

**A Macroeconomic Framework for Developing Economies
in Compatible Control Regimes**

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Introduction

Modern neo-classical macroeconomists, to the extent that they have worked on developing countries, have tended to make little concession to different economic structures. And yet most modern macroeconomics originates in America – applied work uses American data and theoretical work assumes an economic structure consistent with salient features of the United States. The problems faced in applying modern macroeconomics to developing countries are severe precisely because economic structures are different. Financial markets are often virtually absent; many of these economies are small, open, and periodically hit by temporary trade shocks; and most of them are heavily regulated by government controls.

The authorities commonly use an array of policies that have macro effects:

- they set exchange rates, trade and other taxes, import quotas, price controls, interest rate ceilings, liquidity ratios for banks;
- they determine the magnitude and composition of public expenditure; and
- they incur domestic and foreign liabilities.

These policies regulate private behavior to a far greater extent than is usual in developed countries. The typical developing country economy could therefore be described as a ‘control regime’. Many controls generate undesirable micro-level inefficiencies and as a result the very issue of policy is hardly its optimality characteristics as much as its feasibility. From this perspective, an appropriate minimal property of a system of controls is that they should be consistent with each other at the macro level. Such a control regime is ‘compatible’. All compatible regimes give rise to sustainable equilibria, even though some of them might be highly inefficient.

The objective in the present exercise is to provide a body of neo-classical theory – theory characterized by choice-theoretic formulations – which is purpose-built for a class of developing countries, namely small, open economies with weak domestic financial markets, subject to a variety of government controls and liable to provide temporary shocks especially in their terms of trade (TOT). Ghana is one such ‘controlled open economy’. The theory is an extension of the fix-price temporary equilibrium theory of Malinvaud and others, which incorporates neo-classical micro foundations of maximizing agents into a model in which markets are not cleared by price changes.

For compatible control regimes, policy reforms may be highly desirable. However, reform is by no means technically straightforward. The transition from the existing to the desired set of policies can be deeply problematic.

The starting point for the development of a theory of how agents respond to temporary windfalls is the existing theory of the Dutch Disease. However, that analysis focuses only on a *permanent windfall in an economy without controls*.

Controls restrict how private agents make use of the windfall:

- foreign exchange controls inhibit the acquisition of foreign financial assets;
- import quotas may restrict the volume of imports, or alter their composition; and
- interest rate ceilings may alter the volume and composition of investment.

In developed countries trade policy is generally peripheral to macroeconomic performance – trade taxes are usually low and do not change markedly. By contrast, in many developing countries governments impose high barriers to trade (often in the form of quotas), and actively vary them as a key instrument of macroeconomic policy. Indeed, "*behind the rhetoric of import substitution industrialization (ISI), it has often been the Central Bank which has determined the height of trade barriers, with an eye on the foreign exchange reserves*" (Bevan et al. p.8).

Structural adjustment, as most other changes in macro policy in developing countries, involves major changes in trade policy. As a result, for given world prices, the domestic relative price of exportable to importable goods is substantially altered. In these circumstances, tradable goods can no longer be treated as a Hicksian composite commodity. The three aggregates – exportables, importables, and non-tradables – thus give rise to two independent relative prices, both of which change. With the loss of the fundamental simplifying assumption of constrained relative prices among

tradable goods, the concept of the real exchange rate becomes problematic.

To summarize:

- It is impossible to adequately analyze the macroeconomic problems of developing countries within the confines of the standard small open economy; trade policies, either explicitly or implicitly, are central to the analysis, but are suppressed if exportables and importables are aggregated into a single tradable category. Most of the important macro problems facing developing countries – stabilization, liberalization, and structural adjustment – have substantial trade policy components.
- The problems posed to policy makers may be extraordinarily difficult to resolve when proper account is taken of even a relatively restricted set of economic controls. Familiar and apparently straightforward questions, such as whether the budget is overly lax, may become complex and opaque in this context.

The Theory of a Temporary Windfall in a Controlled Economy Associated with a TOT Shock

The endogeneity of trade controls, as noted above, requires the disaggregation of tradables into exportables and importables. In the analysis of temporary shocks, the choice between consumption and investment plays a central role. And the endogeneity of investment requires a further disaggregation of non-tradables into capital and consumer goods.

Combining these distinctions, the non-tradable capital goods sector emerges as the key sector for the analysis of temporary trade windfalls. One activity that almost invariably, is found in this sector is construction. The dominance of this activity in the sector enables the latter to be called ‘construction’ for short, with ‘buildings’ as its output.

Virtually all export windfalls induce a temporary boom in the construction sector, and some control regimes can cause a costly exaggeration in such a boom. There are two routes by which a construction boom is induced – through a temporary increase in savings and through a permanent increase in consumption. The circumstances on which neither of these routes operates are quite special and illuminating. If agents correctly forecast export prices, and credit markets are perfect, the fluctuations in export prices have no consequences for any sector of the economy. Current income fluctuates around a known permanent income to which expenditure is continuously equated through changing financial assets and debts.

However, if credit markets are imperfect, then such fluctuations in savings will alter the availability or cost of domestic finance and hence give rise to

fluctuations in domestic investment. Unless tradable and non-tradable capital are perfect substitutes in the production process (in which case the distinction is vacuous), these fluctuations in investment will cause fluctuations in demand for 'buildings': Hence, perfect credit markets are a necessary, but by no means a sufficient, condition for the delinking of changes in export prices and construction booms.

There are important asymmetries in impact associated with shocks. Thus, a theory of booms will not carry over to slumps merely by a reversal of sign.

First, there may be asymmetries in the speed of price adjustment; prices rising in response to excess demand more rapidly than they fall in response to excess supply.

Second, whereas with a boom it is always possible to accumulate assets in foreign financial markets and then run them own, during a slump it may not be possible to borrow.

Third, whereas during a boom it is always possible to add up to the domestic capital stock through imports of capital goods, during a slump the rate of decumulation is in practice constrained by the rate of depreciation.

Finally, whereas a positive shock increases investment, a negative shock need not reduce it. For example, whether positive or negative, a permanent shock changes the relative price of tradables to non-tradables and hence the optimal allocation of resources. Investment is the means by which capital can be added to the sector in which there is an incentive to expand output. Hence, any change in relative prices creates a premium upon mobility and thereby an incentive to increase investment. The less a given shock alters permanent income, the weaker the incentive to reallocate resources. Thus in general, a positive shock stimulates investment both through this mobility premium effect and through the rise in savings. A negative shock has the mobility premium effect of stimulating investment, while transient dissaving reduces it so that the net effect is ambiguous.

Government regulations in (international trade, credit, and) foreign exchange markets can be expected both to reduce the efficiency with which private operators transform a windfall into productive investments, and to amplify the relative price changes which occur in the absence of regulations. In order to examine the foreign exchange market implications in detail, we first consider the situation of financial markets in an uncontrolled economy.

The developing country is assumed to be capital poor with a foreign borrowing constraint reflected in higher return on domestic capital than the interest rate on foreign financial assets. Foreign assets are acquired temporarily during the boom period to be converted later into domestic real

capital. This temporary holding of foreign assets stretches the investment boom beyond the income boom. The rationale for such a stretching process is to avoid the costs associated with short-run supply bottlenecks in the non-tradable capital goods sector. By deferring investment, the cost of these capital goods is cheaper, so that the investment process is more efficient. However, the extra domestic investment is not indefinitely deferred, because offsetting this temporary reason for investing abroad is an underlying reason for investing at home, namely that, by assumption, the economy achieves a rate of return above that available on the world capital market.

Many agents are not in a position directly to diversify their asset accumulation into interest bearing foreign financial assets. Instead, the banks against whom most private agents acquire claims denominated in domestic currency perform this activity. This implies that even in the unregulated open economy, a temporary trade shock will have short-term monetary repercussions. As the counterpart to what would otherwise be an accumulation of foreign financial assets to be subsequently decumulated, there is now a corresponding domestic money supply trajectory. With banks subject to a reserve/deposit requirement, there is a consequent increase in the demand for Reserve Money (as a basis for the deposit creation to satisfy the temporary increase in the demand for money as an asset by the non-bank public during the boom).

The supply of Reserve Money is automatically increased initially by the extent of the initial windfall as agents convert foreign exchange into domestic currency through the exchange equalization account. If private agents wish directly to hold financial assets only denominated in domestic currency in the absence of a domestic bond market they will hold bank deposits. The banks will hold two types of assets as the counterpart to these liabilities. To support the increase in deposits they will hold domestic currency, which is a claim on the Central Bank, and beyond this they will hold foreign financial assets. The latter will show up in the (external) balance of payments (official settlements) as a private capital outflow. The former represents a liability incurred by the Central Bank. As a counterpart to this the Central Bank acquires foreign financial assets, which will appear in its holdings of international reserves. The Central Bank is thus the custodian of a fraction of the foreign financial assets temporarily and indirectly accumulated by private agents – the fraction being determined by the prudential (assumed stable and higher than the mandatory) cash/deposit ratio of domestic deposit money banks (DMBs).

During the windfall, the demand for money rises for two distinct reasons. First the demand for foreign financial assets is indirect – most private agents hold claims on DMBs denominated in domestic currency, given the assumption of no domestic securities market, with the banks holding foreign assets together with the extra cash reserves entailed by the (prudential) cash/deposit ratio. This is the ‘asset effect’. The second component of the

increase in the demand for money is the increase in real expenditure (E), which, since it reflects the increase in permanent income, is discrete and sustained. This latter is termed the 'liquidity effect'.

Together, they cause the money demand to jump up at the outset of the windfall. It then rises further as a result of the build-up of financial assets, and subsequently declines. Whether these changes are accommodated by changes in money supply or by offsetting changes in other components of money demand depends on the fiscal policy adopted.

It can be shown that the ratio of the demand for financial assets (A) to the transactions demand for money (D) is given by:

$$A/D = vq/(1-q)/a(1-qs)$$

where $D = aE$; E refers to domestic expenditure; $s =$ savings ratio; q is the proportion of asset accumulation which is financial (rather than being directly channeled into real assets); v is the (incremental) capital/output ratio.

The supply of money (M) is made up of currency and bank deposits. Thus:

$$M = mH$$

where H is Reserve Money and m is the money multiplier (assumed stable).

Pre-boom monetary equilibrium requires:

$$aE = mH$$

The process by which the supply of Reserve Money is altered depends upon whether the exchange rate is floating feely or managed. If it is freely floating (and with no large holdings of the national currency abroad), the only mechanism for increasing the supply of Reserve Money, H, is the fiscal deficit. If, however, the exchange rate is maintained at a target, then the Central Bank must be prepared to supply either foreign exchange or Reserve Money (H) depending on which side of the market is short. The supply of Reserve Money is then the sum of the fiscal deficit and the payments surplus. In practice, policy induced changes in the fiscal deficit to accommodate changes in money demand can be ignored as impracticable and unlikely.

The Freely Floating Exchange Rate Regime

The time path of the exchange rate reflects the time path of the demand for money: there is a temporary appreciation followed by a depreciation of the same magnitude. The asset and liquidity effects cause a jump in the exchange rate at the outset of the windfall. As foreign financial assets are depleted, the

asset demand for domestic money derived from them falls. This decline in the demand for money is offset by exchange rate depreciation. Hence the nominal exchange rate jumps at the outset of the windfall and declines during asset decumulation, eventually reverting to its initial level.

This trajectory of the exchange rate has implications for the market rate of interest available on foreign financial assets. The exchange rate subsequently depreciates after its ‘instantaneous’ appreciation upon ‘news’ of the windfall. The initial appreciation represents a loss in domestic currency terms that must be deducted from the nominal interest rate available on the world capital market before determining the nominal interest rate on domestic currency bank deposits that can be afforded by the DMBs.

From the initial point the expected depreciation of the exchange rate would require a corresponding rise in domestic interest rates above the world rate (uncovered interest parity).

With the depreciation, the temporary increase in the nominal domestic interest rate coincides with a rising nominal price of tradable goods. Hence in units of tradable goods, the domestic interest rate remains equal to the (constant) world interest rate. In a sense, therefore, the real interest rate can be seen to remain constant throughout the windfall in the floating case.

The Managed Exchange Rate Regime

In most developing countries the monetary authorities intervene directly in exchange rate determination, selecting a target rate, or path, which it maintains by means of reserve accumulation or decumulation. With such an intervention, there are two ways in which a temporary windfall can generate divergence between the actual exchange rate and that which would prevail in a freely floating market.

First, the Central Bank might simply maintain the initial exchange rate fixed. In this case the divergence is identical with the path taken by the floating rate as analyzed above.

Second, the Central Bank may intervene to determine the exchange rate according to a policy rule. For example, it might sell forex to induce the nominal of the international reserves holdings of the central bank to rise by a given amount and buy if they fall by some predetermined amount. The windfall might trigger changes in exchange rates as reserves rise or fall. The divergence then depends on differences between the rate thus determined by the policy rule and the floating rate.

Conceptually, four components of the central Bank foreign exchange reserves

ca be distinguished as follows:

- forex acquired by government directly or indirectly through taxation of windfall. There are no offsetting liabilities to this portion of reserve assets;
- forex acquired in exchange of domestic currency which will be held permanently by private agents for domestic transactions – the counterpart to the liquidity effect or seignorage;
- forex borrowed from foreign agents – largely aid inflows; and
- forex acquired in exchange for domestic currency which will only be held temporarily – the counterpart of the asset effect. Corresponding to this the Central Bank has a liability which it will only know about and be able to date if it understands the intentions behind the current money demand of private agents.

The information problem of the Central Bank is therefore to interpret changes in its holdings of international reserves by attributing them to temporary and permanent in the private sector, and to temporary and permanent changes in the budget deficit and exchange and trade controls. This problem is considerable, both because private sector responses are complex, involving overshoots in both the relative price of tradables and non-tradables and in money demand. Moreover, the Central Bank in its management of the exchange rate regime will at best discover any changes in trade controls and the budget deficit after a lag. If the Central Bank misinterprets the accumulation of foreign exchange reserves it may expend them, pre-empting resources which would otherwise be spent by the private sector on capital accumulation. Subsequent depreciation pressure on the exchange rate then becomes inevitable.

Conclusions

A fixed exchange rate therefore implies, among others, that

- the Bank of Ghana automatically acquires a custodial role for temporary holdings of windfall foreign exchange earnings;
- there is a higher price level during the windfall, and a smaller initial increase in relative prices of non-tradable goods (on account of the fixed instead of appreciating exchange rate that could obtain in a free float situation besides the excess demand for money moderates non-traded goods price increases); and
- there is a lower nominal interest rate if the fixed rate is credible and therefore the domestic nominal rate hovers around the world rate.

In the case of managed or ‘dirty float’ exchange rate regime, it is probable that the accumulating reserves by the Central Bank might trigger a revaluation of the exchange rate. This is likely when the policy rule that determines the

rate is related to reserves. Since an appreciation would occur automatically in the pure float regime, such a revaluation would in itself reduce the divergence from the floating rate, compared to the case of the fixed rate. A divergence may nonetheless remain. The fact is that the political costs of devaluation are so high in some countries that the latter might be met by import controls. Given the need for a healthy stock of international reserves – a minimum of four months of imports cover is the norm – and the fact that the nation has suffered political instability when the cover has fallen to about two weeks below the target minimum reserves level, the currency must be allowed to depreciate if necessary to build reserves.

In any case a lot depends on the size and stability of the money multiplier. If the multiplier is significantly large there could result an increase in money supply relative to demand. If banks succeed in remaining fully loaned up so that the money supply increases by the full multiple of the multiplier, then despite the increase in money demand – the combined liquidity and asset effects – there could be an excess supply of money at the initial price level. In such an eventuality, even though foreign exchange reserves are accumulating, a possible second-best response will for the Central Bank to depreciate the nominal exchange rate, so that the price level rises uniformly without disturbing the real exchange rate – the relative price of tradable and non-tradable goods.

In conclusion, controls have powerful consequences in making both private and public responses to a shock sub-optimal. The linkage between private and social consequences of actions is disrupted, so that rational private responses cease to induce desirable aggregate outcomes. Furthermore, the informational requirement, and degree of analytic sophistication, demanded of the authorities if they are to manage events successfully appear altogether excessive. Thus, *"even a combination of well-informed and well-intentioned public and private agents would find it impossible to manage a trade shock successfully if they were trapped in an inherited system of economic control"* (Bevan et al., 2000, "Macroeconomic Issues", May, p. 140).