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15 The Relationship between Exchange Rate Policy and Monetary Policy in Ten Industrial Countries

Stanley W. Black

15.1 Introduction

The dichotomy between pegged and floating exchange rate systems goes as far back in economic analysis as Ricardo and has generated an enormous literature on the reasons for choice of different exchange rate regimes (Tower and Willett 1976). More recently, economists have begun to analyze alternative regimes of monetary control, both from analytical (Poole 1970) and institutional (Hodgman 1974) points of view. The analytical and institutional viewpoints on monetary control have been effectively combined by Modigliani and Papademos (1980) in a paper on alternative techniques of monetary control in a closed economy. These latter papers have focused on the domestic aspects of monetary policy, such as the use of interest rates, reserve aggregates, or credit controls as means of influencing the economy. (See also Atkinson, Blundell-Wignall, and Chouraqui 1981.)

A recent notable paper by Dale Henderson (1982) has begun to draw some of the parallels between the analysis of pegged versus floating exchange rate regimes and alternative monetary control techniques. In an elegant generalization of Poole's analysis to the open economy, Henderson shows that when all disturbances affect the financial sector, the authorities should hold interest and exchange rates constant to minimize fluctuations in output, allowing money stocks and international reserves to fluctuate instead. On the other hand, when all disturbances affect the real sector, interest and exchange rates should be allowed to fluctuate, holding constant the stocks of international reserves and money supplies. In general, a managed float is appropriate. Henderson's analytical approach, which is both powerful and revealing, lacks the degree of institutional detail that would enable one to compare actual alternative mechanisms of monetary control and exchange rate policies in different countries. In section 15.2 of this paper I generalize the Modigliani and Papademos model to the open economy in order to provide an effective framework for such an analysis. I show that the choice between alternative methods of monetary control carries with it logical implications for the type of exchange rate regime that is appropriate. There is thus a natural parallelism in exchange rate policy and monetary policy that goes beyond Henderson's analytical results based on the types of disturbances facing the economy.

In section 15.3 of the paper I compare the exchange rate policies and monetary control regimes of ten industrialized countries (Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom, and the United States). The parallelism predicted in section 15.2 is borne out in reality, with some interesting variations. In section 15.4, I then compare some empirical reaction functions for monetary and exchange rate policies in these ten countries. Section 15.5 offers some conclusions.

15.2 An Open Economy Model of Financial Structure

The basic Modigliani-Papademos model for a closed economy contains an IS curve equilibrium condition for the domestic goods market, an LM curve for the M1 money market, an aggregate supply relationship for the price level, and an equilibrium condition in the market for bank credit. This differs from the traditional neo-Keynesian model only by the substitution of intermediated bank credit for the more customary government and/or private bond market. The IS, LM, and BB curves are shown to intersect as usual in (r, Y) space, so that monetary control can focus either on M1 or on bank credit. Under uncertainty, the relative stability of the various curves determines the optimal choice of monetary instruments. Credit rationing appears when the savings deposit rate is not allowed to move to clear the credit market.

An open economy version of this model simply requires the inclusion of a foreign good and its domestic price level ep^*, a foreign component for the domestic monetary base, foreign sources of credit to the domestic economy, and a foreign interest rate r_f in addition to the domestic loan rate r and savings deposit rate r_s. It is assumed that the domestic and foreign goods are imperfect substitutes and that domestic and foreign credit are imperfect substitutes because of differences in currency denomination and the associated exchange risk. Thus r_f is defined to *include* the expected change in the exchange rate e.

Table 15.1 below shows the flow-of-funds accounts for this economy, which is divided into five sectors: deficit units, surplus units, private banks, the central bank, and the rest of the world. Flows are shown in constant price terms, with sources negative and uses positive. Each column of the table represents a sectoral sources-uses statement and hence sums to zero. Each row represents a market equilibrium condition, of which only six are independent, given the columnar balance sheet constraints and the definition of M2 as the sum of M1 and savings deposits. The markets for savings deposits (SD) and foreign loans (NFB) are assumed to face an infinitely elastic supply at, respectively, a constant spread of the loan rate over the deposit rate $r - r_s = d$ and a constant foreign rate of interest r_f. The market for bank reserves (RES) is assumed to face infinitely elastic demand at a zero interest rate. Thus the six independent market equilibrium conditions will be capable of determining the six variables, Y, r, SD, NFB, RES, and e or NFA^{cb}, together with a supply side to determine the price level. We now proceed to specify the behavioral relationships that allow this equilibrium to be analyzed.

The IS equation (1) for equilibrium in the goods market sets domestic investment plus exports equal to private saving plus the value of imports in terms of domestic goods. Expected signs are shown above the arguments.

(1) $$I(\overset{-}{r}, \overset{-}{r_s}, \overset{-}{r_f}) + EX(\overset{-}{p/ep^*}) = S(\overset{+}{Y}) + (ep^*/p)\, IM(\overset{+}{Y}, \overset{+}{p/ep^*}).$$

Income is defined as the value of domestic output deflated by the consumer price index

(2) $$Y = pX(p)/\bar{p}.$$

Consumer prices $\bar{p}$ are given by a weighted average of domestic and foreign prices.

Table 15.1 **Flow of Funds**

Markets	Deficit Units	Surplus Units	Private Banks	Central Bank	Rest of World
(i) Goods	Id − Sd	$I_s - S_s$	0	0	EX − IM
(ii) Bank reserves	0	0	RES − NDA^{cb}	NDA^{cb} − RES	0
(iii) M1	$L1_d$	$L1_s$	−(M1 − C)	−C	0
(iv) Savings deposits	0	SD_s	−SD	0	0
[(v) M2 = (iii) + (iv)	$L2_d$	$L2_s$	−(M2 − C)	−C	0]
(vi) Bank loans	$-B_d$	0	B	0	0
(vii) Foreign loans	−FB	FL	0	0	NFB
(viii) Foreign assets	0	0	NFA^{pb}	NFA^{cb}	−NFA

Note: In constant prices, sources (−) and uses (+).

$$(3) \qquad \tilde{p} = p^{\mu}(ep^{*})^{1-\mu}.$$

The supply of real output is taken to be an increasing function of domestic prices $X(p)$ because of the existence of wage contracts set in nominal terms.

The supply of M1 is taken to depend in the product of a money multiplier $k(r)$ and the monetary base, defined as the sum of the net domestic and foreign assets of the central bank. The demand for M1 depends on the usual income, prices, and interest rates.

$$(4) \qquad k(r)(\mathrm{NDA}^{cb} + \mathrm{NFA}^{cb}) = p\mathrm{L1}(\overset{-}{r}, \overset{-}{r_s}, \overset{+}{Y})$$

The credit market is analyzed by considering separately deficit units, who are assumed to hold neither savings deposits nor foreign assets, and surplus units, who are assumed not to borrow either at home or abroad but who may lend abroad. The real value of bank borrowing by deficit units is then equal to (table 15.1, column 1) the excess of their investment over their own saving, plus their accumulation of real balances of transactions money, less the real value of their foreign borrowing.

$$(5) \qquad B(\overset{-}{r}, \overset{+}{r_f}, \overset{-}{Y}) = I_d(\overset{-}{r}, \overset{-}{r_f}) - S_d(\overset{+}{Y}) + \Delta \mathrm{L1}_d(\overset{-}{r}, \overset{+}{Y}) - \mathrm{FB}(\overset{+}{r}, \overset{-}{r_f}).$$

The government is not considered separately but may be thought of as an exogenous deficit unit. Acquisition of real balances by surplus units in the form of M1 plus savings deposits is equal to (table 15.1, column 2) the excess of their saving over investment less the real value of their foreign lending. Capital gains and losses are ignored in this accounting.

$$(6) \qquad \Delta \mathrm{L2}_s(\overset{+}{r_s}, \overset{\pm}{r_f}, \overset{+}{Y}) = S_s(\overset{+}{Y}) - I_s(\overset{-}{r_s}, \overset{-}{r_f}) - \mathrm{FL}(\overset{-}{r_s}, \overset{+}{r_f}).$$

Subtracting (6) from (5), defining the total change in the liabilities of the banking system as $\Delta \mathrm{L2} = \Delta \mathrm{L2}_s + \Delta \mathrm{L1}_d$ and net foreign borrowing as $\mathrm{NFB} = \mathrm{FB} - \mathrm{FL}$, we have the sources and uses of credit in real terms.

$$(7) \qquad S(\overset{+}{Y}) + B(\overset{-}{r}, \overset{+}{r_f}, \overset{-}{Y}) + \mathrm{NFB}\,(\overset{+}{r}, \overset{+}{r_s}, \overset{-}{r_f}) = I(\overset{-}{r}, \overset{-}{r_s}, \overset{-}{r_f}) + \Delta \mathrm{L2}(\overset{-}{r}, \overset{+}{r_s}, \overset{\pm}{r_f}, \overset{+}{Y}).$$

Thus saving plus bank borrowing plus net foreign borrowing must equal investment plus accumulation of real balances in the form of M2. Equation (7) is equivalent to the sum of the first two columns of table 15.1, and is therefore an identity.

The consolidated balance sheet for the banking system as a whole, including the central bank together with the commercial and savings banks, requires that the additions to M2 be equal to domestic bank lending plus the change in net foreign assets, again as an identity from columns 3 and 4 of table 15.1:

(8) $$\Delta \text{L2}(\overset{-}{r}, \overset{+}{r}_s, \overset{\pm}{r}_f, \overset{+}{Y}) = B(\overset{-}{r}, \overset{+}{r}_f, \overset{-}{Y}) + \Delta \text{NFA}^{pb}(\overset{-}{r}, \overset{+}{r}_f) + \Delta \text{NFA}^{cb}.$$

Substituting into the foreign asset equilibrium condition from the rest of the world sectoral statement of sources and uses of funds yields the balance of payments:

(9) $$\text{EX}(\overset{-}{p/ep^*}) - (ep^*/p)\,\text{IM}(\overset{+}{p/ep^*}, \overset{+}{Y}) + \text{NFB}(\overset{+}{r}, \overset{+}{r}_s, \overset{-}{r}_f) = \Delta \text{NFA}^{pb}(\overset{-}{r}, \overset{+}{r}_f) + \Delta \text{NFA}^{cb}.$$

15.1.1 Model 1: Control of M1

When monetary control is exercised via manipulation of the monetary base to achieve a target level of M1, the model is similar to the standard IS-LM model. Equations (2) and (3) can be solved for $p(\overset{+}{Y}, e\overset{+}{p}{}^*)$ which can then be used to eliminate p from the model. Competition in intermediation yields the condition $r_s = r - d$, which can be used to eliminate r_s. In figure 15.1, equation (1) yields the downward-sloping IS curve, equation (4) the upward-sloping LM1 curve, and equation (7) the ambiguously signed CR, or credit-market curve. As usual, the three curves must intersect in a common point A. Under a floating exchange rate regime, the foreign balance curve from equation (9) will also pass through point A with Δ NFA^{cb} = 0. Under a pegged rate this will no longer necessarily be true. The resulting endogenous movements of reserves will directly influence the location of the

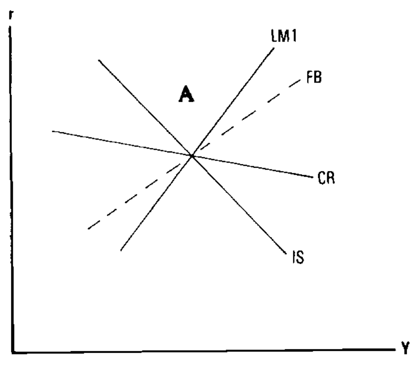

Fig. 15.1

IS-LM-CR intersection, as any nonsterilized portion of reserve flows causes the monetary base to rise or fall.

It is the obvious ability of the floating rate regime to cut off the endogeneity of the monetary base that makes a floating rate attractive to countries that wish to control M1. Note that the ability to sterilize the monetary effects of reserve flows mitigates the institutional attractiveness of a float. On the other hand, if most of the net domestic assets of the central bank are held in the form of direct, nonmarketable claims on the private banks or the government, the central bank may not be willing to offset reserve movements completely.

15.1.2 Model 2: Control of Credit

An alternative method of controlling the monetary system, whose wide use in practice is discussed in section 15.3 of the paper, is direct control of bank lending. Assuming that price movements can be adequately taken into account in setting the limits on bank credit, this can be expressed as a limit to the *real* volume of bank lending.

$$B(\overset{-}{r}, \overset{+}{r_f}, \overset{-}{Y}) = \bar{B}. \tag{11}$$

If we assume that the loan rate adjusts to clear the loan market, stability conditions require the BB curve in figure 15.2 to be flatter than the IS curve.

Credit restriction in this model takes the form of an upward shift in the BB curve, which raises interest rates and reduces investment and income.

As interest rates rise under credit restrictions, nonbanks would be induced to increase their foreign borrowing as an alternative source of finance (see equation [7]), generating a capital inflow. As in model 1, with a pegged exchange rate, the equilibrium point can be above or below the foreign balance, or FB curve. However, the resulting influx or efflux of reserves is not

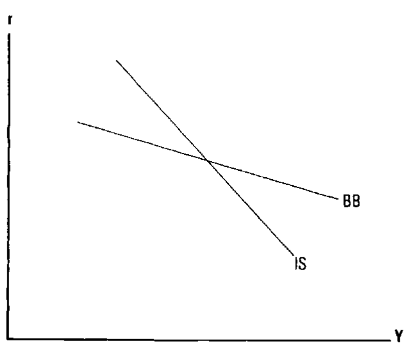

Fig. 15.2

allowed to affect the level of bank credit under this regime. Although the level of M2 will rise or fall with the balance of payments, the primary tool of monetary control is not directly undermined by the international flows. This contrasts sharply with the situation in model 1 under a pegged exchange rate.

On the other hand, credit controls combined with a pegged exchange rate can create problems. Nonbank channels of credit can be opened up to bypass the credit restriction. Controls over bank lending frequently take the form of specifying direct limits on the growth of bank credit by individual banks. This prevents banks from bidding for funds in the credit market and distorts the allocation of investment. An alternative, but seldom used, approach would specify reserve requirements on bank lending and limit the total available reserves.

15.1.3 Model 3: Control of Bank Credit and Net Foreign Assets

As noted above, simply controlling bank credit with a pegged exchange rate leaves the balance of payments free to fluctuate with changes in other internal and external conditions. The level of international reserves may not always be adequate to finance these fluctuations, even if the level of the pegged exchange rate is appropriate in the long-run sense of purchasing power parity. The addition of controls over the net foreign asset position of banks might seem to be a logical way to guarantee external balance along with internal balance in the context of a pegged exchange rate. Unfortunately, it should be obvious from equation (9) that the only way to control the *total* net foreign asset position of private banks together with the central bank is to adopt exchange controls over private sector transactions, with all of the ill effects that such controls can be expected to yield (Bhagwati 1978). Simply controlling the *private* banks' net foreign asset positions will reduce the variability of only one element of the balance of payments, which will often be acting to finance the payments of other sectors.

The adoption of total foreign exchange controls allows M2 as well as bank credit to become independent of balance-of-payments flows. From equation (8), the change in M2 must equal the credit target $\overline{B}$:

$$\Delta L2(\overset{+}{r}, \overset{-}{r r_f}, \overset{+}{Y}) = \overline{B}. \qquad (12)$$

The resulting LM2 curve in figure 15.3 will be downward sloping and, as Modigliani and Papademos argue, steeper than the IS curve for stability.

15.1.4 Model 4: Controls Plus Credit Rationing

The extension of controls over bank credit and possibly exchange market transactions is likely to lead the authorities to prevent interest rates from moving to clear the loan market, as was assumed above. In this case, true credit rationing will arise, in the sense of unsatisfied demand for credit at

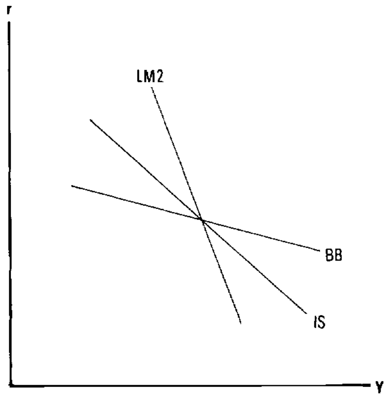

Fig. 15.3

existing interest rates. The inducement to seek nonbank channels of unregulated finance, including foreign borrowing, will increase dramatically in this situation. Furthermore, the misallocation of credit caused by arbitrary, nonprice rationing will sharply exacerbate the problems raised by credit ceilings on individual banks.

From an analytical point of view, the restriction of credit via an upward shift in the BB curve in combination with interest rate ceilings would be expected to reduce saving and investment at the given interest rate. This could be seen diagrammatically as a clockwise pivoting of the IS curve through the unconstrained equilibrium point, forcing a reduction in output.

Such a monetary policy regime would encourage the use of a pegged exchange rate with exchange controls over all private capital flows, in order to reduce the tendency of unsatisfied borrowers to turn to foreign sources of capital. A floating exchange rate would generate substantial upward pressure on the exchange rate during restrictive periods, followed by downward pressure during expansionary periods.

15.3 A Classification of Exchange Rate and Monetary Policy Regimes in Ten Countries

Actual exchange rate and monetary policy regimes do not fall neatly into pigeonholes labeled "pegged," "floating," "control of M1," or "control of bank credit." Even a pegged exchange rate fluctuates freely between its upper and lower limits and can have the limits changed. And, as recent experience has made clear, most cases of floating rates involve a significant degree of management via central bank intervention in the exchange market. Furthermore, the existence of generalized floating among the major world currencies since 1973 has made it impossible for any country to do more than peg to a subset of the rest of the world's currencies.

The simple classification of a currency as "pegged" or "floating," as seen, for example, in *International Financial Statistics,* thus needs to be supplemented by some additional information on the degree of flexibility allowed in the exchange rate. Table 15.2 shows in column 1 the formal classification of each country's exchange rate regime during the 1970s, but columns 2 and 3 add information on the variability of the effective exchange rate and central bank intervention relative to GDP. As might be expected, countries with floating rates have higher average variability in their effective exchange rates than countries which peg (1.65 vs. 1.29), although Belgium and the Netherlands rank lower than the other "peggers."

The second half of table 15.2 classifies countries according to differences in monetary policy. Column 4 gives the primary monetary target, while column 5 indicates the primary instrument through which monetary policy is carried out. Whenever the primary target is M1 or the monetary base, the main operating instrument is open market operations (or equivalent changes in reserve requirements, as in Germany). By contrast, whenever the main target is domestic credit or M2, credit controls are often used as a primary instrument of monetary policy. (It should, of course, be recognized that this oversimplifies institutional differences and changes in the use of instruments, which are more carefully spelled out in Black [1983]).

Column 6 of table 15.2 gives a measure of the frequency of change of the discount rate in each country, a measure of the authorities' willingness to allow interest rates to fluctuate. This measure is relatively low in France, Italy, Japan, and Sweden. Columns 7 and 8 provide information on the average rate of inflation in each country during the 1970s and its variability. Italy and the United Kingdom of course stand out as high-inflation countries, while Japan has also had a comparably high variability of inflation.

In order to throw more light on the interrelationship between monetary policies and exchange rate policies, table 15.3 cross-classifies the information in table 15.2 according to whether a country was pegged or floating and used credit controls or primarily open market operations in monetary policy. Remarkably, the differences between floaters that use credit controls and floaters that use open market operations are often greater than the difference between the latter and peggers. The parallels between exchange rate policy and monetary policy suggested in the analysis of section 15.2 appear very evident in the data.

The one group of countries that has broken this "law of parallelism" in monetary and exchange rate policy, namely, the countries that float and use credit controls oriented toward M2 or the control of domestic credit, have had higher average inflation, and more variable inflation, as well as more variable exchange rates. Apparently, reliance on market forces to determine exchange rates and credit controls to limit monetary growth is a relatively unstable combination. The German case, by contrast, is stable.

The other two pairings, which might be called "pure" peggers and float-

Table 15.2 **Measures of Exchange Rate Policy and Monetary Policy, 1973–79**

	Exchange Regime[a]	Variability of Effective Rate[b]	Variability of Inter-vention[c]	Primary Monetary Target[d]	Primary Monetary Instrument[e]	Frequency of use of Discount rate[f]	Inflation Rate[g]	Variability of Inflation[g]
Belgium	Peg	.89	.281	DC	CC	25	7.5	3.17
Canada	Float	1.20	.143	M1	OMO	24	7.8	2.46
France	Peg	1.48	.093	M2	CC	14	9.3	2.50
Germany	Peg	1.65	.165	MO	OMO	19	5.1	1.37
Italy	Float	1.83	.179	DC	CC	15	13.3	5.00
Japan	Float	2.15	.105	M2	CC	15	9.3	6.15
Netherlands	Peg	.98	.171	M2	CC	19	7.4	2.03
Sweden	Peg	1.44	.168	DC	CC	14	8.7	1.81
United Kingdom	Float	1.67	.323	M3	CC	33	13.3	5.14
United States	Float	1.42	.026	M1	OMO	23	7.2	2.63

[a]Countries listed as pegged are members of the EMS/EEC narrow margins arrangement.

[b]Standard deviation of percentage change in monthly effective exchange rate, from International Financial Statistics.

[c]Standard deviation of monthly changes in foreign exchange reserves, adjusted for swaps and foreign borrowing, as percentage of 1980 GDP in United States dollars. See Black (1980) for details.

[d]DC = domestic credit, MO = monetary base. See OECD (1979) and Black (1983, appendix on institutions).

[e]CC = credit controls, OMO = open market operations. See Black (1983, appendix on institutions).

[f]Percentage of months in which discount rate was changed; see Black (1983).

[g]Mean and standard deviation of annual inflation rate of consumer price index.

Table 15.3 Monetary Policy versus Exchange Rate Policy

	Peg	Float	F-statistic
A. Variability of effective exchange rate:			
Credit controls	1.20	1.88	
Open market operation	1.65	1.31	$F_{(3,6)} = 4.21$
B. Variability of intervention:			
Credit controls	.178	.202	
Open market operation	.165	.084	$F_{(3,6)} = .72$
C. Frequency of discount rate change:			
Credit controls	.18	.15[a]	
Open market operation	.19	.24	$F_{(3,5)} = 1.53$
D. Average inflation rate			
Credit controls	8.22	12.0	
Open market operation	5.1	7.5	$F_{(3,6)} = 7.20$
E. Variability of inflation:			
Credit controls	2.38	5.43	
Open market operation	1.37	2.54	$F_{(2,7)} = 23.12$

[a]Excluding the United Kingdom, which used a floating discount rate from October 1972.

ers, appear to have performed more acceptably, on this limited but suggestive evidencė. The pure peggers, for example, had lower variability of their exchange rates at the cost of higher variability in their reserves, as compared with the pure floaters. The "mixed" floaters, however, intervened about as much as the peggers and had much higher variability of exchange rates, as did Germany.

While the credit control countries, as expected, adjust interest rates less frequently than open market countries, the mixed floaters adjust them least. The pure floaters had Germany appear to have the best inflation performance, with the pure peggers not far behind. The mixed floaters, however, are a poor third in inflation performance.

15.4 Lessons from Studies of Reaction Functions

In two recent papers I estimated central bank policy reaction functions for these same ten industrial countries for domestic monetary policy instruments (Black 1983) and exchange market intervention (Black 1980). It may be useful, in the context of this discussion, to summarize the findings of those studies that appear to be relevant to the relationship between the two types of policies.

A general conclusion, which seems inescapable from the evidence, is that both internal targets such as inflation and unemployment and external targets such as competitiveness, the current account, and reserves are important in determining *both* domestic monetary policy and exchange rate intervention. However, the external targets, as might be expected, play a relatively larger role in determining exchange rate intervention in most countries, judging by the relative number of significant coefficients in reaction functions. And of course for the countries with pegged exchange rates, the proximity of the exchange rate to the peg is a necessarily important factor, which is confirmed in the regressions.

"Leaning against the wind," in the sense of intervention to cushion movements of the exchange rate, appears to be a widespread practice, (the same conclusion is found in Artus [1976] and Quirk [1977]). In addition, movements in competitiveness appear to have set off counteracting intervention policies in some cases (Japan, Canada). Finally, large current account imbalances have led to significant intervention where capital flows have been inadequate to finance them at existing levels of interest rates and exchange rates (Japan, Germany, the United Kingdom).

Interestingly enough, these very same factors appear to be the external variables that affect "domestic" monetary policy, such as interest rates, open market operations, reserve requirements, and credit controls. There is no doubt that the authorities have a choice to respond to external imbalance with either "domestic" or "international" instruments. This distinction of course implies the imperfect substitutability of assets denominated in different currencies, since otherwise the only effective intervention would be indistinguishable from domestic monetary policy.

Less obviously, the authorities can also respond to *internal* imbalances with alternative combinations of domestic and international instruments. For example, in 1973–75 the United Kingdom and Italy both used exchange market intervention to resist the exchange rate implications of domestic expansion in the face of large current account imbalances. Again in 1977 they both used intervention to resist the exchange rate implications of restrictive domestic policies. Conversely, in 1980 and 1981 the United States and the United Kingdom have chosen to accept the exchange rate appreciation that accompanies tight monetary policy, making it an evidently important part of the domestic policy package.

Turning to domestic monetary policy behavior itself, the reaction functions show, not surprisingly, that countries with pegged exchange rates give relatively high policy weights (not necessarily welfare weights) to external target variables. Floaters, on the other hand, typically give more emphasis in policy formulation to internal targets.

As found in section 15.3 above, it is not the case that peggers necessarily do any better or worse in formulating "domestic" monetary policy than floaters. The worst inflation performance during the 1970s was that of Italy and the United Kingdom, both floaters. The best performance was that of Germany and the United States, also both floaters. It is suggestive, however, that the former two are mixed floaters, which use credit controls, while the latter two use open market operations. Clearly, other factors must also be brought into a full explanation of these differences, including fiscal policy and the state of labor relations and indexation.

15.5 Conclusion

In this paper I have argued that there is a natural parallelism between exchange rate and monetary policy regimes, which arises out of the economic logic of models in which monetary control is exercised either through control of bank reserves or control of bank credit. I have shown that the logic of the reserves model leads in the direction of a floating exchange rate, while the logic of the credit control model leads in the direction of a pegged rate.

That logic was supported by showing that six of ten major industrialized countries fell into one of the two "pure" cases, and that these six plus Germany had achieved performances with respect to internal and external measures of economic stability that were superior to those of the three "mixed" countries which used floating exchange rates with credit controls.

Finally, I pointed out that reaction function studies reveal an intimate relationship between the conduct of monetary policy and exchange rate policy, since either policy may support or undermine the other in affecting both domestic and external targets. Differences in exchange rate regime were shown to have a profound impact on the conduct of monetary policy. My argument in this paper is that differences in the monetary policy regime can have an equally profound impact on the choice of exchange rate policy, since credit controls do not mix well with a floating rate.

15.6 Postscript

Following discussion at the Conference, the classification of Germany in tables 15.2 and 15.3 was made consistent with the other Snake countries, with no real changes in the conclusions reached. The comments by Paul de Grauwe suggest an appropriate way to deal with a limitation in the analytical model, and I accept them with enthusiasm. De Grauwe (1982) develops an open economy financial model which addresses some of the issues discussed above.

Comment Paul de Grauwe

In his paper Stanley Black sets himself the task of adding some institutional detail to a classroom macromodel for an open economy. In particular, he models credit controls and other types of restrictions in order to see how the choice of particular modes of monetary policymaking affects the choice of the exchange rate regime. The attempt is similar to the one made recently by McKinnon and Mathieson (1981) for less developed countries with a heavily "repressed" financial system.

Although I think the problem is important, I feel that the way credit controls are modeled by Stanley Black is unsatisfactory and needs some changes. To show this, I start from the partial equilibrium model of the credit market, as represented by figure 15.C.1. On the vertical axis the loan rate is set out (this is r in Black's paper), on the horizontal axis the quantity of loans is represented. The L_D curve is the demand curve for bank loans, the L_S curve represents the supply of loans by banks. Equilibrium is obtained in E.

Given the banks' balance sheet constraint, L_S is dependent on the willingness of the nonbank public to hold bank deposits (the demand for deposits). In other words, banks receive deposits from the public and lend these out, adding a constant margin over the deposit rate. This is basically the way Stanley Black models the credit market. In figure 15.C.1 this implies that underlying L_S there is a demand for deposit equation D which is a positive function of the deposit rate r_D (represented by r_S in Black's paper). The L_S curve is then nothing but the D curve plus a constant margin d.

The problem arises when credit ceilings are introduced and when one assumes, as Stanley Black does, that the margin between loan and deposit rates is unchanged. Suppose the authorities set a quantitative limit on the amount of bank loans. This is represented in figure 15.C.2. The ceiling is set at $\bar{L}$. It is assumed, first, that loans are the only earning assets of banks. Then it can easily be seen that it will be difficult to maintain a fixed margin d. The credit ceiling reduces the supply of loans to the level $\bar{L}$, so that the loan rate increases. Given their balance sheet constraint, banks will try to reduce the deposit rate in order to ration the amount of outstanding deposits. The result is an increase in the margin from d to d' in figure 15.C.2.

Now add the complication (as in Black's model) that there are other earning assets for the banks, such as foreign assets. In the flexible margin model of figure 15.C.2, this would lead to a combination of an increase in the margin and spillover investment in these other earning assets (the L_S curve shifts upward). In Black's model, however, banks are constrained to keep the margin constant. Thus, as a result of the credit ceiling, both the loan

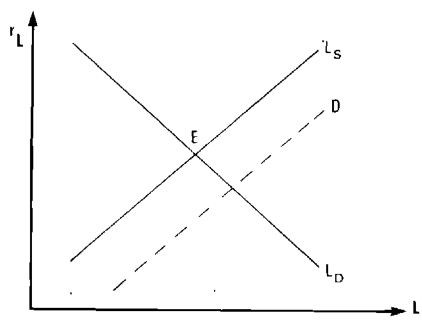

Fig. 15.C.1 Demand and supply of bank loans

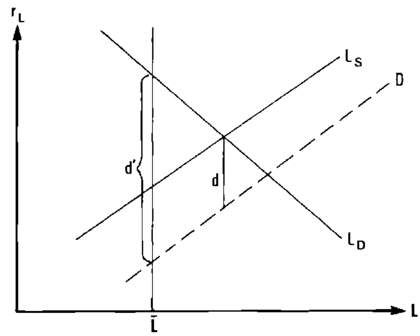

Fig. 15.C.2

and the deposit rate must increase, so that banks acquire more deposits. Since they have to decrease their lending, the excess of deposits over loans must be invested in these alternative assets (net foreign assets).

This fixed margin model yields a surprising result: that credit ceilings necessarily increase the bank's balance sheet—that is, they actually increase the total size of banking intermediation. This result would not necessarily obtain if the margin were allowed to change with the imposition of credit ceilings.

A further problem arises because in Black's model banks will not increase their net foreign assets (NFAp1). As can be seen from equation (8), banks increase their net foreign assets if the loan rate (r) declines or if the foreign rate (r_f) increases. Since after the imposition of a credit ceiling the loan rate increases, banks in Black's model will not increase their net foreign assets. As a result the excess of deposits over loans is invested exclusively in non-interest-bearing reserves (RES). In fact, in Black's model bank reserves perform the role of a slack variable which automatically increases to enforce the balance sheet constraint following the imposition of a credit ceiling.

This implies that banks are willing to let the deposit rate increase, attracting more (and more expensive) deposits which they then invest in non-interest-bearing assets. Profitability necessarily declines and can even become negative in Black's model if credit ceilings are set sufficiently low. This will certainly affect banks' willingness to supply loans and to issue deposits. The preceding criticism has further implications for some of the results obtained in Black's model. One result is that the imposition of credit controls induces a net capital inflow in a pegged exchange rate system and an appreciation of the currency in a flexible exchange rate system. The reason is that unsatisfied borrowers turn to the foreign market and increase their foreign borrowings. In addition, the increased deposit rate leads to increased demand for domestic deposits from the rest of the world. In a fixed rate system this leads to a net capital inflow, in a floating rate system to an appreciation of the currency.

In the alternative formulation of a model with a flexible margin between deposit and loan rate, this effect of credit ceilings is far from obvious. In such a model there are two opposing tendencies. The increase in the loan rate leads domestic borrowers to increase their foreign borrowings (capital inflow); however, the decline in the deposit rate shifts holders of domestic wealth into foreign assets (capital outflow). The net effect is unclear a priori and will depend on the relative strength of the two opposing forces.

A final remark concerns the empirical evidence presented by Black. He finds that peggers rely more often than floaters on credit controls, and interprets this result in the light of his theoretical model. The preceding discussion makes this interpretation less plausible. I would suggest an alternative interpretation: countries which rely on credit controls are countries where the monetary authorities have very little faith in the price mechanism as a device to allocate credit efficiently. For the same reason, these authorities will tend to have little faith in the price mechanism as a device to determine an equilibrium exchange rate in the exchange market. Therefore, it should come as no surprise that countries with an extensive credit control system have resisted more than other countries the move toward flexible exchange rates.

To conclude, Stanley Black has provided us with an important piece of research, which, although not yet finished and in certain respects even unsatisfactory, is one of the first attempts at integrating more institutional detail in our macromodels for open economies.

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