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SPECIAL EXCHANGE RATES FOR CAPITAL ACCOUNT TRANSACTIONS

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ABSTRACT

The exchange rate consistent with high employment and a balanced current account are rarely the same as the rates consistent with asset market equilibrium at interest rates policy makers wish to prevail. Whenever rates are freely determined the assets markets prevail and the results may be hard to live with, or at least harder than would appear to be the case of special exchange rates and capital controls which are used to isolate home assets markets from the world capital market. This paper investigates the motive for choosing capital controls and special exchange rates, the principal forms and some of the experience. We look in particular at three institutional arrangements:

- dual exchange rates separating current and capital account transactions,
- black or parallel markets for foreign exchange,
- exchange rate guarantees, dollar deposits and dollar-linked domestic debt.

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SPECIAL EXCHANGE RATES FOR CAPITAL ACCOUNT TRANSACTIONS*

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The exchange rate consistent with high employment and a balanced current account are rarely the same as the rates consistent with asset market equilibrium at interest rates policy makers wish to prevail. Whenever rates are freely determined the assets markets prevail and the results may be hard to live with, or at least harder than would appear to be the case of special exchange rates and capital controls which are used to isolate home assets markets from the world capital market. This paper investigates the motive for choosing capital controls and special exchange rates, the principal forms and the some of the experience. We look in particular at three institutional arrangements:

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*This paper is part of a research project on exotic exchange rate arrangements conducted for the World Bank. I am indebted to members of the division on Trade and Adjustment Policy for helpful discussions and suggestions.

These are the main forms of coping with the problem of asset market integration and spill-over effects from asset markets to the rest of the economy. They amount to either restricting the traffic or to applying special rates that attempt to isolate assets markets from too close a link with the rest of the world or too close a link with the home economy, whichever appears easier to break.

1. The Motive for Isolating Assets Markets.

The starting point for any discussion of special arrangements for assets markets is the high mobility of capital. Assets markets are linked internationally, they are linked in terms of risk and expectations-adjusted returns and that linkage is tight and rapid. That implies severe restrictions on the scope for policies; policies must be such as to give asset holders the world rate of return or else they will seek to leave with one of three results: under a fixed rate the stock of reserves (if the rate were fixed) will be depleted, under a flexible rate the exchange rate will be depressed to a level where home returns are again in line with those abroad means, or because of these alternatives policies will be aligned with the requirements of assets markets rather than with policy priorities.

The problem can be easily understood by looking at three key linkages between an economy and the rest of the world. These are respectively the linkages between interest rates, the linkages of prices, and the impact on employment of real exchange rates:

(1) $\quad i = i^* + \dot{e}/e + R(\ )$

(2) $\quad P = f(eP^*)$

(3) $N = N(eP^*/P)$

where i and i^* are home and foreign interest rates, e/e is the rate of depreciation and R is the risk premium. P and P^* are home and foreign prices and N is employment. Equation (1) states that home interest rates are equal to those abroad, adjusted for anticipated depreciation and the risk premium that emerges from political and exchange rate risk. This equation can be viewed as the constraint on financial policies: In integrated asset markets the home interest rate must be set high enough or else the currency will come under attack. Equation (2) points out that domestic prices will be affected by the exchange rate: a collapse of the exchange rate would surely cause a steep increase in home inflation. Equation (3) emphasises that a change in the (real) exchange rate will influence employment. In the longrun no doubt real depreciation will raise employment, in the shortrun predominant distribution effects may make the effects run the other way.

These three linkages then mean that asset markets are internationally integrated and that this integration places restraints on policy or that lack of attention to these constraints as implications for inflation and for employment. Moreover, because the reactions are strong and rapid the issues are of foremost importance. They cannot be disregarded because reserves are often in short supply and deep depreciation of the exchange rate can be politically catastrophic, but running the world to the tune of assets markets is at best questionable. Hence the interest in institutional arrangements that delink assets markets and free policies for what are perceived to be the "true" priorities.

There is any number of examples of countries where massive exchange rate movements or capital flows became an inconvenience or more for policy makers. For example, in the U.S. in 1980-85 the steep dollar appreciation,

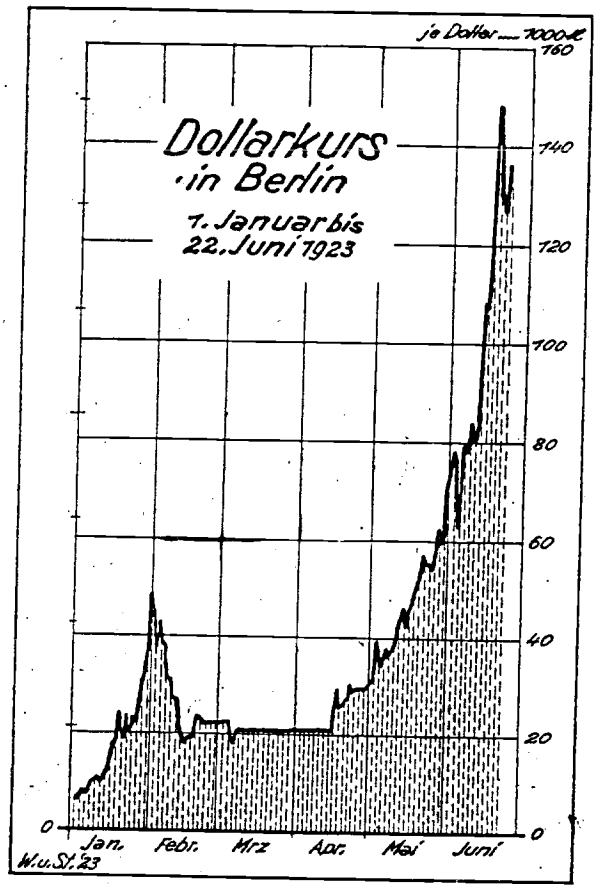
for safe haven reasons or because of interest rates, led to overvaluation and an unprecedented shock to manufacturing. Very soon there was talk of renewing the import surcharge, that had already been tried to cope with the overvaluation of the early 1970s, and even a renewal of interest equalisation taxes came into discussion.

But, of course, the shock can also run the other way when capital flight leads to a collapse of the exchange rate and, as a result, an inflation explosion. The best example would be the onset of the German hyperinflation in the 1920s. The "balance of payments school" at that time saw in the confidence-induced collapse of the exchange rate the source of domestic inflation which in turn led to budget deficits that validated the escalating rates of price increase. Figure 1 shows the exchange rate of the dollar in Berlin in early 1923. During February-March the government manages to stabilize the rate and while this is going on prices are stable. Then a loss in confidence, related to the reparations problem, ensues and in a few weeks the exchange rate increases sevenfold (!) thus leading into hyperinflation as the exchange rate depreciation via prices, wages and the widening budget deficit opens all mechanisms for uncontrolled price rises. There is any number of examples, though perhaps less extreme, about the macroeconomic problems emerging from a collapse of confidence in assets markets. There are even more episodes of cases where asset market integration simply foreclosed policy options because it was felt that the consequences for reserve losses or the exchange rate were inacceptable.

The importance of the capital market integration issue has been highlighted in the aftermath of the debt problem. Much of the accumulation of Latin American external debt reflects, in fact, the financing of capital flight. This is strikingly the case for Argentina, Mexico and Venezuela

Figure 1

The Exchange Rate Collapse in Hyperinflation Germany



where the amounts are extraordinarily large. The consequence is this: real wages are being cut to gain competitiveness and hence trade surplusses to finance the debt service that is the counterpart of capital flight.

If wage earners and external asset holders are not one and the same the social implications are shocking. Table 1 shows the liabilities of U.S. banks (not counting banks in other countries, currency and other forms of wealth) to Latin America:

Table 1 Liabilities of U.S. Banks to Latin American Residents
(Billion $ U.S., End of Period)

	Latin America	Mexico	Venezuela
1980	24.1	4.5	3.1
1982	43.0	8.0	8.4
1984	55.9	12.7	10.5

Source: Federal Reserve Bulletin, various issues.

2. Delinking Assets Markets.

There are various ways in which assets markets can be delinked. The first is to decide on the scope for capital controls. One possibility is to maintain the international integration of capital markets given by equation (1) above, but to delink domestic assets markets, at least partially, from the home economy. The means would be a special, separate exchange rate for asset market transactions. Free capital mobility at a fixed or flexible special rate, separate from commercial transactions, would be a way of separating equation (1) from (2) and (3). Having more than one exchange rate makes it easier to live with the exchange rate consequences of capital market integration.

An alternative is to opt against international integration of assets markets by instituting formal capital control. This may take the form of a prohibition of holding of foreign assets by residents except for special authorisation. The difficulty is to make that prohibition stick: black markets will emerge or capital flows will take place implicitly in current account transactions. In response the government may be tempted to quasi-legalize (this is a peculiarly Latin notion) parallel markets for foreign exchange or create domestic equivalents in the form of a dollar denominated internal debt or dollar deposits. The effectiveness of capital controls determines here how successfully a government can split markets and isolate the home economy.

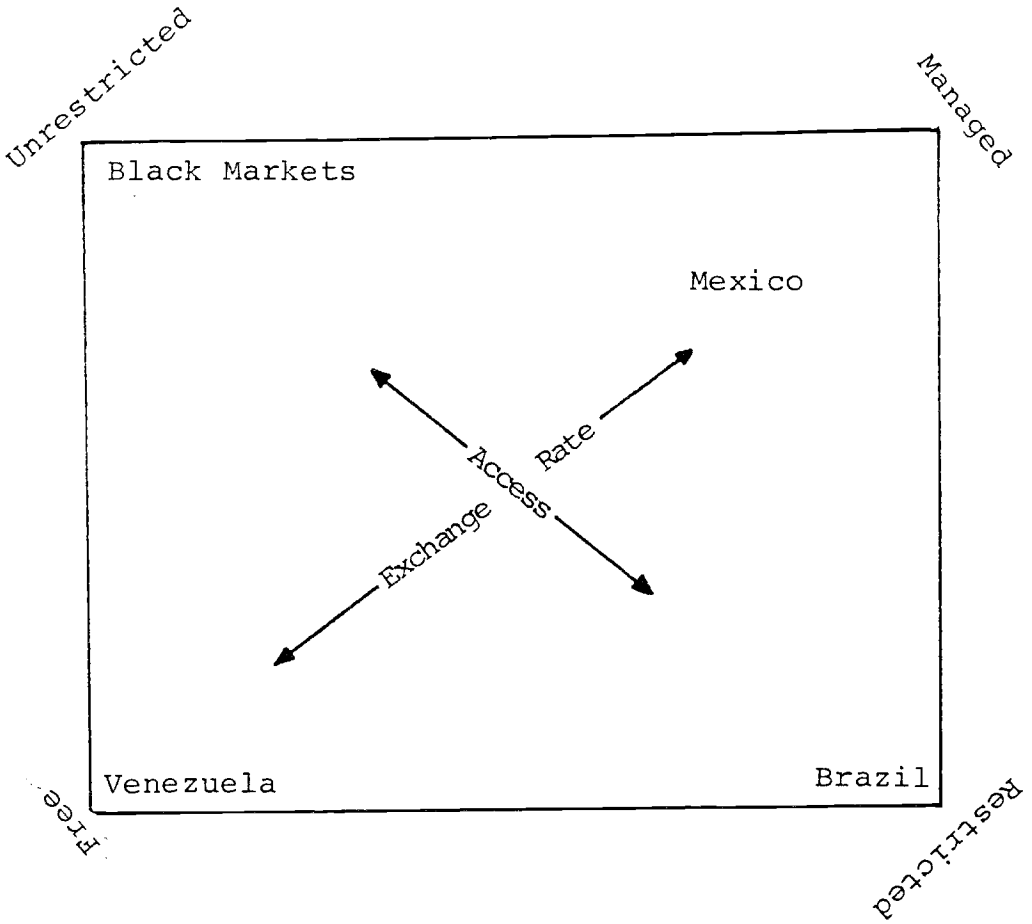
Figure 2 helps classify some of the modalities: a two way classification distinguishes whether the rate for asset market transactions is managed (fixed as a special case) or freely determined and whether access to the exchange market for capital account transactions is restricted or completely open. Institutional arrangements fall somewhere in the box. For example, Mexico has a heavily managed rate with unrestricted access, while Venezuela also has unrestricted access but considerably less intervention. Brazil restricts the access completely for the official market where the rate is managed. Even the black market has a somewhat managed rate and an implicit restriction of access for corporations. In the remainder of the paper we study some of these systems to see what particular problems they solve and what problems they create.

3. Dual Exchange Rates.

In this section we discuss dual exchange rates: a situation where a significant part of commercial transactions is conducted at a uniform fixed

Figure 2

Alternative Exchange Market Arrangements



rate while capital account and selected commercial transactions go at another rate, a free or managed rate. The interesting features in this regime, setting it aside from the discussion of multiple rates in the previous section, arise from the capital account. The fact that the foreign exchange market is opened to capital account transactions establishes an immediate linkage between financial markets, and specifically expectations prevailing in financial markets, and the exchange rate or the level of intervention. By separating financial transactions from commercial transactions the authorities attempt to maintain the advantages of a managed, stable exchange rate for commercial transactions that is not upset by the vagaries of the capital account.

Dual rates are typically established by countries that feel they cannot or do not wish to prohibit capital account transactions. In circumstances where the macroeconomy is highly unstable capital flows will be very volatile and potentially massive. If foreign exchange reserves are limited a country has essentially two choices: set a uniform rate that is so undervalued that there can only be an expectation of appreciation and hence no threat of capital flight. Alternatively the rates must be split so that the capital account rate can depreciate to whatever level required to make the public willing to hold the existing stock of domestic assets. Each alternative has serious drawbacks: the over-depreciation of a uniform rate represents a dramatic shock to real wages and inflation. It poses the question why real wages should be cut merely to stabilize the expectations of wealth holders. But the free rate on capital account also raises questions: will it distort allocation as some transactions slip into the free market, will it be stable in the absence of intervention and will there ultimately be exchange rate unification?

Figure 3 makes some of these issues more concrete by showing the Mexican example. The Figure shows three different rates: the Mexican "controlled" rate that applies to essential imports, most exports and debt service. The "free rate" applies to all other transactions, in particular capital account transactions and tourism. The third rate is the New York quotation for cable transfers corresponding to the external free market. Figure 4 shows the premium of the N.Y. rate over the "controlled" rate in Mexico. The huge differential up to January 1983 corresponds to the early experimentation with exchange control of various kinds. Since then the levels and differentials have been established in a manner that the Central Bank increasingly has come into a position of managing the two rates.

Mexico has moved to a dual, managed rates with a moderate differential. Venezuela's case shown in Figure 5 by contrast does not show a settling down yet. Following a long tradition of fixed exchange rates the government abandoned pegging the rate except for essential imports in March 1983. Specifically capital movements were to be conducted in a free foreign exchange market. The premium shown in Figure 6 reached a level, using monthly averages, of more than 260 percent. The volatility of the free rates and the extent of discrepancies between free and controlled rates pose important issues for resource allocation and macroeconomics.

A Model of the Dual Market: We now present a sequence of models of dual markets, building up progressively the key linkages between asset markets and the macroeconomy. We start with a model of full employment, a constant commercial exchange rate, purchasing power parity, rational expectations and only two assets: domestic money and foreign nominal interest earning assets.[1]

[1]For detailed discussion and derivations see Appendix I.

Figure 3
Mexican Exchange Rates
(Pesos per $ U.S.)

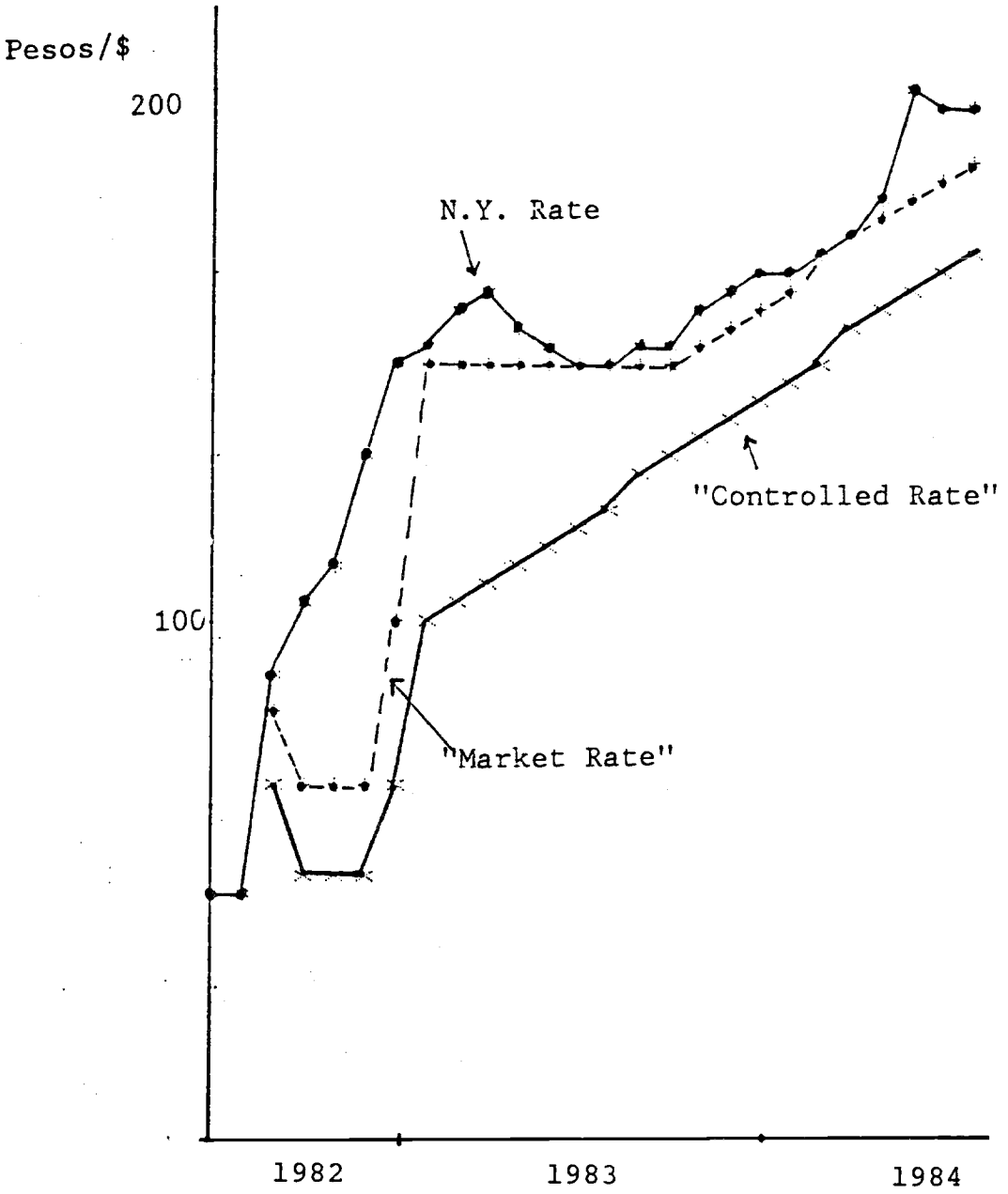


Figure 4

The Mexican Free Market Premium
(N.Y. Rate as Percent of Official)

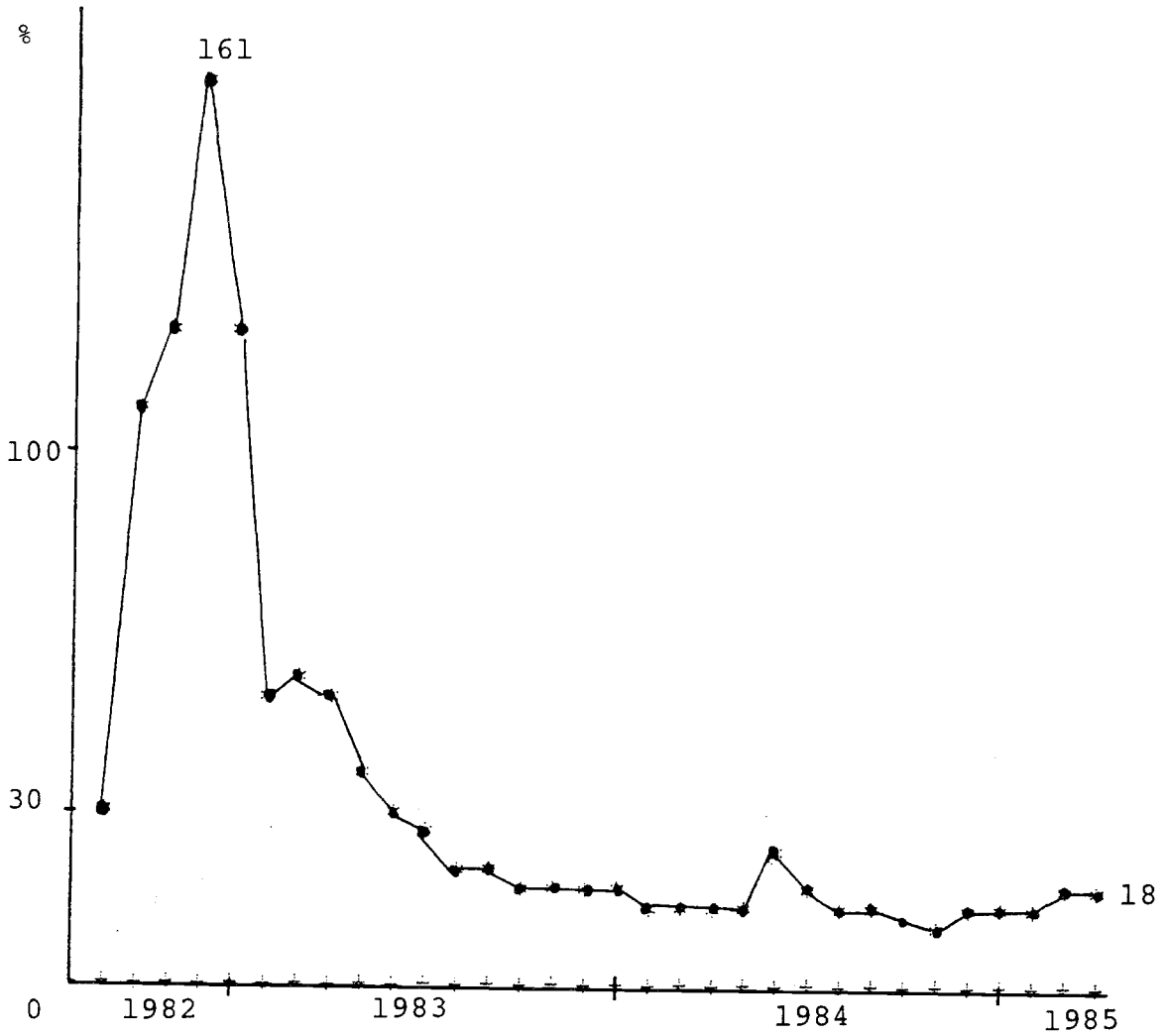


Figure 5

Exchange Rates in Venezuela
(Bolivars per $ U.S.)

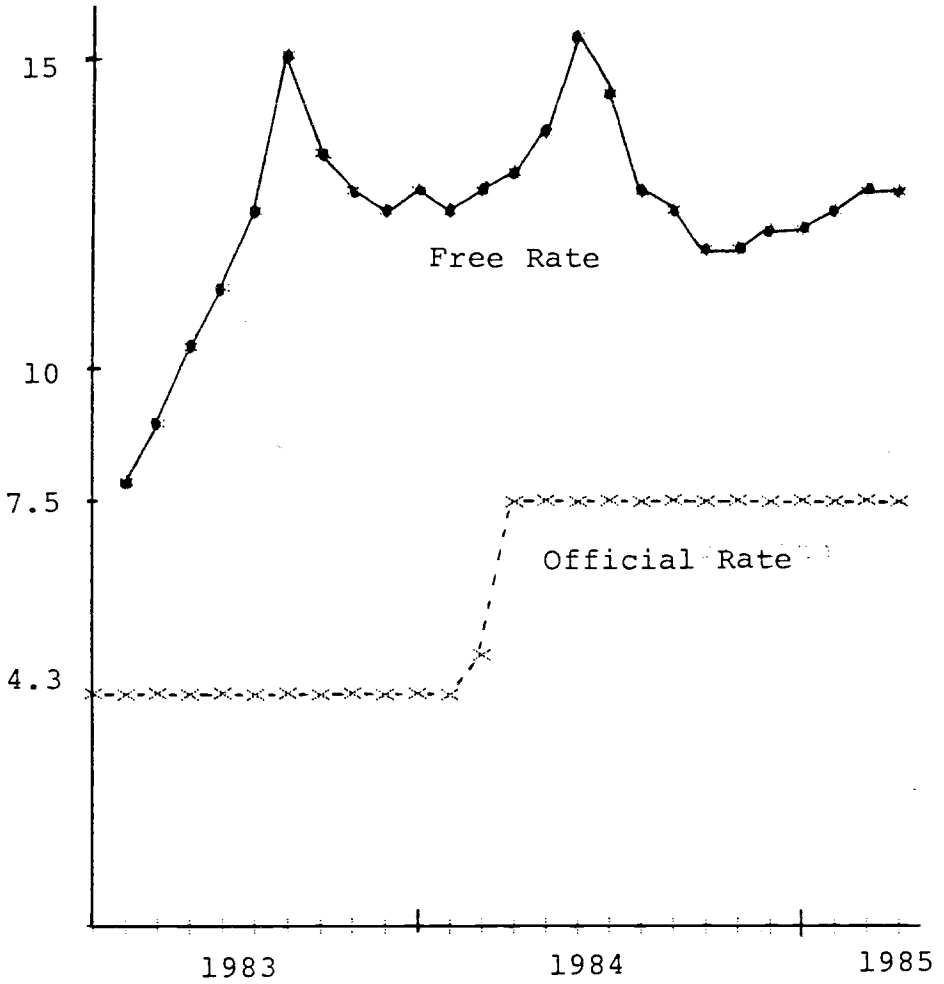
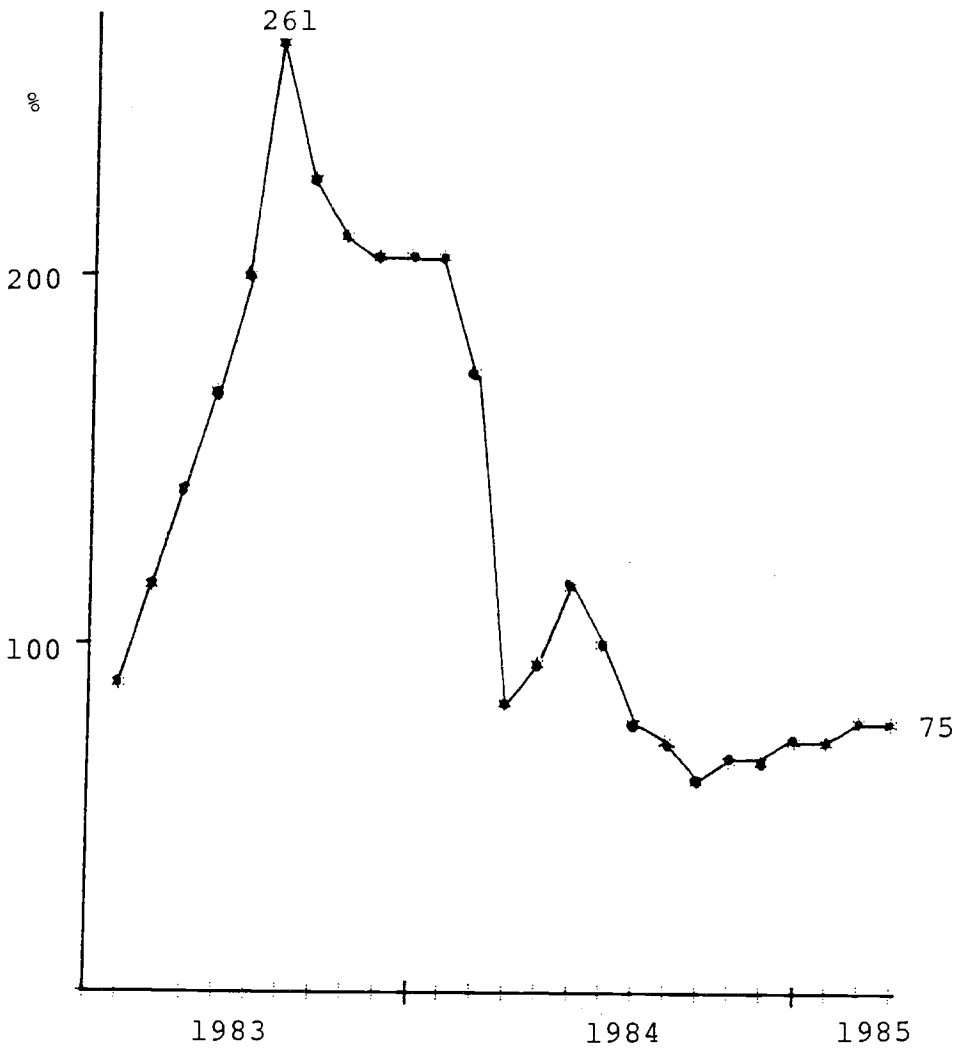


Figure 6
Venezuela: Free Market Premium
(As Percent of Official Rate)



In the asset market the desired ratio of money to foreign assets, M/eK depends on the rate of return on foreign assets which equals the rate i* plus the expected rate of depreciation, $\dot{e}/e$. The term K denotes the stock of foreign assets and eK their value in home currency:

(4) $\quad M/eK = L(i^* + \dot{e}/e) \quad , \quad L' < 0$

or, inverting the equation,

(4a) $\quad \dot{e}/e = h(M/eK) - i^* \quad , \quad h() = L^{-1}, \qquad h' < 0$

Here e represents the capital account exchange rate which is assumed flexible and is used to value foreign assets. Alternative models have been presented by de Macedo (1983), Lizondo (1984), and Flood (1978) where external asset accumulation plays a significant part. We focus here on domestic events rather than on the effects on the home economy of foreign interest earnings. But the simplification is one of convenience, it does not fundamentally alter the analysis. Since we are not focussing on foreign asset accumulation we assume that i*=0. Hence the value of K remains constant over time except for government intervention.

The trade balance equals the excess of income over spending. We assume away investment and take taxes to be zero. Private saving is assumed proportional to the excess of planned real asset holdings, w, compared to actual holdings, (M+eK)/x, with an adjustment for anticipated capital gains on real balances and on foreign assets. Here x denotes the exchange rate for commerical transactions and hence with PPP also the price level. Letting λ be the rate of depreciation of the commercial rate, $\lambda = \dot{x}/x$, we have the following expression for the real trade balance:

(5) $\quad B = S - g = v(w-m-k) + \lambda m + (\lambda - \dot{e}/e)k$

$\qquad m = M/x, \qquad k = Ke/x$

where g denotes real government spending which is financed by domestic credit creation.

The rate of increase in real balances, $\dot{m}/x$, is determined by real government spending plus the real trade surplus. Thus the change in the real money stock can then be written as:

(6) $\qquad \dot{m} = v(w-m-k) + (\lambda-h(m/k)k$

The other dynamic equation of the model describes the evolution of the real capital account rate, $q \equiv e/x$, or equivalently the premium of the capital account rate over the commercial rate:

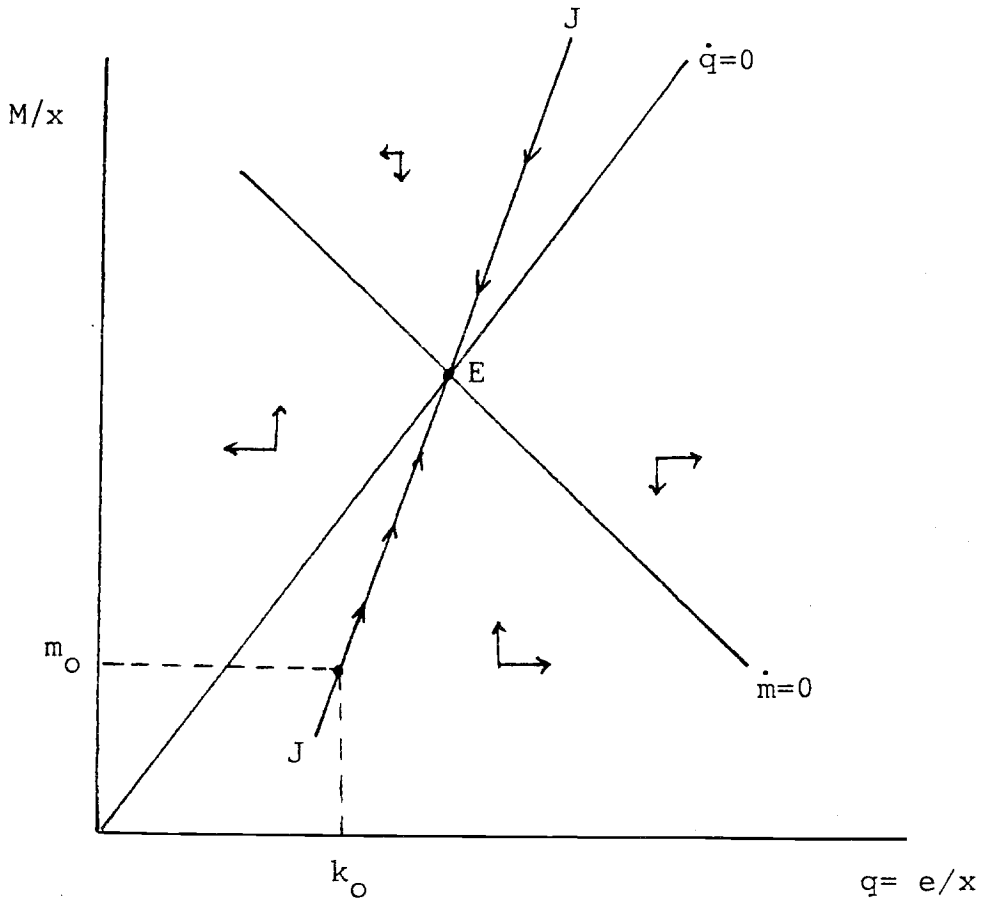
(7) $\qquad \dot{q}/q = h(m/k) - \lambda$

Figure 7 shows the schedules along which respectively real balances are constant and the real capital account rate are constant. The arrows indicate the dynamics and, as is conventional in perfect foresight models of this structure, there is a unique stable trajectory JJ. From any initial stock of real balances, say m_o, the economy converges to the longrun equilibrium at E along the path JJ.

The model is closed by a specification of the rate of depreciation of the commercial rate. It is assumed that the commercial rate depreciated at a rate λ that is sufficient, in the steady state, to generate the inflation tax revenue with which to finance the given level of real government spending.

Given any intial real money stock such as m_o there is a unique equilibrium on JJ and hence a value of foreign assets k_o. With a given value K/x that means we have a unique capital account rate at which the assets markets clear. Over time the system evolves to the steady state equilibrium at E. If real balances initially are low the path is characterized by rising real balances and a rising real value of foreign assets or an increasing

Figure 7



Adjustment With A Dual Rate

premium of the capital account rate relative to the commercial rate, e/x. Thus if assets are intially low there will be trade surplusses that cause the real money stock to be rising as the central bank intervenes to sustain the commercial rate. At the same time the real value of foreign assets is rising due to capital gains.

In the steady state saving is zero, trade is balanced and the real money stock is constant. The premium of the capital account rate is constant, as the rate depreciates at the same pace as the commercial rate. The seignorage supported by depreciation finances real government spending. The equilibrium dynamics in Figure 7 is shown for a given rate of depreciation λ of the commercial rate. It is interesting now to ask how an increase in the rate of depreciation will affect the premium.

It is shown in Appendix I that an increase in government spending requires an increase in the rate of depreciation, given inelastic real money demand. Increased depreciation of the commercial rate will immediately depreciate the capital account rate or increase the premium. Even in the steady state the premium will increase. The result is intuitively obvious once we recognize that in the steady state the capital and commercial rate depreciate at the same rate. An increase in the rate of depreciation of the capital account rate shifts asset holders from money to foreign assets. Given the fixed supply only an increase in the premium can bring about that rebalancing of portfolios. The increase in the premium due to an increased rate of crawl of the commercial rate was demonstrated by Lizondo (1984).

Expectations: Having sketched the effect of a current increase in the rate of government spending we look next at the impact of a shift in expectations. Starting in the steady state the public anticipates that the government will increase real spending, deficit finance and depreciation at some known future

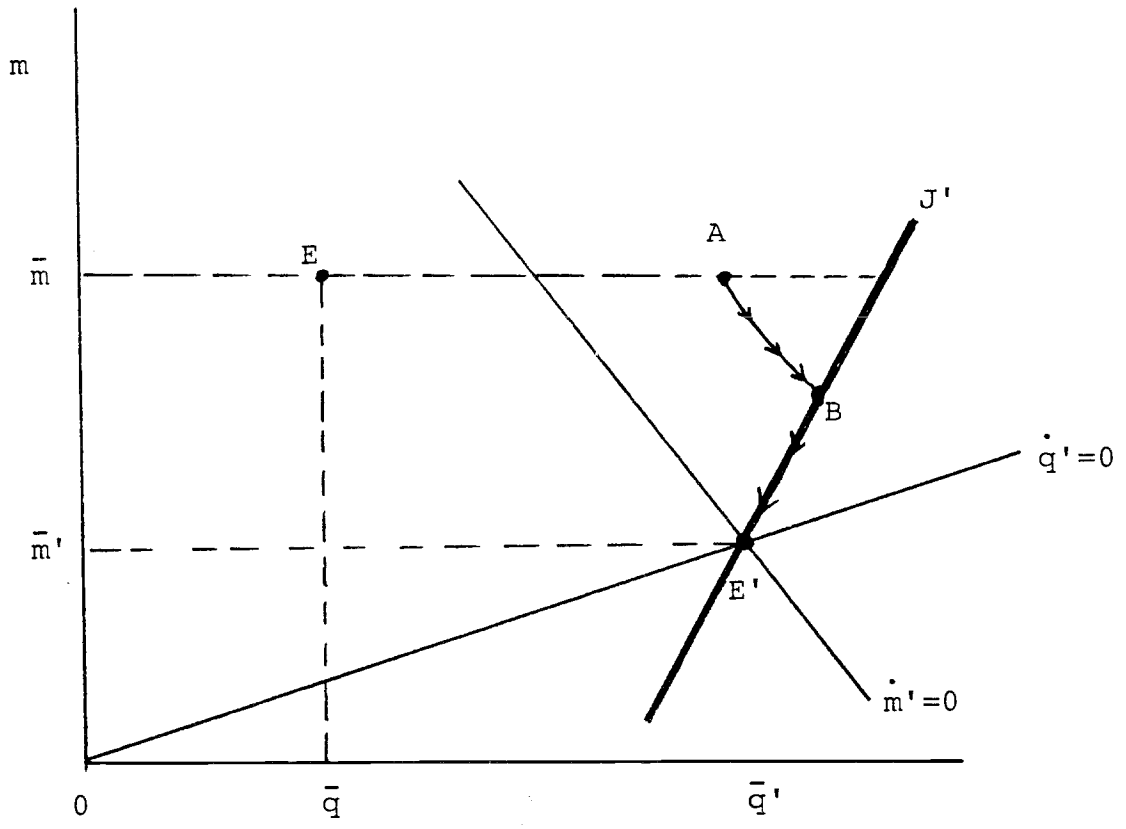
date. What is the path of adjustment to this disturbance? This is an interesting question if we want to explain the large fluctuations in the data for the dual market premium.

In Figure 8 we show the initial equilibrium at point E. As shown in Appendix I an increased steady state rate of depreciation shifts the schedules. The $\dot{q}=0$ rotates clockwise and the $\dot{m}=o$ schedule shifts out and to the right. The new steady state is at point E' with an increased steady state premium $\bar{q}'$.

Now consider the adjustment process. At the moment the expectation of higher future government spending develops there is an immediate portfolio shift from money to foreign assets leading to a jump in the premium from point E to a point like A. The extent of this instantaneous depreciation depends among other things on how proximate the shift in monetary policy is. If it were almost immediate the jump is virtually all the distance to J'J'. Now at point A the dynamics are still governed by the initial monetary policy and accordingly with the high level of the premium the value of foreign assets is high relative to real balances. This can only be an equilibrium if the rate of depreciation of the capital account rate has risen and hence is now higher than the that of the commercial rate. Accordingly the system moves in the direction of point B. The economy arrives at B precisely at the time when the more rapid rate of depreciation of the commercial rate is introduced. From there on the movement is along J'J' with some decline in the premium.

Note that we can determine the rate of depreciation of the capital account rate from the conditions of monetary equilibrium as shown in (4a). With a declining ratio of real balances to external assets along the path ABE' the rate of depreciation of the capital account rate must be rising

Figure 8



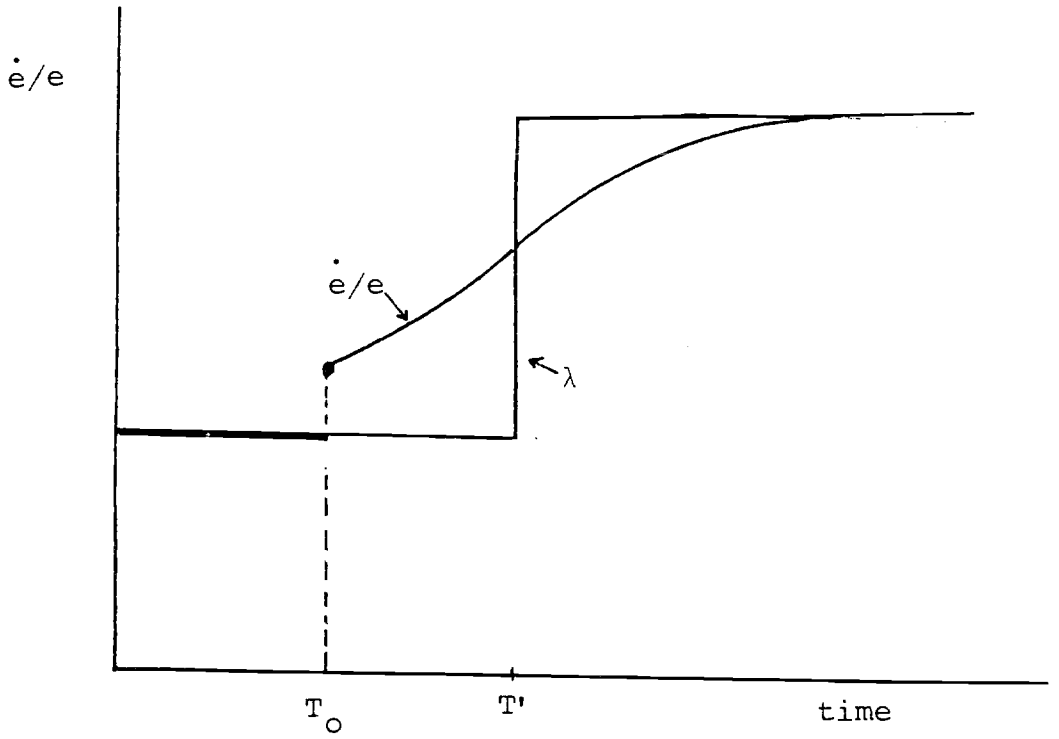
An Anticipated Increase in
Government Spending

throughout. Figure 9 shows the path of the rate of depreciation of the capital account rate over the path. The times T_o and T' correspond to the initial shift in expectations and the implementation of the new policy. Up to time T_o we have equal rates of depreciation: $\dot{e}/e = \lambda$. Then at the time expectations shift there is a jump in the premium and in the rate of depreciation of the capital account rate. Since the rate of depreciation of the commercial rate is still unchanged the premium is further appreciating until time T'. Now the commercial rate depreciates at the higher rate λ' in excess of the capital account rate, implying some real appreciation. Over time the two rates converge to depreciate at the same pace.

It is interesting to comment also on the trade balance in the adjustment process. As long as monetary policy is unchanged, following the shift in expectations, there is a trade deficit. The deficit arises because the increase in the premium raises wealth relative to target and the real capital gains lead to dissaving. Furthermore, with declining real balances seignorage starts falling short of the initial level of spending thus further deteriorating the trade deficit. The expectation of a shift in policy will therefore lead to trade deficits and potentially difficulties in sustaining the path of depreciation.

We have considered increased real government spending and deficits financed by money creation. The increase in spending can be viewed as either spending on goods and services or transfers abroad by the government, including government debt service. In this broader interpretation the exercise is of interest because it suggests that any disturbance that leads to increased deficit finance will provoke an increase in the premium. Moreover, since we were looking at real government spending in excess of real tax collection we can also think of the exercise in terms of a loss of real

Figure 9



An Increased Rate of Crawl

government revenues due to reduced taxes or a loss of external resources. In this perspective the expectation of a decline in real oil prices, for example, would increase the state enterprise and government budget deficit, imply deficit finance and hence forces a depreciation of the capital account rate.

Consider now the effect of intervention. Assume the central bank sells foreign assets or foreign exchange in exchange for domestic money. We can decompose the impact of such an intervention into two separate effects. The private sector now holds increased foreign assets at each level of the premium. With unchanged real balances the premium would immediately decline to move the economy back to portfolio balance at point E. But real balances in private hands have declined as part of the open market operation, just as they would have in the case of a devaluation. The decline in real balances takes the economy to the south-west of point E, on JJ, in Figure 7. Accordingly the premium declines proportionately more than the increase in foreign assets. Intervention in the capital account market thus clearly is effective in depressing the premium. Interestingly it also gives rise to a trade surplus via the wealth effects of the decline in the premium.

Extensions: The basic model has served to show the linkage between financial policies and the premium in the dual market. But the analysis needs extension if we are to see some macroeconomic complications coming from dual markets. So far the dual rate exerts effects only on the value of wealth and hence on income and spending. But in fact the more important channels operate presumably via relative prices and domestic interest rates. These, too, are linked to the free rate and the important point to recognize is that financial disturbances such as we saw above have macroeconomic

effects via the free exchange rate. Furthermore these effects occur simply on the basis of expectations.

We now consider the case where some goods--non-essential imports and non-traditional exports--are transacted along with capital account transactions in the free market. Essential imports, say food and materials, and traditional exports are conducted at a fixed rate. Since part of the goods now are traded at the free rate, the aggregate price level is influenced by both the commercial and the free rate. Moreover the premium of the free rate now sets the relative price of those goods entering via the free market. Instability of asset demands, policies, and expectations now introduces instability of the price level and of relative prices.

Moreover, if the dual rate regime is chosen to defend the foreign exchange reserves this purpose may in fact not come to be satisfied. Financial disturbances that lead to an increase in the premium draw resources into the premium market on the supply side while leading consumers to substitute toward the controlled market. A rise in the premium associated with a "flight from domestic money" still will lead to reserve depletion, except that it now is channelled via the enlarged trade deficit at the regulated rate.

We maintain a maximum of the previous structure. The specification of asset markets remains unchanged. But now we need to separate the markets for the two clases of goods, maintaining for each the PPP assumption since some points can still be made in that setting. Let foreign prices be unity so that e and x denote the prices of goods that trade at the official and free rate respectively. The aggregate price level, P, now is an expenditure weighted function of these two prices. The premium and the relative price of goods trading in the free market continues to be denoted by q.

(8) $P = P(e,x)$, $q = e/x$

In the previous equations P now replaces x as the deflator for assets.

To simplify matters we dispense with depreciation of the regulated rate, i.e. $\lambda = 0$. Let B and J now denote the trade balances at international prices of the regulated and free market.

It is important to recognize that now the free market no longer involves finding the price at which an existing stock of foreign assets, K, is held. The market now can, via the current flows, generate an accumulation or decumulation of foreign assets. The same effect would arise (uninterestingly) from interest on foreign assets, but the effect considered here is more central. Specifically we look at the possibility of trade being diverted from the official market to the free market: the central bank faces larger trade deficits and loses reserves, while in the free market a trade surplus leads to accumulation of foreign assets. We can think of the implications of shifting transactions to the free market as legalizing the capital flight involved in underinvoicing of exports or the import smuggling financed by underinvoiced exports. Because the free market now involves not only stocks but also flows we need to specify the trade balances for the official and the free market separately. We denote these real trade balances by B and J respectively:

(9) $B = B(q,a,u,g)$, $J = J(q,a,u)$

An increase in the free market rate relative to the fixed official rate will deteriorate the official trade balance, B, and improve the trade balance in the free market. The reason is that consumers will substitute toward the now relatively cheaper goods traded at the official rate while producers will move resources out of production for the official market and into activities that benefit from the free rate. This substitution is one of the most

important features of a dual rate regime once commercial transactions get into the free market.

Formally, the model is now more difficult because the real money stock, the stock of foreign assets and the premium each must be tracked and hence a simple phase diagram can no longer help. But we can still get a lot of answers by just looking at comparative steady states where accumulation and depreciation are zero. The steady state system, as shown in the appendix, is defined by the following equations:

(10) $J(q, m + k, 0) = 0$

(11) $w = m + k$

(12) $m/qK = L(0)$

Equations (11) and (12) combine to give us a relation between the premium and the stock of foreign assets in Figure 10. The relation is:

(13) $w = qK(1 + L(0))$

and hence for given target wealth, w is simply a rectangular hyperbola which captures both portfolio preferences and saving behavior. We show equation (10) as the upward sloping schedule JJ. In drawing the schedule as positively sloped, we assume that a rise in the premium improves the trade balance via substitution effects more than enough to offset the deterioration that stems from the rise in wealth and spending brought about by a higher free market rate. The steady state equilibrium is at point E.

Consider now the following policy measure. The government moves some export activity that previously was conducted at the official rate into the free market. We show in Figure 11 the effect as a rightward shift of the JJ curve. Since the increased export surplus of the free market has to be compensated by higher wealth or a reduction in the premium JJ shifts to the position indicated by the dashed schedule. Across steady states the premium

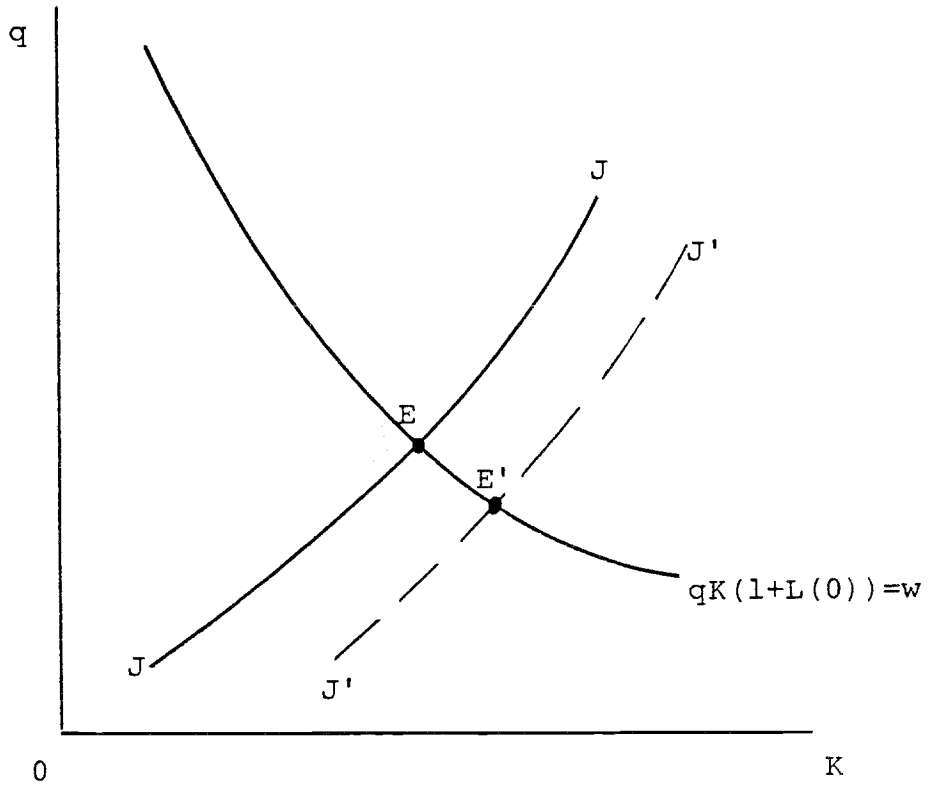
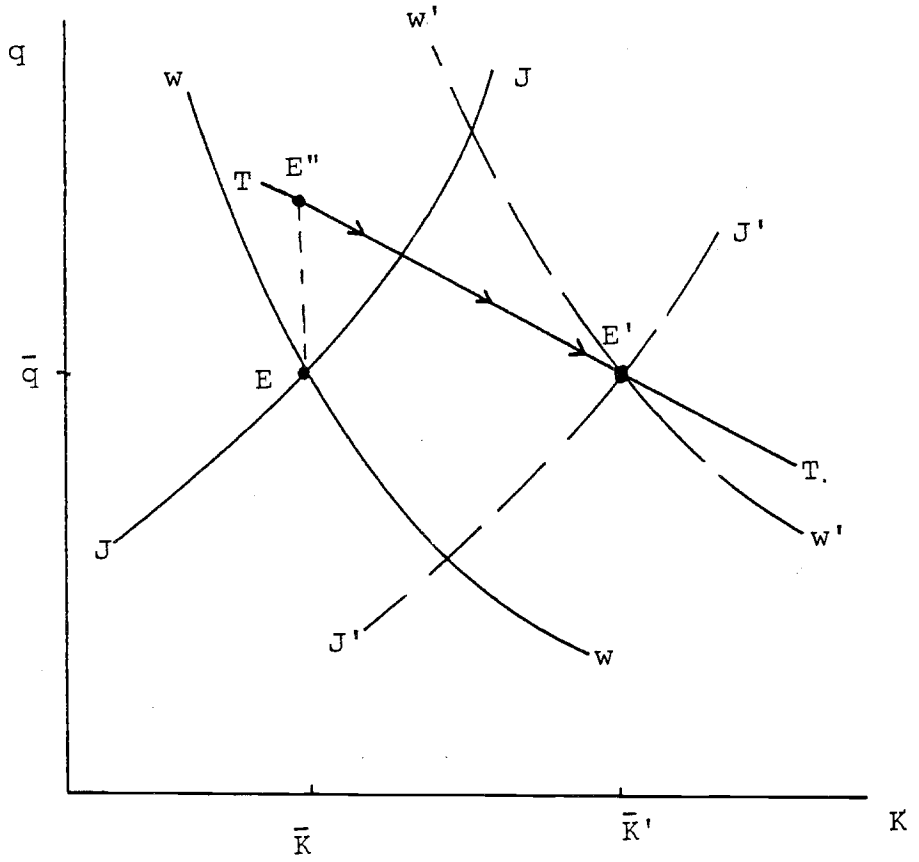


Figure 10

Commercial transactions Enter the Free Market

Figure 11

A Portfolio Shift Toward
Foreign Assets



declines and the stock of foreign assets, K, rises. From (11) and (12) it can be shown that across steady states real balances are constant:

(14) $\quad m = sw \quad , \; s = L(0)/(1 + L(0))$

where s is the steady state ratio of money to wealth in the absence of inflation.

But note, now, that the decline in the premium, at a fixed official rate, means an appreciation of the free rate and hence a decline in the price level P(x,e). With a fall in the price level constant real balances imply a fall in nominal balances and thus a cumulative deficit at the official rate. The policy shift of exports to the free market is only in part compensated by a reduction in the premium which shifts production toward the official market and demand toward the free rate.

Trade disturbances, as can be seen from the above argument always leave longrun real balances unchanged. The cumulative official deficit depends on the impact the disturbance has on the premium. But the direction of change of the premium will depend on the relative importance of wealth and substitution effects in the free market trade balance. If the wealth effect dominates JJ is negatively sloped. Then a shift of some exports toward the free market can actually raise the longrun premium and lead to a loss of external assets in the free market. In that case moving exports from the official to the free market (assuming stability) would generate cumulative reserve gains.

Consider next a portfolio disturbance. This is, of course, the kind of event against which countries seek to protect themselves with a dual rate. From (14) it is apparent that longrun real balances will decline. Accordingly if the premium remains unchanged or even falls then there must be a cumulative trade deficit at the official rate. The mechanism is the

following: the portfolio shift drives up immediately the premium in the free market. As a result there are two effects on the official trade balance. The higher premium directly diverts resources to the production of those goods that enter the free market and shifts demand toward the goods traded at the official rate. Second, the rise in the premium raises wealth and therefore raises spending thereby also increasing the official deficit.

In Figure 11, we show the adjustment starting from an initial equilibrium at E. The portfolio shift leads to a rightward shift of JJ and ww by exactly the same amount and hence E' is the new equilibrium. If the adjustment process is asymptotic then there will be a path TT along which the economy travels, starting with an immediate sharp rise of the premium from E to E". Subsequently, as foreign assets are being accumulated and money is being decumulated portfolio proportions of M and K come more nearly in line with preferences. The process continues until the full adjustment in portfolios has been achieved by changes in nominal money and external assets. The unambigous effect is that a portfolio shift is fully absorbed by a loss in reserves even though this occurs via the regulated market rather than as capital flight. This conclusion is really important because it shows that the dual rates can break the speed of capital flight but may not be able to stop an equivalent reserve loss occurring via the impact of the premium on the trade deficit.

Triple and Multiple Rates: We saw earlier the Venezuelan case where the free market premium reached more than 260 percent of the commercial rate. Such a discrepancy is of course a very large distortion. It maintains the real wage in terms of some essentials at the cost of a large tax thrown on the sectors forced to sell at the commercial rate. The resulting tendency toward a deficit in the regulated market brings about reserve depletion and thus

expectations of devaluation. The expectation then further raises the premium and reinforces the reserve losses.

A typical response to the dilemma is to maintain the regulated rate for essential imports but to shift some exports toward a third market where the rate is also fixed but at a higher level. In Venezuela such a multiple system involves presently the following structure:

Table 2 The Venezuelan System

Date	Bolivars/$U.S.	Category
2/1983	4.3	petroleum exports, debt service,and basic food
	6.0	most imports
	free	all other transactions
2/84	4.3	basic food
	6.0	petroleum exports
	7.50	services, most imports, debt service,
	free market	non-traditional exports, non-essential imports, capital account transactions

The change in the exchange rate structure involves a real depreciation in respect to debt service, services and imports. Their relative price increases as they are shifted from the lowest rate to an intermediate level involving a 25 percent depreciation. What would we expect to be the impact on the free market premium over the basic rate, e/x? We can still use our model except that now we have another parameter $\beta \equiv x_1/x$ the ratio of the intermediate rate to the basic rate. The ww schedule would remain unchanged. But there will be an effect on the trade balance of the free market. The question is whether splitting the basic rate will increase or reduce the trade surplus of the free market. If the resources entering the sector that now has an increased official rate come primarily from the free market, and

if the increased price diverts demand primarily toward the free market then we get a deficit there or J( ) declines at each level of q or JJ shifts leftward in Figure 10 above. With unchanged real balances across steady states the splitting would involve a cumulative trade surplus at the official rate. Conversely if the shift primarily worsens the official trade balance while improving the free market surplus the premium would decline. The price level $P(e, x, x_1)$ now could fall (depending on the relative weights) and there might be a cumulative loss of reserves, as can be observed from the equation for real balances written here in terms of nominal money and prices:

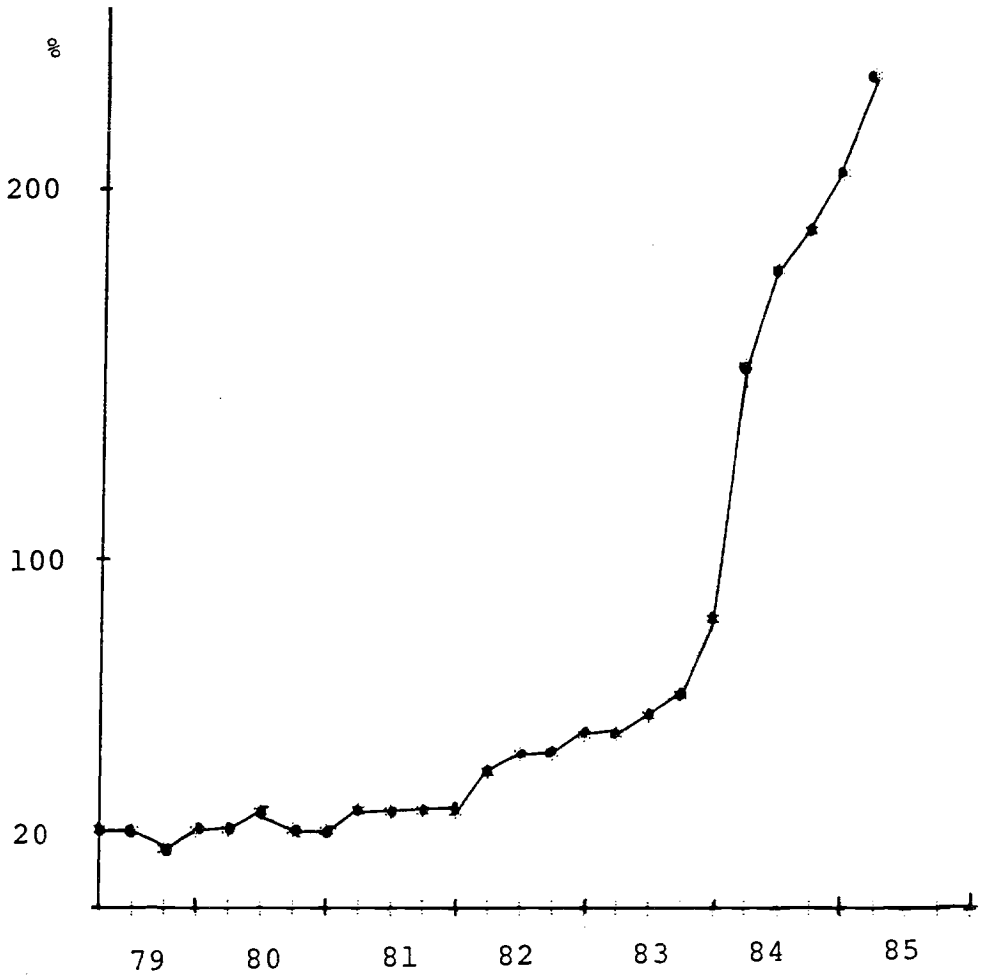
(14a) $M = P(e, x, x_1)sw$

The ambiguity of the effect of the policy move on reserves is, of course, critical. It suggests that an obvious move to increase efficiency--removing some items from a severely undervalued exchange rate--may in fact produce exactly the wrong results for reserves. Moreover there is no presumption that shifting an activity from one rate to another will in fact improve welfare as is obvious from the second-best nature of the exercise. This point is important because it means that increasing the number of rates by shifting activities from the lowest or basic rate toward the more "realistic" free rate does not necessarily reduce distortions in the economy. It may well increase the misallocation.

The Unification Problem: Figure 12 shows the premium of the free rate over the official exchange rate for the Dominican Republic. The official rate is constitutionally fixed at 1 peso/$ U.S. As is apparent the free rate at which an increasing number of transactions are conducted has progressively moved away from the official rate. The Dominican Republic now faces a very classical problem common in Europe after World War I: Should the official

Figure 12

Premium of the Dominican Republic
(Percent over Official Rate)



exchange rate be restored as a uniform rate, requiring deflation such as the U.K., for example, undertook in moving back in 1925 to the pre-war par, or should a new uniform rate be set, taking into account the level of the free rate as Poincare did in 1926 in France.

It is clear that the present system is not viable because it involves huge distortions. In response to the distortions an increasing number of transactions are shifted to the parallel rate so that the average exchange rate in fact is depreciating over time as a consequence of the progressive reallocation. Table 3 shows the effects of this reallocation on the effective exchange rate (weighting the trade categories by the exchange rate treatment they receive).

Table 3 Average Exchange Rates for the Dominican Republic
(Pesos per $U.S.)

	1982	1983	1984*
Effective: Imports	1.19	1.31	2.18
Effective: Exports	1.0	1.15	1.77
Official	1.0	1.0	1.0
Parallel	1.46	1.61	2.75

*Estimate
Source: World Bank

Much the same problem, though in perhaps less clear-cut terms, arises for a country where the free rate and the basic rate are so far apart that the resource allocation costs outweigh any macroeconomic benefits--i.e., Venezuela though probably not Mexico. When the dual rate has gone far out of line the unification of rates becomes an important macroeconomic issue. The expectations about the manner in which unification will be achieved will affect both the premium (and hence the trade deficit) and also interest rates

and activity. If the expectation, as must ordinarily be the case, is one of devaluation of the official rate then the free market premium will already reflect that expectation and be correspondingly higher, thereby worsening the trade deficit. Interest rates will reflect the expectation of depreciation of the free rate and thus will rise in the period ahead of the expected depreciation. Therefore if the devaluation is delayed real interest rates for activities tied to the official rate are increasing and that, of course, leads to a decline in activity. Bankruptcy problems arise as debt service comes to absorb declining real earnings of the sector that is atrophied by the overvalued official rate.

It is obvious then that a dual rate far way from the official rate must be a very transitory policy. Attempts at unification cannot be avoided and the real wage problem ultimately cannot be solved by implicit trade taxes and subsidies that infect all markets and, especially, forward looking financial markets. A more sensible model is the Mexican solution where the dual market is used as a strictly transitory shock absorber. Figure 4 above showed the premium in the free Mexican market relative to the controlled rate. The divergence is kept small, although when financial disturbances occur they are allowed to affect the premium. But fundamentals are reflected in the rate in the sense that the premium stays on average well below 20 percent.

4. Black Markets.

Our analysis has focussed on cases where the government sanctions an official free market for all non-preferential transactions. In some cases the reaction to the high premium is to exclude certain transactions, in particular capital account transactions, altogether from access to foreign exchange. As a consequence a black market will immediately spring up and

function in a manner completely identical to the dual market we have already studied.

Figures 13 and 14 show the premium in the Brazilian black or "parallel" market in the past ten years. It shows the same erratic pattern as the Venezuelan dual rate, reflecting expectations about major shifts in financial policy, politics and official exchange rate policy.

The market brings together all unauthorized foreign exchange transactions: import smuggling and coffee export smuggling undertaken to avoid quotas and/or export taxes, unofficial military export revenue, tourism, and capital account transactions. In Dornbusch et.al. (1983) it is shown that the market is well-behaved in that seasonal factors, interest rates, the official real exchange rate and anticipations of maxis explain the behavior of the premium. In fact even the bid-ask spreads in the black market can be well explained in terms of the theory of dealership. (See Dornbusch and Pechman (1985)). Interest rates and the variability of the premium that proxies the extent of news explain the size of the spread.

Figure 15 shows the Premium in Argentina in the period since Martinez de Hoz. Except for brief periods of unified exchange markets there is always a premium. Politics and real interest rates are the main determinants. The Argentinian example shows how politics can take a free exchange rate far way from PPP. An example is the 1983 Alfonsin pre-election period in late 1983: the premium rises to more than 100 percent (in daily data) and falls by 40 percentage points immediately on the day after the election. Of course, the path of the premium has effects on resource allocation and on inflation and thus is an important macroeconomic issue.

The traditional view of black markets is to view them as an offshoot of the restriction of commercial transactions. But there is all the evidence

Figure 13
The Black Market Premium: Brazil 1974-81

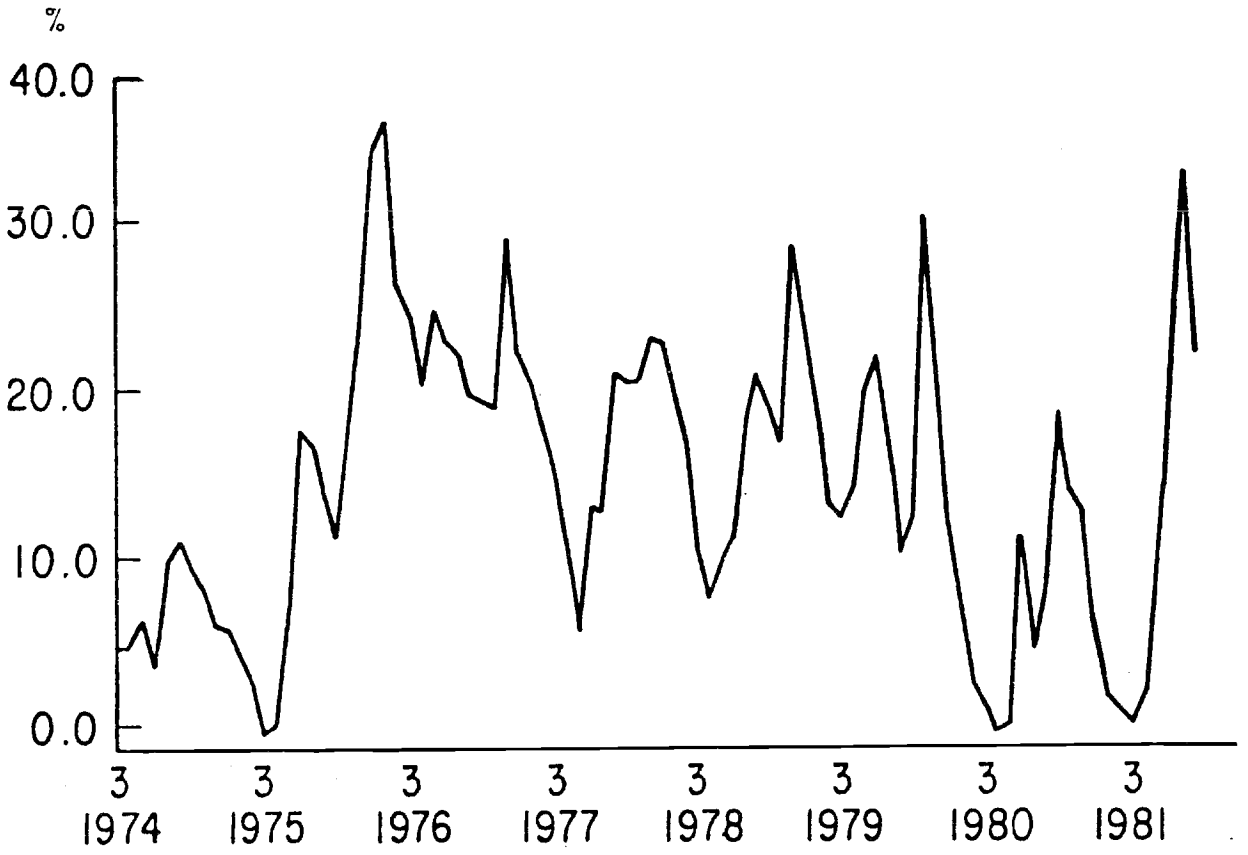


Figure 14
The Parallel Market Premium in Brazil
(Percent of the Official Rate)

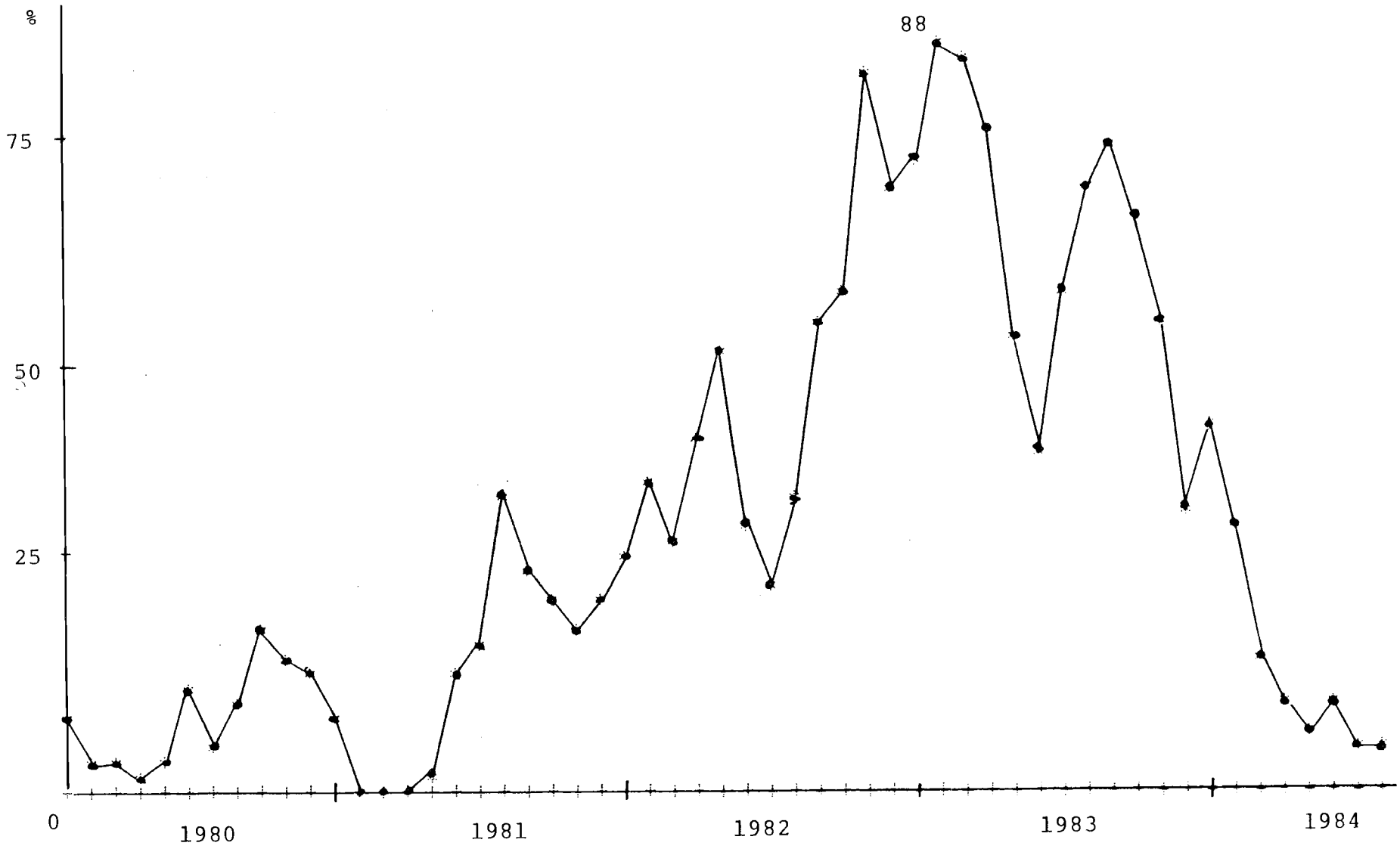
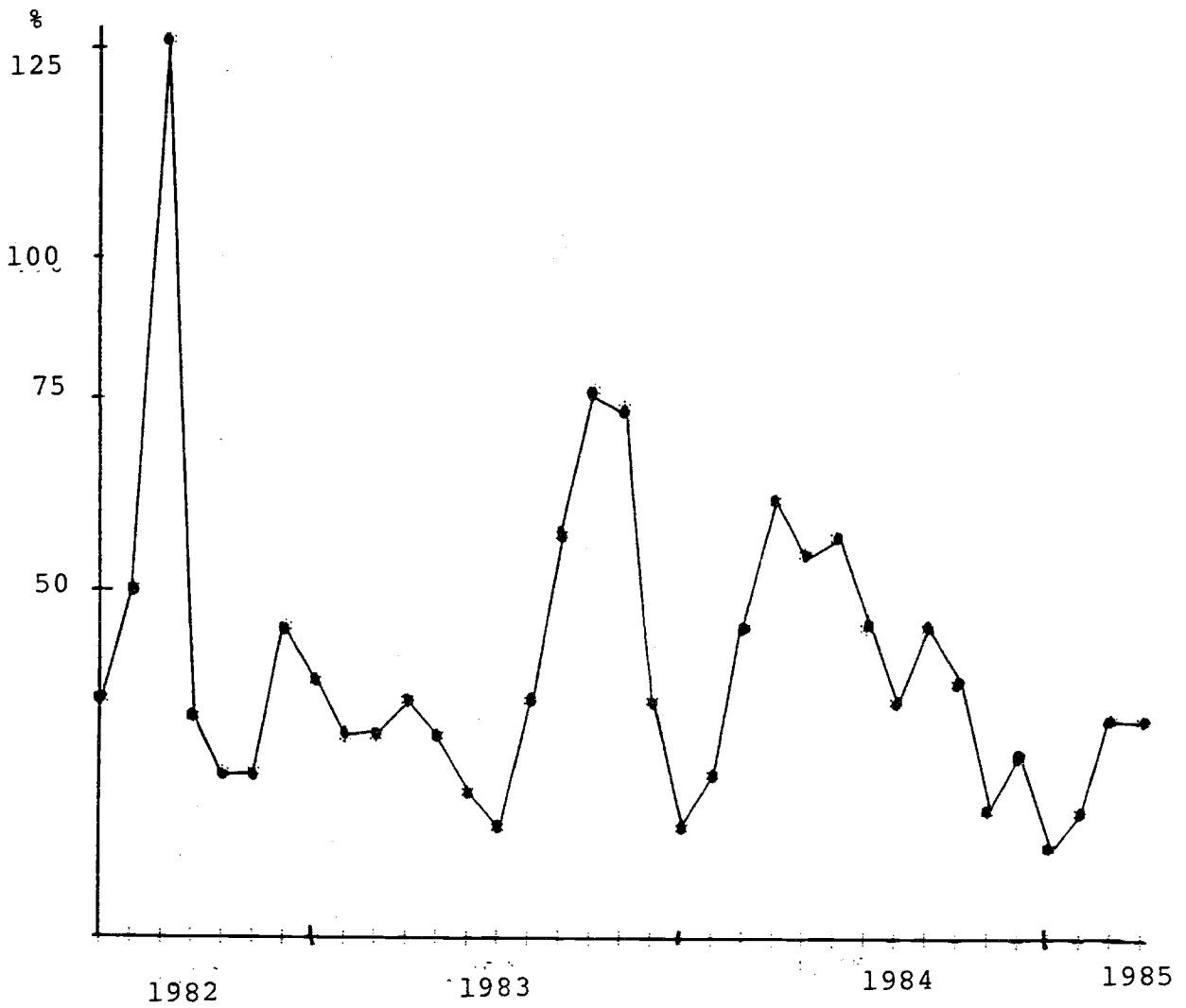


Figure 15

Parallel Market Premium in Argentina
(Percent of Official Rate)



to support the view that they are closely tied to financial markets. At any point in time there is a given stock of foreign assets in the hands of domestic residents. Given expected returns on domestic assets there will be a level of the premium that establishes stock equilibrium. The level of the premium in turn influences the flows into and out of the pool of foreign assets in the hands of the public. These considerations are particularly obvious in the case of Argentina. In July 1982, for example, the government chose to solve problems of domestic overindebtedness of firms and the government by freezing nominal interest rates below the rate of inflation. There was an immediate shift of portfolio holders out of domestic assets into black dollars. The premium, within a day shot to above 100 percent. The high level of the premium in turn encouraged underinvoicing on the export side and thus deprived the government of foreign exchange and of revenue from export taxes thereby worsening the financial difficulties of the public sector.

Brazil, similarly, has had periods where the black market went to a sharp premium, for example at the outset of the debt crisis in late 1982. The level of the premium was so high that a peculiarly inefficient arbitrage occurred. The government allocated foreign exchange for tourists--$1000 for every man, woman or child. Given a premium of nearly 100% it paid mothers with ten babies (who fly free of charge) to fly back and forth to Miami, plundering the central bank. Queues for passports which were required to obtain foreign exchange were for once even longer than those for food. The large premium may have cost the government perhaps as much as $U.S. 1 billion in reserves.

Because the black market is integrated with forward looking asset markets it is clear that expectations about future political or economic

events will be reflected in the premium even before they materialize. Thus the chance of a Peronist victory pushed up the premium prior to Alfonsin's election. Similarly anticipated exchange rate action can be seen in the premium. The anticipation of a maxi-devaluation of the official rate, for example, would lead to an immediate rise of the premium in the black market. The increased premium in turn worsens the financial conditions of the government not only by posting a visible sign of no confidence, but also by drawing resources away from the official balance.

An interesting fact, in this context, is the decline of the Brazilian premium over the last year despite the large and deteriorating financial conditions. Part of the reason is, of course, the extremely high real interest rate. The rate in Brazil is upward of 40 percent in real terms and thus is more than competitive with any capital gains expected in the black market. But a further fact depressing the premium may well be the fact that the government has ceased purchasing domestic gold which therefore flows through the black market. The resulting increased flow supply of black dollars keeps a lid on the premium and hence may well work to stabilize expectations.

The dual and black market examples point to the critical role of financial factors, and in particular expectations, in determining the premium in the free market. In countries where the budget and the real exchange rate are out of line speculation about the inevitable timing of the adjustment cannot but enter the premium and therefore affect rapidly and pervasively the entire economy. It might be argued that the government by sustaining real wages via a low official rate financed by external borrowing is helping workers. But the deficit is increased by the rising premium: The free market runs a surplus that is privately accumulated while the government borrows

abroad to finance "its" deficit. Ultimately the real wage must be cut to generate a trade surplus to finance the external debt. Participants in the free market may ultimately be the net beneficiaries of the scheme, not labor. In this sense the dramatic Mexican adjustment suggests itself as a better policy than the pattern observed in Venezuela or Argentina.

5. Exchange Rate Guarantees.

In the 1970s several countries financed large current account imbalances by encouraging private borrowing abroad. The borrowing was done by corporations who had access to the world capital market or by commercial banks who funded their domestic lending in the world capital market. This external borrowing had two key features. First it was short or at most medium-term. Second, the loans were denominated in dollars. Both features turned out to be critical once external financing became more difficult to secure and longstanding exchange rate policies became questionable. Sooner or later every one of the major borrowers had to offer exchange rate guarantees to persuade domestic firms or banks to maintain their external indebtedness rather than paying off their loans thus precipitating an even more acute exchange rate crisis.

The exact modalities differ between countries, but the principles are much the same: the central bank or Treasury will guarantee for the borrowing firm the exchange rate at which the firm is allowed to acquire foreign exchange in the ultimate repayment of the debt. Moreover the exchange rate that is guaranteed often involves a significant implicit subsidy to assure that the debt is being rolled rather than prematurely paid off. This system was used in Argentina in 1981, following the Martinez de Hoz overvaluation to cope with the shortage of foreign exchange. An estimate by Carta

Economica (1983, p.55) places the amount of the subsidy at between 6 and 9 percent of GDP. The stunning amount gives an idea of just how important quantitatively the issue of external indebtedness was for the Argentinian economy. It also shows the extreme shortsightedness of policy makers who guaranteed exchange rates that were totally incompatible with the ongoing inflation and overvaluation.

The difficulty with an exchange rate guarantee, much the same as that involved in a dollar-linked internal debt to be discussed below, is the charge on the budget. If in fact a major devaluation is required despite the guarantee then the need to pay up on the guarantee creates a massive budget deficit which, unless it can be tax financed which of course it rarely can, prejudices the very effect of the devaluation.

Brazil's 432 Accounts: The Brazilian system of exchange rate guarantees (called 432 accounts after the Regulation 432 that instituted this mechanism) has been in effect for a number of years and now is proving to be a major source of difficulty. The institutional features are the following: firms who have borrowed abroad are required to incur debts for a minimum term of several years. To avoid exchange rate exposure they do not want to assume they can, at any time during the currency of the loan, deposit in cruzeiros the equivalent of the principal. Once the deposit is made the Central Bank assumes the full service of the loan to maturity and all liabilities of the borrower cease. But, as a further complication, even after a loan has been deposited in the Central Bank a borrower can turn around, at any time choose to withdraw again the deposit from the Central Bank, with a minimum notice period, and resume the debt service.

In practice the institutional features involve a severe restriction on the Central Bank's ability to conduct monetary policy. If interest rates

were pushed down below the world level (adjusted for depreciation) the domestic cost of borrowing would fall below the world level and hence firms would chose to borrow at home and use the proceeds to make the dollar deposit in the Central Bank to relinquish the higher cost external debt. The dollar deposits would amount to a contraction of the monetary base which would force interest rates immediately back up. The dollar deposit facility this works precisely like international capital mobility in Mundell-Fleming models. This can be seen from the balance sheet of the monetary authorities where 432 accounts appear as liabilities.

Assets	Liabilities
Domestic Credit (C)	Currency + Bank Reserves (B)
Foreign Exchange (R)	432 Accounts (D)

Using the balance sheet and the definition of the monetary base as currency plus bank reserves we can readily express the money supply, M, as the money multiplier times the monetary base or, using the balance sheet identity, in terms of foreign exchange, domestic credit and dollar deposits:

(15) $M = xB$

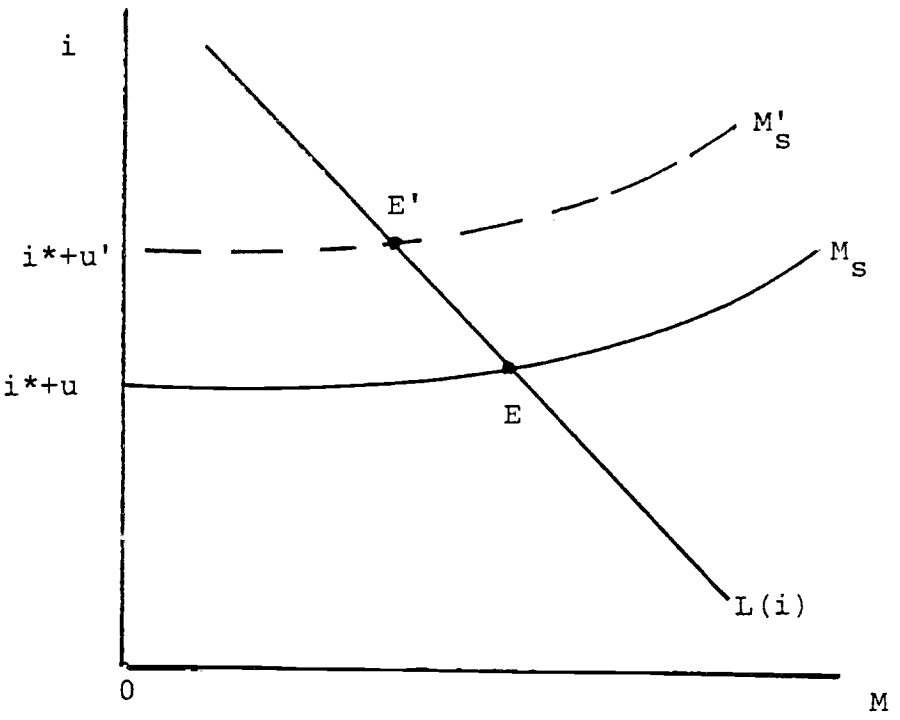
$= x(R+C-D)$

But note now that the the fraction of their external debts, V, which firms want to cover by dollar deposits depends inversely on home interest rates relative to foreign rates plus anticipated devaluation, $i - i^* - u$.

(16) $D = h(i - i^* - u)V \qquad h' < 0$

The money supply function therefore includes this reaction of private firms to relative interest rates. In Figure 16 we show the demand for money as a function of the home interest and the money supply function drawn for given domestic credit and foreign exchange. If domestic and foreign

Figure 16
The Effect of 432 Deposits



borrowing are highly substitutable then home interest rates cannot fall below the cost of external borrowing including expected depreciation. The money supply function becomes flat at that level, including possible a risk premium. An expansion in domestic credit would simply be offset one-for-one by firms' increasing dollar deposits thus maintaining the money supply unchanged.

Even though there is no international capital mobility in the sense that residents could acquire foreign assets, there is nevertheless the equivalent effect, at the margin, by firms' ability to shift in and out of dollar deposits at the Central Bank. This is particularly obvious in the case of an expected depreciation of the exchange rate. An anticipation of depreciation increases the cost of servicing dollar debts and, hence, causes firms to try and borrow in the home market to pay off their external debt by making 432 deposits. As a result the money supply contracts and home interest rates rise to the point of matching the increased expected depreciation. This is shown in Figure 16 as the upward shift of the money supply function.

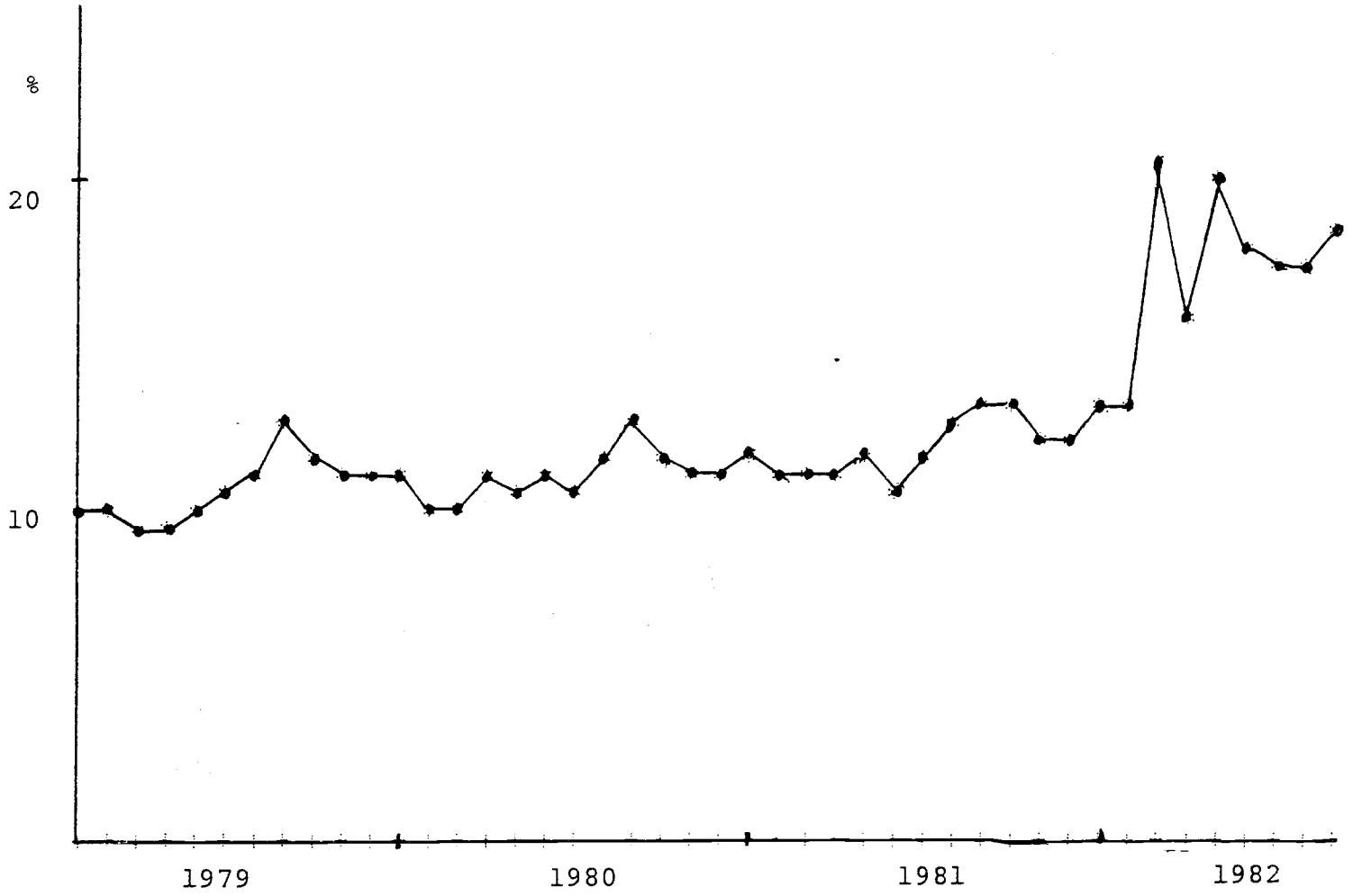
Dollar Deposits and Dollar Debts: In countries where capital mobility is restricted but the restriction is hard to enforce, or where it is outright impossible, governments have frequently sanctioned the use of domestic dollar deposits or dollar-linked deposits. The Mex-dollar deposits or Israel's Patam accounts are examples. The system has two chief advantages. First, it saves the country in the aggregate on foreign exchange. The counterpart of the private sector's dollar deposits is a small foreign exchange base that serves as reserves. Alternatively, if the dollar deposits had been "bought" they would have required selling off national assets or running current account surplusses. Second, shifts in deposits betweeen dollars and local

currency do not introduce great instability since they are merely accounting entries rather than shifts in reserves or large movements in exchange rates.

The main shortcoming is that offering such deposits increases capital mobility at the retail level. Dollar deposits will be more attractive to households and firms the larger is exchange rate risk. Where the international capital market would be accessible only to firms and large investors the institution of dollar deposits takes capital mobility to the corner branch of the bank. Figure 17 shows Mex-dollars as a fraction of total deposits in a few years up to the 1982 crises. (For a history see Ortiz (1983b). It is clear from the Figure how, in early 1982 a shift toward dollar deposits occurred as the country was nearing financial difficulties. These deposits are more attractive the less financial stability there is since they represent effectively an insurance against the instability. But in the aggregate the insurance is difficult to pay. If the government is, in fact, forced to undertake a major devaluation it may well be the case that the Banking system, because of partial reserves, is not in a position to honor the deposits. The resulting runs and bankruptcy will then break the system unless the government steps in to write down the claims or fiscalize the system. While small shifts introduce no problem whatsoever, large shifts due to a loss of confidence mean that the government has to assume the debts of the banking system or write down the value of deposits. The 1982 crises, in Mexico and in 1984 in Israel, highlight the issue. In Mexico, in the face of a deteriorating foreign exchange situation, the government converted all dollar Mex-dollar deposits into pesos at 70 pesos/$U.S. while the N.Y. rate was about 100 pesos or even more. In Israel the government guaranteed the Patam accounts thus assuming a major budget responsibility on top of an already overburdened fiscal system.

Figure 17

Ratio of Dollar to Total Deposits in Mexico



It is clear that dollar deposits are an attractive option for a government with few exchange reserves because there is no dissipation, through whatever channels, due to capital ourtflows. As confidence problems emerge rather than having a run on reserves there is merely a shift into dollar-deposits. Everything stays calmer much longer, allowing the wrong policies to be conducted well beyond what is safe. In exchange, when the crisis does happen it is extreme because the whole financial system either collapses or must be bailed out. For countries with financial stability, as Fischer (1983) has argued, there are clear gains from dollar-deposits because of the gain in seignorage on "home-made" dollars. But there is also a question about financial stability because dollar-deposits, just as exchange rate guarantees, are an extemely dangerous and costly institution. They cause exchange rate adjustments to be delayed because the consequences for the financial system of a devaluation would be too large. The result is that ultimately, when they do occur, they will be even more destructive. Of course, one might argue that the presence of these deposits and the large costs of a situation where things do go wrong lead governments to pursue more prudent policies for the reason that they seek to avoid the extreme difficulty. That argument is valid, but still it appears that dollar deposits are more prominent and more visible when things are starting to go wrong and the legalization of these deposits buys some extra time for the government to yet further delay adjustment.

There is a new school of thought that attaches great welfare significance to capital market liberalization including quite possibly the unrestricted mobility of capital and the right of financial institutions to offer any kind of asset. The argument that in such a system a government's inflation tax base might be seriously eroded would be countered by saying

that that is all for the good, forcing government to bring their ship in order and stop inflationary policies. But in fact things may turn out the other way: with a reduced tax base the inflation rate might have to be higher so as to yield the same revenue. Whichever is the case the analysis of capital market liberalization cannot be considered without linking it to the budget and without considering the social costs of offering dollar deposits with an implicit government guarantee.

Dollar-Linked Internal Debt: The issues raised by dollar-denominated public debt are much the same as those involved in dollar-deposits. Should public debt be indexed, and if it is indexed should it be linked to domestic prices or to the exchange rate. Fischer (1983) has discussed the arguments for and against indexed public debt. Here we are interested in the foreign exchange indexation question. This question arises because of the possibility of real exchange rate changes.

Dollar-linked public debt is common for example in Argentina or in Brazil. Brazil's ORTNs for example are linked, at the option of the holder, to the maximum of the increase in the price index or in the exchange rate. In offering the exchange rate guarantee on the public debt the government avoids paying an exchange rate risk premium. In exchange it is forced to make a large transfer payment to government bond holders any time the exchange rate is depreciated.

The problem with a dollar-indexed debt is that the country in the aggregate does not have a dollar-indexed income and that the government, most definitely, does not have a dollar-indexed revenue. Even on the best behavior there can be adverse terms of trade shocks such as Chile's decline in copper export prices or Brazil's increase in oil import prices. If these shocks are so large as to require real depreciation and have repercussions on

the real budget revenue then payment of a dollar-indexed debt means increased real tax burdens in the face of declining real income. Such a system is questionable on the economics and extremely hard on the politics. It ultimately leads to the temptation to write down the claims of the dollar bond holders, or at least the expectation that this could happen, and therefore raises borrowing costs .

Many of the difficulties of Latin America of the past ten years stem from a combination of very poorly developed fiscal systems, with a resulting need for deficit finance, and overdeveloped financial systems with excessive indexation and dollarization. The combination has meant extreme financial instability and erosion of the inflation tax base. They have certainly not stopped inflation, they may well have increased it. The question is which way to get out of the difficulty: reintroduce primitive financial systems in the spirit of Henry Simon (1948) or overstabilize the government budget. It might well be argued that rolling back the financial system is impossible. But shaping up of the public sector poses no less of a difficulty. It means starting to raise taxes on people who so far have used their largely untaxed income and wealth to buy dollar denominated securities while complaining about the government's lack of fiscal responsibility.

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Appendix I. The Dual Exchange Rate Model

The model assumes a single good, purchasing power parity at the commercial rate, x, and two assets: domestic money and a foreign security (or foreign money). Throughout we denote by λ the rate of depreciation of the official rate and by u the depreciation rate in the free market.

The portfolio balance is given by:

(A1) $\quad M/eK = L(\dot{e}/e + i^*), \quad L' < 0$

or, solving for $\dot{e}/e$:

(A1a) $\quad \dot{e}/e = h(M/eK) - i^*, \quad h' < 0$

where

e is the capital account rate
M is domestic money
K the stock of foreign nominal assets
i* the foreign interest rate which is assumed zero

Wealth is defined as the sum of real balances and foreign assets

(A2) $\quad a = m + k$

It is assumed that investment and taxes are zero. A given level of real government spending, g, is financed by domestic credit creation. The growth in the real money stock is determined by the rate of depreciation of the commercial rate, government spending and the trade surplus, B:

(A3) $\quad \frac{d(M/x)}{dt} = (g + B) - (M/x)\dot{x}/x$

The trade surplus is determined by the discrepancy between saving and real government spending. Real saving is determined by the gap between target wealth, w, and actual wealth, a, and by capital gains:

(A4) $\quad S = v(w - a) - (eK/x)(\dot{e}/e - \dot{x}/x) + (M/x)\dot{x}/x$

Accordingly saving has a stock adjustment component and a component arising from the capital gains realized from external assets and the inflation losses incurred on real balances.

Noting that the trade surplus is the excess of saving over government spending we have:

(A5) $\quad B = S - g$

and hence using (1), (2) and (3):

(A3a) $\quad \frac{d(M/x)}{dt} = S = (M/x)\dot{x}/x = v(w - a) + (\lambda - h(M/eK))k$

$\quad m = M/x, \quad k = eK/x \quad , \quad q = e/x, \quad \lambda = \dot{x}/x$

where λ is the given rate of depreciation of the commercial rate that satisfies the condition of steady state deficit finance:

(A6) $\quad \lambda L(\lambda)\bar{k} = g$

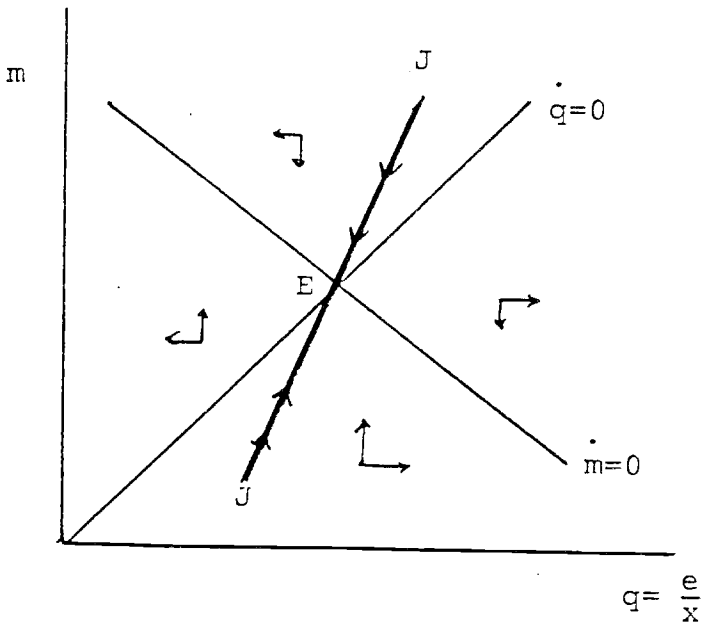
where m is the steady state level of real balances given a policy of spending at the real rate g.

The system can be studied in terms of the two differential equations governing the evaluation of the real value of assets:

(A7) $\quad \dot{m} = v(w-m-k)+(\lambda-h(m/k))k$

(A8) $\quad \dot{q} = q\ (h(m/k) - \lambda)$

These two schedules and the corresponding dynamics are shown in the phase diagram.



For any initial value of the real money stock, m_o, adjustment takes place along the stable trajectory JJ to the steady state at E. In the adjustment process a trade surplus is accompanied by a real deprecation of the capital account rate.

Once commercial transactions enter the free market the system of equations becomes:

(A9) $\dot{m}/m = [v(w-a) - h(m/k)(1-c)k]/m - ch(m/k)$

(A10) $\dot{K}/K = J(q,a,u)/K - (1-c)h(m/k)$

(A11) $\dot{q}/q = (1-c)h(m/k)$

where it is assumed that $\dot{x}/x = 0$ and where c is the share of free market goods in the deflator:

(A12) $P = P(e,x)$

In the steady state $u = h(m/k) = 0$. Thus the steady state system simplifies to:

(A13) $j(q,qK(1+L(0)), 0) = 0$

(A14) $m = L(0)qK$

(A15) $w = qK(1+L(0)$

where the last two equations imply that:

(A16) $m = sw, \quad s = L(0)/(1+L(0))$

This system is used in the text for comparative statics.