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Foreign Capital Inflow and Monetary Policies in a Financially Repressed Economy

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The financial liberalization process in LDCs has often disrupted by excessive foreign capital movement. The loss of monetary control has led to an accelerating inflation, a deterioration of current account and sometimes a slow-down of output growth. Incorporating the role of foreign capital in a monetary growth model, this paper investigates the effectiveness of three sets of macroeconomic policy which are typical in financial liberalization process — namely, a reduction in money growth rate, a hike in regulated interest rates and a depreciation of domestic currency. The disruptive effects of an increase in world interest rate is also analyzed in the same context.

I. Introduction

In many LDCs, the financial sector is strictly regulated by the government. Domestic interest rates are set much below the market clearing rates and foreign exchange rate is overvalued, thus causing the dual structure of the financial markets. These financial repressions restrain domestic saving and generate pressure for reliance on foreign capital to supplement domestic saving. In order to spur domestic saving and enhance the efficiency of investment, many LDCs have attempted to liberalize the financial sector. The typical financial liberalization package includes a hike in interest rate, a reduction in growth rate of money supply and a depreciation of domestic currency.

However, the experience of many LDCs in the last three decades shows that the financial liberalization process has been disrupted by attraction

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and absorption of foreign short-term capital inflow. When foreign capital enters, the money supply is directly influenced. Any monetary policy which bears on a foreign capital flow will bring new results on inflation, the output growth rate and the balance of payments.

The purpose of this paper is to analyze the effects of government financial liberalization policies on macroeconomic variables in a LDC which is open to foreign capital. Here, we explicitly incorporate the role of foreign capital into a monetary growth model. It is shown that in the short-run, a high interest rate policy can accelerate inflation and reduce output growth rate when an economy opens itself to foreign capital. The restriction on short-term foreign capital inflows is desirable to avoid the loss of monetary control.

In section II, we develop a neoclassical monetary growth model incorporating a foreign capital flow. The deposit-output ratio is allowed to change, but the foreign debt-output ratio is assumed to be fixed in order to focus our attention on output growth rate and balance of payments. In section III, three sets of monetary policy — changes in domestic portion of money supply, bank interest rates and depreciation rate of exchange rate — are discussed. Finally, section IV presents concluding remarks.

II. The Model

A. Foreign Capital Inflow, and Balance of Payments

Technologically, a fixed amount of imported raw material and capital goods are required to produce a unit of domestic product.[1] The raw material, petroleum, and capital goods are the main import items in a typical LDC while few finished consumer goods are allowed to be imported. The import is assumed to be a fixed proportion, δ of the output, y. The trade balance in terms of domestic currency can be written as

$$(1) \qquad \text{TRADE BALANCE} = Px(\varepsilon)y - e\delta y,$$

where P denotes the domestic price, x is the ratio of export to domestic output, and e is a fixed exchange rate. The ratio of export to domestic output, x, is a function of the real exchange rate denoted by ε.

[1] See Findlay and Rodriguez (1971) and Itsumi and Moriguchi (1978) for the treatments of imported intermediate goods in macroeconomic models.

The current account consists of trade account and net interest payments. The current account, in terms of domestic currency, can be written as

(2) $\text{CURRENT ACCOUNT} = Pxy - e\delta y - i^* eF^*,$

where i^* is the world interest rate, and F^* is the outstanding foreign debt. The current account is assumed to be negative because one of the policy objective in this paper is to restore the current account balance.

The net inflow of foreign capital (ϕ) is assumed to be a function of differential between the domestic interest rate (i) and the cost of foreign borrowing.[2]

(3) $\text{NET CAPITAL INFLOW} = e\,\phi\,(i - i^* - \hat{e})y,$

where $\hat{e}$ is an exchange depreciation rate.

The overall balance of payments, which should be cleared through changes in domestic money supply, can be written as

(4) $\text{BALANCE OF PAYMENTS} = Pxy - e\delta y - i^*\ eF^* + e\phi y$

$$= Py(x - \varepsilon\delta - \varepsilon\gamma i^* + \varepsilon\,\phi).$$

(4-1) $bp = x - \varepsilon\delta - \varepsilon\gamma i^* + \varepsilon\,\phi,$

where bp is a ratio of balance of payments to domestic output and γ is a foreign debt-output ratio. The overall balance of payments, which reflects changes in foreign exchange holdings, is assumed to be always positive.

Differentiate equation (4-1) with respect to the real exchange rate, ε, we obtain the following:

(5) $$\frac{\partial dp}{\partial \varepsilon} = \frac{\partial x}{\partial \varepsilon} - \delta - \gamma i^* + \phi.$$

The sing of $\frac{\partial dp}{\partial \varepsilon}$ depends on $\frac{\partial x}{\partial \varepsilon}$, δ, γ, i^* and ϕ. It is assumed that the sum of increases in exports and net capital inflows outweigh the sum of increases in imports and foreign interest payments when the real exchange

[2] Domestic borrowers, mainly large corporations, switch between domestic loans and foreign loans according to the interest rate differential.

rate rises: i.e., $\frac{\partial dp}{\partial \varepsilon} > 0$. We will later examine a case where the world interest rate is so high that depreciation actually hurts the overall balance of payments.

B. Monetary Sector

The public is assumed to desire to hold money balances (M^d) that are strictly proportional to income:

$$(6) \qquad M^d = kPy.$$

In the addition of the neoclassical monetary theory, the money market is always in equilibrium at each moment of time:

$$(7) \qquad (\frac{M}{P})^s = (\frac{M}{P})^d = ky$$

However, the supply of money is no longer controlled exclusively by the government. The foreign sector influences the money supply mechanism in two ways; first, the current account is cleared through foreign reserve creation (destruction) resulting in increasing (decreasing) domestic money supply; second, the net inflow of foreign capital increases the foreign reserve raising the domestic money supply.

To focus the role of government on the monetary policies, neither government expenditure nor tax is assumed. The government makes loans to business sector by printing money. An increase in money supply ($\dot{M}^s$) is the sum of an increase in government loan payments to firms ($\dot{L}$) and a balance of payments surplus as described by the following equation:

$$(8) \qquad \dot{M}^s = \dot{L} + Py(x - \varepsilon\delta - \varepsilon\gamma i^* + \varepsilon\phi)$$

The growth rate of money supply (μ) is defined as

$$(9) \qquad \mu = \mu_0 + \frac{1}{k}(x - \varepsilon\delta - \varepsilon\gamma i^* + \varepsilon\phi),$$

where μ_0 is the ratio of changes in government loan payments to money supply.

Differentiate equation (9) partially with respect to ε:

$$(10) \qquad \frac{\partial \mu}{\partial \varepsilon} = \frac{1}{k} \frac{\partial bp}{\partial \varepsilon} > 0$$

An increase in the real exchange rate raises the growth rate of the money supply.

C. Consumption, Investment, and Growth

The household consumption (C) is assumed to be a fixed proportion, c of its disposable income:

$$(11) \qquad C = c\ [w\alpha y + \frac{D}{P}(i - \pi^e) - \theta \frac{M}{P} \pi^e],$$

where w is a wage rate, α is a fixed labor-output coefficient, D is savings deposit, i is a nominal interest rate fixed by government, π^e is expected inflation rate, and θ is a households' portion of total money holdings. The savings deposit (D) is the only financial asset available to the household. The marginal propensity to consume, c is a function of the expected real interest rate.

The investment (I) is defined as

$$(12) \qquad I = \dot{K} = y - c[w\alpha y + (i - \pi^e) \frac{D}{P} - \theta \frac{M}{P} \pi^e] - xy,$$

where $\dot{K}$ is an increase in capital. Substitute equation (7) into equation (12); then replace $\dot{K}$ by $\sigma \dot{y}$ and divide both sides of the equation by y:

$$(13) \qquad g = \frac{1}{\sigma} \{1 - c\ [w\alpha + (i - \pi^e)d - \pi^e \theta k] - x\},$$

where σ is a output-capital ratio and d is a deposit-output ratio. The growth rate of output (g) is a function of real exchange rate and deposit-output ratio.

Differentiating both sides of natural logarithm of equation (7) with respect to time, we obtain

$$(14) \qquad \pi = \mu - g.$$

Assuming a perfect foresight, the expectation of inflation rate is rational in the sense that the expected inflation rate, π^e, is always equal to the actual inflation rate, π. Substituting equations (9) and (13) into (14), we

obtain

$$(15) \qquad \pi^e = \mu_0 + \frac{1}{k}(x - \varepsilon\delta - i^* \delta\gamma + \varepsilon\phi) - \frac{1}{\sigma}\{1 - c[w\alpha + (i - \pi^e)d - \pi^e\theta k] - x\}.$$

Differentiating equation (15) partially with respect to d (ε), $\frac{\partial \pi^e}{\partial d}$ ($\frac{\partial \pi^e}{\partial \varepsilon}$) is obtained by solving it implicitly:

$$(10) \qquad \frac{\partial \pi^e}{\partial d} = \frac{1}{\sigma + A} c(i - \pi^e) > 0$$

and

$$(17) \qquad \frac{\partial \pi^e}{\partial \varepsilon} = \frac{1}{\sigma + A}\left(\sigma\frac{\partial \mu}{\partial \varepsilon} + \frac{\partial x}{\partial \varepsilon}\right) > 0,$$

where $A = \frac{\partial(1-c)}{\partial(i-\pi^e)}[\alpha w + (i - \pi^e)d - \theta k\pi^e] + c(d + \theta k) > 0.$

Turning back to the output growth rate, $\frac{\partial g}{\partial d}$ ($\frac{\partial g}{\partial \varepsilon}$) is obtained by solving for it implicitly after differentiating equation (14) partially with respect to d (ε), and then substituting equations (16) and (17) into it:

$$(18) \qquad \frac{\partial g}{\partial d} = -\frac{\partial \pi^e}{\partial d} < 0$$

and

$$(19) \qquad \frac{\partial g}{\partial \varepsilon} = -\frac{1}{k(\sigma + A)}\left[A\frac{\partial dp}{\partial \varepsilon} - k\frac{\partial x}{\partial \varepsilon}\right] < 0.$$

D. The Dynamic System

In equilibrium, the deposit-output ratio and the real exchange rate should not change; $\dot{d} = 0$ and $\dot{\varepsilon} = 0$.[3]

By differentating the definition of deposit-output ratio d, with respect to time, we get

[3] A more accurate dynamic system should include how the changes in foreign debt affect the economy. However, this effect is ignored to focus attention on the inflation and savings.

$$(20) \qquad \dot{d} = \left(\frac{\dot{D}}{Py}\right) = \left(\frac{\dot{D}}{P}\right)\frac{1}{y} - dg.$$

By definition,

$$(21) \qquad \left(\frac{\dot{D}}{P}\right) = (1-c)[w\alpha y + (i-\pi^e)\frac{D}{P} - \theta\pi^e\frac{M}{P}] - \theta kgy.$$

Substituting equation (21) into (20), we get

$$(22) \qquad \dot{d} = (1-c)[w\alpha + (i-\pi^e)d - \theta k\pi^e] - (\theta k + d)g = 0.$$

Differentiating the identity, $\varepsilon = \frac{e}{P}$, with respect to time, we get

$$(23) \qquad \dot{\varepsilon} = \varepsilon(\hat{e} - \pi^e) = 0.$$

Since both π^e and g are functions of $\dot{\varepsilon}$ and $\dot{d}$, equations (22) and (23) represent the dynamic system of the economy.

III. Alternative Monetary Policies

In this section, three alternative monetary policies as well as effects of an increase in the world interest rate are considered.

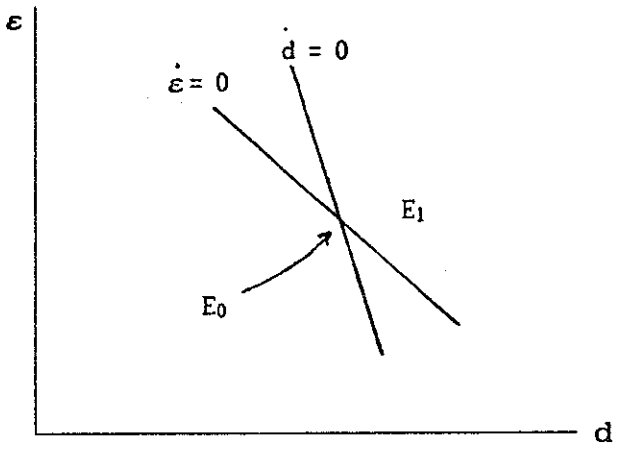
A. *A Reduction in the Ratio of Government Loan Payments to the Loan Supply*

A reduction in the ratio of government loan payments to money supply does not affect the foreign capital movement.

In terms of our model, a discrete reduction in μ_0 shifts both $\dot{\varepsilon} = 0$ schedule and $\dot{d} = 0$ schedule upward to the right (See Figure 1).

As the inflation rate decreases due to a reduction in μ, the real exchange rate rises. This, in turn, leads to an improvement in the balance of payments, causing the money supply to recover from the initial drop. On the other hand, a reduced inflation rate raises the deposit-output ratio. Therefore, the resulting increase in the interest cost as well as the leakage to exports results in a reduction in the output growth rate. As the output increase slowly, the inflation rate rises again until it reaches the old equilibrium rate, $\hat{e}$. At the new equilibrium, E_1, the output growth rate is lower while the balance of payments per output is larger than before.

Figure 1
Dynamic Effect of a Reduction in μ_0



B. An Increase in the Nominal Interest Rate

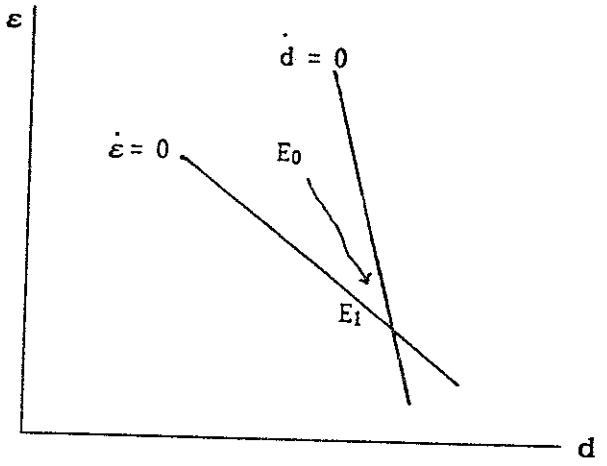
In terms of our model, an increase in a nominal interest rate shifts the $\dot{d} = 0$ schedule up to the right. However the $\dot{\varepsilon} = 0$ schedule moves unambiguously down to the left. This is because excess money supply from an increase in foreign capital inflow causes inflation rate to jump. The new equilibrium, E_1, is achieved with a higher deposit-output ratio and a lower real exchange rate (See Figure 2).

Initially, an increase in interest rate raises the deposit-output ratio by increasing the growth rate of deposit. A higher inflation rate reduces the real exchange rate and hence balance of trade. As the balance of payments deteriorates, the growth rate of money supply drops. The inflation rate continues to decline until it reaches the previous equilibrium rate, $\hat{e}$. At the new equilibrium, E_1, the overall balance of payments depends on the extent to which foreign capitals move in. However, the balance of trade is lower than the previous equilibrium.

Turning to the output growth rate, initial effects are different depending on the parameters of an economy. For an economy with a small financial intermediation, the extent of an increase in output growth rate is smaller than when it is closed to foreign capital movement. On the other hand, for an economy with a substantial banking sector, the output

Figure 2

Dynamic Effect of an Increase in i



growth rate declines less, or even rises due to the forced saving associated with a higher inflation rate.

The new equilibrium output growth rate depends on the interest rate sensitivity of household saving rate and the size of financial intermediation.

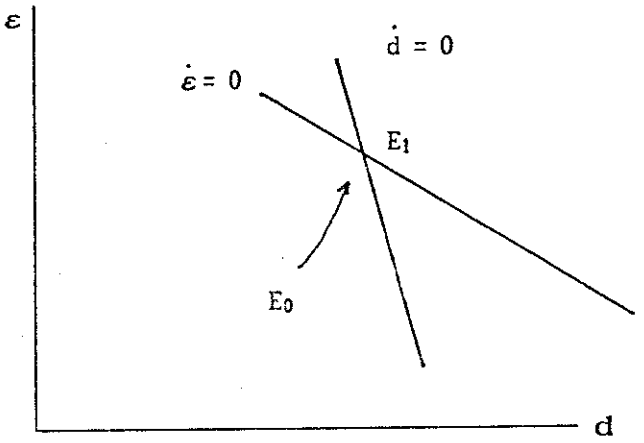
C. An Increase in Exchange Rate Depreciation

In terms of our model, an accelerated depreciation shifts both the $\dot{\varepsilon} = 0$ schedule and $\dot{d} = 0$ schedule to the right (See Figure 3). However, the $\dot{\varepsilon} = 0$ schedule shifts further to the right than the $\dot{d} = 0$ schedule does. This is because an increase in depreciation rate raises the real exchange rate directly, but increases the deposit-output ratio indirectly through a reduction in the inflation rate.

An increase in the rate of nominal depreciation causes the real exchange rate to rise. A higher depreciation rate means higher cost of foreign borrowing. This, in turn, discourages foreign borrowing, reducing the growth rate of money supply. This could result in a lower inflation rate in the short run. The reduced inflation rate raises the real exchange rate even further, improving the balance of trade. However, eventually the growth rate of money supply rises and inflation rate accelerates until it

Figure 3

Dynamic Effect of an Increase in $\hat{e}$



reaches the higher equilibrium rate, $\hat{e}_1$.

At the new equilibrium, the balance of trade is larger than before. On the other hand, as a larger export reduces the rate of investment, the new equilibrium output growth rate is lower than the previous one. The only exception is when the banking sector is so large that the distribution effect outweighs both the substitution effect of a higher inflation rate and the leakage effect of export.

D. An Exogenous Shock: an Increase in the World Interest Rate

A rise in world interest rate discourages the foreign borrowing, reducing the growth rate of money supply. This, in turn, lowers the inflation rate. Therefore both the $\dot{d} = 0$ schedule and the $\dot{\varepsilon} = 0$ schedule shifts upward to the right (See Figure 4). The new equilibrium is settled at the higher real exchange rate and a higher deposit-output ratio. At the new equilibrium, the output growth rate is lower, but the inflation rate bounces back to the previous equilibrium rate, $\hat{e}$.

However, an interesting case develops when the increase in i^* is so great that even with higher real exchange rate the balance of payments deteriorates due to increased interest payments. In such a case, the slope of $\dot{\varepsilon} = 0$ schedule positive (See Figure 5). Therefore, the system becomes

Figure 4

Dynamic Effect of an Increase in i^* (Case 1)

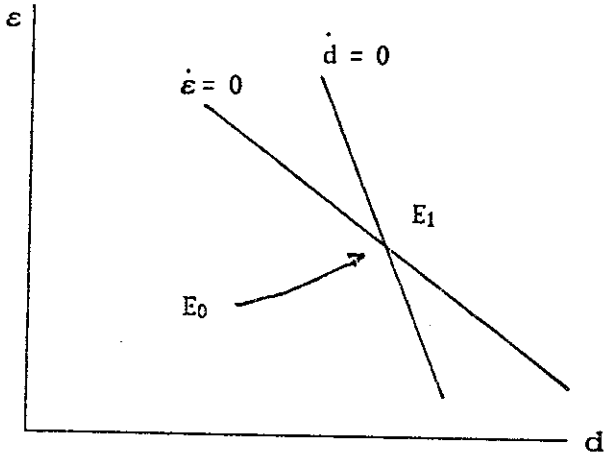
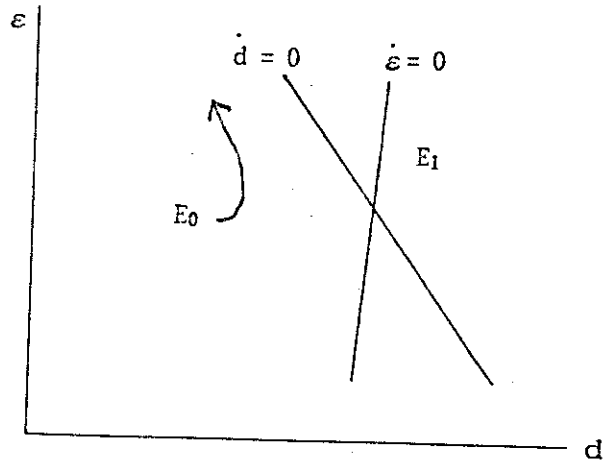


Figure 5

Dynamic Effect of an Increase in i^* (Case 2)



unstable. An increase in i^* causes the balance of payment to deteriorate; so does the money supply. This reduces the inflation rate. The resulting rise in ε has a negative effect on the balance of payments because now in-

creased interest cost from a higher real exchange rate outweighs the improvement in trade balance and capital inflow. Therefore, growth rate, real money stock, and balance of payments will be continuously reduced unless more inflow of foreign capital is forthcoming.

IV. Concluding Remarks

The purpose of this paper was to analyze various effects of alternative monetary policies on a small LDC which is financially repressed, but open to foreign capital inflow. These policy effects are analyzed in a dynamic context by constructing a neoclassical monetary growth model.

A reduction in the ratio of government loan payments to total money supply does not affect foreign capital movements. However, the balance of payments is improved, but the output growth rate is deteriorated.

The effects of a higher domestic interest rate on the output growth rate and the balance of payments are uncertain. The inflation rate rises in the short run due to a larger foreign capital inflow. Therefore, the effect of a higher interest rate on the saving is partly negated by a higher inflation.

An accelerated depreciation of the exchange rate raises the inflation rate even though it improves the balance of trade. However, inflation can actually slow down in the short run if the reduction in foreign capital inflow is substantial.

A big increase in the world interest rate can cause an economy to be unstable; a large interest payments casue both the output growth rate and the balance of payments to drop continuously unless more inflow of foreign capital is forthcoming.

The dependence on foreign capital can be reduced only through an increase in domestic saving. For an economy open to international capital, a high interest rate policy to encourage more domestic saving faces another problem in addition to the income redistribution effect — the inflow of foreign short-term capital and resulting inflation. The appreciaiton in real exchange rate works against exports, thus further exacerbating the trade balance. In other words, a high interest rate policy can lead to a further dependence on foreign capital.

To avoid this undesirable effect of a high interest rate policy, the monetary authority should curb short-term foreign capital inflow. The easiest way is to impose direct restriction on foreign capital. A more delicate method is to increase the depreciation rate of the exchange rate so that the real opportunity cost of using foreign capital remains unchanged.

References

Dornbusch, R., "Inflation Stabilization and Capital Mobility," *National Bureau of Economics Working Paper No. 555,* 1980.

Itsumi, Y. and C, Moriguchi, "Terms of Trade and Full Capacity Growth in a Resource-Importing Economy," *Journal of International Economics,* August 1978.

Findlay, R. and C. Rodriguez, "Intermediate Imports and Mcroeconomic Policy under Flexible Exchange Rates," *Cnadian Journal of Economics,* May 1977.

Fry, M.J., *Money, Interest, and Banking in Economic Development,* The Johns Hopkins University Press, 1988.

Hong, K., "Macroeconomic Dynamics in a Financially Repressed Economy," *Journal of Economic Development,* July 1985.

Kahkonen, J., "Liberalization Policies and Welfare in a Financially Repressed Economy," *Staff Papers 34,* International Monetary Fund, 1987.

Krugman, P., "The Capital Inflows Problem in Less Developed Countries," *Manuscript,* February 1980.

Mathieson, D., "Financial Reform and Capital Flows in a Developing Economy," *Staff Papers,* International Monetary Fund, September 1979.

McKinnon, R.I., *Money and Capital in Economic Development,* The Brookings Institution, 1973.

———, "Monetary Control and the Crawling Peg," *The Crawling Peg: Past Performance and Future Prospects,* edited by J. William, 1981.

Shaw, E.S., *Financial Deepening in Economic Development,* Oxford University Press, 1973.

Sidrauski, M., "Inflation and Economic Growth," *Journal of Political Economy,* December 1967.

van Wijinbergen, S., "Credit Policy, Inflation, and Growth in a Financially Repressed Economy," *Journal of Development Economics,* March 1983.