unlike Scenario A, the effect of this initial response on the trade balance is negative. The trade deficit means that real depreciation follows over time. The movement in this second instrument acts to further shrink the initial gap between actual and target investment, reflecting a stable system.

To summarize, the assignment of instruments matters. Inappropriate assignment creates intertemporal tensions between different policy objectives and makes the simultaneous achievement of targets over time unlikely. The next section builds on this intuition.

3.2 The Role of Distributional Conflict

The previous sub-section shows that policy assignment matters. This section introduces distributional conflict through lagged wage adjustment and shows that, while the overall results from the previous sub-section continue to hold, wage adjustment and differential saving behavior introduce new complications.

[8] I have chosen notation (i.e., the repeated use of ψ and λ), so as to enhance comparability between the two scenarios. This especially comes in handy in the next section.

3.2.1 Scenario A: RER policy targets accumulation

For reasons discussed earlier, suppose any change in distribution invites a response in the form of nominal wage movements that gradually restore the initial distribution – represented by a real wage that equals Λ – over time.

The extended Scenario A can now be captured by the dynamic set-up encapsulated by eqs. (28) - (30), which constitute a 3×3 system of non-linear differential equations.

$$\begin{aligned} \dot{q} &= k_1(\bar{I} - \dot{K}_T) \\ &= \psi(q, W_T, \mu; \bar{I}, \overline{tb}, \Lambda);\ \psi_q < 0,\ \psi_W,\ \psi_\mu > 0 \end{aligned} \tag{28}$$

$$\begin{aligned} \dot{W}_T &= k_2\left(\Lambda - \frac{w_T}{q}\right) \\ &= \phi(q, W_T, \mu; \bar{I}, \overline{tb}, \Lambda);\ \phi_q > 0,\ \phi_W < 0,\ \phi_\mu = 0 \end{aligned} \tag{29}$$

$$\begin{aligned} \dot{\mu} &= k_3(tb - \overline{tb}) \\ &= \lambda(q, W_T, \mu; \bar{I}, \overline{tb}, \Lambda);\ \lambda_q > 0,\ \lambda_W \gtreqless 0,\ \lambda_\mu > 0 \end{aligned} \tag{30}$$

where k_1, k_2, and k_3 are positive constants that capture the speed of adjustment of the relevant variable in response to any shock. As in the previous subsections, I normalize these to unity without loss of generality.

The new elements are equation (29) and the partials associated with each equation with respect to the nominal wage. The signs of these can be explained as follows. Starting with equations (28) and (29), the signs of the partials with respect to W_T, follow directly from eqs. (11) and (23). Intuitively, changes in the nominal wage and the real exchange rate have opposite effects on profitability and investment. How does a rise in the nominal wage affect the trade balance? Here the answer is a bit more involved and depends on the relative saving rates. In the absence of a difference between saving rates across income sources (i.e., $s_R = s_W$), the drop in profitability and investment leads to a trade surplus (so that $\lambda_W > 0$). If, however, saving out of wages is sufficiently small, so that a rise in the nominal wage strongly boosts consumption, then the outcome is a trade deficit. Finally, the partials associated with equation (29) follow from the equation itself.

Suppose now that there is an exogenous shock (say the investment target is set higher). Then (28) tells us that policy makers should begin depreciating the real exchange rate. This has two effects (see eqs. (29) and (30)): (1) it raises the trade balance to a level above the target and induces policy makers to orient fiscal policy away from investment subsidies, and (2) nominal wages begin to rise in response to the initial redistribution. Both (1) and (2) have the effect of reducing investment, further widening the initial gap between target and actual investment. As in Section 3.1.1, the assignment of instruments here is likely to generate instability regardless of the relative saving rates.

More formally, the relevant necessary and sufficient Routh-Hurwitz conditions for dynamic stability are:

$$\psi_q + \phi_W + \lambda_\mu < 0 \tag{31}$$

$$(\psi_q \phi_W - \psi_W \phi_q)\lambda_\mu + (\phi_q \lambda_W - \phi_W \lambda_q)\psi_\mu < 0 \tag{32}$$

$$\begin{aligned} &-(\psi_q + \phi_W + \lambda_\mu)(\phi_W + \lambda_\mu)\psi_q + \psi_\mu \phi_q \lambda_W \\ &+(\psi_q + \phi_W)\psi_W \phi_q + (\psi_q + \lambda_\mu)\psi_\mu \lambda_q - (\phi_W + \lambda_\mu)\phi_W \lambda_\mu > 0 \end{aligned} \tag{33}$$

Satisfaction of condition (31) requires that λ_μ be small i.e., $\lambda_\mu < \left|\psi_q + \phi_W\right|$. This, in turn, requires that tradables be a small fraction of private consumption. Suppose for the sake of argument that λ_μ is sufficiently small so that this condition is satisfied. Since $\psi_q \phi_W = \psi_W \phi_q$ (see Appendix), condition (32) is reduced to $(\phi_q \lambda_W - \phi_W \lambda_q)\psi_\mu > 0$. In the absence of saving rate differentials (i.e., when $s_R = s_W$), this condition is unambiguously violated. If $s_R > s_W$, then the condition *could* be satisfied but that requires a relatively small value of ϕ_W which undermines satisfaction of condition (31). Put differently, the satisfaction of the two conditions places contradictory constraints on the sensitivity of wages to distributional changes (i.e., on the magnitude of ϕ_W).

Finally, condition (33) is also unlikely to be satisfied. Since $\psi_q \phi_W = \psi_W \phi_q$, it reduces to:

$$\begin{aligned} &[\psi_\mu(\phi_q \lambda_W + \lambda_\mu \lambda_q)] + [\psi_q(\psi_\mu \lambda_q - \psi_q \lambda_\mu)] \\ &+[-(\psi_q + \phi_W + \lambda_\mu)\phi_W \lambda_\mu] + [-\psi_q \lambda_\mu(\phi_W + \lambda_\mu)] > 0 \end{aligned}$$

The term in the first square parentheses in the first line is positive if $s_R = s_W$, but that in the second square parenthesis is negative. Moreover, the term in the first square parentheses in the second line is positive if λ_μ is high enough so that $\lambda_\mu > \left|\psi_q + \phi_W\right| > 0$, but this contradicts the first condition (31). The same requirement, i.e., a relatively high λ_μ makes the term in the second square parentheses in the second line positive but this too contradicts (31). In sum, contradictory assumptions are required to satisfy the three stability conditions.

The system is highly likely to be unstable regardless of whether or not distributional conflict is incorporated.

3.2.2 Scenario B: RER policy targets external account stability

The new system of eqs. (34)-(36) is given by:

$$\begin{aligned}\dot{q} &= k_1(\overline{tb} - tb) \\ &= \psi(q, W_T, \mu; \bar{I}, \overline{tb}, \Lambda);\ \psi_q < 0,\ \psi_W \gtreqless 0,\ \psi_\mu < 0 \end{aligned} \tag{34}$$

$$\begin{aligned}\dot{W}_T &= k_2\left(\Lambda - \frac{w_T}{q}\right) \\ &= \phi(q, W_T, \mu; \bar{I}, \overline{tb}, \Lambda);\ \phi_q > 0,\ \phi_W < 0,\ \phi_\mu = 0 \end{aligned} \tag{35}$$

$$\begin{aligned}\dot{\mu} &= k_3\left(\dot{K}_T - \bar{I}\right) \\ &= \lambda(q, W_T, \mu; \bar{I}, \overline{tb}, \Lambda);\ \lambda_q > 0,\ \lambda_W < 0,\ \lambda_\mu < 0 \end{aligned} \tag{36}$$

Let's revisit the consequences of an exogenous shock such as a rise in the investment target. Now that policy makers are manipulating the mix between consumption spending and investment subsidies, they respond by increasing the share of the latter. Unlike Scenario A, this has no effect on distribution, and contrary to Scenario A, the effect of this initial response on the trade balance is negative. The trade deficit means that real depreciation follows over time. The movement in this second instrument acts to further shrink the initial gap between actual and target investment, reflecting a stable system.

Looking at the stability issue more formally, note first that, thanks to the choice of notation, the first two Routh-Hurwitz stability conditions are the same as in Scenario A. The first condition, i.e., (31), is unambiguously satisfied. Since $\phi_q\lambda_W - \phi_W\lambda_q = 0$ (see Appendix), the second condition reduces to $(\psi_q\phi_W - \psi_W\phi_q)\lambda_\mu < 0$. This is unambiguously satisfied if $s_R = s_W$. If $s_R > s_W$, satisfaction requires that $\psi_q\phi_W > \psi_W\phi_q$, i.e., $\frac{\psi_W}{\psi_q} > \frac{\phi_W}{\phi_q}$. To aid intuition, normalize the initial value of q to unity, so that $\phi_W = \phi_q$. Then, in the case where $s_R > s_W$, stability requires that $\psi_W < -\psi_q$, that is the trade balance be less sensitive to wages than to the real exchange rate. Why? Recall that the increase in subsidies subsequent to a rise in the target investment rate leads to a trade deficit and a resulting depreciation. The lagged distributional effect is to raise the nominal wage over time. But this rise only makes the trade deficit worse in the case where $s_R > s_W$. The condition that the trade balance be relatively insensitive to wage increases helps dampen this feedback loop that could potentially render the system unstable.

Incorporating $\phi_q\lambda_W - \phi_W\lambda_q = 0$ reduces the third condition, i.e., equation (33), to:

$$(\psi_q + \phi_W + \lambda_\mu)(\psi_\mu\lambda_q - \psi_q\phi_W - \phi_W\lambda_\mu) - \psi_q\lambda_\mu(\psi_q + \lambda_\mu) + [\psi_W\phi_q(\psi_q + \phi_W)] > 0$$

This third condition too is unambiguously satisfied when $s_R = s_W$ (i.e., $\delta = 0$), and only slightly less unambiguously so – because the term in the square parentheses on the left hand side then has a negative sign – when $s_R > s_W$. The sufficient, but by no means necessary, condition to unambiguously ensure stability in the latter case is that the value of ψ_W be relatively low, i.e., the same condition that ensures satisfaction of condition (32). Even if this condition is not satisfied, the satisfaction of (33) is all but ensured.

In sum, while the assignment of instruments matters regardless of the extent of distributional conflict, incorporating distributional considerations and saving rate differences between functional groups too introduce destabilizing mechanisms. To understand the role of saving differentials in more intuitive terms, consider first the case where $s_R \approx s_W$. Rising nominal wages in response to real depreciation in this case have no impact on consumption but do have a positive effect on the trade balance (via declining investment), dampening the initial trade deficit. Next, consider the case where $s_R > s_W$. Now rising nominal wages increase consumption and magnify the initial trade deficit. The system is less likely to be stable (although again, only somewhat so).

4 Concluding Remarks

The literature on economic policy, going back to Tinbergen (1952), has recognized that individual economic policy instruments typically impact more than one objective. In the presence of an omniscient and omnipotent central planner who can implement policy without lags, this should not necessarily be an issue as long as the number of instruments matches the number of targets, and the targets are not mutually inconsistent In a second best world with imperfect information and lags in policy implementation, however, the issue of appropriate assignment of instruments to targets gains salience.

The traditional literature on policy assignment has focused on stabilization and short-run business cycle issues. I have looked here at medium-run capital accumulation, income distribution, and trade balance issues. In order to do so, I incorporate saving differentials between functional income groups. Policy makers target a certain rate of capital accumulation while maintaining the trade balance in the presence of real wage resistance.

It is well-known that distributional and external account considerations create complications in the pursuit of policy. The admittedly stylized analysis here suggests that fiscal policy should target investment directly while the real exchange rate policy should target the trade balance. The opposite policy configuration is highly likely to generate dynamic instability. This follows mainly from the presence of lags in policy execution. In the face of a trade deficit, increased subsidies only increase tradable production over time, and act in fact to magnify the deficit on impact. This creates external balance problems and instability if fiscal policy is directed toward maintaining the external balance.

Large saving rate differences between functional income groups may also constitute a source of dynamic instability. Intuitively, any distributional change that favors spenders over savers has trade balance implications that may frustrate achievement of policy targets. When the saving rate differential is sufficiently high, the adjustment mechanisms of the economy may not be strong enough to eliminate instability even when instruments are appropriately assigned to targets. This suggests that the high worker savings often encouraged by East Asian policy makers may have had greater social utility than is generally recognized.

Table 1: Definitions of key variables

Variable	Definition
Y_i	Output of sector i $(= T, N)$
q	The relative price of tradables (i.e., the real exchange rate)
C_i	Consumption of good i $(= T, N)$
C	Total consumption
I	Investment
R_N	Land rents in the N-sector
w_N	Real product wage in sector i $(= T, N)$
W_i	Nominal wage in sector i $(= T, N)$
T	Total taxes (t when normalized by the capital stock)
G_N	Government spending on non-tradables
K_T	T-sector capital stock
μ	Share of government expenditures falling on non-tradable consumption
S	Total investment subsidies (s when normalized by the capital stock)
Λ, $\bar{I}$, $\overline{tb}$	Target real wage, investment, and (normalized) trade balance, respectively
$s_{R,}s_W$	Saving rates out of non-wage and wage income, respectively

5 Appendix

This appendix lists the partial derivatives associated with eqs. (28)-(30) of Section 3.2.1 and eqs. (34)-(36) Section 3.2.2 (with k_1, k_1, and k_3 normalized to unity).

First Scenario A. From eqs. (10), (11), and (28),

$\frac{\partial \dot{q}}{\partial q} = -f' \frac{w_T}{q^2}$

$\frac{\partial \dot{q}}{\partial W_T} = f' \frac{1}{P_N q}$

$\frac{\partial \dot{q}}{\partial \mu} = \frac{T}{K_T}$

From equation (29),

$\frac{\partial \dot{W}_T}{\partial q} = \frac{w_T}{q^2}$

$\frac{\partial \dot{W}_T}{\partial W_T} = -\frac{1}{P_N q}$

$\frac{\partial \dot{W}_T}{\partial \mu} = 0$

From eqs. (17), (19), (21) and (30),

$\frac{\partial \dot{\mu}}{\partial q} = \frac{\alpha}{q^2} \left\{ \frac{(\delta\gamma+\lambda)\upsilon L_N^{\gamma}}{K_T} + \delta w_T - t - f' \frac{w_T}{\alpha} - \frac{(1-\alpha)(\delta\gamma+\lambda)\lambda q}{1-(1-\alpha)(\delta\gamma+\lambda)} \right\}$

$\frac{\partial \dot{\mu}}{\partial W_T} = \left\{ f' - \left[\frac{(1-\alpha)(\delta\gamma+\lambda)}{1-(1-\alpha)(\delta\gamma+\lambda)} + P_N \right] \alpha\delta \right\} \frac{1}{P_N q}$
$\frac{\partial \dot{\mu}}{\partial \mu} = \frac{1-(\delta\gamma+\lambda)}{1-(1-\alpha)(\delta\gamma+\lambda)} t$

Notice that, based on the above expressions, $\psi_q \phi_W - \psi_W \phi_q = \frac{\partial \dot{q}}{\partial q} \frac{\partial \dot{W}_T}{\partial W_T} - \frac{\partial \dot{q}}{\partial W_T} \frac{\partial \dot{W}_T}{\partial q} = 0$.

Now consider Scenario B. From eqs. (17), (19), (21), and (34),
$\frac{\partial \dot{q}}{\partial q} = \frac{\alpha}{q^2} \left\{ \frac{(\delta\gamma+\lambda) v L_N^{\gamma}}{K_T} + \delta w_T - t - f' \frac{w_T}{\alpha} - \frac{(1-\alpha)(\delta\gamma+\lambda)\lambda q}{1-(1-\alpha)(\delta\gamma+\lambda)} \right\}$
$\frac{\partial \dot{q}}{\partial W_T} = - \left\{ f' - \left[\frac{(1-\alpha)(\delta\gamma+\lambda)}{1-(1-\alpha)(\delta\gamma+\lambda)} + P_N \right] \alpha\delta \right\} \frac{1}{P_N q}$
$\frac{\partial \dot{q}}{\partial \mu} = - \frac{1-(\delta\gamma+\lambda)}{1-(1-\alpha)(\delta\gamma+\lambda)} t$

From equation (35),
$\frac{\partial \dot{W}_T}{\partial q} = \frac{w_T}{q^2}$
$\frac{\partial \dot{W}_T}{\partial W_T} = - \frac{1}{P_N q}$
$\frac{\partial \dot{W}_T}{\partial \mu} = 0$

Based on eqs. (10), (11), and (36):
$\frac{\partial \dot{\mu}}{\partial q} = f' \frac{w_T}{q^2}$
$\frac{\partial \dot{\mu}}{\partial W_T} = -f' \frac{1}{P_N q}$
$\frac{\partial \dot{\mu}}{\partial \mu} = - \frac{T}{K_T}$

Notice, that, based on the expressions above, $\phi_q \lambda_W - \phi_W \lambda_q = \frac{\partial \dot{W}_T}{\partial q} \frac{\partial \dot{\mu}}{\partial q} - \frac{\partial \dot{W}_T}{\partial W_T} \frac{\partial \dot{\mu}}{\partial q} = 0$.

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