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Liberalization of Capital Movements and of the Domestic Financial System

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This paper analyses the dynamic impact of a joint liberalization of capital movements and of the domestic financial sector. Both a simultaneous and a sequential liberalization are examined in an overlapping-generations model with a q-theory of investment. A liberalization generally leads to an initial period of capital inflows followed by capital outflows. It also increases investment and causes an overshooting in share prices. Furthermore, the interest rate level before a liberalization will usually not indicate the direction of net capital flows.

INTRODUCTION

The liberalization of international capital movements has been a widespread phenomenon in the past two decades. Liberalization episodes have occurred in several OECD countries[1] and in some developing nations. Most countries, however, still have restrictions on their international capital movements, although they may consider liberalizing them in the near future. Therefore, understanding the consequences of such a liberalization appears to be of considerable interest.

The most fundamental impact of a liberalization of capital movements is the integration of the domestic financial system with international financial markets. This integration will generally modify the domestic interest rate and will alter the intertemporal decisions of firms and individuals, and possibly of the public sector. Thus, the impact of a liberalization will be intrinsically dynamic and can be examined only in a fully intertemporal framework. Such analysis, however, is complex and has received little attention so far.[2] In particular, the removal of *quantitative* restrictions on capital flows may lead to a fundamental change in the economic system. With binding quantitative capital controls, the interest rate is determined domestically and is not influenced by foreign interest rates. With capital mobility, on the other hand, the interest rate of a small country is determined by the world interest rate. Some dynamic models do not handle this fundamental change satisfactorily. In particular, models with infinitely lived individuals must typically assume that the interest rate is equal to the rate of time preference in the steady state. As a capital account liberalization usually modifies the steady-state interest rate, it cannot equal the preference rate both before and after the liberalization (if the preference rate is exogenous).

This paper uses a small open-economy model based on intertemporal optimization by finitely lived individuals as in Blanchard (1985). In such a model, there can be steady states with different interest rates and exogenous preferences. Moreover, the role of government debt during the liberalization can be examined, as Ricardian equivalence does not hold. The model also includes a q-theory of investment with adjustment costs and is similar to Matsuyama (1987).[3] This framework allows a careful analysis of the evolution of savings and investment as well as the capital account after a liberalization.

Most analyses of a liberalization consider exclusively a removal of capital controls. In such a case, the impact of a financial liberalization on net capital flows is unambiguous. If a country initially faces controls on capital outflows and an interest rate lower than abroad, a removal of capital controls would lead to large net capital outflows. Capital inflows would occur in the opposite initial situation.

This type of analysis, however, neglects a crucial element: most liberalizations of capital movements are accompanied by a liberalization of the domestic financial sector. This joint liberalization occurs simply because most countries with capital controls also have a protected and strongly regulated financial sector. The liberalization of the domestic financial sector can be either a voluntary step taken by the authorities[4] or a consequence from the capital account liberalization: the domestic financial sector must become more efficient to compete with foreign capital flows. As the domestic financial liberalization will also affect the behaviour of firms and individuals, the relevant analysis is the one
of a joint liberalization of capital movements and the domestic financial sector.

This paper considers two experiments: first, a *simultaneous liberalization* of the domestic financial sector and of the capital account; second, a liberalization of the domestic financial sector followed by a capital account liberalization (a *sequential liberalization*). In each case, the analysis focuses on the evolution of savings and investment and on the capital account. It is shown that a likely outcome of a liberalization is an initial net inflow followed by an outflow. The intuition is that the liberalization of the domestic financial sector leads to a better allocation of resources and makes the country more attractive to both domestic and foreign investors. Thus, initially, there will be few incentives for outflows and strong incentives for inflows; over time, however, domestic investment will become less attractive as the capital stock increases and its marginal productivity declines. Net capital inflows therefore decrease over time and turn into net outflows. The change in the long-run net asset position of the country is ambiguous and depends on the initial conditions.

The analysis also reveals that the comparison of the domestic real interest rate with the foreign rate before a capital account liberalization will usually not indicate the direction of net capital flows. This is true even if the domestic financial sector is liberalized first. It is also shown that a liberalization leads to an overshooting in share prices.

Finally, the public sector is also affected by a liberalization. In particular, the service payments on the public debt increase. This increase is usually smaller for a simultaneous liberalization. Moreover, a large initial public debt leads to smaller long-term net capital outflows.

The rest of the paper is organized as follows. Section I describes the model and the initial restrictions in the domestic financial sector. Section II analyses the impact of a simultaneous liberalization; it first looks at the steady-state effect and then examines the dynamics. Section III analyses the effects of a sequential liberalization. Section IV offers concluding remarks.

I. The Model

The model used in this analysis is a small open economy similar to Matsuyama (1987). It is basically an open-economy version of a model by Blanchard

(1985), with a q-theory of investment with costs of adjustment to the capital stock (e.g. see Hayashi 1982). The Blanchard model is based on intertemporal optimization by individuals with finite horizons. The assumption of finite horizons is convenient as it allows the comparison of stable steady states with different equilibrium interest rates. With infinite-horizon models, the interest rate must equal the rate of time preference. Thus, a change in the interest rate arising from a liberalization cannot lead to a new stable steady state.[5]

The domestic financial market is initially restricted in several ways, and various rates of return exist in the economy. In particular, the rates relevant for investment and savings decisions are different. The required rate of return for the firm, r^F, is superior to the actual return for investors, r^D. The wedge between the two rates, κ, is such that

$$r^F = r^D + \kappa. \tag{1}$$

Investors can provide financing to the firm either directly through the stock market, or indirectly through financial intermediaries. It is assumed that the return on both types of investment is r^D and that the wedge κ can be appropriated by the government either by taxing individuals and firms, or by taxing financial intermediaries.[6] Before the liberalization of capital movements, it is assumed that $r^D < r^* < r^F$, where r^* is the *single* world interest rate. When capital controls are removed, there is a single domestic interest rate; i.e. $r^D = r^F = r^*$.

The required rate of return for the firm, r^F is such that

$$r^F = \frac{\text{Div}}{V} + \frac{\dot{V}}{V}, \tag{2}$$

where V is the value of the firm and Div is the dividend:

$$\text{Div} \equiv F(K, L) - wL - I; \tag{3}$$

K is capital stock; L is labour supply; w is the wage rate; and I is gross investment for new capital. $F(K, L)$ is a linear homogeneous production function net of capital stock depreciation. Gross investment I includes the change in capital stock as well as its installation cost:

$$I = \dot{K} + J(\dot{K}/K)K, \tag{4}$$

where $J(\dot{K}/K)$ is the installation cost function of new capital (with $J(0) = 0$, $J'(0) = 0$ and $J'' > 0$). Integrating (2), the optimal value of the firm is

$$V_t = \max \int_t^\infty \text{Div}_v \exp\left[-r^F(v-t)\right] \mathrm{d}v. \tag{5}$$

The rest of the model and of the notation is almost identical to Matsuyama and only the main aspects are presented. An individual born at time s maximizes his expected lifetime utility:

$$\int_t^\infty \ln c(s, v) \exp\left[(\theta + p)(t - v)\right] \mathrm{d}v, \tag{6}$$

where θ is the rate of time preference and p the probability of death. His instantaneous utility function is assumed to be logarithmic. His dynamic budget

constraint is

$$(7) \qquad \frac{da(s,t)}{dt} = [r^D(t)+p]a(s,t)+w-\tau-c(s,t),$$

where τ is a lump-sum tax and c is consumption; a is portfolio wealth and is composed of foreign bonds b, domestic government bonds d, and domestic capital k, at price q. The three assets are perfect substitutes and bear the same return r^D. The government sets the interest rate on its debt and imposes a tax r^*-r^D on foreign bonds when there are capital controls.

Variables aggregated over generations are denoted by capital letters. Aggregate portfolio wealth is therefore $A=B+D+qK$. The standard intertemporal solvency condition is also imposed.

The government collects a lump-sum tax T, has expenditures G and pays the interest on its debt. It also receives the wedge κ as well as the difference between the domestic and the foreign rate on foreign bonds, r^*-r^D. Finally, it borrows to finance a possible deficit. The government budget constraint is

$$(8a) \qquad G-T-\kappa V-(r^*-r^D)B+r^DD=\dot{D}.$$

For simplicity, expenditures are set equal to zero and the public debt is assumed positive and constant; i.e.

$$(8b) \qquad T+\kappa V+(r^*-r^D)B=r^DD.$$

By solving the optimal behaviour of firms and households and aggregating over generations, we find the following system (similar to equations (10) in Matsuyama):

$$(9a) \qquad \dot{C}=(r^D-\theta)C-p(\theta+p)(B+D+qK),$$

$$(9b) \qquad \dot{B}=r^*B+F(K)-C-\phi(q-1)K-J[\phi(q-1)]K,$$

$$(9c) \qquad \dot{K}=\phi(q-1)K,$$

$$(9d) \qquad \dot{q}=r^Fq-F_K-(q-1)\phi(q-1)+J[\phi(q-1)],$$

where $F(K)\equiv F(K,1)$, F_K is the marginal productivity of capital and $\phi=(J')^{-1}$. Two cases are considered below. The first is an economy with no capital mobility and a restricted financial sector, called a *repressed economy.* In this case, $\dot{B}=0$ and r^D and r^F are determined endogenously. The second case is a liberalized economy where $\dot{B}$ is determined by (9b) and $r^D=r^F=r^*$. After the liberalization, the system (9) is saddlepoint-stable if $r^*<\theta+p$[7] and this condition is assumed to hold throughout the analysis.

II. A Simultaneous Liberalization of the Capital Account and the Financial System

This section analyses a once-for-all financial liberalization and consists of two elements: a liberalization of the capital account, and a removal of the various distortions in the domestic financial sector. The impact of a liberalization of the capital account on an economy with an efficient financial system is well known. If the initial domestic interest rate is lower than the foreign rate, a capital outflow occurs. A capital inflow would be observed in the opposite case. With a restricted domestic financial system, the same results obtain if all the various rates of return are below the foreign rates or if they are all above.

The interesting case is when the domestic rate of return for investors is lower than the foreign rate, while the domestic rate relevant for firms is higher than the foreign rate. Assuming that there is a *single* foreign rate r^*, this case occurs when initially

$$r^F > r^* > r^D.$$

A financial liberalization gives an incentive for capital outflows for individuals and an incentive for capital inflows for firms. What is the net effect? The remainder of this section shows that an initial inflow followed by an outflow is likely, although the long-run net asset position is ambiguous. For this purpose, I first compare the steady states of the repressed and the liberalized economies; I then look at the dynamics of the liberalization.

Comparison of steady states

The repressed economy. In the repressed economy we have no capital flows; i.e. $\dot{B} = 0$. For simplicity, it is assumed that $B_0 = 0$; hence $C_0 = F(K_0)$. Moreover, from (9c) the price of capital is equal to unity, $q_0 = 1$. Using these two results and equation (9a) (setting $\dot{C} = 0$), we can determine the capital stock:

$$K_0 = \Gamma(r^D, D), \tag{10}$$

where the function Γ is decreasing in both its arguments. Once K_0 is determined, the wedge between interest rates can be determined. From (9c) and (9d), we have

$$F_K(K_0) = r^F = r^D + \kappa. \tag{11}$$

With regulated financial markets, the government can set the interest rate r^D offered on its bonds. With a public debt given by history, setting r^D determines the capital stock. This in turn determines the implicit wedge κ. Alternatively, the government could reach the same capital stock by setting the wedge. (Then r^D would be determined endogenously.)

The liberalized economy. When the economy is liberalized, both externally and domestically, by arbitrage, the interest rates are equalized to the world rate. The liberalized economy is therefore governed by the same system (9), where $r^D = r^F = r^* = r$ and where the $\dot{B} = 0$ assumption is removed. The crucial assumption in this section is that initially $r^F > r^* > r^D$. From (8b), the liberalization implies a higher debt service for the governemnt as well as a loss in revenue from the wedge tax. It is assumed that lump-sum taxes are increased to balance the budget.

From (9c) and (9d), we find

$$q^* = 1, \tag{12}$$

$$F_k(K^*) = r^*. \tag{13}$$

As $r^* < r^F$, we clearly have $K^* > K_0$; i.e. *a liberalization leads to a higher capital stock.* Moreover, the price of capital q is the same in each steady state.

While the effect of a liberalization on the steady-state capital stock is unambiguous, the effect on consumption and foreign assets is not clear. From (9a) and (9b), we get

$$B^* = \frac{C^* - F(K^*)}{r} \tag{14}$$

$$(15) \qquad C^* = \frac{p(\theta+p)}{(\theta+p-r)(r+p)}[F(K^*) - r(K^*+D)].$$

Equations (14) and (15) mean that there is not necessarily a net asset position; i.e. a liberalization does not necessarily lead to a long-run net capital outflow. The condition to have a net outflow is

$$(16) \qquad \frac{F(K^*)}{K^*+D} > \frac{p(\theta+p)}{r^*-\theta}.$$

From (16), *a long-run capital outflow does not occur when domestic investment opportunities are very large* (e.g. with a slowly decreasing marginal productivity with F_{KK} close to 0). Moreover, it can be seen easily that the stability condition ($r^* < \theta + p$) implies that the right-hand side of (16) is larger than r^*. By using (13) and the fact that $F(K^*) = w + F_K(K^*)K^*$, a necessary condition for a net outflow is[8]

$$(17) \qquad w > r^* D.$$

Thus, *the larger the public debt D, the less likely is a net capital outflow.* This is because r^D is initially closer to r^*. Alternatively, if r^D is kept constant for a larger D, capital outflows are less likely because the initial capital stock is lower.

Dynamics of the liberalization

To analyse the dynamics, the model is linearized around the liberalized steady state. If the wedge κ is small, the linearized system can be used to look at the transition between the two steady states.[9] The system is identical to Matsuyama and is described by his equations (12) and (13). As mentioned above, if $r < \theta + p$, the system is saddlepoint-stable. The stable path to the liberalized steady state is given by the following system:

$$(18a) \qquad C - C^* = [(1+\beta)(K_0 - K^*) - B^*](\lambda_1 - r)\exp(\lambda_1 t) + \beta(K_0 - K^*)(\lambda_2 - r)\exp(\lambda_2 t),$$

$$(18b) \qquad B - B^* = [(1+\beta)(K_0 - K^*) - B^*]\exp(\lambda_1 t) - (1+\beta)(K_0 - K^*)\exp(\lambda_2 t),$$

$$(18c) \qquad K - K^* = (K_0 - K^*)\exp(\lambda_2 t),$$

$$(18d) \qquad q - 1 = -\frac{F_{KK}(K^*)}{\lambda_2 - r}(K_0 - K^*)\exp(\lambda_2 t),$$

where λ_1 and λ_2 are the two negative roots of the linearized system. The first negative root, λ_1, is associated with the savings dynamics and $\lambda_1 = r - \theta - p$. The second negative root, λ_2, is associated with the investment dynamics. Moreover,

$$\beta = \frac{-p(\theta+p)F_{KK}(K^*)K^*}{(r-\lambda_2)(\lambda_2 - r - p)(\lambda_2 - \lambda_1)}.$$

As $K^* > K_0$, it can be easily seen from (18c) that the capital stock increases monotonically, while (from 18d) q first jumps up and then decreases. Thus, when $r^F > r^*$, *a liberalization leads to an increase in investment and to an overshooting in share prices.*[10]

The evolution of foreign assets is described by differentiating equation (18b) with respect to time:

$$\dot{B} = (1+\beta)(K_0 - K^*)[\lambda_1 \exp(\lambda_1 t) - \lambda_2 \exp(\lambda_2 t)] - B^* \lambda_1 \exp(\lambda_1 t). \quad (19)$$

It can be seen that $\dot{B}$ is likely to be initially negative and then to turn positive, as illustrated in Figure 1. This is the case when B^* is not too negative and $|\lambda_1| < |\lambda_2|$,[11] i.e. when the negative root associated with investment is larger in absolute value than the one associated with savings. This condition is likely to hold unless the adjustment cost is very high: firms want to increase their capital stock as quickly as possible, while savings increase only through the slow accumulation of wealth by individuals.[12] When $|\lambda_1| < |\lambda_2|$, it can be easily seen that $\dot{B}(0) < 0$ and that $\dot{B}(t)$ is increasing. Moreover, when B^* is not too negative, $\dot{B}$ becomes positive as t increases. Thus, there is an initial net capital inflow followed by net outflows. The long-run net asset position (B^*) is ambiguous and is determined by equation (16).

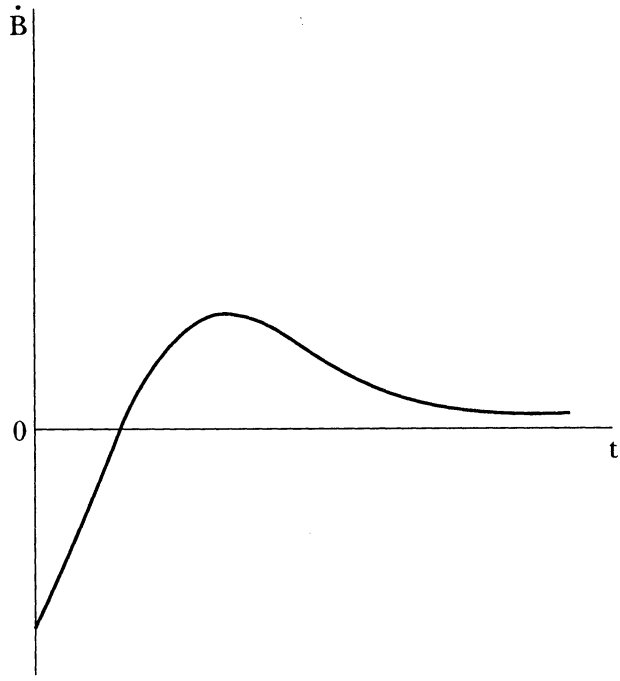

FIGURE 1. Evolution of net capital flows after a liberalization when $|\lambda_1| < |\lambda_2|$.

This section has therefore shown that a simultaneous liberalization of capital movements and of the domestic financial markets leads to an increase in the capital stock and to a temporary increase in share prices. While the effect on international capital flows is ambiguous in general, initial inflows followed by outflows are likely when installation costs are not too large.[13]

III. SEQUENTIAL LIBERALIZATION

The experiment analysed in the previous section was a simultaneous liberalization of the domestic and external financial sectors. What would happen if

the two liberalizations did not occur simultaneously? If the external liberalization comes before the domestic one in this model, the economy behaves as in the simultaneous-liberalization case: firms borrow, and investors lend abroad at better conditions. The domestic financial system thus collapses.

On the other hand, if the domestic liberalization comes before the external one, the transition towards the new steady state is different.[14] The steady state, however, is not affected by the order of liberalization, as the steady-state conditions are identical to the simultaneous case represented by equations (12)-(15). The dynamics are affected by the order of liberalization, but a full analytical solution cannot be derived in this case. As mentioned above, a complete liberalization of capital movements modifies fundamentally the behaviour of the economy as the interest rates, from being endogenous, become exogenous.

Nevertheless, several results relating to the dynamics can be obtained. A domestic liberalization means that the wedge κ disappears and the interest rate is determined endogenously. At this time, r^D and r^F are equalized and there is a single domestic interest rate. As r^D generally jumps up,[15] savings increase and capital accumulates, progressively lowering the interest rate. When capital movements are liberalized, the domestic interest rate equals the foreign rate; i.e. $r^D = r^F = r^*$. Just before the latter liberalization, however, the level of domestic interest rate is different from the foreign one and can in particular be higher.[16] At the same time, from conditions (14) and (15), there may be a net asset position of the country in the steady state, i.e. net long-term capital outflows. Thus, even though the domestic interest rate before a liberalization of capital movements may be higher than the foreign rate, long-term capital *outflows* can be observed. Therefore, the *level of the interest rate before a capital account liberalization is not an indicator of the direction of capital flows.*

The short-term behaviour of capital flows after the two liberalizations can be obtained in a way similar to that described in Section II: in equation (19), K_0 is simply replaced by the stock of capital just before the capital-flows liberalization, K_T (where $K_T > K_0$). Therefore, the same oscillations as in the simultaneous case can occur; i.e. there can still be net inflows followed by net outflows. The magnitude of the oscillations, however, is smaller as they are proportional to $K_T - K^*$. Thus, a previous liberalization of the domestic financial system dampens the fluctuations of medium-term net capital flows.

IV. Concluding Remarks

The full dynamics of a liberalization could be derived from the model presented in this paper. The main results are summarized in the Introduction and are not repeated here. An important aspect of the results is the ambiguity of the direction of capital flows after a capital account liberalization. It was argued, however, that a likely outcome is an initial period with net inflows followed by net outflows.

The dynamics of a liberalization have been interpreted mainly in terms of capital flows and the capital account. It is obviously equivalent to looking at the experiment in terms of the current account and the identity, current account $\equiv$ saving-investment. The liberalization of a repressed economy increases both saving and investment and the effect on the current account is

ambiguous. For example, an initial capital inflow followed by an outflow means that initially investment increases faster than saving and then the opposite is true. That is, we have first a current account deficit and then a surplus.

This analysis should be seen as a first step in the understanding of the dynamics of a liberalization of capital movements, and several additional elements should be considered. First, a crucial assumption has been constant returns to scale in production. Several results of the paper may be altered when this assumption does not hold. Thus, the next step in the analysis is to introduce increasing returns to scale.[17]

Second, the monetary side has been kept in the background and the exchange rate was implicitly assumed to be flexible. A capital inflow followed by a capital outflow would mean an appreciation of the currency followed by a depreciation. Introducing the monetary side would certainly be of great interest. It could allow an analysis of the effect of a liberalization on inflation and in particular on the inflation tax. Changes in money holdings would give another source of capital movements.

Third, this paper has stressed the importance of considering jointly the liberalization of capital movements and of the financial sector, but other elements should be taken into account during a liberalization. For example, stabilization programmes often accompany the liberalization of capital movements. This is an additional reason to observe a capital inflow. Another important element is the role of taxation.

As far as the liberalization of domestic financial markets is concerned, a deeper analysis is certainly worthwhile. This paper has considered a simplified form of financial repression. Attempting to model the restrictions at a more microeconomic level with an explicit representation of financial intermediation would certainly improve our understanding of the effects of a liberalization.[18] Another strong assumption is the perfect substitutability between foreign and domestic assets. The role of uncertainty and of portfolio preferences is certainly important. It would be useful to represent explicitly the effects of portfolio diversification caused by a liberalization (in addition to the effects of a change in the interest rate).

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NOTES

1. This is the case in particular for EC countries with Project 1992.
2. See however Kahn and Zahler (1986), Kohn and Marion (1988), Obstfeld (1986) or Sussman (1988) for dynamic analyses.
3. Matsuyama developed this model mainly to analyse the effect of an oil shock on the current account dynamics. He also examines the impact of capital taxation.
4. This is the case for the European Community with the concept of mutual recognition in financial services.
5. A stable solution could obtain by using an Uzawa-type utility function as in Obstfeld (1981).
6. With perfect competition in the production sector and among financial intermediaries, who pays the tax is immaterial. Moreover, when firms are financed through both shares and bank

loans, it can be shown that the wedge κ is a combination of distortions in the banking sector and in the stock market (see Bacchetta 1989).

7. This condition means that there are two negative eigenvalues for the linearized system (see below). As there are two predetermined variables, B and K, this implies saddlepoint stability.
8. This condition would hold for many countries, but it is not sufficient to have an outflow.
9. Notice that in this experiment the dynamics of the repressed economy do not matter, as in the adjustment process to the new steady state and the economy is liberalized.
10. There is no discrete change in the capital stock at the moment of the liberalization as there are installation costs. Consequently, there is no discrete capital inflow at time 0 (i.e. B is a predetermined variable).
11. To have an initial capital outflow, we need either $\lambda_2 > \lambda_1$ *and* $-1 < \beta < 0$, or B^* being very large. Nevertheless, B^* cannot be too large in absolute value as $B^* = (A^* - A_0) - (K^* - K_0)$.
12. It can be checked that $\lambda_1 > \lambda_2$ when $-\phi'(0)F_{KK}(K^*)K^* > (p+\theta-r)(p+\theta)$. Thus, when $\phi'(0)$ is large, the marginal installation cost increases more slowly and an initial capital inflow is more likely.
13. Calibrating the model for an actual economy, Bacchetta (1989) shows that this would indeed be the path of the capital account after a liberalization.
14. It is often argued that the domestic liberalization should come first.
15. From (9b), C jumps down and $\dot{C}$ tends to be positive. Thus, from (9a) r^D must increase.
16. Notice that if $r^D > r^*$, interest payments on the government debt are larger. A sequential liberalization will therefore put more strain on the government budget than a simultaneous liberalization.
17. See Kohn and Marion (1988) for an analysis of a liberalization of capital flows only.
18. Bacchetta and Caminal (1992) make a step in this direction by introducing explicitly a competitive banking sector.

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