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# Monetary Reform, Credibility, and the Restarting Problem

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There are few situations in which the formulation of macroeconomic policy is more difficult than when it becomes evident that the existing policy mix cannot achieve the authorities' stated objectives. In some cases, the existing policy mix may have been inappropriate even at the start of the stabilization effort. Alternatively, policies that were initially consistent might not have been changed to reflect new external or internal shocks. The authorities are nonetheless confronted with the need to correct their policy stance ("restart" the stabilization program) at a time when the private sector has considerable uncertainty about the nature of future policies and the ability of the authorities to develop an effective macroeconomic policy mix. This lack of credibility means that the effectiveness of some policy instruments may differ considerably from more normal periods. 1/

Our paper analyzes this "restarting" problem in a rather narrow sense by focusing on the issue of how to reinitiate a financial reform after economic developments have forced the authorities to reverse an earlier set of reforms with the result that holders of financial assets suffered large unanticipated real losses. The basic question is therefore how the new phase of the financial reform should proceed when there is virtually no credibility in the private sector that the reform process will be carried to a successful conclusion. Since such a reform is likely to take place during a period with high levels of unemployment and inflation, there is also the issue of whether the reforms should be directed solely toward the attainment of structural goals or whether they should respond to cyclical developments as well.

When the authorities are confronted with these adverse conditions, our analysis indicates that in general the solution to the restarting problem will often involve a two-stage reform process. During the initial phase, the authorities must focus on establishing the belief (credibility) that the reform policy will be carried through. Any attempt to stabilize

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* This paper has benefitted from the comments of S. Chand on an earlier draft. The author is responsible for any remaining errors.

1/ For an empirical analysis of these issues see Artus (1981).

income or inflation during this initial phase would best be carried out with policy instruments other than those used to initiate the financial reform. Once a "significant" degree of credibility regarding the completion of the reform program has been established, the reform policy can become more responsive to cyclical developments. During this second phase, feedback between the reform program and cyclical developments would be appropriate even in the presence of rational expectations.

To illustrate the nature of the restarting problem and to specify the most appropriate reform process, our discussion is divided into two parts. The next section initially presents a two-sector model of an open, developing economy which has had an unsuccessful financial reform in the recent past and where price instability and unemployment are a normal part of the adjustment process. In this situation, the optimal level of the real deposit rate during the first and second phases of the reform program is related to the long-term target for the real deposit rate, the gaps between the current level of wages and prices and their longer-term values, and the private sector's confidence that the financial reform will be completed. The final section gives a summary of our results and discusses the implications of these results for the restarting problem.

## I. Basic Model

In order to examine the relationship between the timing of structural reforms, credibility and cyclical developments, we require a relatively simple model which nonetheless captures both the short- and long-term effects of structural reform policies. Consider a two-sector model of a developing economy where the authorities have decided to gradually remove interest rate ceilings as part of a general financial reform. The first sector of the economy produces an export good using labor, real working capital, 1/ and possibly some fixed and exogenous factor of production (e.g., land). Sector two uses a similar factor mix to produce an import competing good. If $Y_i$ represents output in sector i, $L_i$ the amount of labor utilized in each sector i, and $(A_i/P_i)$ the amount of real working capital, then one possible production function relationship is 2/

$$(1) \quad Y_i = a_{i0} + a_{i1}L_i - a_{i2}L_i^2 + b_{i1}(A_i/P_i) - b_{i2}(A_i/P_i)^2; \quad i = 1,2$$

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1/ Working capital is represented by liquid assets and inventories.

2/ This production function will have a positive marginal product subject to diminishing returns as long as $a_{i1} - 2a_{i2}L_i > 0$ and $-2a_{i2} < 0$ and $b_{i1} - 2b_{i2}(A_i/P_i) > 0$ and $-2b_{i2} < 0$. It is characterized by diminishing returns to scale and marginal products which are independent of the employment of other factors.

with $a_{ij}$, $b_{ij} > 0$ for $i,j = 1,2$. The impact of the fixed factor of production is implicit in the $a_{i0}$ term. This quadratic form minimizes the possibility of substitution between labor and real working capital in order to focus attention on the overall employment of both factors.

Firms will hire labor up to the point where the nominal wage (w) equals the value of the marginal product, or

$$(2) \quad w = P_i \partial Y_k / \partial L_i; \quad i = 1,2$$

where $P_i$ = the domestic price of good i.

Firms are also faced with the constraint that they cannot obtain as much working capital as they desire at the existing ceiling interest rate on bank loans ($\bar{r}_A$). If we define $*r_A^i$ as the value of the marginal product of working capital in each sector, then

$$(3) \quad *r_A^i = P_i \partial Y_i / \partial (A_i/P_i); \quad i = 1,2.$$

The real return on working capital ($r_A^i$), which is a pure rate of return, is

$$(4) \quad r_A^i = *r_A^i / P_i; \quad i = 1,2.$$

With interest rate ceilings and credit rationing, firms will have a potentially large excess demand for real working capital, which reflects the fact that the real return on working capital can far exceed the expected real cost of loans. 1/

$$(5) \quad r_A^i = \bar{r}_A - (\dot{P}_i/P_i)^e$$

where $(\dot{P}_i/P_i)^e$ = expected rate of inflation of price i, and

$\bar{r}_A$ = nominal ceiling loan rate in banking system.

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1/ The high levels of real interest rates that were witnessed in Argentina and Chile during the early stages of their financial reforms suggest that the initial excess demand for real credit can be quite significant.

In this repressed financial system, the stock of loans available at any instant in time $(A_1 + A_2)$ is determined by the level of deposits (M) in the financial system and the reserve behavior of the banking system. To simplify, assume that banks are required to hold reserves equal to k per cent of their deposits and keep no excess reserves. Thus,

$$(6) \quad A_1 + A_2 = (1-k)M.$$

The desired level of nominal deposits will be taken as a positive function of the level of nominal disposable income in each sector and the real return rate offered on deposits ($r_m = \bar{r}_D - (\dot{P}/P)^e$, where $\bar{r}_D$ is the nominal ceiling interest rate on deposits and P is the general price level).

$$(7) \quad M = \sigma_0 + \sigma_1 r_m + \sigma_2(P_1Y_1 - P_1T_1) + \sigma_3(P_2Y_2 - P_2T_2); \quad \sigma_i > 0.$$

The willingness of wealth holders to accumulate bank deposits as portfolio assets will be affected by the private sector's perception of the establishment and sustainability of a positive real return on bank deposits. The more convinced that wealth holders become that the authorities will continuously maintain a positive real return on deposit holdings the larger will be their real holdings of financial assets. To represent the impact of this credibility on bank deposit holdings, it will be assumed that the interest rate elasticity of the demand for bank deposits is sensitive to how much of an improvement has taken place in the real return on time deposits ($r_m - r_m^0$, where $r_m^0$ is the initial real return on deposits) and the gap between the current real return and the authorities' announced long-run target rate ($r_m - \bar{r}_m$). 1/ Thus

$$(8) \quad \sigma_1 = \sigma_1' + \sigma_{11}(r_m - r_m^0) + \sigma_{12}(r_m - \bar{r}_m).$$

If $\sigma_{11}$ and $\sigma_{12}$ are large, then a rapid movement toward the long-run value of $r_m$ will generate a sharp increase in the interest elasticity of the demand for bank deposits.

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1/ There are a number of ways in which credibility effects could be introduced, but this is the most direct.

The behavior of the interest elasticity of the demand for money given in equation (8) represents one simple formulation of what McCallum (31) has called the Lucas (27) "policy evaluation problem". In examining stabilization policy, Lucas noted that the private sector's response to a given policy change may vary depending on the degree to which the private sector anticipates the action (especially if it is a systematic policy response to certain types of cyclical developments), regards the policy changes as transitory or permanent, or has an accurate understanding of the full macroeconomic effects of the policy. The impact on the economy of an unexpected once-and-for-all change in a given policy instrument would thus generally differ from that associated with a comparable change in the same policy instrument that is part of a continuing systematic response to certain types of cyclical developments. Given our specification of the behavior of the interest elasticity of the demand for deposits, the optimal reform program must be designed to take into account the changing effectiveness of $r_m$.

With credit rationing, banks are taken as allocating a fixed percentage of their disposable funds [(1-k)M] to each sector. Thus

$$(9) \quad A_i = u_i(1-k)M; \quad u_1 + u_2 = 1.$$

In setting the ceiling loan and deposit rates, the authorities will be assumed to set the ceiling loan rate at the lowest level consistent with covering the cost of the banks' deposits. This means that the ceiling loan $(\bar{r}_A)$ and deposit $(\bar{r}_D)$ rates will be related by 1/

$$(10) \quad \bar{r}_A = \bar{r}_D/(1-k).$$

Note that this policy regarding the spread between the loan and deposit rates ensures that specifying a path for $\bar{r}_D$ will automatically imply a corresponding path for $\bar{r}_A$.

Short-run labor market developments will reflect the response of wages and prices to the financial reform. We will assume rather different price behavior for the exportable and importable goods. The price of the export good (produced by sector 1) will be taken as equal to a fixed world price $(P_1^*)$ times the exchange rate (E)

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1/ This reflects the fact that for bank earnings to cover deposit payments, we must have $\bar{r}_A(A_1 + A_2) = \bar{r}_D M$. Using $A_1 + A_2 = (1-k)M$, we can therefore obtain equation (10). The analysis could easily incorporate a fixed cost of bank operations.

$$(11) \quad P_1 = EP_1^*.$$

There is thus complete and continuous price arbitrage between the domestic and foreign prices of the exportable goods. As long as the exchange rate remains fixed, any relative price or price level changes will solely reflect changes in the price of the import good.

The domestic price of the import good is assumed to respond to price arbitrage between domestic and international markets and to changes in the net domestic demand for the importable good. The absence of complete price arbitrage on the import side could reflect the fact that the development of an institutional framework of importers and wholesalers has been discouraged by quantitative as well as tariff-related restrictions on imports. Any large excess of the domestic price ($P_2$) of the import good over the world price ($P_2^*$) adjusted for the tariff ($\bar{\tau}$) and the exchange rate will nonetheless lead to some substitution in consumption of the importable good for the domestic good. In addition, changes in the level of domestic demand for the importable good ($C_2 + G_2$) and the domestic supply ($Y_2$) will put pressure on the domestic price of the import competing good as well as affecting the level of imports. The change in the domestic price of the importable good is thus given by

$$(12) \quad \dot{P}_2 = -\delta_0[P_2 - (1+\tau)EP_2^* - \alpha_0] + \delta_1(C_2 + G_2 - Y_2)$$

where $C_2$ = private domestic demand for good 2, and

$G_2$ = government demand for good 2. 1/

The domestic demand for the importable good is assumed to be a function of the levels of income (net of taxes), the real interest rate, and the prices of the two goods in the two sectors. Since the real loan rate is below its market clearing level, it is not a constraint on firms' productive activities. The real deposit rate does, however, represent the effective yield that wealth holders can earn on their savings. Thus

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1/ $G_2$ is taken as fixed throughout our analysis.

$$(13) \quad C_2 = \phi_0 + \phi_1(P_1Y_1 - P_1T_1) + \phi_2(P_2Y_2 - P_2T_2) + \phi_3P_1 - \phi_4P_2 - \phi_5r_m$$

where $\phi_i \geq 0$ 1/ and

$T_i$ = taxes levied on factor income in sector i.

The overall price level (P) is defined to equal

$$(14) \quad P = \varepsilon_1P_1 + \varepsilon_2P_2; \quad \varepsilon_1 + \varepsilon_2 = 1.$$

The fixed $\varepsilon_i$ are assumed to reflect approximately the steady state importance of goods 1 and 2 in domestic consumption.

In most developing countries, movements in nominal wages reflect the influence of both any excess demand or supply of labor and institutional arrangements for the indexing of wages to prices. To allow for both of these factors, assume that the change in the nominal wage (w) is given by 2/

$$(15) \quad \dot{w} = \gamma_0\dot{P} - \gamma_1(N - L_1^D - L_2^D - \alpha_1) + \gamma_2$$

where N = total labor force.

The parameter $\gamma_0$ reflects the degree of wage indexing, whereas $\gamma_1$ measures the impact of any excess supply or demand for labor. N is the total labor force, which is taken as fixed. $L_i^D$ represents the desired (as opposed to actual) utilization of labor in sector i (as implied by equation (2)). When there is an excess demand for labor, it can be assumed that each sector's desired utilization of labor is reduced by some proportion of the total excess demand for labor. 3/ Since we will

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1/ Although not required for our analysis, the demand for $C_2$ would be homogeneous of degree zero if $\phi_1 + \phi_2 + \phi_3 - \phi_4 = 0$.

2/ If wages and prices are stable in the long run, then $\gamma_2 + \gamma_1\alpha_1 = 0$.

3/ See Bruno (1978) for a discussion of this approach. In general, this proportion will be a nonlinear relationship.

be concerned primarily with adjustment paths where $N - L_1^D - L_2^D > 0$, 1/ however, we can use the actual amount of labor demanded in each sector to determine the level of unemployment.

While equation (15) can be viewed as a means of incorporating the effects of an official wage indexing arrangement, there is an alternative justification along the lines suggested by Taylor (1982). In the Taylor model, there are series of overlapping generations of wage contracts which reflect price expectations during these overlapping periods. At each point in time the prevailing wage rate reflects expectations regarding both inflation and employment during the contract period. In a perfect foresight, rational expectations world, equation (15) can be viewed as a continuous time approximation to Taylor's discrete time specification in that actual wage rate changes reflect the actual (and expected) price level changes and the actual (and expected) levels of unemployment. Note that this alternative justification implies that, even if the authorities eliminated official wage indexing, equation (15) would still exist (in a modified form) because of contracting behavior in the private sector.

Since we have assumed a fixed exchange rate, the state of the balance of payments will reflect the issuance of domestic money to finance the government deficit and the growth in the demand for money. If the private sector rapidly adjusts its actual holdings of money to the desired level, then any excessive issuance of money will lead to changes in savings and spending plans that will produce a balance of payments deficit and a loss of foreign exchange reserves. 2/ In order to focus on the financial reform, it is assumed that the government deficit is either zero or at a level sufficiently small that the fixed exchange rate policy can be maintained over time. 3/ It is clear that a large and growing fiscal deficit would make any reform program unsustainable. Establishing control over the fiscal accounts is a required first step in any reform process.

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1/ If $N^U$ is the natural level of unemployment, then we should write $N - N^U - L_1^D - L_2^D$. We shall assume instead that N is net of the natural level of unemployment.

2/ The assumption regarding the rapid adjustment of money holdings is used in order to focus on the employment, output, spending, and relative price effects of the financial reform. It implicitly assumes that domestic prices are sticky and respond only to changes in the consumption demands and price arbitrage effects given in equation (12). This means that any potential excess supply of money immediately spills over onto the demand for the export good and thereby the trade balance.

3/ This would be possible if when a stationary equilibrium is reached the government deficit resulted in the issuance of money and thereby a loss of international reserves that just equalled the central bank's interest earnings on its foreign exchange reserves.

The monetary reform is taken as involving managed increases in the ceiling loan and deposit rates to ultimately bring about either free interest rates or controlled rates that are approximately at that level. 1/ These changes are undertaken in order to increase the level of financial savings and improve efficiency in the use of working capital. As Shaw (1973) has pointed out, during a financial reform "the essential instrument of policy on the market for money is real deposit rate." 2/ Our analysis thus focuses on specifying the optimal path for the real deposit rate ($r_m$) and will generate the implied path for the loan rate from equation (10). When unemployment and a lack of private sector credibility regarding the authorities' policies are likely to be significant problems, then the authorities are assumed to undertake financial reforms which maximize income but minimize unemployment and price instability. 3/ In developing such a financial reform, the relative importance that the authorities attach to their unemployment, price stability and income goals will be given by 4/

$$(16) \quad U = -K_0(N - L_1^D - L_2^D - \bar{\ell})^2 - K_1(P - \bar{P})^2 + K_2(\bar{P}_1 Y_1 + \bar{P}_2 Y_2)$$

where $\bar{\ell}$ is target unemployment. In measuring the income objective, the authorities are taken as evaluating current output in terms of the goods prices that will prevail at the end of the reform period.

Adjustment process

The adjustment process can be described by using the relationships given in equations (1) - (15) to derive two differential equations which relate the behavior of the wage rate (w), the domestic price of the imported good ($P_2$), and the real deposit rate ($r_m$). These equations are (see Appendix II for the derivation):

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1/ The freeing of interest rates is not viewed as a viable policy option at the beginning of the reform due to unstable economic conditions, considerable private sector uncertainty regarding future policies and economic conditions, and as in many countries, the absence of a competitive financial system.

2/ Shaw (1973), p. 117.

3/ The importance of the longer-term financial reform goals are reflected in the steady state value toward which the real deposit rate is being moved.

4/ In equation (16) we have used the level of income evaluated at long-term equilibrium prices rather than the square of the level in order to derive a relatively simple feedback rule.

$$(17) \quad \dot{w} = g_1(w, P_2, r_m); \quad \partial g_1/\partial w,\ \partial g_1/\partial P_2,\ \partial g_1/\partial r_m \gtrless 0$$

$$(18) \quad \dot{P}_2 = g_2(w, P_2, r_m); \quad \partial g_2/\partial w,\ \partial g_2/\partial P_2,\ \partial g_2/\partial r_m \gtrless 0$$

with $\partial g_2/\partial r_m = (\partial g_1/\partial r_m)/[\gamma_0(1-\varepsilon_1)]$. 1/ The uncertainty regarding the signs of the partial derivatives with respect to w and $P_2$ reflects the ambiguous effects of these variables on the excess domestic demand for the imported good. For example, the impact of a higher w on $\dot{P}_2$ depends on the response of the net domestic demand $(C_2 + G_2 - Y_2)$ for the domestic good (equation (12)). Given our production structure and the firm's criteria for employing labor and real working capital, the output level in each sector can be expressed as an implicit negative function of the nominal wage rate and positive function of the price of the sector's output and the real deposit rate. 2/ A rise in the wage rate will reduce the firms' desired levels of output and thereby sectoral incomes. $C_2$ and $Y_2$ will thus both decline, and the sign of $\partial\dot{P}/\partial w$ is, in general, ambiguous. A sufficient condition for $\partial\dot{P}_2/\partial w > 0$ is that the marginal propensities to consume out of factor income are sufficiently small (i.e., $Y_2$ falls by more than $C_2$ when w is increased). 3/

Additional restrictions can be placed on the signs of the partial derivatives in equations (17) and (18) if our analysis focuses only on stable adjustment processes. We then require that

$$(19) \quad \partial\dot{w}/\partial w + \partial\dot{P}_2/\partial P_2 < 0$$

$$(20) \quad \begin{vmatrix} \partial\dot{w}/\partial w & \partial\dot{w}/\partial P_2 \\ \partial\dot{P}_2/\partial w & \partial\dot{P}_2/\partial P_2 \end{vmatrix} > 0.$$

To limit the scope of our analysis, we will assume $\partial\dot{w}/\partial w$, $\partial\dot{P}_2/\partial P_2 < 0$ and $\partial\dot{w}/\partial P_2$, $\partial\dot{P}_2/\partial w > 0$.

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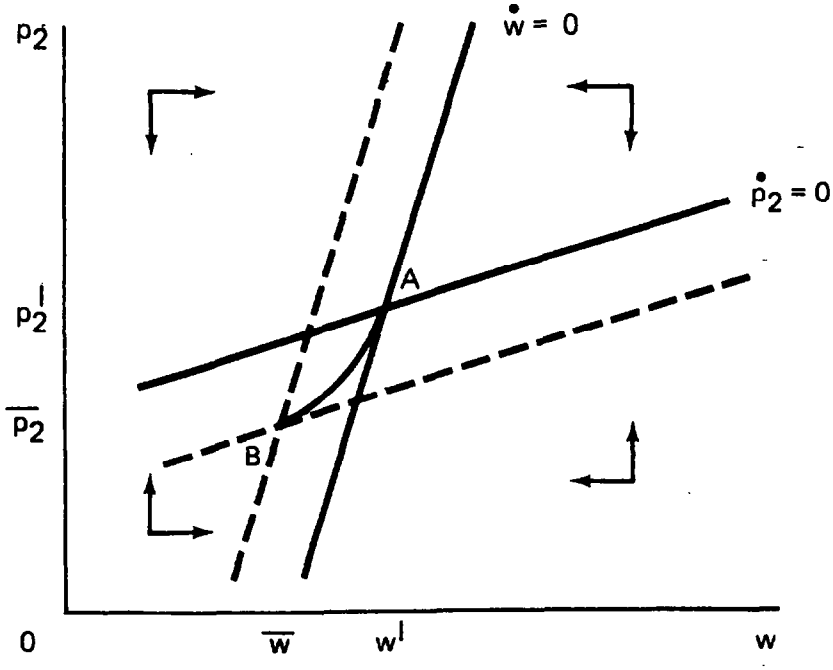
1/ Where $\gamma_0$ represents the response of wages to price level increases and $1-\varepsilon_1$ is the weight of $P_2$ in the overall price level.

2/ See Appendix II.

3/ This condition is also sufficient to ensure $\partial\dot{P}_2/\partial P_2 < 0$.

# THE ADJUSTMENT PROCESS

FIGURE 1



If these stability conditions are satisfied, then Figure 1 can be used to describe the adjustment process as well as the economy's response to a financial reform. The $\dot{w} = 0$ and $\dot{P}_2 = 0$ curves reflect the combinations of w and $P_2$ that yield unchanging values of w and $P_2$ for a given value of the real deposit rate and a given degree of private sector credibility regarding the sustainability of the existing financial reforms. Let $P_2^I$ and $w^I$ be the equilibrium values of $P_2$ and w prior to the financial reform. Any departure from this initial equilibrium due to some exogenous shock will set up either a cyclical or direct return to the initial equilibrium (at A).

Financial reform

In order to describe the most appropriate restarting policy for the financial reform, we must first consider the economy's response to an increase in the real deposit rate. We will then turn to the specification of the initial reform measures and finally to how the reform program should respond to cyclical developments in the period following the initial reforms.

By bringing about an increase in the availability of real credit, the rise in $r_m$ stimulates the production of both the exportable and importable goods. If these interest rate and production movements combine to create an excess domestic supply of the imported good (i.e., $\partial\dot{P}_2/\partial r_m < 0$), then $P_2$ will decline, which will also lead to a fall in the wage rate. 1/ In terms of Figure 1, the initial impact of the change in $r_m$ will be to shift the $\dot{P}_2 = 0$ curve down to the right and the $\dot{w} = 0$ curve up to the left. 2/ The economy would then begin to move from the initial equilibrium at A toward the new equilibrium at B.

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1/ It must be remembered that $P_1$ is fixed and tied to world prices as long as there is a fixed exchange rate (see equation (11)). This also takes $\partial\dot{w}/\partial r_m < 0$. In an inflationary economy, the rates of increase of the domestic price of the imported good and wage rate would fall.

2/ For any given value of w, the change in $P_2$ that is required to keep $\dot{P}_2 = 0$ while $r_m$ is reduced is given by

$$dP_2/dr_m\big|_{\dot{w}=0} = -(\partial\dot{P}_2/\partial r_m)/(\partial\dot{P}_2/\partial P_2) < 0$$

i.e., the $\dot{P}_2 = 0$ curve must shift down to the right. Similarly, for any

The initial fall in the wage rate will be less than the decline in $P_2$ even if $\gamma_0 = 1$ (full indexing) since $P_2$'s weight in the overall price level $(1 - \varepsilon_1)$ is less than one. The resulting decline in the real product wage in the export sector $(w/P_1)$ will stimulate employment of labor in that sector, but the rise in the real product wage in the import-competing sector $(w/P_2)$ will reduce that sector's level of employment. It is therefore possible to have either a rise or fall in the overall employment of labor even though there will be greater utilization of real working capital. 1/ Unemployment can thus become a serious problem if price reductions significantly lead the decline in wages. 2/ This implies that the issue is not just what happens to the overall real product wage (as measured by the general price level) but also what changes occur in the sectoral real product wages seen by firms. While a transitional period with a lower real product wage in the export sector and a higher real product wage in the import sector may be needed to bring about a redistribution of labor employment from the import competing sector to the export sector, an excessive increase in the real product wage in the import sector can lead to a serious unemployment problem. 3/ Thus, even if the adjustment path is stable, a financial reform can interact with the wage indexing scheme to generate a rise in unemployment which may be sustained for a significant period of time (on a path such as AB in Figure 1).

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1/ (footnote continued from page 11) given value of w, the change in $P_2$ that is required to keep $\dot{w} = 0$ while $r_m$ is increased is given by

$$dP_2/dr_m\Big|_{\dot{w}=0} = -(\partial\dot{w}/\partial r_m)/(\partial\dot{w}/\partial P_2) > 0$$

(i.e., the $\dot{w} = 0$ curve must shift up to the left).

1/ Note that our production function assumptions (which effectively rule out the substitution of $(A_i/P_i)$ for $L_i$) will make the case with unemployed labor appear less likely that it would be with factor substitution.

2/ In a highly inflationary economy, this problem would occur if the rate of increase in the level of prices slowed more rapidly than the rate of increase in wages.

3/ Our assumption that there is a transitional period during which real product wages can differ across sectors implies that labor is not instantaneously mobile between sectors. This labor immobility is also part of the justification for the wage indexing scheme given in equation (15). While our model specified the overall level of unemployment, it does not identify the distribution of this unemployment between sectors. This would require the specification of a "transfer function" describing the determinants of intersectoral labor movements.

Given a situation where the financial reform can generate unemployment and price instability and there is little private sector credibility that any financial reforms will be successfully carried out, let us next turn to the issues of how the authorities should restart the reform, whether the reform program should respond to cyclical developments, and how to best attain the authorities' longer-term financial system goals. The optimal financial reform program can be derived by selecting the path for $r_m$ so as to minimize unemployment, maintain price stability, and maximize long-term income (equation (16)) subject to the constraints imposed by the basic behavioral relationships (equations (1) - (15)). In analyzing this problem, we are focusing on the case where the private sector generally has complete information about the economy's structure and the announced reform policy but realizes that the authorities could be forced to depart from this program. Although the optimal reform program will involve a feedback rule linking cyclical developments and the optimal value of $r_m$, this rule is not time invariant but rather is affected by the degree of credibility in the system. In general, the reform program that best achieves the authorities' short- and longer-term objectives will be composed of two phases: an initial ("restarting") phase involving discrete increases in real lending and deposit rates undertaken primarily to help reestablish the credibility of the reform program; and a second phase which involves increasing the responsiveness of the reform program to cyclical developments as credibility grows and the financial reform comes closer to its longer-term objectives.

The two phases of the optimal reform are implicit in the feedback rule which links departures of the real deposit rate from its long-term value to deviations of wages and the price of the domestic good from their respective steady state values in a manner which minimizes unemployment and price instability and maximizes income. As shown in Appendix II, this optimal feedback rule is given by

$$(21) \quad r_m - \bar{r}_m = \theta_1(P_2 - \bar{P}_2) + \theta_2(w - \bar{w})$$

where $\theta_1 < 0, \theta_2 > 0$ if $\partial\dot{w}/\partial r_m, \partial\dot{P}_2/\partial r_m < 0$

$\theta_1 > 0, \theta_2 < 0$ if $\partial\dot{w}/\partial r_m, \partial\dot{P}_2/\partial r_m > 0$.

Since the most appropriate initial increase in $r_m$ depends on the economy's initial position relative to its steady state equilibrium, the restarting of the reform will differ from case to case. One situation which the authorities could fact initially is when the economy has had time to reach a new equilibrium with $w = \bar{w}$ and $P_2 = \bar{P}_2$ but with $r_m < \bar{r}_m$

(i.e., the level of real output is suboptimal). 1/ In this situation, equation (21) indicates that the optimal change in $r_m$ is set equal to $\bar{r}_m$. Why is this the optimal initial change when it will likely lead to adverse cyclical developments? When $w = \bar{w}$ and $P_2 = \bar{P}_2$, this sharp increase in $r_m$ is the best way to rebuild the credibility that the authorities are serious about the successful completion of the reform. As will be discussed later, the financial reform program can only respond significantly to cyclical developments if there is considerable credibility that the reform will be completed. Thus, if the authorities move quickly at the beginning of the reform to establish credibility, they will be in a position to respond more extensively to cyclical developments in subsequent periods. Note that the authorities are able to adopt this policy mix (when $w = \bar{w}$ and $P_2 = \bar{P}_2$) because there will be no initial unemployment problem. They can thus focus their policy on longer-term objectives.

A more difficult initial situation is when the economy has not yet reached its new steady state equilibrium and is experiencing both inflation and unemployment (i.e., $P_2 > \bar{P}_2$, $w > \bar{w}$, and real wages above their steady state values). While a high value of $r_m$ (close to $\bar{r}_m$) would again help reestablish credibility, it may also lead to further increases in unemployment or price instability. The authorities' willingness to trade off between the attainment of their price stability, employment, and financial reform goals is reflected in the signs and size of $\theta_1$ and $\theta_2$ in equation (21). The values of the $\theta_i$ indicate that an increase in the value of $r_m$ should be higher (i) the lower the degree of private sector credibility that the reform process will be completed, (ii) the more that the price of the domestic good ($P_2$) has risen above its steady state value, and (iii) the

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1/ The economy's steady state equilibrium will involve domestic goods prices ($\bar{P}_1$, $\bar{P}_2$) equal to their world equivalents (adjusted for tariffs) and a wage rate ($\bar{w}$) that will ultimately ensure full employment of labor regardless of the value of $r_m$. Different levels of $r_m$, however, will alter the amount of real balances held by the private sector and hence the amount of real working capital available to firms. In general, a lower level of $r_m$ will imply a low level of total output ($\bar{P}_1\bar{Y}_1 + \bar{P}_2\bar{Y}_2$). Since additions to real working capital is subject to diminishing returns, however, there is an output maximizing level of the real deposit rate ($\bar{r}_m$). In the analysis it is assumed that the authorities set $r_m$ at $\bar{r}_m$. Higher or lower values of $r_m$ would be suboptimal since they would result in a lower level of output.

smaller the gap between the current wage rate (w) and its steady state value. 1/ The initial increase in $r_m$ thus reflects the tradeoff between authorities' desires to establish credibility and the need to limit increases in unemployment and price instability. Even though a large initial increase in $r_m$ may be needed to help establish credibility in a highly inflationary period, this may be suboptimal if it seriously worsens unemployment.

Once the initial change in $r_m$ has been made, the response of $r_m$ to cyclical movements in $P_2$ and w during the second phase of the reform program represents an attempt to modify the economy's response to wage and price movements. This can be illustrated by combining the dynamic equations (17) and (18) for w and $P_2$ with the optimal financial reform policy feedback rule given in equation (21). If we consider a linear expansion of these relationships in the neighborhood of the steady state equilibrium, we will have, in the case of $\partial\dot{w}/\partial r_m$, $\partial\dot{P}_2/\partial r_m < 0$,

$$(22)\quad \dot{w} = \underset{(-)}{[\partial g_1/\partial w} + \underset{(+)(-)}{\theta_2 \partial g_1/\partial r_m}](w-\bar{w}) + \underset{(+)}{[\partial g_1/\partial P_2} + \underset{(-)(-)}{\theta_1 \partial g_1/\partial r_m}](P_2-\bar{P}_2)$$

$$(23)\quad \dot{P}_2 = \underset{(+)}{[\partial g_2/\partial w} + \underset{(+)(-)}{\theta_2 \partial g_2/\partial r_m}](w-\bar{w}) + \underset{(-)}{[\partial g_2/\partial P_2} + \underset{(-)(-)}{\theta_1 \partial g_2/\partial r_m}](P_2-\bar{P}_2)$$

One implication of equation (22) is that the optimal feedback between $r_m$ and $P_2$ and w makes wage changes more responsive to departures of either wages or prices from their steady state values. Since an increase in $r_m$ results in an excess domestic supply of the imported good which drives down $P_2$ and (via the indexing arrangement) w, we have seen that unemployment can become a significant problem if the real product wage in the import competing sector rises sharply. The optimal feedback rule helps to minimize this unemployment problem by bringing down w more rapidly in order to avoid a sharp increase in the real wage.

In contrast, the use of the policy rule makes changes in the domestic price of the imported good less responsive to any departure of wages or prices from their steady state values. Thus, while the higher initial value of $r_m$ will put downward pressure on $P_2$ and w, the feedback rule will

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1/ This is the case when $\partial\dot{w}/\partial r_m$, $\partial\dot{P}_2/\partial r_m < 0$.

help to ensure that $P_2$ will decline more slowly than w. 1/ This will help to prevent too rapid a rise in the real product wage in the import-competing sector, which will limit firms' incentive to reduce the utilization of labor. While the feedback rule is basically designed to limit increases in the real product wage to prevent a higher level of unemployment, it is important to note that the success of any such cyclical policy would be weakened if firms extensively substituted real working capital for labor. Our production structure has ruled out such substitution; but, if such an opportunity existed, then the expansion of real deposit holdings brought about by higher $r_m$ could result in greater utilization of real working capital and some displacement of labor. This would be especially likely to occur during the early stages of the reform when the real ceiling loan rate may still be far below its equilibrium value. Firms would thus have considerabce incentive to substitute greater amounts of real working capital for labor in production. The greater availability of real working capital could therefore contribute in the short run to less employment of labor even though in the long run it may contribute greatly to a higher level of output.

The nature of the optimal feedback between $r_m$ and cyclical developments in $P_2$ and w is strongly affected by the degree of credibility regarding the successful completion of the financial reform. If the interest elasticity of the demand for deposits is strongly influenced by both the improvement in the real deposit rate that has taken place since the beginning of the reform and the remaining gap between the current and long-term levels of $r_m$, then the $\theta_i$ vary with the degree of credibility. As shown in Appendix II, the $\theta_i$ will tend toward zero if the interest elasticity of the demand for deposits is highly sensitive to the progress made in the reform and the changes still required to complete the reform. In this situation, countercyclical movements in $r_m$ would have a strong adverse effect on the willingness of the private sector to accumulate deposits. This would in turn limit the availability of real credit, which would hold output below its long-run level. Thus, if credibility regarding the successful completion of the financial reform is not well established, then the scope for a countercyclical element in the financial reform can be quite limited. This is an additional rationale for having a two-stage financial reform. The initial phase can be used to help establish credibility regarding the completion of the reform, and a countercyclical element in the monetary reform program would then be possible in the second phase. This countercyclical component in the optimal financial reform policy may not be very important initially but could expand over time as credibility increases.

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1/ In an inflationary economy, the rate of increase of wages would decline more rapidly than the rate of increase in $P_2$.

It should be noted that our optimal restarting program is based on the assumption that the authorities can effectively control the real deposit rate. Our analysis has ruled out the possibility that firms can relend the funds they receive from banks, there is a curb market or unregulated financial system, and there are international capital flows. The existence of any of these factors would seriously reduce the authorities' ability to control the real deposit or loan rates. At the same time, these factors would also minimize the effects of any initial financial market distortions, thereby reducing the need for a financial reform.

## II. Optimal Monetary Reform and the Restarting Problem

Our analysis has indicated that a monetary reform which focuses on the gradual elimination of interest rate ceilings will generally involve a decontrol policy which is sensitive to both longer-term reform objectives and shorter-term cyclical developments. The extent of the reform program's response to cyclical developments, however, will be strongly influenced by the credibility that the authorities are able to establish regarding the successful completion of the financial reform. In a number of respects our basic conclusion is similar to that reached by Taylor (1982) concerning the issue of whether the monetary authorities should continue to respond to cyclical developments when they shift to being less accommodating to inflation. Taylor argued that, even if the authorities decide on no accommodation of inflation (i.e., no increase in the stock of nominal money in the face of an exogenous rise in the price level), monetary policy should still respond to other cyclical developments.

Even though our results favor a gradual structural reform policy that responds to cyclical developments, this does not mean that the reform program would not involve discrete (and potentially large) adjustments in the policy instruments at the very beginning of the program. Since wages and prices will initially differ from their ultimate (post reform) values, an initial discrete change in the real deposit rate is needed to start the economy on its optimal adjustment path. This may require a substantial change in the policy instrument whenever interest rates have abnormally low ceilings in a highly inflationary economy.

When the authorities can establish credibility regarding the successful completion of the reform program, there will be considerably greater scope for a countercyclical element in the reform program. The key question, however, is what steps the authorities can take to develop this credibility. In some cases, it must be recognized that the only option may be to direct the reform program solely toward the achievement of the longer-term structural objectives. If credibility can only be established by actual progress in the reform, then any countercyclical component may be interpreted as a sign that the reform program will not

be completed. 1/ It may thus be optimal to utilize a two-phase reform program. During the initial phase, the primary objective would be to establish credibility regarding the eventual completion of the reform by allowing for little or no cyclical response in the reform instrument. Once a "sufficient" degree of credibility is established, then there would be a second phase which would allow for more significant feedback effects. It is only in the case where the private sector is quite certain that the reform will be completed that a countercyclical element can be incorporated into the reform program from the very beginning. Essentially, any initial discrete increase in $r_m$ is part of a signal to the private sector from the authorities that a change in the policy regime has taken place. The private sector's willingness to accept that signal as an indication of a new policy commitment depends in part on the scope of the initial policy action and also on their evaluation of whether or not subsequent cyclical developments will force the authorities to again abandon their reform efforts.

1/ Fellner (1982) has argued against a countercyclical element in anti-inflation policy on essentially these grounds.

## Notation

$Y_i$ = output in sector i

$L_i$ = labor utilized in sector i

$L_i^D$ = desired utilization of labor in sector i

$w$ = nominal wage rate

$P_i$ = domestic price of good i

$P_i^*$ = world price of good i (in foreign currency)

$E$ = exchange rate

$\tau$ = tariff rate (ad valorem)

$C_2$ = domestic demand for good i

$T_i$ = taxes paid on income earners in sector i

$P$ = overall price level

$N$ = total labor force

$A_i$ = nominal stock of working capital in sector i

$*r_A^i$ = value of marginal product of working capital in sector i

$r_A^i$ = real return on working capital in sector i

$\bar{r}_A$ = nominal ceiling loan rate

$\bar{r}_D$ = nominal ceiling deposit rate

$r_m$ = real return on deposit holdings

$M$ = nominal holdings of deposits

$k$ = required reserve ratio in banking system

## Optimal Monetary Reform

The system of equations representing economic behavior during a monetary reform can be reduced to two differential equations in w and $P_2$. To illustrate how this system can be derived, it is useful to begin by noting that equations (1), (2), and (6) - (9) represent a system of equations for $Y_1$, $Y_2$, $L_1$, $L_2$, $A_1$, and $A_2$ that can be solved as functions of w, $P_1$, $P_2$, and $r_m$.

We will have

(i) $Y_1 = Y_1(w, P_1, P_2, r_m)$

$$\partial Y_1/\partial w < 0, \quad \partial Y_1/\partial P_1 > 0, \quad \partial Y_1/\partial P_2 < 0, \quad \partial Y_1/\partial r_m > 0$$

(ii) $Y_2 = Y_2(w, P_1, P_2, r_m)$

$$\partial Y_2/\partial w < 0, \quad \partial Y_2/\partial P_1 < 0, \quad \partial Y_2/\partial P_2 > 0, \quad \partial Y_2/\partial r_m > 0$$

(iii) $L_1^D = L_1^D(w, P_1) \qquad \partial L_1^D/\partial w < 0, \quad \partial L_1^D/\partial P_1 > 0$

(iv) $L_2^D = L_2^D(w, P_2) \qquad \partial L_2^D/\partial w < 0, \quad \partial L_2^D/\partial P_2 > 0.$

$L_1^D$ and $L_2^D$ are independent of $r_m$ and the other sector's output price because of the quadratic production function we have used in equation (1). We can substitute these results for $Y_1$, $Y_2$, $L_1^D$, and $L_2^D$ into the remainder of the equations to obtain two differential equations in w and $P_2$ of the form (taking $P_1$ as purely exogenous)

(v) $\dot{w} = g_1(w, P_2, r_m)$

with $\partial g_1/\partial w = \gamma_1[(\partial L_1^D/\partial w) + \partial L_2^D/\partial w)] + \gamma_0(1-\varepsilon_1)\{\delta_1[\phi_1 P_1(\partial Y_1/\partial w)$

$$+ \phi_2 P_2(\partial Y_2/\partial w) - (\partial Y_2/\partial w)]\} \gtrless 0$$

$$\partial g_1/\partial P_2 = \gamma_1(\partial L_1^D/\partial P_2) + \gamma_0(1-\varepsilon_1)\{-\delta_0 + \delta_1[\phi_2[Y_2 + P_2(\partial Y_2/\partial P_2) - (\partial Y_2/\partial P_2)]\} \gtrless 0$$

$$\partial g_1/\partial r_m = \gamma_0(1-\varepsilon_1)\delta_1[\phi_1 P_1(\partial Y_1/\partial r_m) + \phi_2 P_2(\partial Y_2/\partial r_m) - \phi_5 - \partial Y_2/\partial r_m] \gtrless 0$$

(vi) $\dot{P}_2 = g_2(w, P_2, r_m)$

with $\partial g_2/\partial w = \delta_1[\phi_1 P_1(\partial Y_1/\partial w) + \phi_2 P_2(\partial Y_2/\partial w) - (\partial Y_2/\partial w)] \gtrless 0$

$$\partial g_2/\partial P_2 = -\delta_0 + \delta_1\{\phi_2[Y_2 + P_2(\partial Y_2/\partial P_2)] - (\partial Y_2/\partial P_2)\} \gtrless 0$$

$$\partial g_2/\partial r_m = \delta_1[\phi_1 P_1(\partial Y_1/\partial r_m) + \phi_2 P_2(\partial Y_2/\partial r_m) - \phi_5 - \partial Y_2/\partial r_m] \gtrless 0$$

The optimal control problem now is one of selecting $r_m$ so as to maximize $\int_0^\infty e^{-\rho t}[-K_0(N - L_1 - L_2 - \bar{\ell})^2 - K_1 P^2 + K_2(\bar{P}_1 Y_1 + \bar{P}_2 Y_2)]dt$ subject to the behavioral equations for w and $P_2$ given in (v) and (vi). As discussed by Arrow (2) and Bryson and Ho (8), this is equivalent to selecting the value of $r_m$ which maximizes the current valued Hamiltonian

(vii) $Z = -K_0(N - L_1^D - L_2^D - \bar{\ell})^2 - K_1[\varepsilon_1 P_1^* E + (1-\varepsilon_1)P_2]^2 + K_2[\bar{P}_1 Y_1 + \bar{P}_2 Y_2] + q_1\dot{w} + q_2\dot{P}_2$

subject to equations (v) and (vi). The $q_i$ are costate variables. The necessary conditions for a minimum are

(viii) $\partial Z/\partial r_m = 0$

(ix) $\dot{q}_1 = \rho q_1 - (\partial Z/\partial w)$

$$(x)\quad \dot{q}_2 = \rho q_2 - (\partial Z/\partial P_2)$$

or

$$(xi)\quad 0 = q_1 + q_2/[\gamma_0(1-\varepsilon_1)] - [K_2/(\partial g_2/\partial r_m)](\bar{P}_1(\partial Y_1/\partial r_m) + \bar{P}_2(\partial Y_2/\partial r_m)]$$

$$(xii)\quad \dot{q}_1 = [\rho - (\partial g_1/\partial w)]q_1 - (\partial g_2/\partial w)q_2 - 2K_0(N - L_1^D - L_2^D)(\partial L_1^D/\partial w + \partial L_2^D/\partial w) - K_2[\bar{P}_1(\partial Y_1/\partial w) + \bar{P}_2(\partial Y_2/\partial w)]$$

$$(xiii)\quad \dot{q}_2 = [\rho - (\partial g_2/\partial P_2)]q_2 - (\partial g_1/\partial P_2)q_1 - 2K_0(N - L_1^D - L_2^D)(\partial L_2^D/\partial P_2) + 2K_1(1-\varepsilon_1)[\varepsilon_1 EP_1^* + (1-\varepsilon_1)P_2] - K_2[\bar{P}_1(\partial Y_1/\partial P_1) + \bar{P}_2(\partial Y_2/\partial P_2)]$$

To solve for the optimal path for $r_m$, we can first solve (xi) for $q_2$ as a function of $q_1$. This can in turn be differentiated to yield $\dot{q}_2$ as a function of $\dot{q}_1$. Substituting these values of $q_2$ and $\dot{q}_2$ into (x) yields a new equation in $\dot{q}_1$ and $q_1$. When this new equation is equated with (ix), we can solve for $q_1$ as a function of the various endogenous and exogenous variables in the system (except for $q_2$). From this relationship, we can obtain an expression for $\dot{q}_1$ by differentiation. Substituting these values of $\dot{q}_1$ and $q_1$ into (xii) thus allows us to derive a linear approximation for the optimal value of $r_m$ in the neighborhood of the steady state as

$$(xiv)\quad r_m - \bar{r}_m = 1/E \left\{ \frac{-2K_0}{B} \left( \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} + \frac{\partial L_2^D/\partial P_2}{\gamma_0(1-\varepsilon_1)} \right) \left\{ \frac{\partial g_1}{\partial w} \left( \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} \right) + \frac{\partial g_2}{\partial w} \frac{\partial L_2^D}{\partial P_2} \right\} \right.$$

$$- \frac{2K_1}{\gamma_0}(1-\varepsilon_1)\frac{\partial g_2}{\partial w}$$

$$\left. + \frac{2K_0\rho}{B} \left( \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} \right) \left\{ \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} + \frac{\partial L_2^D/\partial P_2}{\gamma_0(1-\varepsilon_1)} \right\} \right\} (w - \bar{w})$$

$$+ 1/E \left\{ \frac{-2K_0}{B} \left( \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} + \frac{\partial L_2^D/\partial P_2}{\gamma_0(1-\varepsilon_1)} \right) \left\{ \frac{\partial g_1}{\partial P_2} \left( \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} \right) + \frac{\partial g_2}{\partial P_2} \frac{\partial L_2^D}{\partial P_2} \right\} \right.$$

$$\left. + \rho \frac{2K_0}{B} \frac{\partial L_2^D}{\partial P_2} \left( \frac{\partial L_1^P}{\partial w} + \frac{\partial L_2^P}{\partial w} + \frac{\partial L_2^P/\partial P_2}{\gamma_0(1-\varepsilon_1)} \right) - \frac{2K_1}{\gamma_0} \frac{q_2}{\partial P_2}(1-\varepsilon_1) \right\} (P_2 - \bar{P}_2)$$

where $B = \gamma_1 \left( \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} + \frac{\partial L_2^D/\partial P_2}{\gamma_0(1-\varepsilon_1)} \right)$ which is taken as positive, and

$$E = \frac{2K_0}{B} \left( \frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} \quad \frac{\partial L_2^D/\partial P_2}{\gamma_0(1-\varepsilon_1)} \right)^2 \frac{\partial g_1}{\partial r_m} + \frac{2K_1}{\gamma_0}(1-\varepsilon_1)\frac{\partial g_2}{\partial r_m} .$$

In general, for an economy with a stable adjustment process, we can thus write (equation (21) in text)

$$(xv)\quad r_m - \bar{r}_m = \theta_1(P_2 - \bar{P}_2) + \theta_2(w - \bar{w})$$

with $\theta_1 < 0$, $\theta_2 > 0$ if $\frac{\partial g_2}{\partial r_m}, \frac{\partial g_2}{\partial r_m} < 0$

$\theta_1 > 0$, $\theta_2 < 0$ if $\frac{\partial g_1}{\partial r_m}, \frac{\partial g_2}{\partial r_m} > 0$ .

To evaluate the impact of the development of credibility on the adjustment process, we need to know how changes in $\sigma_{11} + \sigma_{12}$ (from equation (8)) affect the $\theta_i$. The $\sigma_{11} + \sigma_{12}$ term represents the effect of the monetary reform on credibility and thereby the interest elasticity of the demand for deposits, and they appear only in the $\partial g_1/\partial r_m$ and $\partial g_2/\partial r_m$ terms in the E expression contained in the equation for $r_m - \bar{r}_m$. If we define $\theta_i = T_i/E$, 1/ then $\frac{\partial \theta_i}{\partial(\sigma_{11}+\sigma_{12})} = -\frac{T_i}{E^2}\frac{\partial E}{\partial(\sigma_{11}+\sigma_{12})}$. Given our assumption that B is greater than zero, we also have

$$\frac{\partial E}{\partial(\sigma_{11}+\sigma_{12})} = \frac{2K_0}{B}\left\{\frac{\partial L_1^D}{\partial w} + \frac{\partial L_2^D}{\partial w} + \frac{\partial L_2^D/\partial P_2}{\gamma_0(1-\varepsilon_1)}\right\}\frac{\partial^2 g_1}{\partial r_m \partial(\sigma_{11}+\sigma_{12})}$$

$$+ \frac{2K_1}{\gamma_0}(1-\varepsilon_1)\frac{\partial^2 g_2}{\partial r_m \partial(\sigma_{11}+\sigma_{12})},$$

$$\frac{\partial^2 g_2}{\partial r_m \partial(\sigma_{11}+\sigma_{12})} = \frac{1}{\gamma_0(1-\varepsilon_1)}\frac{\partial^2 g_2}{\partial r_m \partial(\sigma_{11}+\sigma_{12})}, \text{ and}$$

$$\frac{\partial^2 g_1}{\partial r_m \partial(\sigma_{11}+\sigma_{12})} = \delta_1\gamma_0(1-\varepsilon_1)\left\{\phi_1 P_1 \frac{\partial^2 Y_1}{\partial r_m \partial(\sigma_{11}+\sigma_{12})} + \phi_2 P_2 \frac{\partial^2 Y_2}{\partial r_m \partial(\sigma_{11}+\sigma_{12})}\right.$$

$$\left. - \frac{\partial^2 Y_2}{\partial r_m \partial(\sigma_{11}+\sigma_{12})}\right\}$$

Given the solutions for $Y_i$, it can be shown that $\frac{\partial^2 Y_i}{\partial r_m \partial(\sigma_{11}+\sigma_{12})} > 0$.

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1/ In this terminology, equation (xiv) could be written as

$$r_m - \bar{r}_m = T_1(w-\bar{w})/E + T_2(P_2 - \bar{P}_2)/E$$

with $T_1/E < 0$, $T_2/E > 0$ if $\partial g_1/\partial r_m$, $\partial g_2/\partial r_m < 0$

$T_1/E > 0$, $T_2/E < 0$ if $\partial g_1/\partial r_m$, $\partial g_2/\partial r_m > 0$.

The key issue is thus whether the higher supply of good 2 induced by a higher interest elasticity of the demand for deposits is more or less offset by the income induced increase in the demand for good 2. If one assumes the supply effects dominate, then $\partial^2 g_i / \partial r_m \partial(\sigma_{11} + \sigma_{12}) < 0$ and $\partial E / \partial(\sigma_{11} + \sigma_{12}) < 0$. Since $\theta_1$ is negative, an increase in $\sigma_{11} + \sigma_{12}$ thus pushes $\theta_1$ toward zero (when $T_1$, $E < 0$). Similarly, a rise in $\sigma_{11} + \sigma_{12}$ has a negative impact on $\theta_2$, reducing its size.

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