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Exchange Rate Determination under Flexible and Two-Tier Exchange Rate Regimes

Ching-chong Lai*

INTRODUCTION

In order to shelter the economy from enormous capital movements, many countries have adopted the regime of dual exchange rates. According to 1988 *IMF Annual Report on Exchange Arrangements and Exchange Restrictions*, more than one-sixth of the member countries engage in dual currency practice. These countries are Argentina, Belgium, Chile, Costa Rica, Ecuador, Egypt, El Salvador, Guatemala, Luxembourg, Mexico, Nigeria, Paraguay, People's Republic of China, Peru, South Africa, Venezuela, and so forth.[1] Under such an arrangement, in general all current account transactions take place at a pegged *commercial* rate, while all capital account transactions take place at a freely floating *financial* rate. In this system, for the purpose of preventing current account imbalance from spreading to the domestic economy, the monetary authorities may intervene in the financial foreign exchange market. The type of intervention operations are called "neutral" if, as defined by Lanyi (1975, p. 716), "the monetary authority sells (buys) foreign exchange in the financial exchange market equal to the net increase (loss) in official reserves arising from a current account surplus (deficit)." The consequence of such a neutral intervention policy is that "[it] ensures overall balance of payments equilibrium, with the imbalance on current account exactly offset by an equal imbalance of opposite sign on capital account." [Lanyi (1975, p. 716)][2]

This paper attempts to examine the exchange rate overshooting phenomenon under a two-tier exchange regime with neutral intervention policy, and attempts to compare it with that under flexible exchange rates. The issue is chosen for the following two reasons:

1. Under both two-tier exchange regime with neutral intervention and flexible regime, the overall balance of payments, which consists of the current account and the capital account balance, is maintained in equilibrium. The only difference between the two regimes is that the current account and capital account transactions are settled at *different* exchange rates under the two-tier regime, while the transactions in both accounts are settled at *uniform* exchange rate under the flexible regime.

2. The existing literature on comparing the short-run with the long-run movement of the exchange rate under a two-tier regime almost unanimously focus their attention on the framework which is characterized by flexible financial rates and pegged commercial rates with non-intervention policy [for example, Cumby (1984), Aizenman (1985), Gardner (1985), Dornbusch (1986), and Lai and Chu (1986a)], or by the financial and commercial rates both being flexible [for example, Bhandari (1985) and Lai and Chu (1986b)]. So far it is curious that very few efforts have been devoted in the literature to dealing with the implication of neutral intervention operations on the exchange rate movement.[3] This paper is written to provide a primary step to examine the dynamic response of the financial exchange rate

*Institute of the Three Principles of the People, Academia Sinica, Nankang, Taipei 11529, Taiwan, Republic of China.
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under a two-tier exchange regime in which the monetary authorities conduct a neutral intervention policy in the financial foreign exchange market.

The rest of the paper is organized as follows. In the next section a general macroeconomic model which is able to describe both two-tier and flexible regimes is presented. The third section examines the nature of the properties of long-run equilibrium under both regimes. The fourth section first discusses the short-run impact of monetary policy and the possibility of the exchange rate overshooting or undershooting under both regimes, and then compares the difference between them. The concluding section summarizes the main findings of this paper.

THE THEORETICAL MODEL

Basically, the model we shall develop can be viewed as an extension of the Frenkel and Rodriguez (1982) model, which modifies the pioneering contribution of Dornbusch (1976) by allowing imperfect capital mobility. Specifically, it assumes that: (i) the open economy is specified to be small in the sense that it cannot influence foreign interest rate and foreign prices of its imports; (ii) the domestic output is fixed at its full-employment level, given freely flexible wages in the labor market; (iii) the domestic price adjusts with a lag, not instantaneously; (iv) expectations of future exchange rates and prices are formed regressively.[4,5]

In accordance with the above descriptions of the economy, the theoretical model can be described by the following log-linear relationships:

(1)[6] $$\dot{p} = k\{u + \gamma\bar{y} - \sigma[i - \theta_p(\hat{p} - p)] + \mu[\delta(e_c + p^* - p) - \bar{y}\}; \quad 0 < \gamma < 1, \theta_p, \sigma, \delta, \mu > 0$$

(2) $$m - p = -\lambda i + \phi\bar{y}; \quad \lambda, \phi > 0$$

(3) $$\delta(e_c + p^* - p) + \beta[i - i^* - i^*(e_c - e_f) - \theta(\hat{e}_f - e_f)] = 0; \qquad \beta, \theta > 0$$

(4a) $$e_c = \bar{e}_c \qquad \text{dual exchange rates}$$

(4b) $$e_c = e_f = e \qquad \text{flexible exchange rates}$$

where

p = the logarithm of the domestic price
k = the speed of adjustment in the goods market
$\bar{y}$ = the logarithm of the full-employment income
u = the logarithm of the autonomous component of aggregate demand
i = the domestic nominal interest rate
p^* = the logarithm of the foreign price in terms of foreign currency
e_c = the logarithm of the commercial exchange rate (the price of foreign currency in terms of domestic currency)
e_f = the logarithm of the financial exchange rate (the price of foreign currency in terms of domestic currency)
m = the logarithm of the money supply
i^* = the foreign nominal interest rate
$\dot{p}$ = dp/dt = rate of change of p with respect to time (t)

and that circumflexes denote long-run equilibrium values of the relevant variables.

Equation (1) describes that the domestic price adjusts sluggishly to excess demand in the goods market. The assumption of sluggish price adjustment is not only popularly used in the existing well known literature [e.g., Dornbusch (1976) and Frenkel and Rodriguez (1982)], but also consistent with empirical findings [e.g., Helliwell, Maxwell and Waslandner (1979) and Meese (1984)]. In addition, in equation (1) the domestic absorption is specified to be determined by the domestic real interest rate, $i - \theta_p(\hat{p} - p)$, and the level of domestic income, $\bar{y}$, and the current account balance is specified to be determined by the terms of trade, $e_c + p^* - p$. Equation (2) is the standard equilibrium condition for the money market, in which the demand for real money balance is a function of nominal interest rate and real output.

The equilibrium condition of the overall balance of payments is described by equation (3). It specifies that the net trade balance and the net capital inflows must sum to zero. Under the flexible regime, the exchange rate adjusts freely to maintain the balance of payments in equilibrium; while under the dual regime, the neutral intervention operations undertaken by the monetary authorities ensure the overall balance of payments equilibrium. In view of these facts, under both regimes the money supply in equation (2) remains constant even if the current account (hence the capital account) is not balanced. In equation (3), the net trade balance improves in response to a depreciation of the real exchange rate. In specifying the capital account, as in Frenkel and Rodriguez (1982) and Kiguel (1987), we assume that the net capital inflows are an increasing function of the difference between the yield on domestic bonds, i, and that on foreign bonds, $i^* + i^*(e_c - e_f) + \theta(\hat{e}_f - e_f)$.[7,8] As noted in Frenkel and Rodriguez (1982), the coefficient β denotes the degree of capital mobility. $\beta = 0$ and $\beta \to \infty$ correspond to zero capital mobility and perfect capital mobility, respectively. It will be shown below that the extent of β is a crucial factor determining the possibility of the exchange rate overshooting or undershooting.

Finally, equation (4a) specifies that current account transactions have a *pegged* exchange rate under the two-tier regime, while equation (4b) specifies that current account and capital account transactions have a *uniform* exchange rate under the flexible regime.

LONG-RUN EQUILIBRIUM

In this section we utilize the model specified above to obtain the long-run behavior of the system under alternative exchange rates.

Dual Exchange Rates with Neutral Intervention Policy

Under dual exchange rates, e_c is fixed at $\bar{e}_c$, the system (1), (2), and (3) can be solved for the three endogenous variables: p, i, and e_f. At long-run equilibrium, $\dot{p} = 0$ and p, i, and e_f are at their stationary levels, $\hat{p}$, $\hat{\imath}$, and $\hat{e}_f$. By Cramer's rule, we find that

(4) $$\partial\hat{p}/\partial m|_{\text{dual}} = \sigma/(\lambda\mu\delta + \sigma) > 0$$

(5) $$\partial\hat{\imath}/\partial m|_{\text{dual}} = -\mu\delta/(\lambda\mu\delta + \sigma) < 0$$

(6) $$\partial\hat{e}_f/\partial m|_{\text{dual}} = \delta(\beta\mu + \sigma)/\beta i^*(\lambda\mu\delta + \sigma) > 0$$

where "dual" denotes dual exchange rates. Equations (5)-(7) state that, under a regime of dual exchange rates in which the monetary authorities conduct a neutral intervention policy, an expansion in money supply will increase the domestic price and the financial exchange rate, and decrease the interest rate in the long run. These results run contrary to those under dual exchange rates with non-intervention policy, which indicate that an increase in money supply will not contribute any effect on the domestic price and financial exchange rate, but will decrease the foreign reserves by an equal quantity [see, for example, Aizenman (1985), Gardner (1985), and Lai and Chu (1986a)]. The non-neutral property revealed in equations (5)-(7) follows from the fact that the dual regime suffers from a form of money illusion, i. e., the exchange-rate rigidity in the current account.

As is evident, in the long run the appreciation of the real exchange rate (p rises and $\bar{e}_c$ and p^* are fixed) will lead to a deficit in the current account, implying the monetary authorities must sell official reserves in the commercial exchange market so as to defend the existing fixed commercial rate. Encountering with such a circumstance, the monetary authorities do intervene in the financial foreign exchange market and buy the same amount of official reserves as those lost in the commercial foreign exchange market, so that the financial rate will depreciate, resulting in a surplus in the capital account.

Therefore, the mechanism which induces capital inflow to offset current account deficit is the intervention action conducted by the authorities in the financial foreign exchange market.

Before ending the discussion of the long-run nature of two-tier exchange rates with neutral intervention, we should address that, as Fleming (1974, pp. 3-4) claimed, "There is no reason why the authorities should not buy or sell foreign currency for domestic currency on the capital exchange market. Indeed, if they wish that market to make its maximum contribution to the equilibrium of the balance of payments as a whole, they *must* so intervene, selling in the capital transactions market the foreign exchange they are acquiring in the current transactions market and buying in the former the foreign exchange they are selling in the latter. This will give them a profit (or a loss) according as they bring the 'capital' rate closer to (or pry it apart from) the 'current' rate." Obviously, the monetary authorities will incur a profit (loss) as the selling (buying) price in the commercial foreign exchange market is less than the buying (selling) price in the financial foreign exchange market if the current account experiences a deficit (surplus). However, in this paper we ignore this profit or loss by assuming implicitly that it is absorbed by the central bank.

Flexible Exchange Rates

Under flexible exchange rates, given $e_c = e_f = e$, the system (1), (2), and (3) can determine three endogenous variables: p, i, and e. Set $\dot{p} = 0$ and $p = \hat{p}$, $i = \hat{\imath}$, and $e = \hat{e}$ in the long run, then from equations (1)-(3) we have the following comparative results:

(7) $$\partial\hat{p}/\partial m|_{\text{flex}} = 1$$

(8) $$\partial\hat{\imath}/\partial m|_{\text{flex}} = 0$$

(9) $$\partial\hat{e}/\partial m|_{\text{flex}} = 1$$

where "flex" denotes flexible exchange rates. Equations (8)–(10) tell us that, under flexible exchange rates, the standard long-run neutrality is valid, i.e., the equilibrium domestic price and exchange rate increase equiproportionately with the domestic monetary expansion, while the interest rate is totally unaffected. These results are the same as those of Dornbusch (1976) and Frenkel and Rodriguez (1982).

THE NATURE OF THE SHORT-RUN SOLUTIONS AND THE COMPARISON BETWEEN TWO REGIMES

In this section we first analyze the short-run impact of exchange rates and the overshooting hypothesis under both two-tier and flexible exchange rates. Then we proceed to compare the difference concerning the impact effect to monetary shocks between these two regimes.

Dual Exchange Rates with Neutral Intervention Policy

Since the money market and overall balance of payment are in equilibrium at all instants by assumption, equations (2) and (3) must hold at any point of time. The immediate or impact effect can be determined by solving equations (2) and (3) with sticky domestic prices, as we assume that the domestic price adjusts sluggishly in response to excess demand in the goods market. Given $e_c = \bar{e}_c$, it follows from (2) and (3) that

(10) $$-\lambda i = m - p - \phi\bar{y}$$

(11) $$\beta i + \beta(i^* + \theta)e_f = \beta i^* + \beta i^*\bar{e}_c + \beta\theta\hat{e}_f - \delta(\bar{e}_c + p^* - p)$$

By Cramer's rule, it gives that

(12) $$e_f = \{\lambda[\beta i^* + \beta i^*\bar{e}_c + \beta\theta\hat{e}_f - \delta(\bar{e}_c + p^* - p)] + \beta(m - p - \phi y)\}/\lambda\beta(i^* + \theta)$$

Substituting the long-run property, $\partial\hat{e}_f/\partial m|_{\text{dual}} = \delta(\beta\mu + \sigma)/\beta i^*(\lambda\mu\delta + \sigma)$, into (13), the short-run impact effect of monetary expansion on the financial exchange rate is given by

(13) $$\partial e_f/\partial m|_{\text{dual}} = [\lambda\delta\theta(\beta\mu + \sigma) + \beta i^*(\lambda\mu\delta + \sigma)]/\lambda\beta i^*(i^* + \theta)(\lambda\mu\delta + \sigma) > 0$$

The economic reasoning for equation (14) is as follows. At the instant of increased money supply, owing to the presumption that the domestic price is sluggish, the interest rate must immediately decrease to maintain continuous money market equilibrium. Given $\bar{e}_c$ and p being fixed in the short run, it follows from equation (3) that the current account remains at its initial level, and hence the return on both bonds is required to be equalized to maintain the balance of payments equilibrium. As a result, the spot financial exchange rate must rise to equalize the yield on both bonds, given the fact that the interest rate decreases and stationary financial exchange rate increases.

A comparison between (14) and (7) indicates that

(14) $$\partial e_f/\partial m|_{\text{dual}} - \partial\hat{e}_f/\partial m|_{\text{dual}} = \sigma(\beta - \lambda\delta)/\lambda\beta(i^* + \theta)(\lambda\mu\delta + \sigma) \gtrless 0 \text{ if } \beta \gtrless \lambda\delta$$

It is clear from equation (15) that the financial exchange rate will overshoot or undershoot its long-run equilibrium level, depending on the relative size of β and $\lambda\delta$. Obviously, an expansion in money supply will result in an overshooting of the financial exchange rate if capital mobility is relatively high (i. e., $\beta > \lambda\delta$), while undershooting will prevail if capital mobility is relatively low (i. e., $\beta < \lambda\delta$).

The conclusion is easily explicable. Given $\bar{e}_c$, p^*, and p being fixed in the short run, the balance-of-payments equilibrium condition requires that $\theta(e_f - \hat{e}_f) = -i + i^* + i^*(\bar{e}_c - e_f)$ hold after monetary disturbances occur. As described above, a rise in money supply will instantly decrease the interest rate and increase the financial exchange rate. It is clear from equation (14) that the magnitude of the increased financial rate has an inverse relationship with the degree of capital mobility;[9] therefore, the higher (lower) the capital mobility is, the more likely will the effect of decreased interest rate exceed (fall short of) the effect of increased financial rate. As a result, the higher (lower) capital mobility will be associated with the overshooting (undershooting) phenomenon.

Flexible Exchange Rates

Following the same procedures used above, it is easily verified that[10]

(15) $$\partial e/\partial m|_{\text{flex}} = \beta(\lambda\theta + 1)/\lambda(\delta + \beta\theta)$$

(16) $$\partial e/\partial m|_{\text{flex}} - \partial\hat{e}/\partial m|_{\text{flex}} = (\beta - \lambda\delta)/\lambda(\delta + \beta\theta)$$

Equation (17) is the conclusion proposed by Frenkel and Rodriguez (1982, p. 17), "when capital is highly mobile the exchange rate must overshoot its long-run value, but when capital is relatively immobile the exchange rate undershoots its long-run value."[11] The economic reasoning for equation (17) has been interpreted in detail by Frenkel and Rodriguez (1982) and should not be repeated here.

Comparisons between Two Regimes

The above discussion has established the following two findings for us to compare both regimes, following an increase in the money supply:

Finding 1. As one country experiences a short-run overshooting (undershooting) under dual regime with neutral intervention policy, it must also display exchange rate overshooting (undershooting) if the economy switches the regime to that of the flexible exhange regime.

It is clear from equations (15) and (17) that

(17) $$\text{sgn}[\partial e_f/\partial m|_{\text{dual}} - \partial\hat{e}_f/\partial m|_{\text{dual}}] = \text{sgn}[\partial e/\partial m|_{\text{flex}} - \partial\hat{e}/\partial m|_{\text{flex}}] = \text{sgn}[\beta - \lambda\delta]$$

It indicates that the critical condition determining short-run overshooting or undershooting is the same under the two regimes. Specifically, equation (18) reveals an important implication, that is, if short-run exchange rate overshoots (undershoots) its long-run equilibrium value under dual exchange rates with neutral intervention policy, there must be a short-run overshooting (undershooting) under flexible exchange rates.[12]

After initial jump in e under the flexible regime and in e_f under the dual regime, both e and e_f will monotonically converge to their long-run levels. It seems that we can judge both regimes in terms of the extent of overshooting or undershooting since it reflects the volatility of the exchange rate.[13] Subtracting (17) from (15) gives

$$[\partial e_f/\partial m|_{\text{dual}} - \partial \hat{e}_f/\partial m|_{\text{dual}}] - [\partial e/\partial m|_{\text{flex}} - \partial \hat{e}/\partial m|_{\text{flex}}]$$
$$= (\beta - \lambda\delta)\{\delta - \beta[i^*(\lambda\mu\delta + \sigma) + \theta\lambda\mu\delta]\}/\lambda\beta(i^* + \theta)(\lambda\mu\delta + \sigma)(\delta + \beta\theta)$$

Therefore, the higher the degree of capital mobility is, the more likely the magnitude of short-run *overshooting* under the flexible regime exceeds that under the dual regime. While the lower the degree of capital mobility is, the more likely the magnitude of short-run *undershooting* under the flexible regime falls short of that under the dual regime. Since most countries adopt dual exchange rates in order to insulate the interest-elastic and speculative capital flows [Cumby (1984) and Aizenman (1985)], the former situation is more likely to be the case.

Finding 2. Under flexible exchange rates, the factors for determining the change of the short-run exchange rate in response to an expansion in money supply are solely determined by the asset markets. However, such a dichotomy between the real and the asset sector does not hold under dual exchange rates with neutral intervention policy.

What is immediately clear from (14) and (16) is that in the short run the change of exchange rate under the flexible regime is exclusively determined by the parameters in the money and foreign exchange markets, whereas the change of exchange rate under the dual regime is determined by the parameters not only in the money and foreign exchange markets but also in the goods market. The dichotomous property between real and asset sectors in the so-called asset market approach to the exchange rate determination, which can be found in Dornbusch (1976) and Frenkel and Rodriguez (1982) in the context of the flexible regime, does not hold under dual exchange rates with neutral intervention policy.

It is clear from the above discussion that the market participants who form their expectations regressively, are presumed to know the long-run value of the exchange rate. Thus, from (7) we know that, in a two-tier regime with neutral intervention operations, economic agents now possess precise knowledge of structural parameters: δ, β, μ, λ, σ, and i^* to compute the long-run value of the financial exchange rate. Moreover, as the short-run equilibrium is determined jointly by the instantaneously cleared markets of money market and foreign exchange market, the short-run financial exchange rate is related closely to the calculation of its long-run value. Equipped with this knowledge, the short-run value of the financial exchange rate thus has something to do with the parameter in the goods market, and accordingly, the dichotomy between asset and real sectors does not hold, owing to the fact that the public use the information σ, a parameter in the goods market, to make their calculation. On the contrary, under the flexible regime, the long-run value of the uniform exchange rate will increase equiproportionately with the increased money stock. The participants thus can correctly calculate their long-run value of the exchange rate without collecting any macroeconomic parameter. Consequently, the short-run instantaneous exchange rate has nothing to do with the parameter in the goods market. So dichotomy prevails. It is to be noted here is that the reason given above can also be complementarily taken to explain why both constrained (dual) and unconstrained (flexible) regimes will react differently in the short run, which is reported in equations (14) and (16).

CONCLUDING REMARKS

Based upon a simple model, this paper has analyzed the exchange rate determination and the possibility of the exchange rate overshooting or undershooting under the dual and flexible regimes, and has compared the difference between the two regimes. To date most of the existing literature on the dual regime have confined their analyses to the framework of non-intervention policy. Our model instead turns to another direction in which neutral intervention operations are undertaken by the monetary authorities. Within this framework, the following conclusions have been drawn:

(i) Under both regimes, the crucial factor determining whether the short-run exchange rate will overshoot or undershoot its long-run level, is the degree of capital mobility. An expansion in money supply will exhibit an overshooting if the capital mobility is relatively high, while undershooting will prevail if capital mobility is relatively low.

(ii) The dichotomy property between real and asset sectors can be found in the flexible regime, but cannot be observed in the dual regime.

NOTES

1. Collins (1988) takes Mexico as an example to describe how the dual exchange regime works.
2. Swoboda (1974, p. 260) also argues that, "such [neutral intervention] operations maintain the stock of international reserves constant, so that current-account imbalances do not affect the monetary base."
3. To the best of my knowledge, the only exceptions which explicitly set out the theoretical model are Lai and Chang (1987) and Haaparanta (1988). However, Lai and Chang focus their attention on the relationship between the stability property and the residents' net foreign asset position, and Haaparanta examines the insulation function of the neutral intervention policy.
4. Regressive expectations imply that the economic agents are assumed to know the long-run values of the variables but are ignorant of the exact adjustment path. Bhandari (1982, p. 16) names this pattern "quasi-rational expectations." Recently, Frankel and Froot (1987) use survey data to investigate the rationality of the various exchange-rate expectations. Their empirical study supports regressive expectations.
5. In effect it is well known that regressive expectations will be consistent with rational expectations if we set a specific value of the expectational parameter under regressive expectations. Dornbusch (1976), Bhandari (1982), and Frenkel and Rodriguez (1982) offer a detailed analysis.
6. $\mu = 1/\overline{Y}$, where $\ln\overline{Y} = \overline{y}$. For a full derivation of equation (1), see Bhandari (1982, ch. 13).
7. Letting $\ln X = x$, where $x = e_f, e_c$, and e_f^e (the logarithm of the expected financial exchange rate), then one unit of domestic money can now buy $1/E_f$ units of foreign exchange which may be repatriated next period at the expected rate E_f^e. During the time period, the $1/E_f$ units of foreign exchange can earn i^*/E_f in interest income which is repatriated from current account transactions into domestic money in amount $\overline{E}_c i^*/E_f$. These two components of return can be combined to give an overall return of $\overline{E}_c i^*/E_f + E_f^e/E_f$. Hence the yield for holding bonds from now to the next period is

   $$[\overline{E}_c i^*/E_f + E_f^e/E_f - 1]/1 = \overline{E}_c i^*/E_f + (E_f^e - E_f)/E_f$$

   Finally, using the Taylor's linear approximation and given regressive expectations: $e_f^e = \theta\hat{e}_f + (1 - \theta)\, e_f$, the yield for holding foreign bonds can be reduced to $i^* + i^*(\overline{e}_c - e_f) + \theta\,(\hat{e}_f - e_f)$. For a full derivation of the return on foreign bonds, see for example Flood and Marion (1982) and Gardner (1985).
8. The model we use is an extension of the Frenkel and Rodriguez (1982) framework from a flexible regime to both the two-tier and flexible regimes; the preceding statement indicates that we also follow their analysis in adopting the flow approach to international capital movements. Lately some models adopt the stock approach instead [e. g., Kouri (1976) and Branson (1979)]. For the difference between the two, see Sinn (1982) and Bhandari, Driskill and Frenkel (1984). Though the stock approach seems more reasonable, this paper still utilize the flow approach for minimizing the number of differential equations and for avoiding the complexity of the analysis.
9. Equation (14) can be rewritten as

   $$\partial e_f/\partial m|_{\text{dual}} = [\lambda\mu\delta(i^* + \theta) + i^*\sigma]/\lambda i^*(i^* + \theta)(\lambda\mu\delta + \sigma) + \delta\theta\sigma/\beta i^*(i^* + \theta)(\lambda\mu\delta + \sigma)$$

10. Assume that the interest rate and uniform exchange rate (rather than financial exchange rate) adjust instantaneously to clear the money and foreign exchange markets, and use the long-run property $\partial\hat{e}/\partial m|_{\text{flex}} = 1$, equation (16) can be derived immediately.
11. Frenkel and Rodriguez (1982) use $1/b$ to replace λ; accordingly, their critical condition determining overshooting or undershooting is $\beta b \gtrless \delta$.

12. Assuming that capital is perfectly mobile ($\beta \rightarrow \infty$) and exchange rate expectations are static ($\theta = 0$), equations (14) and (16) now become

$$\lim_{\substack{\beta\to\infty \\ \theta\to 0}} [\partial e_f / \partial m|_{\text{dual}}] = 1/\lambda i^*$$

$$\lim_{\substack{\beta\to\infty \\ \theta\to 0}} [\partial e / \partial m|_{\text{flex}}] = \infty$$

The above two equations indicate that, as the economy experiences a perfect mobility of capital and the economic agents form their expectations in a static manner, the change of short-run exchange rate is a definite value under the dual regime, but it will go to infinity under the flexible regime. It implies that the system of flexible exchange rates cannot possibly determine an equilibrium price of foreign currency, but the system of dual exchange rates can avoid this deficiency. The similar point has been made by Chen, Lai and Tsaur (1988).

13. In his frequently cited paper, Turnovsky (1979) gives a rationale for judging exchange rate systems in terms of exchange rate volatility. He argues that, "Monetary expansion can therefore contribute to fluctuation in the exchange rate, . . . , they will also tend to be reflected in fluctuations in the domestic interest rate and domestic asset prices. Given the presumption that stability is generally desirable, these fluctuations can be viewed as imposing welfare losses on the economy. Thus an important policy question arising out of the Dornbusch analysis is to determine the extent to which active monetary stabilization policy is able to eliminate, or at least reduce, this overshooting phenomenon." (p. 86)

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