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THEORETICAL AND POLICY ASPECTS
OF DUAL EXCHANGE RATE SYSTEMS

by

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THEORETICAL AND POLICY ASPECTS OF DUAL EXCHANGE RATE SYSTEMS*

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Abstract

When facing persistent balance of payments problems, some countries have resorted to a dual exchange rate system as an alternative to a uniform exchange rate adjustment. Typically under the dual system, certain selected transactions take place at a fixed official exchange rate, while the remaining transactions take place at a more depreciated rate, which is usually determined by market forces. This paper examines certain macroeconomic aspects of the dual exchange rate system, such as the reasons for its adoption, the effects on the balance of payments, and the problems involved in unification of the rates. It is argued that dual exchange rate systems can be useful in neutralizing speculative capital flows and thus keep the external position from deteriorating while adjustments are made in domestic policies. The system cannot, however, be expected to maintain external balance in the long run if the authorities do not change their policy stance. The dual exchange rate system is also not without drawbacks. If significant differences arise between the two rates leakages between the markets can develop, which can be destabilizing. Furthermore, this system can be used to establish a disguised form of taxes and subsidies on international trade, thereby creating distortions in the import and export sectors of the economy.
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I. Introduction

Dual exchange rate systems have been widely used by developing countries facing severe problems in the balance of payments, particularly those experiencing significant capital outflows. Mexico, for example, switched to a dual exchange rate system as part of its response to the balance of payments problems that the country experienced during the early stages of the debt crisis; Argentina adopted a dual exchange rate system soon after the end of Malvinas war, when the country had a large imbalance in its external sector. Under this regime there is a division of the market for foreign exchange. In general, there is one market for most current account operations that take place at the commercial (or official) exchange rate which is usually pegged by the central bank. The second market is essentially geared toward capital account transactions of the private sector where the financial (or parallel) exchange rate is freely determined by market forces.\(^1\)

In many developing countries short term capital flows are one of the most volatile and potentially destabilizing components of the balance of payments. When these countries face a critical situation in their external sector, capital outflows usually tend to reinforce this weakness and contribute to a deterioration of the external sector. If a country adopts a dual exchange rate system under these circumstances, it usually achieves a significant improvement in the balance of payments. As a matter of fact, under this regime capital outflow pressures do not erode central bank

\(^1\) This type of institutional arrangement is certainly not intrinsic to a dual exchange rate system, though is the most commonly used. In other cases both exchange rates are allowed to float (such as in Italy during the early 1970s), or both are pegged (such as in Mexico during 1984).
reserves, instead, they are likely to lead to a depreciation of the financial exchange rate.

Despite the ability of dual exchange rate systems to maintain, at least temporarily, the external situation under control without having to devalue the exchange rate or to move to a flexible exchange rate system,\(^{1/}\) in most cases, this relief is only transitory. To the extent that the external problems were the result of expansionary monetary and/or fiscal policy, the dual exchange rate system can only provide transitory relief to the external sector. If the country does not correct the underlying domestic policies and makes them consistent with equilibrium in the external sector, it will sooner or later confront new problems in the balance of payments.

The experiences with the implementation of the dual exchange rate system indicate that the difference between the value (in terms of domestic currency), of the two exchange rates can be significant. As it can be noticed from tables I and II, the premium on the dual (capital account) exchange rate was always positive. In the Dominican Republic, for example, as the government followed expansionary domestic policies which, in turn, fueled the rate of inflation, the premium started to creep up from 20% in the first quarter of 1981, to over 200% at the time when the system was finally abandoned in January 1985. The premium on the dual rate was also significant in the Mexican case which for most of the period exceeded 30%. The existence of premiums of this magnitude on the capital account exchange rate creates problems regarding the functioning of the system. In particular, it becomes

\(^{1/}\) These arguments are discussed in some detail in Fleming (1971) and (1974); Lanyi (1975) and Kiguel (1985).
usually difficult to enforce the actual separation of transactions between the two markets because exporters would now have an incentive to underinvoice and importers to overinvoice the value of their transactions. To the extent that the government cannot fully enforce the complete separation of the markets, this type of activities will cause a further deterioration in the balance of payments and might eventually force the authorities to abandon this exchange rate regime.

An additional problem arises because the governments sometimes use the dual exchange rate system as a substitute for commercial policy. For example, if a country wants to promote its industrial exports, it can do so by allowing exporters to sell a proportion of its exports earnings at the most favorable (usually the financial) exchange rate, rather than in the commercial market. The International Monetary Fund and the World Bank are in general opposed to the use of multiple exchange rate system, since they tend to create a distortion on relative prices and have undesirable effects for resource allocation. In addition, this system usually requires a costly system of controls. Dual exchange rate systems are just a special case of multiple exchange rates, one in which there are only two exchange rates. This is probably one of the main reasons why the international organizations are usually opposed to dual exchange rate systems and tend to include a target for the unification of the exchange rate market as part of the conditionality on some of their loans.

There are significant similarities between a dual exchange rate system and a regime that imposes tight restrictions on capital flows. It is not unusual for countries experiencing balance of payments problems similar to the ones just described to impose strict foreign exchange controls,
particularly on capital outflows. However, in most developing countries, these restrictions on financial transactions are very difficult to enforce. As a result, though once again these measures can be useful to achieve a short term improvement in the balance of payments, they do not prove effective to halt financial transactions in foreign currency which now take place at an unofficial (sometimes illegal) market at what is usually called the black market exchange rate.¹ When the black market exchange rate is primarily used for financial transactions, the behavior of this exchange rate is likely to be similar to the one of the parallel exchange rate of the dual exchange rate system that we will examine in this paper. Both of them are flexible while their values are primarily determined by portfolio balance equilibrium conditions. The main difference between them is institutional, in one case it is lawful to purchase foreign currency as a financial asset while in the other it is not.² Ghana, for example, has imposed capital controls for more than a decade. During this period though, illegal transactions in foreign currency took place in the black market. As can be noticed from table III, the premium on the black market exchange rate has been significant; in some cases the black market value exceeded the official value of the foreign currency by over


² As a result one would expect the equilibrium black market exchange rate to carry a risk premium over the equivalent equilibrium value of the financial exchange rate.
2,000%. In Ghana foreign currency seems to have been mainly used as a financial asset to hedge against domestic inflation.\(^1\) Given the similarities between this type of capital controls, and dual exchange rate systems, many of the results and policy implications presented in this paper can in general be extended for economies imposing capital controls.

There are interesting links between dual exchange rate systems and some forms of multiple exchange rate regimes. Venezuela, for example, has technically been using a multiple exchange rate system with three exchange rate markets since February 1983. The primary and secondary exchange rates are pegged, while the tertiary exchange rate floats freely. The primary exchange rate is only used for public sector exports and essential imports and for servicing public and registered private foreign debt. The secondary rate has been used for most current account operations and hence it is essentially equivalent to the commercial exchange rate of the dual system. The tertiary exchange rate primarily equilibrates private financial capital flows. One can analyze this arrangement as a special case of a dual exchange rate system in which some of the transactions that take place at the commercial exchange rate are subject to a tariff (subsidy). In the Venezuelan case, the secondary exchange rate is the equivalent to the commercial rate. Imports channeled through the primary market end up receiving a subsidy, while the exports channeled through this market face an export tax. Given the similarities of the two systems, in many cases, the discussion that we will present in this paper regarding the effects of changes in policy variables on the balance of

\(^1\) The work of Pinto (1986) strongly supports this argument.
payments and on the financial exchange rate can be extended for an economy using multiple exchange rate systems.

The purpose of this paper is to examine the characteristics of the external adjustment of the economy and the behavior of the nominal exchange rates and relative prices under a dual exchange rate system in which both markets are officially recognized by the authorities. We will also examine the usefulness of a dual exchange rate system to deal with a balance of payments crisis, and discuss the problems that the adoption of a dual exchange rate system might create. Given the distortions and enforcement problems created by dual exchange rate systems and the opposition they face from the international organizations, the regime is usually adopted on a transitory basis. For that reason, throughout the paper, we consider the dual exchange rate system as a temporary response to serious difficulties experienced in the balance of payments; the final goal of the monetary authorities is the unification of the foreign exchange market. In this respect we will discuss the adjustments in domestic policies that are necessary to insure a successful unification of the markets, and the problems that the monetary authority face regarding the level at which the unified exchange rate is set.

The next three sections will present an analytical discussion of the issue. In section II, for expository reasons, we study an economy under crawling peg\(^1\) experiencing a balance of payments deficit and assume that the system is not sustainable under the prevailing domestic policies. The economy is described using a simple model of the asset approach to the balance of

\(^1\) A fixed exchange rate system can be analyzed as a special case of the present model in which the rate of crawl is equal to zero.
payments similar to the ones developed by Kouri (1976) and Calvo and Rodriguez (1977) for flexible exchange rates. We then present a model of an economy under dual exchange market along the lines of Flood (1979), Kiguel (1984) and Lizondo (1986a) and (1986b). We briefly analyze its structure and discuss the adjustment process as the economy switches from the crawling peg to the dual exchange rate system in response to a balance of payments crisis. In section III we consider in some detail the characteristics of the macroeconomic adjustment in response to various policy changes such as changes in the budget deficit or in the rate of crawl. Since dual exchange rate systems are in general considered temporary regimes, in section IV we address the most important features regarding the unification of the foreign exchange market to a flexible and to a crawling peg exchange rate system.

Finally, section V examines some of the policy implications that emerge from the analysis in the previous sections, and other policy issues that are relevant for the evaluation of the performance of a dual exchange rate system. In particular, we will discuss the conditions under which it would be appropriate for a country to adopt a dual exchange rate system, the problems that tend to arise as a result of its implementation, and a few arguments that can be used in favor of the utilization of the dual exchange rate system mainly as a temporary arrangement.

II. Adoption of Dual Exchange Rate Systems

A. The Crawling Peg System

Consider a small economy under a crawling peg system. Let the nominal exchange rate be denoted by e and the rate of crawl by \( \pi \). Assume that the private sector allocates its wealth between two noninterest bearing
assets: domestic money, denoted by $M$, and foreign money, denoted by $f$. The
nominal stock of private wealth, $W$, is thus defined by

$$W = M + ef$$  \hspace{1cm} (1)$$

Let the fraction of wealth that is allocated to domestic money be
denoted by $\delta$ and let $\delta$ be a decreasing function of the expected rate of
depreciation of the nominal exchange rate, which we assume to be equal to the
actual rate of depreciation $\pi$. Thus,

$$M = \delta(\pi) W \hspace{0.5cm} 0 < \delta(\pi) < 1 \hspace{0.5cm} \delta'(\pi) < 0$$  \hspace{1cm} (2)$$

Using (2) to replace $W$ in (1), we obtain the portfolio equilibrium condition

$$m = \lambda(\pi) f \hspace{0.5cm} \lambda(\pi) > 0 \hspace{0.5cm} \lambda'(\pi) < 0$$  \hspace{1cm} (3)$$

where $\lambda(\pi) = [\delta(\pi) / (1-\delta(\pi))]$, and $m = (M/e)$ is the stock of domestic
money in terms of foreign currency, which for simplicity will be referred to
as the real stock of domestic money. Equation (3) is represented by the ray
OP in Figure 1. Since it is assumed that the central bank will sell or buy
foreign currency at the predetermined exchange rate, and that portfolio
equilibrium is attained instantaneously, the economy is always at a point
along OP. In order to describe the adjustment of the economy along this
schedule, however, we must also examine the evolution of the stocks of
domestic and foreign money (i.e. the stock of total wealth).
Figure 1.
The economy produces and consumes traded and nontraded goods. Output of traded goods, $y_T$, and nontraded goods, $y_N$, are assumed to be fixed. Private sector nominal expenditure is a fixed proportion, $a$, of nominal wealth $W$. A constant fraction $\alpha$ of private sector nominal expenditure is devoted to traded goods, while fraction $(1-\alpha)$ is devoted to nontraded goods. Defining the units of traded goods so that their price in terms of foreign money is equal to one, their domestic currency price is equal to the exchange rate, $e$.\textsuperscript{1/} The domestic currency price of nontraded goods, $p$, adjusts so as to clear the nontraded goods market. Denoting by $c_T$ and $c_N$ the private sector consumption of traded and nontraded goods, we obtain

$$c_T = a \alpha (m + f)$$  \hspace{1cm} (4)$$

$$c_N = (1 - \alpha) a (m + f) r$$  \hspace{1cm} (5)$$

where $r = (e/p)$ is the real exchange rate, defined as the relative price of traded with respect to nontraded goods.

Public sector total expenditure, $g$, and taxes, $t$, are assumed to be fixed in terms of traded goods. Out of total expenditure $g$, $g_T$ is devoted to traded goods and $g_N$ to nontraded goods, with

$$g = g_T + g_N$$  \hspace{1cm} (6)$$

\textsuperscript{1/} This implies that $m$ can also be interpreted as the real stock of domestic money in terms of traded goods.
Equilibrium in the nontraded goods market requires that private sector demand plus public sector demand be equal to output.

\[ [(1-\alpha) a (m+f) + g_N] \; r = y_N \]  \hspace{1cm} (7)

Thus, the real exchange rate \( r \) appreciates with increases in private sector wealth and with increases in public sector expenditure in nontraded goods.

It is assumed that domestic credit creation is used to finance the public sector deficit.\(^1\) Thus

\[ . \; D = e(g-r) \]  \hspace{1cm} (8)

where \( D \) is domestic credit, and a dot over a variable denotes its derivative with respect to time. Using \( R \) to denote the stock of international reserves expressed in foreign currency, the balance of payments is equal to

\[ . \; R = [y_T - \alpha a (m+f) - g_T] - f \]  \hspace{1cm} (9)

---

\(^1\) Some of the results presented in this paper could be sensitive to the existence of interest bearing public debt. Recent works by Ize and Ortiz (1986) and van Wijnbergen (1986) dealing with balance of payments crises show, using the budget constraint of the public sector, that government debt can be crucial to understand a balance of payments crisis.
where the expression in brackets represents the current account balance, and
the other term represents the capital account balance. The change in the
nominal stock of domestic money is given by

\[ \dot{M} = e \dot{R} + D = e [y_T - \alpha (m+f) + g_N - t] - ef \]  \hspace{1cm} (10)

From equation (3) we obtain

\[ \dot{f} = [\lambda(\pi)]^{-1} \dot{\hat{m}} \]  \hspace{1cm} (11)

Using (11) to replace \( \dot{f} \) in (10), and noting that \( m = (M/e) \), we obtain

\[ \dot{\hat{m}} = \frac{\lambda (\pi)}{1 + \lambda(\pi)} [y_T - \alpha (m+f) + g_N - t - \pi m] \]  \hspace{1cm} (12)

Equation (12) describes the evolution of the real stock of domestic money.

Setting \( \dot{\hat{m}} = 0 \), we obtain the condition

\[ \alpha (m+f) = y_T + g_N - t - \pi m \]  \hspace{1cm} (13)

Equation (13) is represented by curve \( \dot{m} = 0 \) in Figure 1. To the left of this
curve \( m \) increases, and to the right of this curve \( m \) declines. Thus, the
economy moves along curve OP until it reaches a stationary equilibrium at A.

---

1/ It is assumed that the central bank does not monetize changes in the
domestic currency value of international reserves arising from changes in
the exchange rate.
where the stock of foreign money and the real stock of domestic money stay constant.

Using (3) and (13), the stationary stock of foreign money, \( \overline{f} \), and the stationary real stock of domestic money, \( \overline{m} \), are given by

\[
\overline{m} = \frac{\lambda(\pi)(y_T + g_N - t)}{\alpha \lambda(\pi) + 1 + \pi \lambda(\pi)}
\]

and

\[
\overline{f} = \frac{[y_T + g_N - t]}{\alpha \lambda[\lambda(\pi) + 1] \pi \lambda(\pi)}
\]

Since in stationary equilibrium the stock of foreign money is constant and the capital account is in equilibrium, the balance of payments is equal to the current account balance. From equations (9) and (13), it follows that in stationary equilibrium

\[
R = t - g - g + m_\pi
\]

The change in international reserves is equal to the public sector surplus (or deficit) plus the proceeds from the inflation tax.

Under the assumptions of the model, as long as the right hand side of (16) is positive or zero, there is no reason for the private sector to doubt that the crawling peg system will be maintained, and thus no balance of

\[1/\] We define a stationary equilibrium as a point at which the real stocks of domestic and foreign money remain constant for a given set of policies. A stationary equilibrium thus defined is not necessarily a long run equilibrium, since a stationary equilibrium may be consistent with declining international reserves, and therefore unsustainable in the long run.
payments crisis need occur.¹/ However, the adoption of expansionary policies would originate an excess demand for foreign exchange, causing a decline in the international reserves of the central bank, and thereby compromising the sustainability of the crawling peg system.

Assume, for example, that the economy is initially on point A in Figure 1, and that at this point the public sector deficit is exactly equal to the inflation tax, so that the balance of payments is in equilibrium. Now, assume that the public sector reduces taxes $t$, so that the $\hat{m} = 0$ curve shifts to the right to $\hat{m}' = 0$. The new stationary equilibrium will be $A'$, and the economy will adjust from A to $A'$ gradually along the OP curve. In the process of adjustment, the real exchange appreciates and the current account turns into deficit due to the increase in real wealth; the capital account also turns into deficit due to the private sector accumulation of foreign money. Faced with this loss in reserves, and a situation that is unsustainable in the long run, the authorities may decide to switch to a dual exchange rate system by letting the financial transactions to be settled in a free market so as to stop the capital outflow. Furthermore, if the private sector anticipates this change in regime, and expects the financial exchange rate to depreciate with respect to the commercial exchange rate, it will shift its portfolio towards foreign money thereby accelerating the capital outflow and producing a balance of payments crisis that forces the authorities into an immediate adoption of the dual system. A more detailed analysis of this process, however, requires

¹/ The reader is referred to Obstfeld (1986a) for a model in which private sector expectations about a sharp change in government macroeconomic policies could lead to a speculative attack, in fact cause such an attack. Thus, in this case there actually is a collapse of an exchange rate regime that would otherwise have been viable.
that we first describe the evolution of the various variables under a dual exchange rate system.

B. Dual Exchange Rate System

We assume that under the dual system all financial transactions take place in a free market, and all the commercial transactions take place at the commercial (official) exchange rate \( e \), which continues crawling at a rate \( \pi \) due to central bank intervention. ¹/ Since the financial exchange rate adjusts so as to clear the free market, net capital flows are zero, and the stock of foreign money stays constant at the level outstanding at the time the dual system is adopted. Denoting this stock by \( f_0 \), and the financial exchange rate by \( x \), private sector nominal wealth is equal to

\[
W = M + xf_0
\]  

(17)

Thus, private sector consumption of traded and nontraded goods is described by

\[
c_T = a (m + sf_0)
\]  

(18)

\[ c_N = (1-\alpha) a (m + sf_o) r \]  

where \( s = (x/e) \) indicates the spread between the financial and the commercial exchange rate, and \( m = (M/e) \).

Equilibrium in the nontraded goods market now requires

\[ [(1-\alpha) a (m + sf_o) + g_N] r = y_N \]  

(20)

The change in international reserves under the dual system is equal to the current account balance since only commercial transactions take place at the commercial exchange rate,

\[ R = y_T - \alpha a (m + sf_o) - g_T \]  

(21)

Since domestic credit creation continues to obey equation (8), the change in the real stock of domestic money follows

\[ \dot{m} = y_T - \alpha a (m + sf_o) + g_N - t - \pi m \]  

(22)

Setting \( \dot{m} = 0 \) we obtain the condition

\[ \alpha a (m + sf_o) = y_T + g_N - t - \pi m \]  

(23)

Equation (23) is represented by curve \( \dot{m} = 0 \) in Figure 2. To the left of this curve \( m \) increases, and to the right \( m \) declines.
Since financial transactions take place at the free market, the composition of the private sector portfolio will depend on the expected rate of depreciation of the financial exchange rate. Assuming perfect foresight,

\[ m = \lambda (\frac{\dot{s}}{s}) sf_0 = \lambda \left[ (\frac{\dot{s}}{s}) + \pi \right] sf_0 \]  \hspace{1cm} (24)

Equation (24) describes the evolution of the spread between the exchange rates, and can be converted into

\[ (\frac{\dot{s}}{s}) = h (\frac{m}{sf_0}) - \pi \hspace{1cm} h' = (1/\lambda') < 0 \]  \hspace{1cm} (25)

Setting \( \dot{s} = 0 \) we obtain the condition

\[ h (\frac{m}{sf_0}) = \pi \]  \hspace{1cm} (26)

Equation (26) is represented by the \( \dot{s} = 0 \) schedule in Figure 2. Above this schedule \( s \) increases, and below this curve \( s \) declines. The system exhibits saddle point stability. It is assumed that in the absence of anticipated disturbances the variables adjust along the convergent path DD, until they reach a stationary equilibrium at E. The stationary equilibrium values of the spread, \( \tilde{s} \), and the real stock of money, \( \tilde{m} \), are

\[ \tilde{m} = \frac{\lambda(\pi) \left[ y_T + g_N - t \right]}{\alpha a \left[ \lambda(\pi) + 1 \right] + \pi \lambda (\pi)} \]  \hspace{1cm} (27)

\[ \tilde{s} = \frac{1}{\tilde{f}_0} \frac{\left[ y_T + g_N - t \right]}{\alpha a \left[ \lambda(\pi) + 1 \right] + \pi \lambda (\pi)} \]  \hspace{1cm} (28)
Figure 2.

\[ s = 0 \]

\[ m = 0 \]

Figure 3
We are now in condition of examining in more detail the transition from the crawling peg system to the dual exchange rate system. As mentioned previously, the adoption of expansionary policies under the crawling peg system produces an appreciation of the real exchange rate, and turns both the current and the capital account of the balance of payments into deficit, as the economy adjusts along a path such as AA' in Figure 1. As the level of international reserves declines, the authorities may decide to switch to a dual exchange rate system in order to stop at least the loss of international reserves arising from capital outflows. The precise consequences of this switch will depend on the decision rule of the authorities and the extent to which the private sector anticipates the change in regime. For example, assume that the authorities decide that they will switch to a dual system when international reserves reach a critical level $R_0$. Furthermore, assume that the private sector knows the authorities decision rule and understands the consequences of the change in regime. Under these conditions, the crawling peg system will end with a speculative attack on the international reserves of the central bank, as in similar situations already analyzed by the literature on balance of payments crisis.  

Recall that we are examining cases that result in dual systems with a financial exchange rate $(x)$ is above the commercial exchange rate $(e)$. Thus, the private sector knows that the financial exchange rate will depreciate with respect to the commercial exchange rate at the time the crawling peg system collapses. Nevertheless, the anticipation of the private sector implies that the financial exchange

1/ See, for example, Krugman (1979), Flood and Garber (1984), Dornbusch (1984b), and Obstfeld (1986a).
rate cannot jump above the commercial exchange rate at the time of the switch in regime, since this would imply an anticipated infinite instantaneous rate of return for holders of foreign money. Instead, the financial exchange rate starts depreciating at a rate faster than \( \pi \) at the time of the switch in regime. This increase in the rate of depreciation causes the private sector to shift its portfolio toward foreign money, thus producing the speculative attack on the international reserves of the central bank that causes the crawling peg system to collapse. This process can be illustrated with the help of Figures 1 and 2. While the economy adjusts from \( A \) to \( A' \) in Figure 1, international reserves decline steadily until the economy reach a point such as \( C \). At that instant, all of the following takes place. The private sector shifts its portfolio towards foreign money, from \( C \) to \( F \), producing a capital outflow that reduces international reserves to the critical level \( R_0 \) thus forcing the authorities to switch to a dual exchange rate system. The magnitude of the speculative attack is such that the level of the real stock of domestic money immediately after the attack is initially, under the dual system, represented by a point such as \( G \) in Figure 2. At point \( G \) the financial exchange rate is equal to the commercial exchange rate \( (s=1) \), and hence there is no jump in the financial rate at that time. From \( G \), the financial exchange rate starts depreciating faster than the commercial exchange rate thus validating the change in the composition of the private sector portfolio. From then on, the spread \( s \) increases while the economy adjusts along the convergent path \( DD \) until it reaches a stationary equilibrium at \( E \).

If the change in regime is unanticipated by the private sector, there is no speculative attack preceding the adoption of the dual exchange rate
system. In this case the economy continues under the crawling peg system past point C with reserves declining steadily. When they reach the critical level $R_0$, the authorities switch to a dual system and the financial exchange rate jumps above the commercial rate and the initial position of the economy under the dual system will be some point such as H in Figure 2. From H, the economy will adjust along the path DD, with the spread between the exchange rates increasing, until the economy reaches a stationary equilibrium at E.

Figure 3 shows the alternative paths for the financial exchange rate. While the solid line describes the evolution of the financial exchange rate when the change in regime is unanticipated, the broken line describes it when the change in regime is anticipated.¹/

The adoption of the dual system, whether anticipated or unanticipated, immediately stops the capital outflow bringing into equilibrium the capital account of the balance of payments. The adoption of the new system, however, does not stop the worsening of the current account of the balance of payments. As the economy adjust towards point E in Figure 2, with s and m increasing, the current account worsens as indicated by equation (21). Furthermore, the real exchange rate continues appreciating as indicated by equation (20). This implies that while the adoption of a dual system may solve the capital flight problem, other policies are needed under the dual system in order to stop completely the worsening of the external situation of the economy.

¹/ Figure 3 shows the logarithms of the exchange rates in the vertical axis, so that a constant slope implies a constant rate of depreciation of the exchange rates.
III. The Economy Under Dual Exchange Rates

The inability of the dual system to eliminate completely the external disequilibrium of the economy can be appreciated by looking at the balance of payments situation once the economy reaches the stationary equilibrium \( E \) in Figure 2. Using (27) and (28) to replace \( m \) and \( s \) in (21), we obtain

\[
R = t - g_T - g_N + \ddot{m} n
\]  

(29)

The change in international reserves is equal to the public sector surplus (or deficit) plus the proceeds from the inflation tax. Since the comparison of (14) and (27) reveals that \( \ddot{m} = \dddot{m} \), equation (29) implies that the balance of payments outcome (in stationary equilibrium) under the dual system is the same that would have resulted (in stationary equilibrium) if the economy had remained under the crawling peg system. Therefore, the adoption of a dual system by itself is only useful as a device to improve transitorily the balance of payments by stopping capital outflows that could rapidly deplete the international reserves of the central bank. This, however, does not solve the basic imbalance between aggregate demand and supply that originated the balance of payments problems in the first place. Other supporting policies are needed in order to make the dual system sustainable in the long run.\(^1\)

\[^1\] Since the stationary equilibrium under the dual system is not sustainable, it can be argued that when switching to a dual system the economy will not adjust along the convergent path \( DD \) in Figure 2 since the private sector will anticipate a change in policy. While we directly assume that the economy adjusts along the convergent path \( DD \) in order to simplify the presentation, this solution is also consistent with the assumption that the private sector expects the public sector to reduce its expenditure in traded goods in order to solve the balance of payments problem. As shown below, changes in public sector expenditure in traded goods do not affect the stationary equilibrium of the economy, and therefore anticipations of such changes do not affect the dynamics of the economy.
Figure 4.

Figure 5
A variety of policies could be adopted to improve the balance of payments situation under the dual exchange rate system. We start by analyzing the effects of an increase in taxes, with the help of Figure 4. Assume that the economy is initially at point \( E \) and that the authorities increase taxes \( t \). Curve \( \delta = 0 \), defined by equation (26), is not affected by the increase in taxes. Curve \( \hat{m} = 0 \), defined by equation (23), however, shifts to the left to \( \hat{m}' = 0 \). The new stationary equilibrium is \( E' \), with a lower spread between the financial and the commercial exchange rates, with a depreciated real exchange rate due to the reduction in \( m \) and \( s \), as indicated by equation (20), and with an improved balance of payments, as can be appreciated by differentiating equation (29) with respect to \( t \).

\[
\frac{dR}{dt} = 1 + \pi \frac{dm}{dt} = 1 - \frac{\pi \lambda (\pi)}{\alpha (\lambda (\pi) + 1) + \pi \lambda (\pi)} > 0 \quad (30)
\]

The increase in taxes has a direct effect that improves the balance of payments, the first term in the right hand side of (30); and an indirect effect that worsens the balance of payments due to the reduction in \( \hat{m} \) which reduces the proceeds from the inflation tax, the second term in the right hand side of (30). Since the direct effect always dominates the indirect effect, the balance of payments improves.

The transition between the initial stationary equilibrium \( E \) and the final stationary equilibrium \( E' \) depends on whether the increase in taxes was anticipated or not. If it was unanticipated, at the time of the increase in taxes the financial exchange rate falls and the economy moves immediately from \( E \) to \( A \), and from there it adjusts along \( D'D' \) towards point \( E' \). The initial fall in the financial exchange rate, and the subsequent decline in \( m \) and \( s \),
reduce real wealth. Therefore, during the transition private sector expenditure declines which causes the real exchange rate to depreciate and the balance of payments to improve. If the increase in taxes was anticipated, the financial exchange rate cannot fall discretely at the time of the change in policy. Instead the financial exchange rate falls from E to B at the time that the private sector learns about the future increase in taxes. Since the increase in taxes has not taken place yet, the economy follows the dynamics determined by curves \( \dot{s} = 0 \) and \( \dot{m} = 0 \), and moves from B to C. The economy reaches C at the time the increase in taxes takes place, and then adjusts from C to \( E' \) along curve D'D'. In this case, the balance of payments improves before the actual increase in taxes takes place. The path of the exchange rates upon an increase in taxes is described by Figure 5. Time \( t_0 \) indicates the time at which the private sector learns about the future change in policy (when the change is anticipated), and time \( t_1 \) indicates the time at which the change in policy takes place. In order to make the figure simpler, it is assumed that the commercial exchange rate is fixed (\( \pi = 0 \)). The case of \( \pi > 0 \) can easily be obtained by increasing by \( \pi \) the slope of each of the curves and interpreting the vertical axis to measure the logarithm of the exchange rates. The solid line describes the behavior of the financial exchange rate when the change in policy is unanticipated, while the broken line describes the behavior of the financial exchange rate when the change in policy is anticipated.

A reduction in public sector expenditure in nontraded goods has the same effects in the financial exchange rate and the balance of payments as an increase in taxes of the same magnitude. However, in this case, there is a
further depreciation of the real exchange rate.\(^1\) A reduction in public sector expenditure that falls entirely on traded goods, on the other hand, improves the balance of payments but has no effect on either the financial exchange rate or the real exchange rate.\(^2\)

Other policies sometimes implemented to improve the external position of the economy under dual exchange rates are modifications in the rules governing the evolution of the commercial exchange rate, which include maxidevaluations and changes in the rate of crawl. As it is apparent from equations (27) and (28) a maxidevaluation has no lasting effect on the real exchange rate, the balance of payments, or the spread between the financial and the commercial exchange rates.

The maxidevaluation, however, has short run effects. A maxidevaluation causes an immediate reduction in the real stock of domestic money. The effects of a maxidevaluation can be analyzed with the help of figure 6. If the maxidevaluation is unanticipated, the economy moves immediately from the stationary equilibrium at point E to a point such as A, with a lower real stock of domestic money. The spread between the exchange rates falls since the financial exchange rate increases by less than the

\(^1\) The reason is the following. A reduction in public sector expenditure in nontraded goods, in addition to causing a decline in private sector wealth, reduces the demand for nontraded goods directly, \(G_N\) declines.

\(^2\) The reason behind this set of results is clear. Since the reduction in \(g_T\) means that the central bank reduces its lending to the public sector, which reduces its purchases of traded goods, the balance of payments improves by the same amount, and no change in relative prices or private sector wealth need occur.
official exchange rate. The real exchange rate depreciates and the balance of payments improves due to the reduction in private sector expenditure arising from the reduction in real wealth. From point A, the economy adjust along DD towards point E. During the process of adjustment the spread between the exchange rates increases, the real exchange rate appreciates, and the balance of payments deteriorates until they return to their initial levels.

When the maxidevaluation is anticipated, the financial exchange rate cannot jump at the time the maxidevaluation takes place. Instead, it jumps at the time the private sector learns about the future maxidevaluation, moving the economy from point E to a point such as B. From there it moves along a divergent path BC. At the time the maxidevaluation takes place the economy is at a point such as C, which has the property that the increase in the commercial exchange rate reduces the spread between the exchange rates sufficiently to move the economy from C to F (on the convergent path DD), without a jump in the financial exchange rate. From point F the economy adjusts along DD to return to the initial stationary equilibrium at E. Notice that when the devaluation is anticipated the balance of payments initially worsens. Figure 7 shows the behavior of the exchange rates upon anticipated and unanticipated maxidevaluations of the commercial exchange rate.

1/ We know that the financial exchange rate increases because the decline in the spread is proportionally smaller than the maxidevaluation, as shown by the following argument. The maxidevaluation that moves the economy from E to A in Figure 6 reduces the real stock of domestic money \( m = (M/e) \) in the same proportion as the increase in the commercial exchange rate (the maxidevaluation) since the nominal stock of money does not change at that instant. However, since point A is above a ray through the origin (curve \( \hat{s} = 0 \)), the decline in the spread is proportionally smaller.
Figure 6.

Figure 7.
A change in the rate of crawl of the official exchange rate, however, has long run effects on the spread between the exchange rates, the balance of payments, and the real exchange rate. Assume that the economy is initially at point E in Figure 8, and that the authorities increase \( \pi \), the rate of crawl of the commercial exchange rate. From equation (23) it follows that the \( \hat{m} = 0 \) curve shifts to the left to \( \hat{m}' = 0 \), while from equation (26) it follows that the curve \( \hat{s} = 0 \) rotates to the left around the origin to \( \hat{s}' = 0 \). The effect of these changes on the stationary level of the spread between the exchange rates is ambiguous; it depends on the elasticity of the demand for domestic money with respect to the expected rate of depreciation of the financial exchange rate.\(^1\) The larger this elasticity, the more likely it is that the spread increases with an increase in \( \pi \).\(^2\)

The effect of the increase in \( \pi \) on the stationary balance of payments is also ambiguous. Differentiating equation (29) with respect to \( \pi \) we obtain

\[ 1/ \quad \text{The elasticity of the demand for money is defined as } \eta = -[\delta'(\pi) \pi/\delta'(\pi)]. \quad \text{(From equation (2)), which is equivalent to} \quad \eta = [\lambda'(\pi)\pi/(1+\lambda(\pi))\lambda(\pi)]. \]

\[ 2/ \quad \text{This result can be obtained by differentiating } \hat{s}, \text{ from equation (28), with respect to } \pi. \quad \text{The reason is the following. Since in stationary equilibrium the rate of depreciation of the financial exchange rate is equal to } \pi, \text{ an increase in } \pi \text{ causes the private sector to shift its portfolio out of domestic money and into foreign money. The larger the elasticity of the demand for money with respect to } \pi, \text{ the larger will be the shift in the composition of the portfolio. Since the stock of foreign money is constant at } f_0, \text{ this shift tends to increase the spread. At the same time, however, the actual real stock of domestic money declines (see Figure 8), which reduces the actual share of domestic money in total wealth and thus tends to reduce the spread. Which of these two opposing effects prevails depends on whether the elasticity of the demand for domestic money is larger or smaller than } \pi/[(\alpha a + \pi) (1 + \lambda(\pi))]. \]
The effect of the increase in \( n \) on the balance of payments depends on the effect of the inflation tax. Since an increase in \( n \) reduces the real stock of domestic money, the inflation tax may either rise or fall depending on the elasticity of the demand for money with respect to the expected rate of depreciation of the real exchange rate. If the elasticity of the demand for money is larger than one, the stationary state balance of payments worsens as a consequence of an increase in \( n \).

The effect of an increase in \( n \) on the stationary real exchange rate depends on its effect on real wealth \((m+sf)\) as indicated by equation (20). The condition for real wealth to increase, and thus the real exchange rate to appreciate, is that the elasticity of the demand for money with respect to expected rate of depreciation of the financial exchange rate be larger than one.\(^1\)

The behavior of the economy in the short run depends on whether the increase in \( n \) was anticipated or not, as shown in Figure 8. If it was unanticipated, at the time of the increase in \( n \) the financial exchange rate jumps upwards and the economy moves immediately from \( E \) to point \( A \), and from there towards the new stationary equilibrium \( E' \). If the increase in \( n \) was anticipated, the financial exchange rate jumps upwards at the time the private sector learns about the future change in policy, moving the economy from \( E \) to

\[
\frac{dR}{d\pi} = \frac{d (\pi m)}{d\pi} = \frac{\pi a[\lambda(\pi) + 1]}{\alpha [\lambda (\pi) + 1] + \pi \lambda (\pi)} (1 - \eta) \geq 0 \quad (31)
\]

\(^1\) This result can be obtained by differentiating \((\pi + sf)\), using equations (27) and (28), with respect to \( \pi \).
B. From there, the economy moves along a divergent path and reaches point C at the time the increase in \( \pi \) takes place. From then on, it adjusts along D'D' towards E'. When changes in \( \pi \) are anticipated, the fluctuations in the financial exchange rate are smaller. The behavior of the exchange rates upon an increase in the rate of crawl of the commercial exchange rate are shown in Figure 9.

IV. Unification of the Exchange Markets

Once the external situation of the economy under dual exchange markets has been stabilized, in the sense of reaching a stationary state with the balance of payments in equilibrium, it is reasonable for the authorities to consider a return to a unified exchange market system. This section examines the effects of unifying the markets into a crawling peg system, and into a floating system.¹/

The unification into a crawling peg system is illustrated in Figure 10. Recall that the dynamics of the economy under a crawling peg system are described by the ray OP and the curve \( \dot{m} = 0 \). The economy is always on the ray OP since this ray represents portfolio equilibrium between domestic and foreign money. The real stock of domestic money increases for points to the left of the \( \dot{m} = 0 \) curve, and declines for points to the right of the \( \dot{m} = 0 \) curve. Thus, the economy always moves along the ray OP towards point A, the stationary equilibrium of the economy under the crawling peg.

¹/ The unification of dual exchange markets, with a crawling and a floating exchange rate, into a unified crawling and a unified floating system is examined in Lizondo (1986b), under the assumption that some current transactions take place in the free market under the dual system. Flood and Marion (1983) discuss the transition from a dual exchange system, in which both exchange rates are floating, to a unified floating system.
Figure 8.

Figure 9.
system. We assume that the rate of crawl of the unified exchange rate will be
equal to the rate of crawl of the commercial rate under the dual system. From
equations (14) and (27), it follows that the stationary real stock of domestic
money will be the same under both systems. Thus, the inflation tax in
stationary state under both systems will be the same, which implies that the
balance of payments in stationary state under both systems will be the same.
In other words, if under the dual system the set of policies was consistent
with long run balance of payments equilibrium, the same set of policies will
also be consistent with long run balance of payments equilibrium under the
crawling peg system. Furthermore, equations (15) and (28), together with (14)
and (27), imply that real wealth, and consequently the real exchange rate,
will be the same in stationary equilibrium under both systems.

In order to examine the short-run effects of the unification it is
necessary to know the position of the economy, in terms of Figure 10, at the
time the change in regime takes place. As mentioned above, the real stock of
domestic money at the stationary state is the same under both systems for a
given set of policies, including public sector expenditure and taxes and the
rate of crawl of the official exchange rate. Thus \( \tilde{m} = (M/e) \) under the dual
system is equal to \( \bar{m} = (M/e) \) under the crawling peg system. In addition,
since we examine cases in which the free exchange rate is above the official
exchange rate under the dual system, \( \tilde{s} > 1 \), equations (15) and (28) imply that
\( f_0 \) is lower than \( \bar{F} \). In other words, the combination \( ((M/e),f_0) \) at the time
of unification is represented by a point such as \( B \), exactly below point \( A \).
The combination \( ((M/X),f_0) \), on the other hand, is represented by point \( C \) on
the ray \( OP_{1/} \)

1/ This follows from equation (3), which defines the ray \( OP \), and equations
(27) and (28), which determine \((M/X)\) since \((M/X) = (\tilde{m}/\tilde{s})\).
Figure 10.

Figure 11.
Assume that the exchange market is unified without a maxidevaluation of the official exchange rate. That is, the initial level of the unified rate is equal to the commercial exchange rate under the dual system. In this case, the real stock of domestic money and the stock of foreign money under the crawling peg system at the time of unification are described by point B. Since B is to the right of the ray OP, the private sector is out of portfolio equilibrium, with a share of domestic money in real wealth higher than desired. Thus, the private sector adjusts its portfolio composition, moving immediately from B to D. The increase in private sector holdings of foreign money has a counterpart decline in the international reserves of the central bank, which sells the foreign money at the unified exchange rate. Thus, the unification of the exchange markets without a maxidevaluation of the exchange rate produces an immediate capital outflow. From point D the economy adjusts along ray OP, with a current account surplus that is only partially offset by a capital account deficit, until it reaches point A at which both accounts of the balance of payments remain in equilibrium.

The initial capital outflow that arises when the markets are unified without a maxidevaluation is due to an excess of holdings of domestic money in the portfolio of the private sector. The underlying reason for this excess of domestic money is that the exchange rate relevant for capital transactions is revalued at the time of the unification, since it declines from \( x \) under the dual system to \( e \) under the unified system. If, alternatively, there is a maxidevaluation that sets the initial level of the unified exchange rate equal to the financial exchange rate of the dual system, the position of the economy at the time of unification would be described by point C on ray OP, and no capital outflow would take place. Thus, a maxidevaluation that sets the
initial unified exchange rate equal to the financial exchange rate at the time of unification would eliminate the initial capital outflow. Clearly, a small maxidevaluation would reduce but not eliminate the capital outflow, while a larger maxidevaluation would produce a capital inflow. For example, a maxidevaluation that places the economy at point $G$ at the time unification would produce an initial capital inflow as the private sector sells its excess holdings of foreign money to the central bank in exchange for domestic money in order to move from $G$ to $H$.

The discussion above assumes that the unification is unanticipated and thus the economy remains at its stationary equilibrium under the dual system until the change in regime takes place. If, alternatively, the unification is anticipated by the private sector, the dynamics of the economy must be reexamined. Assume that the private sector anticipates at time $t_0$ that the exchange market will be unified at time $t_1$ at a rate $z$ and then the unified exchange rate will crawl at a rate $\pi$. We know that there cannot be anticipated jumps in the financial exchange rate, and therefore the financial exchange rate at $t_1$ must be equal to the level at which the exchange rates will be unified, $z$. This implies that the evolution of the various variables depend on the relationship between $z$ and the level that the financial exchange rate would have had at $t_1$ if the spread at $t_0$ remained constant until $t_1$. Assume that if the spread at $t_0$ remains constant the financial exchange rate at $t_1$ is equal to $z$. Then the economy remains at point $E$ in Figure 11 under the dual system until the unification takes place. At that moment the markets are unified at a rate $z$, equal to the financial rate under the dual system. As a result, the economy is at point $C$ in Figure 10 under the crawling peg system, there are no initial capital outflows at the time of unification, and
from C the economy adjusts along OP towards A. Alternatively, assume that if the spread at \( t_0 \) remains constant the financial exchange rate at \( t_1 \) would be lower than \( z \). This would imply an upward jump in the exchange rate at \( t_1 \). Instead, the financial exchange rate jumps upwards at \( t_0 \) moving the economy from E to B in Figure 11. From there, it follows a divergent path until time \( t_1 \), in which it reaches a point such as C where the financial exchange rate under the dual system is equal to \( z \). At \( t_1 \) the exchange markets are unified at the rate \( z \), there is no jump in the exchange rate for capital transactions. The economy under the crawling peg system is initially to the left of point C in Figure 10, and thus an initial capital inflow takes place. After this, the economy adjusts along ray OP towards A. It is now easy to derive the behavior of the economy for the opposite case, in which at the spread prevalent at \( t_0 \) the financial exchange rate at \( t_1 \) would be higher than \( z \). The financial exchange rate would fall at \( t_0 \) moving the economy from E to B' in Figure 11. From there, it would follow a divergent path reaching C' at time \( t_1 \) with the financial exchange rate equal to \( z \). At \( t_1 \) the markets would be unified at the rate \( z \), and there would be no jump in the exchange rate for capital transactions. The economy under the crawling peg system would be initially located to the right of point C in Figure 10, and an initial capital outflow would take place after which the economy would adjust along ray OP towards A.

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1/ Point C in Figure 10 shows \((M/s) = \tilde{m}/\tilde{s}\), where \( \tilde{m} \) and \( \tilde{s} \) correspond to point E in Figure 11. The economy under the crawling peg system is initially to the left of point C in Figure 10 because, in the case, \( m<\tilde{m} \) and \( s>\tilde{s} \) in Figure 11 at the time of the unification.

2/ The economy under the crawling peg system would be initially to the right of point C in Figure 10 because, in this case, \( m>\tilde{m} \) and \( s<\tilde{s} \) in Figure 11 at the time of unification.
The foreign exchange markets could alternatively be unified into a floating exchange rate system. In other words, the central bank could stop buying and selling foreign exchange for commercial transactions, and thus let all the transactions to be settled in the free market. The analysis of this case requires that we first describe the evolution of the various variables under the floating system. This is done in the Appendix.

As we show in the appendix, under a flexible exchange rate system the model exhibits saddle path stability. Moreover, at the stationary equilibrium, the budget deficit is entirely financed through the inflation tax, and the balance of payments remains in equilibrium.

We proceed now the examine the short run effects of unifying the exchange market into a floating system. In order to do so we need to know the position of the economy, in terms of Figure 12, before the unification of the markets. Assuming that the economy was in a stationary equilibrium under the dual system, the position of the economy can be described by points B and C. Since we are analyzing cases in which under the dual system the financial exchange rate is above the official rate, 
\[ \hat{s} > 1, \] equations (28) and (A.12) imply that 
\[ f_0 < f^*. \] In addition, we have shown above that 
\[ m^* = \bar{m}. \] Therefore the combination \((\bar{M}/e), f_0\) is described by point B exactly below A. Point C, on the other hand, describes the combination \([M/x), f_0\). \[ 1/ \] Assume now that the exchange market is unified into a floating system. Since the stock of foreign money is equal to 
\[ f_0 \] and the economy must be on curve FF under the

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1/ This follows from equation (27) and (28), which determine \(M/x\), and equations (A.11) and (A.12), which can be used to define the ray OP in Figure 12.
floating system, at the time of unification the real stock of domestic money adjusts so that the economy moves immediately to point D. Since the nominal stock of domestic money is also given at the time of unification, the variable that adjusts to place the economy in point D is the floating exchange rate v. From Figure 12, since \( (M/x) < (M/v) < (M/e) \), it follows that \( x > v > e \). In other words, the example in Figure 12 shows that at the time of unification the unified floating exchange rate will be between the commercial and the financial exchange rates of dual system. This result, however, does not necessarily hold in all cases. It is possible for the curve FF to be flatter than the ray OP, and thus for point D to be to the left of C. In this case, at the time of unification the floating exchange rate will be higher than both, the commercial and the financial exchange rate of the dual system. What is not possible, is for point D to be to the right of point B. Thus, the floating exchange rate necessarily depreciates with respect to the commercial exchange rate of the dual system. Once in point D the economy adjusts along FF towards A with a capital account deficit, arising from the accumulation of foreign money by the private sector, that is matched by a current account surplus.

The discussion above assumes that the unification was unanticipated, and thus that the economy remained at its stationary equilibrium under the dual system. If, alternatively, the unification is anticipated by the private sector the dynamics of the economy may be different. Assume that the private sector anticipates at \( t_0 \) that the exchange market will be unified into a floating system at \( t_1 \). Since there cannot be anticipated jumps in the exchange rate that applies to capital transactions, the evolution of the economy will depend on the position of the curve FF with respect to the ray OP
in Figure 12. For example, assume that curve FF coincides with ray OP so that point D coincides with point C. Then, the economy remains in stationary equilibrium under the dual system in point E in Figure 13. At the time of unification \((M/x) = (M/x)\), which implies \(x = v\), so there is no jump in the exchange rate that applies to capital transactions. Assume, alternatively, that curve FF is steeper than ray OP, as in the example presented in Figure 12, so that point D is to the right of C. If the economy were to remain at stationary equilibrium under the dual system, at \(t_1\) the exchange rate that applies to capital transactions would fall from \(x\) to \(v\). Since the private sector knows that this would be the consequence, the financial exchange rate instead falls immediately at \(t_0\) moving the economy under the dual system from E to B' in Figure 13. From there, the economy adjusts along a divergent path with \(m\) rising and \(s\) declining so that \((M/x) = m/s\) increases. At time \(t_1\), when the unification takes place, \(M/x\) has risen sufficiently to be equal to \((M/v)\), represented by point D in Figure 12. So, at the time of unification \(x = v\), and there is no jump in the exchange rate. From the previous analysis it follows that if the FF curve were flatter than the ray OP, the financial exchange rate would depreciate at \(t_0\) moving the economy under the dual system from E to B in Figure 13. From there, \(m\) would decline and \(s\) would rise, to that \((M/x) = m/s\) would decline until the unification takes place. At that time, \(x = v\) and there would be no anticipated jump in the exchange rate that applies to capital transactions.

V. Policy Implications

In this section we will discuss some of the policy issues that arise regarding the adoption and performance of a dual exchange rate system. The discussion will be based on the model introduced in section II of this paper and on the relevant empirical evidence and economic literature available.
Figure 12.

Figure 13.
For the purpose of this discussion we will first come back to some of the experiments that we discussed in sections II and III and compare the short run responses under a dual exchange rate system and under a crawling peg. In order to analyze some of the potential advantages of a dual exchange rate system we will once again consider an economy under a crawling peg system that corresponds to the model introduced in section II. We will now examine the effects of an increase in the budget deficit as a result of a reduction in taxes. If the monetary authorities choose to remain under a crawling peg system they will have to devalue the exchange rate. Following the devaluation there will be a reduction in real money balances and total private wealth, and thus an improvement in the current account. Moreover, portfolio balance conditions will result in capital inflows (as agents reduce their stock of foreign private assets) and an increase in international reserves. However, once the economy reaches its short run equilibrium, the private sector will start to accumulate wealth, the balance of payments will deteriorate and the central bank will once again face a loss of reserves, forcing a second devaluation of the of exchange rate. In this case a clear pattern emerges in which the central bank repeatedly devalues the exchange rate in order to avoid a balance of payment crisis.

As we already mentioned, another way to avoid the sudden loss in reserves is to unexpectedly adopt a dual exchange rate system. Under this system capital flow pressures have no effect on international reserves and hence the authorities do not face the risk of a rapid balance of payments crisis. This permits the central bank to finance the current account deficits
for a longer period without being forced to devalue the exchange rate and without confronting a balance of payments crisis.

Under both exchange rate arrangements the only enduring solution for the balance of payments problems is a reduction in the budget deficit. The choice between moving to a DERS and continuing under a crawling peg will depend on the way in which the authorities evaluate the costs of multiple exchange rates against the costs of repeated maxidevaluations, and on the extent to which they perceive each of these policies to be sustainable during the transition to lower deficits. The capital account will always remain in balance under dual exchange rate system. Under the crawling peg, as the central bank repeatedly makes maxidevaluations, credibility problems could arise causing capital outflows and a collapse in the balance of payments. In this case, the economy can clearly maintain a better grip on its external situation through the adoption of a dual exchange rate system.

The existence of discrepancies between the public and private sector perceptions regarding policy actions provides an additional setup in which dual exchange markets appear as a viable option to shield international reserves. In order to illustrate this issue we will consider once again an economy under a crawling peg system which is currently under internal and external balance. For expositional purposes we will further assume that the private sector anticipates a future maxidevaluation of the exchange rate which the authorities have no intention of making effective. Under the crawling peg system, the higher expected rate of return on foreign assets will lead to an increase in the demand for foreign currency and hence capital outflows. If the magnitude of these outflows is sufficiently large, the economy may deplete its stock of international reserves and face a balance of payments crisis. To
restore the level of reserves the simplest viable option open to the monetary authorities is to uphold the expectations of the private sector and devalue the exchange rate. After the maxidevaluation, the initial portfolio allocation will be restored. There will be capital inflows, but the economy will experience a reduction in real wealth and end up with a current account surplus. In summary, unfounded expectations of a maxidevaluation can lead to a balance of payments crisis, an unintended maxidevaluation of the exchange rate and a current account surplus.

If the economy had been instead under a dual exchange rate system capital outflows would obviously not have occurred and the country could have avoided the maxidevaluation. As we showed in section IV, in response to the expected devaluation of the commercial exchange rate, there is an immediate depreciation of the financial exchange rate. Initially, there is an increase in real wealth and a deterioration in the current account. As long as agents continue to expect a maxidevaluation of the exchange rate the spread will be rising. If the central bank does not uphold the expectations and maintains the commercial exchange rate within the pre-established path, agents will eventually change their expectations, the financial exchange rate will fall, and there will be a sudden reduction in the spread. In this case, the central bank is able to deal with the "crisis" without having to devalue the exchange rate and without experiencing (except for the initial increase in the current account deficit) problems in the balance of payments.

Despite its ability to avoid a deterioration in the balance of payments situation in the presence of capital outflows, the adoption of a dual exchange rate system is likely to create distortions in the economy and to have significant short term effects on relative prices and on aggregate
demand. Since the dual exchange rate market is usually implemented at times when there are capital outflows, there is in general an initial depreciation in the financial exchange rate. The existence of different prices for what is essentially the same good (foreign currency) should be viewed as a distortion. In order to understand the characteristics of the distortion that arises under the dual exchange rate system it is necessary to determine the value of the equilibrium (or shadow price) exchange rate. When there is complete separation between current account and capital account transactions and the equilibrium value lies in between the two exchange rates the adoption of the dual exchange rate system amounts to a subsidy on imports and on the sale of foreign financial assets and a tax on exports and capital outflows (or purchase of foreign assets).1/

The tax subsidy structure could become much more obscure in countries where the type of transactions allocated to the two markets is much more cumbersome. For example, in some countries (such as the Dominican Republic) a specifically chosen group of imports went through the commercial exchange market, another selected number of exportables were channeled through the financial exchange market while foreign exchange transactions related to all other imports and exports were traded in varying proportions in the two markets. In this case it is clear that the dual exchange rate system was not only used to improve the negative effects that capital flows could have on the overall balance of payments, but also, though in a covert way, as a substitute

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1/ This aspect of dual exchange rate systems is formally shown in Adams and Greenwood (1985). Their main conclusion is that a division of the foreign exchange market similar to the one discussed in sections II and III is equivalent to a tariff on financial transactions.
for commercial policy. In Mexico, for example, the dual exchange rate system initially embodied a subsidy on interest payments for private and public external debt and on certain priority imports and a tax on oil exports. While later arrangements maintained this basic structure, the system became more complex as the government became more selective in channeling exports and imports through the two markets. A similar experience took place in Venezuela following the implementation of a three-tier exchange rate system in February 1983. This system embodied a subsidy for the payment of previously contracted public and private debt and for essential imports. There was also an implicit tax on oil exports and to a lesser extent a subsidy for intermediate inputs.

The dual exchange rate system is also likely to affect the behavior of the economy as a result of the dynamics of relative prices. As a matter of fact, fluctuations in the price of nontradable goods and in aggregate demand are likely to be greater under the dual exchange rate system than under the crawling peg. To illustrate this effect, we will consider the model for an economy under a crawling peg system introduced in section II. The economy is currently experiencing internal and external balance. Let's suppose that unfounded expectations of a maxidevaluation developed, thus increasing, for a given level of wealth, the desired holdings of foreign money. Moreover, we now assume that the corresponding portfolio allocation represents a sustainable short run equilibrium in the sense that the central bank has enough reserves to accommodate the adjustment in private portfolios. Notice that in this case, total wealth remains unchanged and hence there are no
effects on aggregate demand. Moreover, there are no further effects on the price of nontradables or on the balance of payments. The only change is a loss in central bank reserves equal to the increase in the private demand for foreign money.

On the other hand, when the economy is under dual exchange rates, unfounded expectations of a maxidevaluation will have real effects. As we already discussed in section III, in response to the expected future devaluation of the commercial exchange rate, the financial exchange rate immediately depreciates leading to an increase in wealth, and in the demand for nontradable goods, to an appreciation of the real exchange rate, and a balance of payments deficit. As time passes and agents become convinced that the authorities will not devalue the exchange rate, there will be a sharp appreciation of the financial exchange rate, a reduction in wealth and in the relative price of the nontradable good, while the balance of payments will show a surplus. In this case, it is clear that we will observe fluctuations in relative prices (which do not take place under the crawling peg system) and in the balance of payments, as well as large variations in the premium on the financial exchange rate.

This discussion brings to the forefront the transitory character of a dual exchange rate system. Though the dual exchange rate system was shown

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1/ For simplicity we are ignoring the effects on tax revenues that can result from changes in the inflation tax.

2/ The sustainability of dual exchange rate systems is discussed at some length in Frenkel and Razin (1986). In an intertemporal framework which includes the budget constraint of the government and the private sector they show that "there is a limited set of policy options consistent with a permanently viable dual exchange rate system." (p.3)
to be useful to shield international reserves from capital outflows when the country faced a balance of payments crisis, the system might not perform as well when the capital outflows do not threaten a depletion of reserves. In fact, it was just argued that in the presence of some temporary disturbances (such as speculation in the foreign exchange markets) the economy will not experience real effects under a crawling peg system, while there will be large fluctuations in the premium on the financial exchange rate and to a lesser extent in aggregate demand, the balance of payments and in relative prices under the dual exchange rate system. From a policy making perspective, it seems that the choice of a dual exchange rate system should be constrained to situations in which the economy faces short term severe problems in the balance of payments.

The likely development of leakages between the two markets when the spread is sufficiently large provides an additional reason for using the dual exchange rate system as a transitory regime. In the model presented in section II, we not only assumed that current account and capital account transactions are fully separated through the dual exchange rate system, but we implicitly assumed that the authorities are able to fully enforce this arrangement. Whenever, the spread between the exchange rates is sufficiently large, there is an incentive for economic agents to "arbitrage" by diverting transactions that are supposed to be effected in one market to the other.

The most common way in which economic agents switch transactions between the two markets is through over invoicing and under invoicing. For example, if, as is usually the case, we assume that the value of the financial exchange rate exceeds the value of the commercial exchange rate, importers, by overstating the total value of their purchases abroad, are able to buy foreign
In this appendix we extend the model developed in section II for a flexible exchange rate system. The change in the nominal stock of domestic money under the floating system is equal to the change in domestic credit since international reserves remain constant. Thus,

\[ M = v(g - t) \]  

(A.1)

where \( v \) is the floating exchange rate. The change in the real stock of domestic money, \( m = M/v \), is therefore equal to

\[ \dot{m} = (g - t) - m \left( \frac{\dot{v}}{v} \right) \]  

(A.2)

Portfolio equilibrium now requires

\[ m = \lambda \left( \frac{\dot{v}}{v} \right) f \]  

(A.3)

Equation (A.3) can be inverted to obtain

\[ \frac{\dot{v}}{v} = h \left( \frac{m}{f} \right) \quad h' < 0 \]  

(A.4)

Using (A.4) to replace \( \dot{v}/v \) in (A.2) we obtain

\[ \dot{m} = (g - t) - m \cdot h \left( \frac{m}{f} \right) \]  

(A.5)
Equation (A.5) describes the evolution of the real stock of domestic money under the floating system. Setting \( \dot{m} = 0 \) in (A.5), we obtain

\[
(g - t) = m h (m/f) \tag{A.6}
\]

Equation (A.6) is represented by curve \( \dot{m} = 0 \) in Figure 12. Below this curve \( m \) rises, while above this curve \( m \) declines. Notice that curve \( \dot{n} = 0 \) in Figure 12 could also be positively sloped. However, as long as \( n < 1 \) we would obtain a saddle path as the one presented in Figure 12. We assume that this condition holds.

The change in private sector holdings of foreign money must be equal to the surplus or deficit of the current account of the balance of payments, since the overall balance of payments must be in equilibrium under the floating system. Thus,

\[
\dot{f} = y_T - \alpha (m + f) - g_T \tag{A.7}
\]

Setting \( \dot{f} = 0 \) we obtain

\[
y_T - g_T = \alpha (m + f) \tag{A.8}
\]

Equation (A.8) is represented by curve \( \dot{f} = 0 \) in Figure 12. Above this curve \( f \) falls, while below this curve \( f \) increases.

Equilibrium in the nontraded good markets requires that private plus public sector expenditure be equal to output. Thus,
\[(1 - \alpha) a \ (m + f) + g_N \ r = \ y_N \]  \tag{A.9}

The system formed by equations (A.5) and (A.7) exhibits saddle-point stability. The economy always moves along the convergent path \( FF \) towards the stationary equilibrium \( a \). From equation (A.6), the rate of depreciation in stationary equilibrium must be such that the budget deficit is financed by the inflation tax. Assuming that before the unification the balance of payments was brought into equilibrium, the inflation tax under the dual system \( \tilde{m} \pi \) was equal to the public sector deficit. This means that when the stationary equilibrium is unique, the same pair \( (\tilde{m}, \pi) \) would be the stationary state solution for the floating system. In other words, in stationary equilibrium under the floating system the real stock of domestic money, denoted by \( m^* \), will be equal to \( \tilde{m} \) (the stationary state real stock of domestic money under the dual system), and the rate of depreciation of the floating exchange rate \( (\tilde{\psi}/\psi) \) will be equal to \( \pi \) (the rate of crawl of the commercial exchange rate under the dual system). Thus, in stationary equilibrium

\[(\tilde{\psi}/\psi)^* = \pi \]  \tag{A.10}

\[
m^* = \frac{\lambda (\pi) [y_T + g_N - t]}{\alpha a [\lambda (\pi) + 1] + \pi \lambda (\pi)} \]  \tag{A.11}

Using (A.10) and (A.11) together with (A.4) we obtain

\[f^* = \frac{[y_T + g_N - t]}{\alpha a [\lambda(\pi) + 1] + \pi \lambda (\pi)} \]  \tag{A.12}
where $f^*$ is the stationary state stock of foreign money under the floating system. Equations (28) and (A.12), together with (27) and (A.11), imply that real wealth, and consequently the real exchange rate, will be the same under stationary equilibrium under both systems.
REFERENCES


Table 1

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Source: IFS, World Currency Book.
### Table IV

**VENEZUELA**

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Source: IFS
Some Recent DRD Discussion Papers

186. The Determinants of Savings in Developing Countries: Theory, Policy and Research Issues, by Arvind Virmani, August 1986.


197. Import Compression and Export Performance in Developing Countries, by M. Khan and M. Knight, October 1986.


