IMPORT QUOTAS AND MACROECONOMIC BALANCE IN A SIMPLE DYNAMIC MODEL

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Import quotas and macroeconomic balance in a simple dynamic model

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Abstract. A simple dynamic model analyses macroeconomic balance in a country employing a system of exchange control and import quotas. Excess demand pressure forces the domestic price level of non-tradables and importables subject to licensing above the world price level. This creates static losses due to allocative inefficiency, rent-seeking and smuggling, thus exacerbating excess demand. The outcome in the steady state depends on the setting of the exchange rate and the balanced government budget. The effects of employing three commonly used policy instruments are examined, and the condition to achieve a steady state of full capacity output is derived.

Contingentements à l'importation et équilibre macro-économique dans un modèle dynamique simple. Ce mémoire développe un modèle dynamique simple pour analyser l'équilibre macro-économique dans un pays qui utilise un système de contrôle des changes et de contingentements à l'importation. L'utilisation de contingentements à l'importation pour contrôler les pressions de la demande excédentaire engendre une augmentation du niveau de prix domestique des biens non-transigés et des biens importables avec permis au dessus du niveau des prix mondiaux. Voilà qui engendre des pertes en analyse statique, pertes engendrées par l'inefficacité dans l'allocation des ressources, par les activités pour s'approprier la rente, et par les activités de contrebande. Ces pertes ne peuvent évidemment qu'exacerber les pressions de la demande excédentaire.

Selon le niveau du taux de change et du budget équilibré du gouvernement, le régime stationnaire peut engendrer de façon circulaire contingentements à l'importation et sous-utilisation de capacité chronique. De plus il est possible que l'économie soit aspirée dans un tourbillon d'atrophie économique et d'inflation auto-engendrée. L'auteur définit les conditions permettant d'éviter de tomber dans ce courant tourbillonnaire, les effets de l'utilisation de trois instruments usuels de politique économique,

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et les conditions permettant de se donner accès à un régime stationnaire qui assure un niveau de production résultant de la pleine utilisation de la capacité de production.

INTRODUCTION

In country after country of the Third World, one finds import quotas and exchange controls in place as semi-permanent instruments to deal with balance of payments problems. The IMF (1977) reports that some sixty or more less developed countries maintained restrictions on payments for current transactions. For most, the restrictions are pervasive, affecting virtually all import payments.

This widely employed set of instruments has attracted considerable attention from theorists. A substantial literature dealing with the static micro – and general equilibrium – theoretic effects of import quotas already exists. Most of this literature is concerned with the static efficiency losses associated with the use of import quotas, and the conditions under which a tariff and a quota are formally equivalent.[1]

A related but distinct strand in the literature has emerged in recent years which focuses on the transfers of purchasing power inherent in a system of import quotas. This literature recognizes, as Meade did, that quotas create transfers of purchasing power. It goes on to note that real resources may be used up by rational economic agents in pursuit of the transfers. In some respects this is nothing new: the university president, the mendicant on the street corner, and the prime minister of an aid-receiving country all expend real resources attempting to persuade donors of their deserving nature. Donors, for their part, often go to considerable trouble to sort out the nearly infinite variety of solicitations. Both aspects use up real resources. What is new in the literature is the recognition that the economic good being transferred may simply be a rent-generating right such as a mineral right, an operating licence in a regulated industry, or an import licence. All of these, if their supply is restricted sufficiently, have values as economic goods. Potential recipients of the rights are likely to expend real resources in seeking the rights to a transfer to the point that the marginal rent-seeking expenditure is equal to the marginal value of the expected transfer. Furthermore, if the seeking activity is competitive, the total value of the resources used up in seeking transfers will be equal to the value of the expected transfers.

The static effects of such diversion of real resources are analysed formally in A.O. Krueger's (1974) model of 'rent-seeking' in an LDC. A similar but distinct theme is followed in Munir Sheikh's (1974) analysis of the static

1 The principal landmarks in this literature are J.E. Meade (1951), Chapters XXI and XXIV, and Bhagwati (1965). Since then, a variety of refinements have been made on several aspects of the effects of quotas and the (non) equivalence of tariffs and quotas. For citations of the recent literature, see Fishelson and Flatters (1975), and Sweeney, Tower and Willett (1977).

effects of smuggling when real resources are expended in the smuggling activity. In both cases the *effective* capacity of the economy is reduced by the amount of real resources spent in pursuit of transfers.[2]

Some simple calculations of the value of rents indicate the quantitative significance of this issue. Quota premia frequently range from 50 per cent to 100 per cent of the value of imports. If imports account for some 15 per cent of GNP, rents can then amount to 7½ per cent of GNP. Krueger (1974) offers some estimates for India and Turkey. The Indian estimate (1964) attributes rents of some 7.3 per cent of national income while the Turkish estimate (1968) comes to about 15 per cent of GNP. The existence of rents is thus a problem of comparable magnitude to that of unemployment in industrial countries.

The losses in these models are specific examples of the more general realization that a system of import quotas seems to involve massive losses which go far beyond the usual static efficiency losses that might be attributable to a tariff-equivalent of the import licence premium. As Bhagwati (1978) observes, some of the losses from such regimes arise from features such as the high variance of incentives among activities, and the reliance on physical controls. In a similar vein, but a different context, Kornai (forthcoming) attributes considerable losses to the debilitating paternalism of systems run by minute controls. In any case, there seem to be associated with restrictive foreign exchange regimes large losses of real output, and the size of the output loss is generally a function of the restrictiveness of the regime.

The macroeconomic aspects of an economy employing import quotas, however, have received very little formal analysis in the recent literature. This paper is aimed at helping to fill that gap. Specifically, we are concerned with the dynamic macroeconomic balance in a country employing a system of exchange control and import quotas. We start from the well-known point that use of import quotas to close the external deficit means that the pressure of domestic excess demand is vented largely on domestic prices of non-tradables and importables. The model we develop contains two dynamic responses to such excess demand pressure. The first is the response of the government budget deficit, which we assume in this paper acts as an 'automatic stabilizer.'

2 It is important to recognize that the loss in these models is beyond the efficiency loss attributed to the tariff-equivalent of the import licence premium. It is the loss, for example, due to the fact that while import licences are assigned on the basis of installed capacity, entrepreneurs find it profitable to maintain excess capacity. (Schydlowsky, 1976, reports the results of several Latin American studies showing capital idleness in the midst of capital scarcity, and elaborates the microeconomic reasons why such idleness is privately profitable.) It is the loss due to the fact that there is excess investment in human capital in order to obtain government positions because more highly trained people are required to administer the system and because some (but not all) holders of government positions can expect to supplement their incomes by appropriating a share of the transfers distributed at their discretion. It is also the loss due to the cost of circumventing the legal channels of trade such as the use of headloading and canoes rather than railroads and ocean liners. Note that these losses exist regardless of whether or not the individuals involved pursue illegal activities. They simply invest their time and money to obtain a share of the transfers, and forgo the output they would have obtained in directly productive activities.

The second is the loss of real output arising from the import quota system. If the *net* effect of the two responses is to mop up excess demand pressure, the system stabilizes, and converges on its steady state. Depending on the setting of the government budget regime, however, the equilibrium may involve a perpetual state of unused capacity. Furthermore, if in the face of the unused capacity the standard Keynesian prescription – increase aggregate demand – is applied, the effect is to exacerbate the state of unused capacity. There is also the possibility that the net effect of the two responses is dynamic instability, characterized by self-sustained inflation and growing real output losses. Ultimately the only escape from such a spiral would be to change some feature of the dynamic system.

THE MODEL

A small, less developed country on a fixed exchange rate finds itself in a state of chronic balance of payments deficit. Foreign exchange reserves have been exhausted and consequently changes in reserves can no longer be used by the central bank to maintain the fixed exchange rate. Rather than let the exchange rate go, the authorities have chosen to keep the official exchange rate undervalued, and to employ import licensing to close the external deficit. It is a country such as this that we want to model.

We use the simplest possible version of a dynamic macroeconomic system in order to focus on the essential features of the economy's behaviour under an import quota system. Wherever possible we simplify rather than elaborate. We neglect some important short-run stabilization issues, and some long-run growth issues. Consequently, the model in no way constitutes a general macro model of an LDC.

We use simultaneous difference equations in a log linear functional form. Each variable is a logarithm. The symbol Δ represents first differences and Δ^2, a second difference. Leads and lags are denoted by + and − subscripts. An overbar indicates an exogenous variable. An asterisk indicates the steady state value of an endogenous variable.

On the demand side we focus on the *LM* curve. We abstract from *IS*-curve effects. Not only does this serve to keep the model simple, but it is in keeping with an important feature of LDCs – the absence of organized financial markets. This means, first, that the interest rate does not act as an endogenous equilibrating variable for savers and investors. Rather, the private savings-investment process occurs largely via self-finance.[3] It means also that there is no distinction between fiscal and monetary policy. Money is the only financial asset, and the government can borrow only from the central bank.

The demand for and the stock of real balances are the principal behavioural relationships determining aggregate demand. We write

3 See McKinnon (1973).

$$M^D = bY + P, \qquad b > 0, \tag{1}$$

where

M^D = the logarithm of the demand for nominal money balances;
P = the logarithm of the aggregate price level; and
Y = the logarithm of real output.

Equation (1) says that the demand for real balances is a log linear function of real output, which in this model is the same as real income.[4]

The aggregate price level is an index of domestic and foreign prices:

$$P = w\text{DP} + (1 - w)\overline{\text{FP}}, \qquad 0 < w < 1, \tag{2}$$

where

DP = the log of the domestic price level of non-traded and imported goods;
$\overline{\text{FP}}$ = the log of the world price level converted at the official exchange rate, which enters the price index because it applies to exportable goods; and
w = the share of the domestic price in the price index.

The base money stock is derived from the balance sheet of the monetary authorities (central bank). The monetary base consists of currency plus commercial bank deposits in the central bank. This is identically equal to the sum of: (1) the accumulated government debt held by the central bank (the log of which we denote by GD); (2) advances (i.e., credit) by the central bank to commercial banks (the log of which we denote as C); and (3) the holdings of foreign exchange, which for this discussion we take to be zero.[5] To keep the entire system linear in logarithms we employ a Cobb-Douglas approximation of the money supply identity. This specification is a valid approximation only in the region of the initial values of the money stock components. However, since the steady state will involve a constant level of the money stock and its components, the bias from this specification affects only the disequilibrium path. In our view, the loss of this precision is well worth the gain in analytical simplicity. Hence

$$M^s = \overline{KM} + c\bar{C} + g\text{GD}, \qquad c + g = 1, \tag{3}$$

where c is the share of central bank credit to the commercial banks in the base money stock and $\overline{KM}$ is an exogenous constant.[6] If we make the further

4 In the steady state this specification is equivalent to the usual assumption that the demand for money depends on *permanent* income. As will become apparent below, the steady state income is constant from period to period, but may be at less than capacity output. Hence, in the steady state the use of current income in (1) is equivalent to using permanent income.

5 If the government were to float its debt in foreign capital markets, the monetizing effect of government debt would not change, for it would still enter as an asset of the monetary authorities.

6 An example may help illustrate the extent of the biases. If we let the money stock = 100, consisting of government debt = 20 and credit to commercial banks = 80, then g = .2 and

assumption that the demand for money equals the actual stock in each period, we can drop the distinction between M^D and M^s, simply defining M as the log of the money stock in equations (1) and (3).

The level of the government debt is treated as endogenous in the model. This leaves us the task of explaining that level in a realistic yet manageable way. We begin by noting that government debt changes because there is a fiscal deficit or surplus. We assume that the size of the fiscal deficit or surplus is the outcome of the pre-existing *systems* of government receipts and expenditures, the principal arguments of which are the price level and domestic income. We allow for the fact that the government has discretionary authority in setting the level of the system of government receipts and expenditures. The government budget deficit then is a flow resulting from the initial setting of the tax and expenditure system relative to domestic nominal income.

We hypothesize simply that there is a well-defined government budget regime such that at some nominal income level the deficit is zero, and at nominal incomes above there is a surplus, and at nominal incomes below there is a deficit.

Following Christ (1968), we explicitly allow for the government budget constraint, and in keeping with the LDC context we assume that the entire government budget surplus (deficit) extinguishes money stock (is monetized) because there is no financial sector in which the government could retire its debt (or borrow to finance its deficit). Consequently, the change in the government debt is identical to the government budget deficit. To conform with the log linear specification, we write the flow of new government debt (= the flow of the government budget deficit) as a rate of change of the accumulated government debt.

$$\Delta\text{GD} = \bar{G} - k(P + Y), \qquad k > 0, \tag{4}$$

where $\bar{G}$ is an exogenous constant term. Note further, that in writing (4) we follow Dornbusch (1976) in incorporating an 'automatic stabilizer' or 'fiscal drag' in the government budget regime. Since the level of nominal income acts *negatively* on GD, and hence on the money stock through (3), excess demand pressure that yields higher nominal income tends to set in motion an offsetting force which mops up the excess demand pressure.

Equation (4) also incorporates the role of fiscal policy in setting $\bar{G}$ as the net outcome of the government revenue and expenditure schedules, hence the *level* of nominal income at which ΔGD would be zero. At a nominal income above that level, there is a government budget surplus, reducing government debt and thus creating 'fiscal drag' on the economy. Further, such fiscal drag

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$c = .8$. The Cobb-Douglas form of the money stock identity becomes

$$M^s = 100 = (A)(80^{0.8})(20^{0.2})$$

The constant A, therefore, equals 1.65. If we increase bank credit to 88, the correct (arithmetic) identity would mean the new $M^s = 108$. The Cobb-Douglas form yields the new $M^s = 107.92$.

would continue until the nominal income level adjusts to the point that the government budget is balanced. In other words, while we allow for a potential fiscal policy role, we also observe the government budget constraint in the steady state.

We turn now to the supply side of the model. We take as exogenously given to the economy a well-defined level of capacity output. The economy produces at this level of output *unless* there is some other influence at work. While in the typical dynamic macro model the principal other influence is taken to be the rate of inflation (or price level) relative to the expected rate of inflation (or expected price level),[7] for our purposes we focus on an entirely different source of deviation from capacity output. Specifically, in a situation of substantial and sustained import licensing, we consider the cause of divergence of actual output from potential capacity output to be the use of real resources in search of income transfers rather than to the production of output.

How does such an output loss occur? Consider the difference between an economy in which import quotas are used to close a balance of payments deficit and a freely adjusting economy with either (or both) foreign exchange reserves or the foreign exchange rate adjusting in the face of a balance of payments deficit. In the latter type of economy, the domestic price level (in the long run at least) equals the foreign price level converted at the foreign exchange rate. In the economy employing import quotas, however, the link between the domestic price level and the foreign price level is broken. Consequently the endogenous response to excess demand pressure is quite different in the two economies. In the freely adjusting economy, excess demand pressure is vented on the foreign sector (reserves and/or exchange rate), while in the import-quota economy, excess demand pressure is vented on the domestic market for both non-tradable and imported goods. The foreign price level converted at the fixed official exchange rate, however, remains the price level that recipients of the quotas pay for imports. Consequently, the *difference* between the world price level and the domestic price level at which the quota recipients are able to sell the importables is the unit value of the quota. The total value of the import quota, or more generally the quantitative restrictions (QRS), depends on the unit value and the elasticity of the excess demand for tradables (importables and exportables). Thus, we write

$$\text{QR} = q(\text{DP} - \overline{\text{FP}}), \qquad q > 0, \tag{5}$$

where QR = the log of the premia on import quotas.

In writing (3) and (5) we assume that since the country's foreign exchange reserves have been exhausted, the authorities cannot provide the excess demand for foreign exchange. Furthermore, we assume that the authorities are not attempting to rebuild foreign exchange reserves, and consequently

7 See, for example, Laidler's (1975) model of price and output adjustments using an expectations augmented Phillips curve in a fixed exchange rate economy.

allocate all foreign exchange earnings to import licences which are then used. Thus, the only policy option in equation (5) is to change FP by altering the exchange rate.[8]

The next issue is how economic agents respond to the existence of the rents (i.e., QRS) determined in (5). If the allocation of the rights to a share of the rents is independent of the potential recipients' actions, then clearly the story would stop at this point. If, however, the individual recipient in some way influences the allocation of rents, it seems reasonable to assume that they will do so, but with an eye to the cost of exercising that influence. Specifically, in common with the recent rent-seeking literature (e.g., Krueger (1974)) we assume that potential recipients of the rents will expend real resources seeking rents up to the point that the marginal rent-seeking expenditure is equal to the marginal value of the expected transfer. Consequently, we take the real output losses associated with the restrictive foreign exchange regime to be a function of the size of the expected QRS. Thus, the difference between actual output and capacity output is written

$$\bar{Y}^c - Y = aX_{\text{QR}}, \qquad a > 0, \tag{6}$$

where

X_{QR} = the log of the expected QR, and

$\bar{Y}^c$ = the log of the exogenously given capacity output.

Thus, when expected QRS are zero, actual output equals capacity output, but when $X_{\text{QR}} > 0$, then $\bar{Y}^c > Y$.[9]

The use of *expected* QRS (not actual QRS) in writing (6) is justifiable on the ground that the current period allocation of resources in pursuit of transfers, rather than to production of output, depends on what return agents *expect* to obtain from such an allocation. In principle, the expectation may well differ from the actual.

The appropriate modelling of the expectations formation mechanism is itself a complex and contentious issue. Here we assume that expected QRS are a function of current and past QRS. We thus assume a mechanism whereby agents learn from experience. The rationale for this approach is that such a variety of forces impinge on the size of the QR, and that many of these forces are subject to arbitrary official behaviour. Agents are unable to do any better than to learn from experience. We assume further that they learn slowly, taking each new observation as an additional indication of the underlying

8 This and other policy changes are taken up below. In the interests of keeping the model as simple as possible, however, we do not include in the model the variables necessary to examine the case of foreign borrowing to finance a temporary increase in import licences and an associated temporary decrease in QRS. Such a policy, of course, is only a short-run palliative.

9 We should note that the argument is perfectly symmetrical if the quota restriction is placed on exports – witness the outward smuggling of export crops subject to export controls. However, the sign of q in (5) would be negative.

system. In the long-run steady state, the agents have learned what the system is, and expected QRs are equal to actual. But if some exogenous variable in the system changes, they have to learn again.[10] In short, then, we assume that there is an adaptive expectations mechanism whereby expected QRs adjust in proportion to the difference between actual and expected QRs in a given period.[11]

$$\Delta X\text{QR} = d(\text{QR} - X\text{QR}), \qquad 0 < d < 1 \tag{7}$$

Notice that in writing (6) we have embedded an assumption that agents form their expectations in the current period. This means, when (6) and (7) are combined, that agents' current expectations depend on both the current period's actual QRs and on the expectations formed in the past period. Thus, anything that affects the current QR will have a simultaneous effect on output in (6). An alternative specification would be to have current period expectations formed in the previous period. Thus, the right-hand side of (6) would be written with the lagged value $X\text{QR}_{-1}$, where the time subscript refers to when the expectations are formed. Such a specification, however, adds additional complications to the dynamics without adding any analytical insights, so we do not take up that case here.

This completes the model specification. The model consists of seven simultaneous equations – numbers (1) through (7) – to determine the endogenous variables Y, P, DP, M, GD, QR and XQR.

LONG-RUN EQUILIBRIUM

Solution of the model for the steady state values of the endogenous variables enables us to examine the equilibrium properties of the model. Of particular interest are the steady state values of the price level, the income level, and the size of the QR. In the steady state (denoted by *),

$$Y^* = \bar{Y}^c - a\text{QR}^*, \tag{8}$$

$$\text{QR}^* = q(\text{DP}^* - \overline{\text{FP}}), \tag{9}$$

$$\text{DP}^* - \overline{\text{FP}} = \frac{1}{w - aq}\left(\frac{1}{k}\bar{G} - \bar{Y}^c - \overline{\text{FP}}\right). \tag{10}$$

These results tell us that for a given capacity the equilibrium real output depends on the size of the equilibrium QR. In turn, the equilibrium QR depends

10 It is perhaps worth emphasizing that *if* a particular exogenous variable were to change often enough in a particular way, with the same consequences for the system each time, the adaptive expectations assumed here would no longer apply, for agents would no longer have to learn what the effect of the change would be. They would already have learned from the previous experience.

11 The specification of (7) focuses on the size of the QR. However, from (5) we know that QR depends on both DP and FP. Hence, a more complex expectations mechanism might have separate expectations formation for each of DP and FP. .

on the equilibrium domestic price level relative to the foreign price level (in terms of local currency, converted at the official exchange rate). Finally, the equilibrium domestic price level relative to the exogenously given foreign price level depends positively on the size of the setting of the balanced government budget relative to capacity output.[12] Thus, an attempt to increase the share of government in the economy without a corresponding increase in taxes, means that the deficit is financed by money creation which forces adjustment along the revenue schedule until the government budget is balanced again in the steady state.

The steady state solutions may be illustrated graphically. First, on the demand side, by combining equations (1), (2) and (3), we obtain an equation in DP and Y describing aggregate demand in the steady state. This is drawn as AD in Figure 1. Its slope is the negative of the ratio of the income elasticity of demand for money (b) to the share of domestic prices in the price index, and hence the curve is downward sloping as long as the coefficient b in (1) is positive. Second, on the supply side we combine equations (5) and (6) to obtain a steady state aggregate supply curve (AS). The AS curve is a vertical line where $Y = \bar{Y}^c$ to the point that DP = FP. The AS curve then kinks backward with a slope of $-1/aq$. Finally, we draw a line describing the balanced government budget (GG), whose slope is the reciprocal of the share of domestic prices in the price index.[13]

In the steady state equilibrium, all three curves intersect at a common point. In Figure 1 this is at α, illustrating the steady state solutions of QR*, Y^*, and DP* from equations (8), (9) and (10). The case we have drawn is a steady state where DP* is above $\overline{\text{FP}}$, and Y^* is below $\bar{Y}^c$. Note the crucial role played by the setting of the exogenous policy variables in equation (10) that yielded this result. The setting of $\bar{G}$ (determining, in part, the intercept of the line GG) and the exchange rate (determining the level of DP at which the AS curve kinks backwards), together determine whether or not QRs and the associated output losses emerge. We shall return to this matter below when we examine the effects of changes in policy instrument settings.

12 We are assuming for the present time that the coefficients of the multiplier are such that $w > aq$. We shall see below that this is a necessary condition for stability of the system.

13 The equations for the curves are:

AD curve

$$\text{DP} = \frac{1}{w}[g\text{GD} + \overline{KM} + c\bar{C} - (1 - w)\overline{\text{FP}}] - \frac{b}{w}Y, \tag{a}$$

AS curve

$$\text{DP} = \overline{\text{FP}} - \frac{1}{aq}(Y - \bar{Y}^c), \tag{b}$$

GG curve

$$\text{DP} = \frac{1}{kw}[\bar{G} - k(1 - w)\overline{\text{FP}}] - \frac{1}{w}Y. \tag{c}$$

Note that the relative slopes of AD and GG depend on whether the income elasticity of demand for money (b) is greater than or less than unity. However, this plays no significant role in the model. We simply restrict b to positive values.

The steady state results, of course, refer only to the equilibrium situation. We also want to know whether or not the equilibrium will be achieved, and how the endogenous variables behave if we were to start from a situation out of equilibrium. It is to these questions that we now turn.

DISEQUILIBRIUM BEHAVIOUR

The current value of each endogenous variable is a function of its own past values, and of current and past values of the exogenous variables. Of particular interest are the solutions for DP_0 and Y_0. These are

$$\begin{aligned}\text{DP}_0 = {} & -z_1\text{DP}_{-1} - z_2\text{DP}_{-2} + \frac{1}{ghw(1+d) + w(1+d) - abdq(b+gk)} \\ & \times \{d\overline{KM} + cd\Delta\bar{C} + c\Delta^2\bar{C} + dg\bar{G} + g\Delta\bar{G} - dgkY^c \\ & - (gk + bd)\Delta Y^c - b\Delta^2 Y^c - [dgk(1-w) + abgkq]\overline{\text{FP}} \\ & - [gk(1-w) + abdq + d(1-w)]\Delta\overline{\text{FP}} - (1-w)\Delta^2\overline{\text{FP}}\} \quad (11)\end{aligned}$$

$$\begin{aligned}Y_0 = {} & -z_1 Y_{-1} - z_2 Y_{-2} + \frac{1}{ghw(1+d) + w(1+d) - abdq(b+gk)} \\ & \times \{-acdg\Delta\bar{C} - adgq\bar{G} + adgkq\overline{\text{FP}} + adq\Delta\overline{\text{FP}} + dgkwY^c \\ & + (gk+d)w\Delta Y^c + w\Delta^2 Y^c\}, \quad (12)\end{aligned}$$

where z_1 and z_2 are the coefficients of the characteristic equation.[14] From these we are able to identify the following *impact* effects of changes in the exogenous variables.

1 A reduction in the productive capacity of the economy due to, for instance, a natural disaster such as a crop failure or a flood will result in higher current prices and lower current income.
2 An increase in commercial bank credit ($\bar{C}$) will increase prices and reduce current income.
3 An increase in autonomous net government expenditure ($\bar{G}$) will increase prices and reduce current income.
4 An increase in foreign prices ($\overline{\text{FP}}$) or, what is the same thing, a devaluation, reduces the current domestic price level, and increases current income.

These results, of course, conform with the type of trade-off built into our model. Price and income levels are negatively not positively related here, as in the Phillips curve world. Anything that tends to move the domestic price level

14 These are:

$$z_1 = -\left\{\frac{gkw + w(2+d) - abdq}{gkw(1+d) + w(1+d) - abdq(b+gk)}\right\}$$

$$z_2 = +\left\{\frac{w}{gkw(1+d) + w(1+d) - abdq(b+gk)}\right\}$$

up increases the real output loss, while anything that reduces the price level reduces the real output loss from the QR system.[15]

STABILITY

The necessary and sufficient conditions for the convergence of the endogenous variables on their steady state values are that the roots of the characteristic equation are all less than unity in absolute value. These requirements are met when:

Condition	Sign of $w + d(w - abq) + gk[w + d(w - aq)]$	
$w - aq \gtrless 0$	$\gtrless 0$	(i)
$d(w - abq) + gkw + dgk(w - aq) \gtrless 0$	$\gtrless 0$	(ii)
$4w + 2d(w - abq) + 2gkw + dgk(w - aq) \gtrless 0$	$\gtrless 0$	(iii)

The first condition is simply that the GG curve must be flatter than the AS curve. Thus, condition (i) requires that a reduction in G which would shift the GG curve downwards, reduce DP, and increase Y. Condition (ii) has three terms. The first term is positive if there is positive adaptive expectations ($d > 0$), *and* if the AD curve is flatter than the AS curve ($w > abq$). The second term is positive if there is positive fiscal drag ($gk > 0$).[16] The third term in condition (ii) is positive if there is positive adaptive expectations, positive fiscal drag, *and* the GG curve is flatter than the AS curve ($w > aq$). Condition (iii), for all practical purposes, is redundant if the first two conditions are met.

Violation of the stability conditions is entirely possible.[17] Hence, a country may well be caught not merely in a steady state of chronic underutilization of capacity, but in a vortex of economic atrophy. An initial excess demand situation, whatever its cause – be it expansion of government expenditure to promote economic development or a crop failure – forces a country to adopt an important quota system. Import quota premia appear. Real output losses follow. Excess demand is exacerbated by the real output loss. The inflation and growing output losses feed on each other in a self-perpetuating spiral that continues until a crisis forces a change in the system. Unfortunately, such a spiral is all too frequently the rule rather than the exception in a QR regime.

15 One could incorporate in this model a short-run Phillips curve with the long-run backward-sloping aggregate supply curve. Such a blend, however, while it might lend greater 'realism' to the short-run properties, would make the stability conditions much more complex and would run the substantial risk of obscuring the basic properties of this model.

16 This condition is commonly used in macroeconomic models to ensure stability: see, for example, Dornbusch (1976). The failure of this condition has been used in models of self-generating inflation such as those of Aghevli and Khan (1977), and Dutton (1971).

17 Note, however, that the possibility of instability is *not* simply the result of our adaptive expectations assumption. Even if expectations adapt instantaneously ($d = 1$), it is clear from inspection of conditions (i), (ii) and (iii) that instability is still possible.

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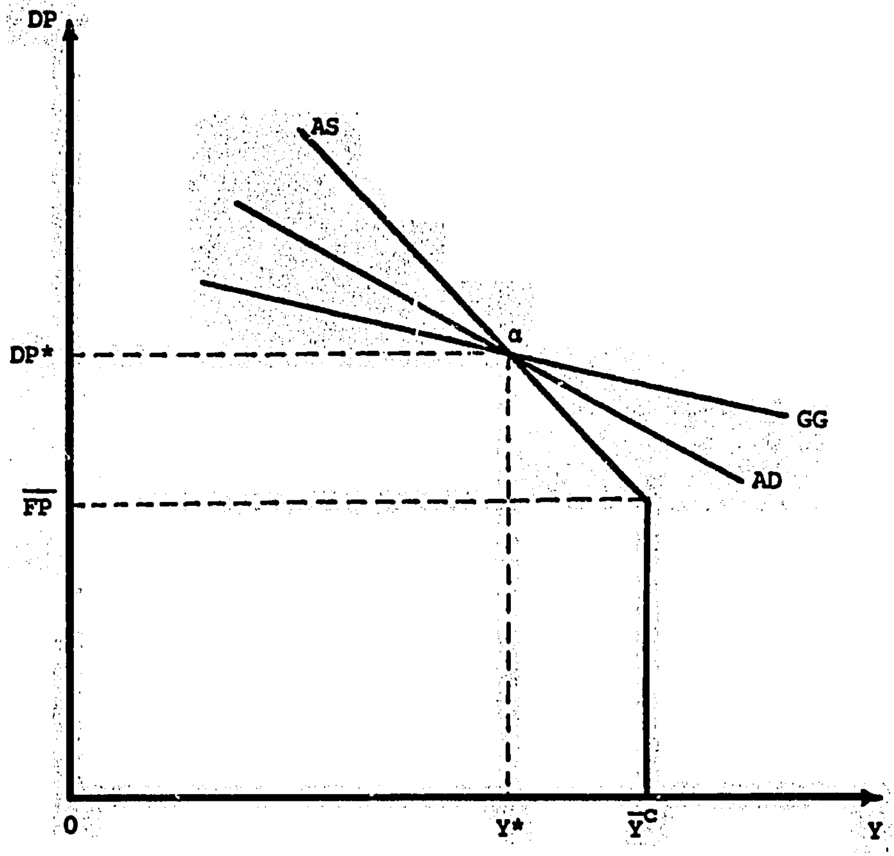

FIGURE 1

POLICY OPTIONS

Three of the exogenous variables may be thought of as corresponding to commonly used policy instruments: the setting of central bank credit to commercial banks ($\bar{C}$), the setting of the net government budget function ($\bar{G}$), and the setting of the official exchange rate at which the foreign price level is converted to local currency ($\overline{FP}$).[18] In this section we examine how changes in these policy instruments affect the domestic price and output levels. (We leave it to the reader to manipulate mentally the curves in Figure 1.)

First, an increase in $\bar{C}$ shifts the AD curve upwards. There is then excess

18 The list of possible policies is not meant to be exhaustive. Most other policies, however, involve some variant or combination of the essential features of these. Prior deposits on imports amount to a reduction in credit to the private sector, decreasing $\bar{C}$. A tariff or import surcharge is equivalent to a *partial* devaluation together with an increase in the government revenue function, thus increasing $\overline{FP}$ and decreasing $\bar{G}$. Note, however, that because a tariff is not a uniform across-the-board change in *all* foreign prices, there may be *relative* price effects which would change the weights in the price index.

demand at DP*. The impact response to the excess demand situation is to force DP upwards, increasing QRS and creating further diversion of output in pursuit of transfers. The increase in $\bar{C}$ has no effect on the balanced government budget schedule GG. In fact, a government budget surplus emerges, retiring government debt to the monetary authorities, and drawing the AD curve back down to the initial position. Thus, the change in credit to commercial banks, which has no effect on the steady state, creates a temporary excess demand situation. The automatic stabilizer feature of the government budget regime mops up the excess and returns the system to its original steady state.

Second, consider a reduction in the value of $\bar{G}$ arising from either a decrease in the government expenditure schedule or an increase in the government revenue schedule. The impact effect is to shift the GG curve downward. This policy change has no direct impact effect on either AD or AS. However, the initial steady state point α is now above the balanced budget line, and the government budget surplus reduces aggregate demand, gradually drawing the AD curve downward until it intersects the new GG curve and the AS curve simultaneously. The long-run effect of a reduction in $\bar{G}$ then is to reduce excess demand and increase the real output of the economy.

The remaining policy instrument is the exchange rate. Consider the effect of a devaluation, which raises $\overline{FP}$. This shifts the AS curve upwards by the size of the devaluation times the ratio of the share of foreign prices to domestic prices in the price index. The devaluation, by reducing the QRS, releases real resources that were formerly spent in seeking QRS, and these resources are now available to produce output. Consequently, the domestic price level (DP*) *falls* as a result of devaluation.[19] This may be one reason (although certainly not the only reason) for the empirical observation in several of the NBER series's country studies reported by Krueger (1978, 145 ff.) that devaluation may have a *negative* effect on the domestic price level.[20]

Because a devaluation reduces QRS, we may be interested in the setting of the exchange rate which would ensure that the economy achieves full capacity output in the steady state. Since this will occur where QR* = 0, from (9) we see that this holds when DP* = $\overline{FP}$. Thus, setting (9) = 0 and solving (8), (9) and (10) simultaneously, we obtain for the value of $\bar{G}$ which yields $Y^* = \bar{Y}^c$. This may be termed the *full capacity budget setting*.

$$\bar{G} = k(\bar{Y}^c + \overline{FP}) \qquad (13)$$

This result tells us that to achieve a steady state of full capacity output we must set $\bar{G}$ so that *the government budget is balanced at the full capacity output valued at international prices*.

This result also points to the fact that the government budget setting and the

19 Algebraically this may be verified by inspection of equation (10) above, noting that $0 < w < 1$, and that for stability $w > aq$.

20 In the same vein, but for rather different reasons, Krugman and Taylor (1978) list several reasons why a devaluation may be contractionary.

exchange rate setting are substitutes for each other in achieving long-run equilibrium of zero excess demand. Thus, if the government budget setting cannot be made more restrictive, and if the QRS are to be eliminated, the exchange rate must be adjusted to satisfy (13). Furthermore, if at the time of a devaluation the common practice of easing up on fiscal restraint is followed, the size of the devaluation necessary to eliminate excess demand must take into account the reduced fiscal restraint. In other words, the *package* of changes in $\overline{FP}$ and $\bar{G}$ to satisfy (13) is likely to be important in achieving long-run balance.[21]

CONCLUSION

In this paper we have developed a simple dynamic model of the macroeconomic behaviour of an economy employing a system of import licensing. The model sheds considerable light on the macroeconomic policy options facing such a country. If it is caught in a spiral of self-generated inflation and growing excess capacity, the policy-makers must first stop the spiral by introducing sufficient fiscal drag to create stability in the system. Second, even if the system is stable, the country may find itself in a chronic circle of QRS and under-utilized capacity. In such a state, the model indicates that the standard Keynesian solution of aggregate demand stimulation by increasing government expenditure would *not* break the circle. Rather, it would exacerbate the situation of excess demand and under-utilized capacity. It does not follow, however, that a policy of commercial bank credit restriction would resolve the difficulties. While having a temporary effect of reducing QRS and stimulating output, it would not affect the steady state DP^* and Y^*. It would merely change the equilibrium *composition* of the base money stock. This is because the automatic stabilizer effect of the government budget regime acts to restore the total money stock to the equilibrium money stock by increasing government debt to compensate for the reduced commercial bank credit.

Finally, because we prefer to avoid trouble in the first place rather than scramble to get out of it when things fall apart, the analysis of this paper provides some simple guidelines for the design of a government budget regime.

- The budget regime should act as an automatic stabilizer.
- The budget regime and the exchange rate should be set, relative to each other, so that the aggregate domestic price level will converge on the world price level.

21 Differences in the short-run effects of devaluation and fiscal restraint are also relevant to the choice of the appropriate combination of $\overline{FP}$ and $\bar{G}$ adjustments. However, since our model abstracts from many of the short-run aggregate supply effects of both fiscal restraint and devaluation, we do not attempt to determine the appropriate short-run choice here. Note, however, that since devaluation also depresses output (see Krugman and Taylor, 1978) it is by no means obvious which instrument – fiscal restraint or devaluation – is preferred in the short run.

15

Obviously such guidelines will not resolve all the problems of achieving macroeconomic balance. They will, however, serve to minimize the macroeconomic difficulties arising from a QR regime.

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