# Determinants of Monetary Policy in France, The Federal Republic of Germany, Italy and the United Kingdom: A Comparative Analysis

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This paper is motivated by interest in the actual decision processes and observed behavior of national monetary authorities in view of the importance of national monetary policies both for domestic economic performance and for international monetary and economic cooperation. In this paper we present and interpret policy reaction functions for the monetary authorities of France, the Federal Republic of Germany, Italy, and the United Kingdom. These functions for particular countries have been developed with due attention to specific national characteristics of the monetary policy decision process, to the setting provided by national financial institutions and markets, and to the selection of policy instruments, or proxies for these, appropriate to the practices of specific national monetary authorities. We have had to omit much of this relevant background material from this paper owing to limitations of space. We hope this omission will be compensated in some degree by materials presented in papers devoted to individual countries in this conference.

As is well known, a single-equation policy reaction function can be regarded formally as a reduced form in which the coefficients are combinations of parameters from the authorities' preference function and from the structural equation model of the economy assumed to be employed by the authorities in making decisions. One important implication of this view is that changes in parameters of a policy reaction function cannot be assigned unambiguously to changes in preferences versus changes in parameters of the authorities' economic model unless the model is fully known to the investigator. This is a counsel of perfection which we are unable to fulfill. Moreover, it seems clear that such a formalized view of the monetary authorities' decision process departs from reality both in its emphasis on the precision of the authorities' preference patterns and the certainty of their knowledge of their own economy and its relations with the rest of the world.

In our view the actual decision process is surrounded by uncertainty and thus involves reliance on judgment and application of standard proce-

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dures which are altered only if policy results are clearly unsatisfactory when judged by the authorities' customary criteria. Thus, we present policy reaction functions as a step in the search for quantifiable patterns of monetary policy behavior. The quantified policy reaction functions thus may serve as a check on more qualitative descriptions of the monetary policy decision process and may help to focus the search for factors—socio-political, economic and international—that account for the differences in monetary policy behavior over time and between countries.

Each of the next four sections of this paper presents and discusses one or more policy reaction functions for the monetary authorities of a specific country. A concluding section offers some cross-country comparisons, brief comments on the phenomenon of regime changes and some observations on the international implications of national behavior patterns.

## I. France

In France monetary policy decisions take place within a system of national economic management in which the central government plays an exceptionally strong role. Control over financial flows by means of monetary and credit policies, budgetary policies, direct administrative controls on the activities of financial institutions and markets, and foreign exchange controls are among the principal means employed by government ministries and the Banque de France to manage the French economy. Direct controls by the Banque de France and the relevant government ministries often are used to regulate both the quantity of credit flowing through various financial institutions and markets and the interest rates paid or charged. Many interest rates are regulated so that they move little, if at all, in response to market forces. The French financial system is segmented by regulations and administrative controls in order to limit the effect that pressures generated in one market by government policy and private behavior will have in other markets. Access to the capital market is controlled by the Ministry of Finance.

Three primary concerns have dominated French monetary policy during the years 1964–81 covered in this study. The first is the development and restructuring of the French economy, especially industry. The second is the desire to maintain a level of domestic prices and interest rates that would contribute to the international competitiveness of French firms and the stability of the French banking system. The third is management of the French balance of payments and the foreign exchange value of the franc without jeopardizing domestic interest rate, credit allocation and money stock objectives.

The French monetary authorities, defined to include the Ministries of Finance and of the Economy as well as the Banque de France, have a wide variety of policy instruments at their disposal. We have chosen to concentrate on two instruments: the control exercised by the Banque de France over short-term money market rates and its power to set ceiling rates for

bank credit expansion. Control over money market interest rates has been directed primarily at the external sector objectives of the balance of payments and the franc exchange rate. Ceilings on bank credit expansion have been used primarily to control the banking system's contribution to growth of the money stock while seeking to minimize interest rate effects.

*Policy Reaction Function for the Money Market Rate*

Our reaction function for the money market rate (Table 1) regresses the quarterly average for the overnight money market rate, IBRQ, (closely controlled by the Banque de France) on the annual percentage rate of change in the spot franc/mark exchange rate, ln ($FRDMXRQ_t$/$FRDMXRQ_{t-4}$), the annual percentage rate of change in the consumer price index, ln($CPIFQ_{t-1}$/$CPIFQ_{t-5}$), and in an industrial production index, ln ($IPIC_{t-1}$/$IPIC_{t-5}$), the three-month Eurodollar rate in London, $REDQ_{t-1}$, and the government budget deficit, $GDEF_{t-1}$.

Our data permit us to estimate the equation for the period 1964.2–82.1. Chow tests indicate significant differences in coefficients between the periods 64.2–74.3, 74.4–81.1 and 81.2–82.1. President Mitterand was elected in May 1981 so that the period 81.2–82.1 may be considered the initial phase of the Mitterand policy regime. We have too few data observations in

Table 1
Policy Reaction Functions for the Banque de France

| Instrument variable: | $IBRQ_t$ | $IBRQ_t$ | $CRAT_t$ |
|---|---|---|---|
| Period: | 1964.2–74.3 (REGIME I) | 1974.4–81.1 (REGIME II) | 1973.1–81.1 |
| Explanatory variables: | | | |
| ln($FRDMXRQ_t$/$FRDMXRQ_{t-4}$) | .91099 (.28222) | 14.852 (2.8825) | 5.5828 (7.1953) |
| ln($CPIFQ_{t-1}$/$CPIFQ_{t-5}$) | 40.682 (4.0725) | 69.967 (4.1646) | — |
| $REDQ_{t-1}$ | .73365 (5.6875) | .22546 (2.5482) | .11072 (5.8252) |
| $RUQ_{t-1}$ | — | — | −.0058251 (−3.9046) |
| ln($IPIC70_{t-1}$/$IPIC70_{t-5}$) | −.32226 (.079128) | 6.9663 (.94339) | 7.0102 (2.2560) |
| $GDEF_{t-1}$ | .023923 (.63247) | −.00048118 (−.046104) | — |
| CONSTANT | −.39057 (−.62655) | −.71058 (−.45901) | .67225 (2.2096) |
| $AR^2$ | 87.91 | 71.86 | 75.45 |
| Durbin-Watson | 1.1007 | .90283 | 1.5076 |

t-ratio in ( )

this period for reliable estimation. We have chosen to present regression results for the two earlier periods. We treat the Mitterand period by means of an out-of-sample forecast based on coefficients for the period 74.4–81.1. This forecast can be compared to the actual time path of IBRQ in Chart 1.

The timing of the regime change between the period 64.2–74.3 and that of 74.4–81.1 together with ways in which coefficients on explanatory variables behave between the two periods point to changes in international monetary arrangements as a possible primary cause of the regime change. The earlier period falls largely in the international fixed exchange rate regime under Bretton Woods. On March 19, 1973 France, Germany, Denmark and the Benelux countries began their joint float relative to the dollar. Current account deficits in the balance of payments began to constrain French monetary policy in 1974. The franc was in and out of the European joint float twice, was subject to managed floating from 76.6 to 79.3 and entered the European Monetary System (EMS) as this came into operation on March 13, 1979. The Barre government was formed in March 1976. In September 1976 the monetary authorities began setting formal monetary targets.

The replacement of the Bretton Woods system by the European joint float is consistent with a reorientation of French policy from a franc-dollar, FF/$, to a franc-mark, FF/DM objective and with a decline in the importance of the Eurodollar rate as an influence on IBRQ. Regression tests revealed no significant relationship between IBRQ and annual percentage changes in FF/$ or FF/DM exchange rates for the 64.2–74.3 period, a result consistent with successful international efforts to stabilize exchange rates under the Bretton Woods system. In the period 74.4–81.1 the FF/$ is insignificant as is consistent with its reduced importance as a policy guide (this regression not shown in Table 1) while the FF/DM variable becomes significant with an appropriate positive sign. The Eurodollar rate is statistically significant in both periods but less so and with a lower positive coefficient in the later period.

The annual inflation rate in the consumer price index is significant with an appropriate positive sign in both periods with a higher coefficient in the later period. The level of unemployment (not presented in Table 1) and the industrial production index as cyclical indicators are insignificant in both periods. These results largely, but not entirely, support the official French emphasis on the external orientation of policy control over money market rates of interest. The government budget deficit lacks a significant relationship to IBRQ in both periods. The French policy of operating a government budget in approximate balance for most years during 64.2–81.1 appears to have freed monetary policy from significant expansionary pressure from this source.

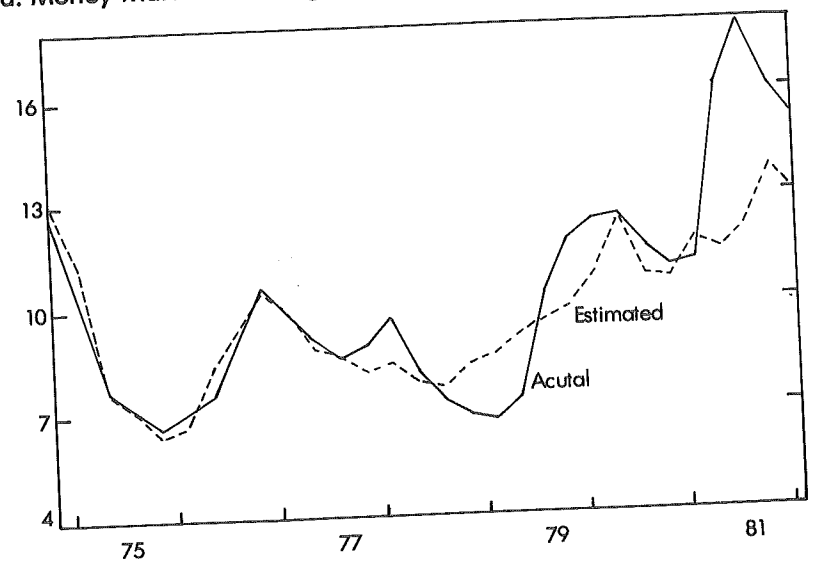
*Policy Reaction Function for Bank Credit Ceilings*

French authorities stress the role of ceilings on the rate of bank credit expansion as the key policy instrument for controlling the money supply.

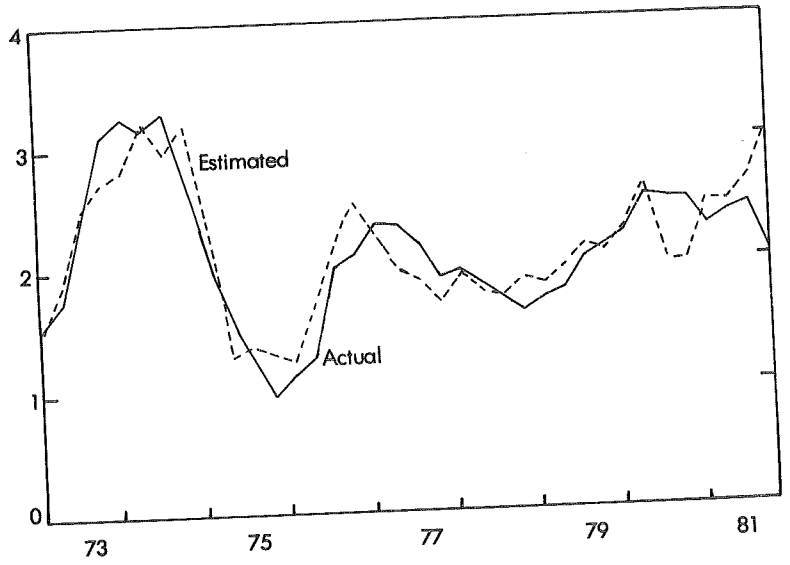
Chart 1

# France

a. Money Market Overnight Rate - Quarterly Average (IBRQ)




b. Index of Credit Rationing Intensity (CRAT)



We have not attempted to develop independently an appropriate measure of the credit rationing policy instrument, a research task of substantial complexity. Instead we represent this instrument by a measure of credit rationing developed by economists at the Banque de France and available to us for the period 1973.1–81.4. This indicator, CRAT, is methodologically and statistically complex in its construction, is scaled continuously from 0 to 4, and is an index of the effective intensity of credit rationing rather than a clear-cut policy indicator, since it incorporates various measures of the restraint experienced by banks, firms and individuals in response to different ceilings and associated penalties. Thus, CRAT is a jointly determined variable and cannot be regarded as an instrument fully controlled by the central bank. Despite these serious reservations we present the CRAT regression in Table 1 so as to have some evidence, although flawed, on a key policy technique of the Banque de France. The period covered, 1973.1–81.4, is nearly identical to that of Regime II for IBRQ.

Four explanatory variables are significant with theoretically reasonable signs. The intensity of credit rationing increases with the annual percentage change in the FF/DM exchange rate, with the annual rate of inflation in consumer prices and with an increase in the Eurodollar rate. Credit rationing declines when unemployment levels rise. The FF/DM exchange rate and the Eurodollar rate clearly are externally oriented variables. The level of unemployment is domestically oriented. The increase in CRAT with the inflation rate may be motivated either by concern for domestic inflation control, per se, or by the implications of domestic inflation for reducing the international competitiveness of the French economy.

Neither the annual percentage change in the industrial production index nor the government budget deficit (whether or not seasonally adjusted) exerted a significant influence on CRAT. Attempts to relate CRAT to the liquidity ratio, $M_2$/GDP, watched attentively by the French monetary authorities, produced significant but negative coefficients suggesting a reverse causal relationship. All three of these variables were dropped from the regression.

The socialist government formed by President Mitterand following his election in May 1981 announced a shift in macroeconomic policy objectives toward greater emphasis on expansion of production and employment. The new government also nationalized additional banks and industrial firms, implemented new tax and transfer payment policies to redistribute income from higher to lower income recipients, and raised minimum wages. These policies signaled a reduced emphasis on the external constraint imposed by the French commitment to relatively fixed exchange rates within the EMS and thus a reduced concern with the condition of the French balance of payments and exchange rate. Subsequent developments have included speculative capital outflows, deterioration of the current account and three devaluations of the EMS central rate for the French franc on October 4, 1981, February 22, 1982 and March 21, 1983. There has also been a marked increase in the size of the government budget deficit relative to GDP.

These developments appear to mark a definite change in policy regime under the Mitterand government. Because of data limitations we have chosen to examine this issue statistically by means of out-of-sample forecasts for CRAT and IBRQ included in Chart 1 and by means of tests of statistical significance. Our data for IBRQ and its explanatory variables extend through 1982.1; our series for CRAT ends with 1981.4. Visual inspection of Chart 1a for IBRQ reveals a gross underestimation of the rise in IBRQ in 81.1 and 81.2 when the French monetary authorities raised money market rates sharply to resist speculation against the franc. A Chow test using our limited data also indicates a statistically significant regime change for IBRQ beginning 1981.2. Chart 1b for CRAT also reveals forecasting error although less than that for IBRQ. A test of statistical significance designed to allow for the very few observations available for CRAT in 1981 is marginally significant but best regarded as inconclusive. Both our forecast underestimate for the rise in IBRQ and overestimate for CRAT probably result primarily from the inability of our policy reaction functions to reflect adequately the strength of the authorities' response to the large and sudden capital outflow following formation of the Mitterand government and announcement of its policies. The authorities raised IBRQ to combat the capital outflow. The accompanying decline in CRAT reflects measures taken to ease the resulting tightness in credit markets oriented to the needs of the domestic economy. The third devaluation of the franc in March 1983 and the adoption of austerity measures of wage, price, and tax policy testify to the difficulty, while maintaining an open economy, of isolating internal and external effects of policy measures from each other even by extensive use of direct controls on capital flows and in domestic credit markets.

## II. The Federal Republic of Germany

This section formulates, estimates, and interprets a policy reaction function for the Deutsche Bundesbank. The policy indicator used as dependent variable is the money market three-month loan rate (quarterly average of daily quotations).

The Deutsche Bundesbank has a variety of policy instruments at its disposition. Its primary instruments of monetary policy include its lending rates (the discount and Lombard rates), quantitative limits to banks' access to rediscount and Lombard credit, the power to change minimum reserve ratios for banks, open market operations in the money and bond markets, repurchase agreements and intervention in the foreign exchange markets including the use of favorable terms for forward cover of exchange risk when engaged in swaps with banks. The overall policy effect of these instruments can be conveniently summarized by their influence on interest rates that prevail in the money market. For example, a recent article in the *Monthly Report* of the central bank states:

> The reason for the Bundesbank's strong influence on the formation of interest rates in the money market is that virtually all banks conduct business with the Bundesbank and that normally no bank is prepared to pay more in the money market than it has to pay at the Bundesbank under roughly the same conditions; nor is it as a rule willing to lend money at lower rates than those paid on funds invested at the Bundesbank.[1]

*The Interest Rate Policy Reaction Function*

The policy goals espoused by the Bundesbank are the standard central bank goals of price stability, cyclical stabilization of output and employment, and external equilibrium as reflected in the balance of payments or in exchange rate movements. Thus, Bundesbank interest rate policy should respond to the domestically oriented measures of price inflation, unemployment and capacity utilization and to the externally oriented measures of exchange rate movements, foreign interest rates, and deficits or surpluses in the German balance of payments. National budget deficits or surpluses also may exert an influence if the central bank resists the monetization of government debt by refusing to accommodate the issue of additional debt through expansion of the money supply.

Table 2 presents interest rate policy reaction functions based on quarterly data for the period 1968.2–81.4. Application of an F-statistic test rejected the null hypothesis that coefficients on the explanatory variables were constant over the entire period, 1968.2–81.4. Instead the test served to identify two sub-periods or policy regimes between which Bundesbank behavioral responses to changes in goal variables were significantly different. Regime I covers the period 1968.2–74.3, Regime II the period 1974.4–81.4. Two developments may help to account for these distinct policy regimes. The first is the transition from the pegged exchange rate system under Bretton Woods to its more flexible successor. This transition was spread over the interval from late 1971 to March 1973 at which time floating relative to the U.S. dollar started in earnest, albeit modified by German membership in the European "snake." The second development was the more or less concurrent shift of Bundesbank policy from its orientation to banks' "free liquid reserves" to "the central bank money stock," a gradual shift that culminated in the first announcement in December 1974 of growth targets for the central bank money stock. For comparative purposes Table 2 presents one interest rate policy reaction function for the entire period 1968.2–81.4 and one for each of the shorter policy regime periods.

Two domestically oriented goal variables exert the anticipated influence on the central bank policy instrument represented by the three-month money market loan rate, (LR3MOSQ). LR3MOSQ responds positively to

[1]Deutsche Bundesbank, *Monthly Report,* Vol. 30, No. 4, April 1978, p. 12.

Table 2
Policy Reaction Function for the Deutsche Bundesbank
(Dependent variable is three-month money market rate, quarterly average, LR3MOSQ)

| Period: | 1968.2–1981.4 | 1968.2–1974.3 (REGIME I) | 1974.4–1981.4 (REGIME II) |
|---|---|---|---|
| Explanatory variables: | | | |
| $\ln(CPI76_{t-1}/CPI76_{t-5})$ | 89.632<br>(8.8209) | 64.206<br>(4.6222) | 57.795<br>(3.5996) |
| MDLSPRQ5[1] | −4.3097<br>(−1.9818) | −14.828<br>(−4.2279) | 6.3856<br>(2.4726) |
| MDLSPRQ6[2] | 9.4176<br>(3.5386) | 3.3763<br>(.52082) | 12.216<br>(4.9310) |
| $CAPUTB_{t-1}$ | .39272<br>(9.5007) | .28208<br>(2.9637) | .38500<br>(4.7696) |
| $REDQ_{t-1}$ | .46104<br>(8.7128) | .67362<br>(5.6501) | .37691<br>(6.4437) |
| CONSTANT | −33.985<br>(−9.6775) | −25.538<br>(−3.1455) | −30.813<br>(−4.8146) |
| ADJ. $R^2$ | 86.13 | 87.21 | 93.07 |
| DURBIN-WATSON | 1.2415 | 1.4477 | 1.7925 |

[1]MDLSPRQ5 is the annual percentage change in the DM/$ exchange rate, $\ln(DM/\$_t / DM/\$_{t-4})$, when the seasonally adjusted current account in the balance of payments is >0. Note that an upward revaluation of the DM results in a negative ln and vice versa so that implications of the signs on coefficients for MDLSPRQ5 and 6 for the effect on LR3MOSQ are reversed.

[2]MDLSPRQ6 is the annual percentage change in the DM/$ exchange rate when the current account in the balance of payments is ≤ 0.

t-ratio in ( )

changes in the inflation rate. Similar results for Regimes I and II and for the overall period substantiate the Bundesbank's reputation for exhibiting special concern for domestic price stability as a policy objective.

The rate of capacity utilization in German industry, (CAPUTB), also evoked a positive response from Bundesbank interest rate policy in both policy regimes and for the overall period. Both the size of the coefficient and the statistical significance for capacity utilization are higher for the more recent policy regime during which the German economy experienced greater variability in capacity utilization than in the earlier period of steadier growth with little underutilization of capacity.

Over the period covered no statistically significant relationship was discovered between the unemployment rate and LR3MOSQ. This may be explained by the relatively low unemployment rate in Germany for much of the period covered in the analysis. In any event the rate of capacity utilization in industry proved to be a much superior cyclical indicator so far as the response of the Bundesbank was concerned.

The federal government budget deficit also failed to qualify as a significant influence on Bundesbank interest rate policy and was dropped from the regression. Various explanations are possible. In the German federal

system the central government budget does not play the dominant role in budget policy that it does in certain other countries in view of the importance of the Lander and local government budgets in the more decentralized German system. It is also possible that Bundesbank policy does not respond in any systematic way to budgetary policy either because of priorities accorded to other goal criteria or because budgetary policy is coordinated with monetary objectives in the planning process and by administrative means rather than by market processes.

The externally oriented variables examined for an influence on Bundesbank interest rate policy are the DM/$ exchange rate, the Eurodollar rate and the current account deficit or surplus in the balance of payments. Bundesbank interest rate policy responded systematically to the rate on three-month Eurodollar deposits over the entire period 1968.2–81.4. The influence of the Eurodollar rate on LR3MOSQ is significantly less in Regime II under a more flexible DM/$ exchange rate policy than under Regime I when defense of a pegged exchange rate was the norm. An attempt was made to adjust the Eurodollar rate for anticipated percentage changes in the spot DM/$ exchange rate using the actual change that occurred to represent the anticipated change assuming perfect foresight. This substitution, tested for the entire period 1968.2–81.4, substantially reduced both the adjusted $R^2$ for the regression and the t-ratio for the Eurodollar rate and was therefore abandoned in favor of the unadjusted Eurodollar rate as reported above.

The response of Bundesbank interest rate policy to the German balance of payments situation as reflected in the current account balance or in changes in the DM/$ exchange rate was more complex. No significant effect of the current account balance, per se, whether or not seasonally adjusted, could be found on LR3MOSQ in the estimated reaction functions. Moreover, devaluations or revaluations of the DM relative to the U.S. dollar did not appear to exert a significant and theoretically meaningful influence on Bundesbank policy until a distinction was made between Bundesbank reactions in calendar quarters during which the current account was in surplus and those in which the current account was in deficit. This was accomplished by multiplying the annual percentage change in the DM/$ exchange rate, $\ln(DM/\$_t / DM/\$_{t-4})$, by a dummy variable based on the current calendar quarter's seasonally adjusted condition of the current account. This procedure resulted in the two exchange rate variables presented in Table 1 (MDLSPRQ5 and MDLSPRQ6) and defined in footnotes one and two to that table. Use of an appropriate F-test verified the statistical significance of splitting the DM/$ exchange rate variable in this way. Estimation of the resulting reaction function for the two distinct policy regimes then yielded the statistically significant and theoretically meaningful coefficients on the exchange rate variable shown in Table 2.

Under a "fixed" exchange rate during policy Regime I the principal movements of the DM/$ exchange rate were periodic up-valuations responding to persistent current account surpluses and speculative inflows of

capital. In its attempt to control the domestic money stock the Bundesbank responded by restrictive domestic policy reflected in the level of the three-month money market loan rate. Thus, revaluation of the DM relative to the dollar typically was associated with a rise in LR3MOSQ. Note that periods of current account deficit during policy Regime I were so rare that the coefficient on MDLSPRQ6, while positive, is not significantly different from zero.

Under a more flexible exchange rate policy during Regime II, (1974.4–81.4), there is a significant inverse relation (see footnotes to Table 1) between movements in the DM/$ exchange rate and the three-month money market rate. An appreciation of the DM relative to the dollar leads to a reduction in LR3MOSQ while a depreciation of the DM leads to a rise in LR3MOSQ. Moreover, the response of the policy instrument to the movements in the DM/$ exchange rate is stronger and more significant during periods of current account deficit than during periods of current account surplus. The pattern of policy response during policy Regime II implies the goal of partial stabilization of the DM/$ exchange rate.

The priority goal of minimizing domestic price inflation helps to interpret the policy responses of LR3MOSQ to percentage changes in the DM/$ exchange rate under both the fixed and flexible exchange rate policy regimes. Under fixed exchange rates domestic instruments of control over the money stock were used in attempts to offset monetary growth through the balance of payments. Under the regime of flexible exchange rates there is a partial tradeoff between control over the domestic money supply and exchange rate flexibility. The choice made by the German authorities typically has been guided by their judgment of the implication for domestic price stability. Thus, Dr. Otmar Emminger, then President of the Deutsche Bundesbank, wrote in the bank's *Monthly Report* for June 1978:

> For the monetary policy of the Bundesbank the suspension of the obligation to purchase dollars in the spring of 1973 represented a profound change in basic monetary conditions. It released the Bundesbank from the necessity to create central bank money involuntarily via purchases of foreign exchange, i.e. monetary policy was better protected against external influences.[2]

Later in the same article Emminger referred to the overshooting of domestic monetary growth targets in 1976 and 1977 for cyclical reasons and in the winter of 1977/78 owing to intervention in the foreign exchange market to steady the value of the DM. Again he emphasized the criterion of domestic price stability:

> One of the reasons why the overshooting of the quantitative monetary target could be tolerated in the above cases is that it was not to be feared in either case that *the primary objective, namely of curbing price*

[2]Ibid., No. 6, June 1978, pp. 9–10.

> *inflation*, would be endangered. As regards the foreign exchange interventions in the winter of 1977/78 the simultaneous appreciation of the Deutsche Mark acted as a brake on domestic price rises. Thus, foreign exchange interventions that are accompanied by an (unavoidable) upward movement of the Deutsche Mark must be judged differently, in terms of stabilization policy, from foreign exchange interventions under a system of fixed exchange rates. [Italics added].[3]

A later staff article in the March 1981 *Monthly Report* devoted to "The Balance of Payments and Monetary Policy" makes a related but opposite point concerning the need to raise domestic interest rates to resist an excessive *depreciation* of the DM even though domestic economic conditions of a cyclical nature might favor monetary ease and lower interest rates.

> Of course, the persistently high level of interest rates in Germany poses additional problems for the domestic economy. But under present conditions [i.e. current account deficit and depreciating DM/$ exchange rate, D.H. and R.R.] the Bundesbank has no real alternative to its monetary policy. The final objective of its policy, in accordance with its statutory mandate, is to maintain price stability.[4]

These views of German monetary authorities lend credence to the estimated policy reaction functions presented in Table 2.

## III. Italy

The key *domestic* economic goals of the Italian monetary authorities may be presumed to be to sustain real economic growth and to contribute to cyclical stabilization of the economy so as to limit unemployment and low use of industrial capacity. Stability of the domestic price level, while hypothetically an important policy goal for purely domestic reasons, may be of secondary importance in Italy. Wage indexation has partially protected workers from loss of real income due to price inflation while a policy of low or negative *real* interest rates to favor business and government borrowing has had support through political and government channels. On the other hand, in an economy as open as the Italian economy the condition of the balance of payments and exchange rate must be a constant preoccupation of the monetary authorities. This implies concern with relative price trends, interest rate differentials, the external value of the lira and the surplus or deficit in the balance of payments, especially the current account.

In view of the large variety of policy instruments available to the Italian authorities the task of choosing an appropriate instrument for a policy reaction function is especially complex. Among the candidates are the cen-

[3]Ibid.
[4]Ibid., Vol. 33, No. 3, p. 9.

tral bank's discount rate, its intervention rate in the Treasury bill market, the obligatory cash reserve requirement, the security investment requirement, the ceiling rates of expansion stipulated for bank loans, the regulation of the net foreign position of commercial banks and special deposits at the central bank as a stipulated percentage of import payments.

Our prime candidate for the best *indicator* of the policy intentions of the Italian monetary authorities is the monetary base. Although this is not strictly a policy instrument, per se, there are two good reasons for choosing it: (1) its movement over time incorporates the influence of a number of the policy instruments used by the Banca d'Italia though certainly not all, and (2) in Banca d'Italia doctrine the monetary base has been regarded as the key monetary aggregate through which the monetary authorities should attempt to exert their influence on the economy.[5]

The prominence accorded since 1974 to "total domestic credit," (TDC), as an intermediate target might suggest its use as a policy indicator rather than the monetary base.[6] We reject this alternative. In the central bank's efforts to achieve domestic and balance of payments goals, control of TDC can be shown to be a distinctly second-best alternative to control of the monetary base and money supply. Efforts to control TDC involve various direct administrative measures (for example, quotas on rediscounting, ceilings on bank loan expansion, setting of minimum marginal security reserve requirements, controls over international capital movements). TDC targets have replaced monetary base control as a stated objective because under government policy the Banca d'Italia has been constrained from permitting interest rates to rise to market clearing levels implied by monetary base control geared to domestic and balance of payments objectives. In the context of freely adjusting credit markets and interest rates, control of the monetary base would remove the raison d'être of the TDC intermediate target. Control of TDC does not guarantee control of the monetary base and money supply which is essential for achieving longer term goals for real economic growth, moderating domestic inflation and achieving equilibrium in the balance of payments. Thus, monetary base control may reasonably be viewed as a Banca d'Italia policy indicator while TDC is better understood as an intermediate target designed for specific Italian conditions.

Since 1974 the Banca d'Italia has sought progressively to widen its discretionary limits with regard to interest rate policy and thus to be able to rely more on market forces and less on administrative measures in implementing monetary policy. Thus, for this more recent period it may be reasonable to estimate a policy reaction function using an appropriate interest rate as the Banca d'Italia's instrument variable. This approach is undertaken following that for the monetary base.

[5]Cotula, C. (1977) and S. Micossi, p. 142; Fazio, A. (1969).

[6](1) Banca d'Italia (1982) by C. Caranza, S. Micossi and M. Villani; (2) Caranza, C. (1977) and T. Padoa-Schioppa; (3) Caranza, C. (1981); (4) Cotula, F. (1977) and S. Micossi.

Table 3
Policy Reaction Functions for the Banca d'Italia

| Instrument variable: | (a) ln(MBTOT3) | (a) ln(MBTOT3) | (b) RTBA |
|---|---|---|---|
| Period: | 1964.4–74.4 (REGIME I) | 1975.1–81.3 (REGIME II) | 1974.1–81.3 |
| Explanatory variables: | | | |
| $\ln(GDP75_{t-1})$ | .25792 (1.9628) | −.33450 (−.79330) | — |
| $\ln(PWORLD_{t-1})$ | 1.1761 (4.7815) | .80949 (2.7039) | — |
| $GDEF_t$ | .0000620 (4.6136) | .00000484 (1.7901) | .000246 (4.1826) |
| $REDQ_{t-1}$ | −.00853 (−2.5461) | −.00618 (−2.3285) | — |
| $\ln(XRITUS_{t-3}/XRITUS_t)$ | .47686 (3.1479) | .13206 (2.0617) | −14.863 (−6.4915) |
| $\ln(LIDMXR_{t-3}/LIDMXR_t)$ | — | — | −9.8859 (−2.4241) |
| $\ln(MBTOT3_{t-1})$ | .30120 (2.6662) | .63154 (4.6257) | — |
| $\ln(CPI3_t/CPI3_{t-4})$ | — | — | 44.969 (6.8578) |
| $\ln(GDP75_{t-1}/GDP75_{t-5})$ | — | — | 12.053 (2.0474) |
| CONSTANT | −1.2860 (−1.3908) | 4.0249 (.97026) | 3.7847 (3.2158) |
| ADJ. $R^2$ | 99.50 | 99.22 | 84.62 |
| Durbin-Watson | 2.5656 | 2.1555 | 1.3354 |

t-ratio in ( )

*Reaction Function for the Monetary Base*

Table 3(a) presents empirical results for the monetary base policy reaction function. We think of a higher world price level, PWORLD, and a higher level of real GDP, GDP75, as permissive of a higher level of monetary base with its attendant effect on the domestic price level. Although the Banca d'Italia employs various controls over capital flows there may be some response to the differential between domestic and foreign interest rates. To represent this influence we add the Eurodollar rate, $REDQ_{t-1}$, to the function. Next there is the requirement that the government deficit be financed subject to a ceiling constraint on interest rates. This constraint frequently has required the Banca d'Italia to exceed its preferred expansion of the monetary base. Thus, the government deficit, GDEF, is added to the policy reaction function. A balance of payments crisis accompanied by devaluation of the lira, emergency borrowing abroad, and negotiating pressure by official foreign lenders can strengthen central bank and government

forces favoring more restrictive monetary and fiscal policies in the aftermath of such a crisis. To test for this influence a variable expressing variation in the lira/$ exchange rate, $\ln(XRITUS_{t-3}/XRITUS_t)$ is added to the reaction function. The lagged value of the monetary base also is included as a regressor.

Use of a Chow test indicates a regime change distinguishing the period 1964.4–74.4 from 1975.1–81.3. Among the likely explanations for the change in regime three are most plausible: (1) the transition to a more flexible exchange rate regime, (2) a change in policy in response to the oil price shock, and (3) a reorientation of domestic monetary policy beginning in 1974 at which time the Banca d'Italia began to exercise greater discretion over the Treasury bill auction rate as an instrument of policy, partly in response to conditions negotiated with the IMF in obtaining a standby credit.

Real GDP is significant at the .06 level with the expected sign in the earlier regime but not in the later one. The world price level is significant with the correct sign in both regimes but less so and with a lower coefficient in the 1975.1–81.3 regime. GDEF is significant at the .01 level in Regime I and at the .10 level in Regime II. This result is consistent with the greater discretion exercised by the Banca d'Italia in the later period.

Both the Eurodollar rate and the percentage change in the lira/$ exchange rate are significant at the .05 level in both regimes but with smaller coefficients in the later period under more flexible exchange rates.

Explanatory variables which were tested and dropped for lack of significance included various versions of the Treasury bill auction rate, hours lost through short time as a measure of unemployment, a measure of capacity utilization in Italian industry and various measures derived from the balance of payments. In the policy reaction function for the *Deutsche Bundesbank* the percentage change in the U.S. dollar exchange rate was found to be much more significant at times when the current account of the balance of payments was in deficit. This possibility was explored for Italy, but an F-test indicated no significant difference in explanatory power compared to that when the current account multiplicative dummy was omitted.

*Reaction Function for the Auction Rate on Treasury Bills*

Since 1974 various reforms centered on the organization of the money market, techniques of financing the Treasury deficit and the responsibilities of the Banca d'Italia in these areas have resulted in somewhat greater latitude for the Banca d'Italia to exercise its influence on interest rate levels as a principal instrument of monetary policy.[7] The economic developments to which the Bank's interest rate policy may be expected to respond are similar to those already discussed for the monetary base as policy indicator.

[7]Hodgman (1974), pp. 97–102; Hodgman (1976), p. 30; Caranza (1981), p. 3; Ciampi (1982).

The auction rate on Treasury bills, RTBA, taken as policy instrument should move to counter cyclical swings in output and employment. It should rise to counteract weakness in the balance of payments. It should respond to movements in the lira/$ or lira/DM exchange rate, the latter because of Italy's membership in the EMS. A measure of the government deficit may be included to test for offsetting or accommodating response by the Banca d'Italia.

Table 3(b) presents an estimated policy reaction function with the Treasury bill auction rate, RTBA, as dependent variable. The period 1974.1–81.3 approximates that for the second regime identified for the monetary base policy reaction function. Explanatory variables found to be significant at the .05 level with the theoretically expected sign are the annual rate of domestic price inflation measured by the consumer price index, $\ln(CPI3_t/CPI3_{t-4})$, the annual rate of growth in real GDP, $\ln(GDP75_{t-1}/GDP75_{t-5})$, the size of the government deficit, $GDEF_t$, the percentage rate of change in the lira/$ exchange rate, $\ln(XRITUS_{t-3}/XRITUS_t)$, and the percentage rate of change in the lira/DM exchange rate, $\ln(LIDMXR_{t-3}/LIDMXR_t)$. The rate of utilization of industrial capacity, with various lags, and hours lost through short time were tried as cyclical indicators and discarded for lack of significance.

In contrast to results for France, Germany, and the United Kingdom the Italian reaction function for the interest rate policy instrument did not exhibit a statistically significant and theoretically meaningful response to the Eurodollar rate. This was so both for the Eurodollar rate lagged one quarter and for the contemporary Eurodollar rate adjusted for the expected percentage change in the lira/$ exchange rate. In the latter case the actual percentage change in the lira/$ exchange rate was used to represent the expected percentage change, a procedure implying perfect foresight. The lack of significance for these versions of the Eurodollar rate suggests that Italian exchange controls may have been relatively effective in inhibiting undesired capital flows related to possibilities for interest rate arbitrage.

## IV. The United Kingdom

Our investigation of the policy reactions of the Bank of England covers the period 1965.2–82.3. This extended period is marked by six general elections involving three swings between Labor and Conservative governments and by a variety of developments in the theory, techniques, and circumstances that help to determine monetary policy. A brief review of salient developments provides relevant background and motivation for the policy reaction function which we present in this section.

Over much of this period monetary policy in Britain found its intellectual orientation in Keynesian macroeconomic theory and in a Radcliffian view of the role of money in the economy. Full employment and the welfare state were the guiding principles for macroeconomic policy. The task of

economic stabilization was assigned to government budgetary and tax measures following well-known Keynesian principles of aggregate demand management. The Bank of England had responsibility for managing the government debt, for interest rate policy, and for using monetary management together with exchange controls to manage the balance of payments and exchange rate.

Interest rate policy focused on two objectives. Short-term interest rates through maturities of about three months were attached to the central bank's discount rate (Bank rate) by a variety of formulae and well-understood practices. The primary purpose of changes in Bank rate and its coterie of dependent rates of interest was to influence short-term capital flows so as to equilibrate the balance of payments. The other interest rate goal was to stabilize the prices and rates of return on gilt-edged stocks (long-term government bonds).

During most of the period until the mid-1970s official opinion both in the Bank and the Treasury attached little or no significance to growth in the money stock for its influence on the price level and inflation, on the competitiveness of the British economy in world markets and hence the balance of payments, or on the ability of the Bank to manage prices and yields on gilt-edged stocks. The prevailing official view was that wage settlements together with productivity determined cost-price levels to which monetary policy had to adjust while budgetary policy regulated aggregate demand to achieve full employment. The implications of public sector deficits (the so-called Public Sector Borrowing Requirement, PSBR) for the ability of the central bank to control the money stock at low interest rates received little emphasis in official thinking.

Under the Heath government (June 1970–February 1974) there were three developments of particular relevance for monetary policy: the reform of the system of monetary and credit controls in September 1971 known as "Competition and Credit Control," the move from a fixed exchange rate to managed floating for the pound sterling on June 23, 1972, and the return to direct controls applied to banks in the form of the Supplementary Special Deposits technique introduced in December 1973. Despite these various changes in technique, a qualitative appraisal of the period suggests no major changes in the basic objectives or instruments of monetary policy.

The Labor government returned to power in February 1974 and governed until the Conservative election victory on May 4, 1979. These years witnessed the rise in importance of the monetary aggregate, sterling $M_3$, £$M_3$, as an intermediate target for monetary policy, partly under pressure from the IMF to which the British government had turned for a large standby credit to bolster the pound in 1976. Growth in £$M_3$ became a publicly announced target for monetary policy beginning in 1976. Nevertheless, no basic changes in the techniques or guiding theories for monetary policy occurred during these years of the Labor government.

The Thatcher government came to power with the Conservative election victory of May 4, 1979. The main elements of the macroeconomic

policy approach of the Thatcher government are well-known and will not be restated here save to recall a few features relating most directly to monetary policy. Both the techniques and the declared goals of monetary policy have been modified under the Thatcher economic program. Exchange controls were abolished in a series of steps extending from June to December 1979. The Supplementary Special Deposits Scheme, previously used to limit the growth in bank loanable funds, was abandoned in June 1980. The Government has made commitments to bring down the rate of growth in $£M_3$ in successive fiscal years and has emphasized the relationship between PSBR and past excessive growth in $£M_3$ accompanied by high nominal interest rates. The Government has accorded top priority to control of inflation with employment, the balance of payments and the exchange rate reduced to secondary importance.

To de-emphasize the role of the Bank of England in determining interest rates, the Bank in June 1980 ended its previous practice of posting continuously its Minimum Lending Rate. A new reform of monetary policy techniques became effective on August 20, 1981 putting in place a system of cash reserve requirements for a broadened list of banks and deposit-taking institutions, increasing the Bank of England's reliance on open market operations in contrast to direct lending to banks and emphasizing the desirability of greater flexibility and responsiveness of short-term interest rates to market forces. If the intent of the new policies is fulfilled in practice, the policy behavior of the monetary authorities should exhibit significantly different patterns beginning in 1979 or 1980.

We have experimented with two types of reaction functions for the Bank of England. In the first we regard Bank rate, BRQ, as the instrument under the control of the authorities. We treat Minimum Lending Rate, MLRQ, as an extension of Bank rate. Moreover, to be able to incorporate additional quarters in our regression for the Thatcher years we have created proxy values for BRQ for the calendar quarters 1981.3–82.3 using the earlier observed relationship between BRQ and the three-month interbank lending rate for this purpose.

Our second type of reaction function regards credit extended to the domestic economy by the Bank of England (conceptually the Bank's domestic credit contribution to the monetary base), as a policy instrument under the Bank's control. We comment below on our unsatisfactory attempts to estimate a reaction function for this "policy instrument."

*Policy Reaction Function for Bank Rate*

In the light of qualitative evidence we regard BRQ as the policy instrument used primarily to influence the balance of payments and exchange rate. Explanatory variables intended to test this orientation included in our regression presented in Table 4 are the quarterly changes in official borrowing abroad, $(OBA_{t-1} - OBA_{t-2})$, and in official reserves, $(OFRES_{t-1} - OFRES_{t-2})$, and the Eurodollar rate, $REDQ_{t-1}$, all lagged one quarter.

We include the annual rate of inflation in consumer prices, $\ln(CPIQ_{t-1}/CPIQ_{t-5})$ to test for a possible orientation of BRQ to domestic goal variables. We examine also the possibility that PSBRQ exerts an interest rate effect and thus may not be fully accommodated by an expansion of central bank credit to the economy. The regression includes also the lagged value of the dependent variable.

In Table 4 we present estimates for the period 1965.2–79.1 and separately for the 14 initial quarters of the Thatcher period. A Chow test for a regime change in regression coefficients that might have occurred in association with the reform in monetary techniques announced in "Competition and Credit Control" in September 1971 or following floating of the pound from June 1972 to the present was not significant. Therefore, we present a single reaction function for the period 1965.2–79.1.

Both qualitative evidence and a Chow test suggest a significant change in regression coefficients for the 14 initial quarters of the Thatcher government. Moreover, in Chart 2 we compare an out-of-sample forecast for BRQ with its actual values (some of which are proxies based on IBRQ). The poor fit of forecast with actual values for BRQ also indicates that the prior regression coefficients do not hold. Indeed, the reaction function estimated for the 14 quarters, 1979.2–82.3, has no statistically significant coefficients and is essentially unreliable. We comment further on this problem below.

Table 4
Policy Reaction Function for the Bank of England

| Instrument variable: | $BRQ_t$ | $BRQ_t$ |
|---|---|---|
| Period: | 1965.2–1979.1 | 1979.2–1982.3 |
| Explanatory variables: | | |
| $PSBRQ_{t-1}$ | .00055331<br>(3.0694) | −.00016946<br>(−.98782) |
| $\ln(CPIQ_{t-1}/CPIQ_{t-5})$ | −2.9304<br>(−.70302) | 28.375<br>(1.1095) |
| $OBA_{t-1} - OBA_{t-2}$ | .00024683<br>(1.6043) | −.00090019<br>(−1.4737) |
| $OFRES_{t-1} - OFRES_{t-2}$ | −.00032676<br>(−2.7292) | .00014305<br>(.78738) |
| $REDQ_{t-1}$ | .16880<br>(2.1621) | −.039646<br>(−.25383) |
| $BRQ_{t-1}$ | .67483<br>(7.3180) | .25496<br>(.44446) |
| CONSTANT | 1.2998<br>(2.0877) | 7.3918<br>(1.2099) |
| ADJ. $R^2$ | 81.86 | 44.61 |
| Durbin-Watson | 2.0522 | 1.3686 |

t-ratio in ( )

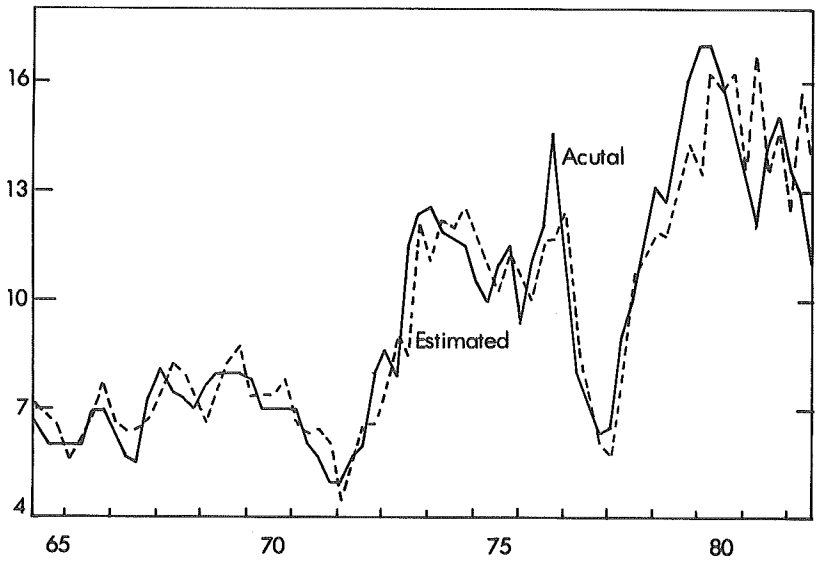
In the period 1965.2–79.1 BRQ exhibits a statistically significant response to three variables in addition to its own lagged value and the constant term. The coefficient for the Eurodollar rate is positive and that for the change in official reserves is negative as expected; that for the change in official borrowing abroad has the expected positive sign but is not significant at the .05 level. PSBRQ exerts a significant positive influence on BRQ suggesting less than full accommodation by the central bank to an increase in PSBRQ. The level of unemployment was dropped from the regression after several attempts yielded either insignificant or perverse coefficients.

Our out-of-sample forecast for the Thatcher period performs very badly as does our estimated reaction function for that period. We are unable to allocate responsibility for this failure among such possible causes as altered priorities among policy goals, misspecification and data problems. In the data category we may mention an exaggeration of PSBRQ in 1981.2 due to the civil servants' strike and new methods for valuing official foreign exchange reserves and official borrowing abroad applied after end-March 1979. Thus, we have no clear *quantitative* evidence as to whether or not monetary policy reactions changed in conformity with stated policy goals under the Thatcher government.

Chart 2

## United Kingdom

**Bank Rate or Minimum Lending Rate - Quarterly Average (BRQ)**



*An Alternative Policy Reaction Function for the Bank of England*

If BRQ is oriented primarily to managing the balance of payments and the exchange rate, what policy reactions does the Bank of England display to domestic economic and socio-political developments? What policy instrument or instruments does the Bank use for this purpose? In this section we comment briefly on our approach and unsatisfactory results relating to these questions.

We have experimented with a variable constructed quarterly from elements in the balance sheet of the Bank of England and intended to represent the extension of credit to the domestic economy by the Bank. Our measure for this "instrument" is the sum of government and "other" securities held in the Banking and Issues Departments of the Bank plus discounts and advances less supplementary special deposits required of banks, all designated as DCMSD. We regressed the level of this variable on PSBRQ, the annual inflation rate in consumer prices, changes in official borrowing abroad, changes in official foreign exchange reserves, the level of unemployment and its own lagged value. We estimated this regression with and without deflation of $DCMSD_t$, $DCMSD_{t-1}$, and $PSBRQ_t$ by the consumer price index and separately for the pre-Thatcher period, 1965.2–79.1 and for 14 quarters of the Thatcher period, 1979.2–82.3.

In both the deflated and undeflated versions PSBRQ had a positive and significant coefficient in the pre-Thatcher period and lacked significance in the Thatcher period while the externally oriented explanatory variables—change in official reserves and in official borrowing abroad—lacked significance in all versions. Other aspects of the resulting regressions were more problematic. Accordingly we record this effort here merely to indicate the direction of our thinking and to acknowledge an unfinished task for the future.

## Concluding Comments

In conclusion we comment briefly on three aspects of our study of monetary policy reaction functions that merit emphasis: namely, observed differences in national patterns of policy behavior, the issue of regime changes, and the more general theme of socio-political influences on monetary policy.

French monetary policy appears to have been concerned primarily with domestic inflation and with managing the balance of payments and exchange rate. From qualitative evidence we know that France has sought to keep domestic interest rates relatively low and stable and to use monetary and budgetary policy to allocate credit to priority goals. It has attempted to specialize the policy instruments of money market rates and of credit rationing respectively to balance of payments and domestic money stock controls and to build barriers between their international and domestic effects by means of direct controls. Evidence from the policy reaction func-

tions shows that such specialization of function and segmentation of markets is incomplete. Two other quantitative results are of interest. Since late 1974 the FF/DM exchange rate has superseded the FF/$ exchange rate in influencing French monetary policy. Also, until 1979, at least, the government deficit in France appears not to have exerted a significant influence on monetary policy.

Our quantitative results support the standard view that German monetary policy has reacted strongly and systematically to domestic inflation and to changes in capacity utilization in industry. It has also been sensitive to the DM/$ exchange rate and the Eurodollar rate. Since the mid-1970s a case can be made that the DM exchange rate is the key exchange rate influence for the French and Italian monetary authorities (somewhat less for the Italian) whereas the DM/$ rate is the key one for the German monetary authorities. Over the period studied the central government budget had no significant influence on German monetary policy.

In Italy monetary base policy continues to respond positively to the government budget deficit but with sharply reduced significance in the period since 1975. This may result from increased discretion exercised by the Banca d'Italia over short-term interest rates beginning in 1974. This trend, if continued and strengthened, could end the Italian authorities' emphasis on credit ceilings and control over total domestic credit in contrast to monetary base control as key techniques of monetary policy. Much depends on the socio-political forces that favor low or negative real rates of interest in Italy. The reaction function for the Treasury bill auction rate is fairly conventional, responding in a stabilizing way to both domestic and external policy goals.

In the United Kingdom Bank rate has responded primarily to the Eurodollar rate, to changes in official reserves, and to the public sector borrowing requirement. There is suggestive though not definitive evidence that the systematic influence of PSBR on the Bank of England's provision of credit to the domestic economy during the pre-Thatcher period has disappeared in the Thatcher period. These responses, at least until the election of the Thatcher government, are consistent with a primarily passive domestic role for monetary policy and with the orientation of Bank rate to the task of external equilibrium.

The regime changes identified by Chow tests for France, Italy, and Germany in late 1974 can scarcely be coincidental. By contrast we find no regime change for monetary policy in the United Kingdom in the mid-1970s. We mention as mere speculations three factors that may help to explain these patterns. One factor is the move from fixed to flexible exchange rates for the world monetary system following the demise of the Bretton Woods system. This does not explain the absence of a regime change in the United Kingdom. A second factor may be differences in the duration and degree of commitment to the European joint float relative to the dollar. France and Italy were in the "snake" for varying periods and are full members of the European Monetary System. The German mark has

been continuously the key currency both in the snake and in the EMS. The pound, by contrast, left the snake rather promptly in June 1972 and has not rejoined the joint float. Finally, there is the possibility that changes in policy reaction functions were in part due to the oil price shock of 1973–74 and subsequent adjustments to it and that this shock was cushioned for the United Kingdom by its North Sea oil production.

One of our purposes in studying the policy reactions of national monetary authorities has been to discover how, if at all, socio-political forces affect monetary policy. We have no hard quantitative evidence to report on this issue such as the influence of approaching elections, opinion survey measures of approval or disapproval of government policies and performance, changing composition of legislatures in elections, strikes, or other quantifiable "political" variables.[8] We do have some preliminary views to share.

Behind some variables typically labeled as "economic" there are barely concealed socio-political forces. The size of the government or public sector deficit and the manner of its financing (for example, whether or not constrained by interest rate ceilings) is one such variable. The issue of inflation versus unemployment has deep political roots. It is useful to distinguish between fundamental political forces and alignments as these influence persistent strategic features of policy behavior such as those just mentioned and shorter term, more tactical influences such as opinion polls, shifts in the composition of legislatures not accompanied by changes in the party in control of the executive functions of government, and even strikes or high levels of unemployment. The tactical forces may have gradual and subtle influences on monetary policy that are difficult or impossible to capture in the kind of quantitative work we have performed. They may, of course, accumulate to break forth in a major political event that sends a clear demand for change in policy orientation. These discrete political events may then produce regime changes in monetary policy reaction functions of the type we would expect to find associated with the elections of Thatcher, Mitterand, and Reagan.

Any scheme of international monetary cooperation such as the European Monetary System or less formal commitments to monetary cooperation or harmonization, much less monetary unification, must be compatible with the deeply embedded, slowly changing and nationally diverse socio-political forces that help to define the persistent, strategic themes of national monetary policies. The degree of international monetary cooperation defined in operational and technical terms that can be achieved and made to work is limited by the degree of convergence in favorable domestic political forces in the cooperating countries. Thus, it is not so much the "political will" as the "political feasibility" of various schemes of international monetary cooperation that determines their acceptability and practicality.

[8]See, however, the paper by John T. Woolley in this volume.

## References

Banca d'Italia. 1982. "La domanda di moneta in Italia, 1963–1981," a cura di C. Caranza, S. Micossi, M. Villani. in *Modello Econometrico Dell' Economia Italiano* (III edizione M3 BI)

Caranza, C. (1977) and T. Padoa-Schioppa. "A Note on the Intermediate Targets of Monetary Policy," in Banque de France, Direction Generale des Etudes, *Cahiers Economiques et Monetaires, 6,* Actes du seminaire des Banques Centrales et des Institutions Internationales, Paris, April 1977, Ire partie, "Les instruments et les objectifs de la politique monetaire," pp. 163–175.

___. (1981). "Targets and Instruments of Monetary Policy' in Italy." Note prepared for the Research Planning Conference on the "Political Economy of Monetary Policy in Western Europe," University of Illinois, Urbana-Champaign, March 1981. Unpublished.

Ciampi, Dr. C. A. (1982). Article appearing in the main edition of the *Wall Street Journal,* June 5, 1982.

Cotula, F. (1977) and S. Micossi. "Some Considerations on the Choice of Intermediate Monetary Targets in the Italian Experience," in Banque de France, Direction Generale des Etudes, *Cahiers Economiques et Monetaires, 6,* Actes du seminaire des Banques Centrales et des Institutions Internationales, Paris, April 1977, Ire partie, "Les instruments et les objectifs de la politique monetaire," pp. 141–162.

Deutsche Bundesbank, *Monthly Report,* various issues as cited.

Fazio, A. (1969). "Monetary Base and the Control of Credit in Italy," in Banca Nazionale del Lavoro, *Quarterly Review,* No. 89, June 1969, pp. 146–69.

Hodgman, D. (1974). *National Monetary Policies and International Monetary Cooperation.* Boston: Little, Brown and Co.

___. (1976). *Selective Credit Controls in Western Europe.* Chicago: Association of Reserve City Bankers.

NOTE: A statistical appendix giving data definitions and sources is available upon request to the authors at Bureau of Economic and Business Research, University of Illinois, U.-C., 428 Commerce West, 1206 South Sixth Street, Champaign, Illinois, 61820, U.S.A.

# Discussion

Tommaso Padoa-Schioppa*

I have to confess that I have always regarded the study of reaction functions as something like peeping through a keyhole: on the one side of the door there are people doing "interesting things"; on the other side somebody (an economist) is trying to catch the secret of what is happening. Like many others, when I was young, in my early days in a central bank, I was on the "watching" side. Today I am more on the side of "being watched." This is how I explain to myself the sense of both guilt and embarrassment that I feel when dealing with reaction functions. And things are further complicated by my experience in an international organization, where the keyhole is used not only to peep but also to whisper advice to those who are busy inside. This is why I would like to suggest that next time not only economists and political scientists should be invited to the conference, but also psychologists.

Trying to overcome these complexes, I would say that a paper that uses reaction functions to analyze the policy behavior of a set of closely integrated countries raises problems at various levels. In the first place there are the problems posed by the use of reaction functions in general. Second, there are the questions related to the particular specifications and results presented by the authors. If one then moves from a separate to a joint consideration of the countries examined (an exercise which I would have liked the paper to carry out more thoroughly), interesting problems and insights emerge of a comparative nature. Finally, there are policy issues specifically due to the close economic and monetary interdependence between the countries considered. I shall make brief remarks on each of these four headings.

## 1. Reaction functions in general

Under this heading I shall just mention a few problems without going into them in detail, since I know the general issues involved in the use of reaction functions have been raised already. I see three problems in particular.

First, the difficulty of disentangling the role played by targets from that played by constraints when analyzing the behavior of the authorities. As Hodgman and Resek say in the introduction to their paper, the coefficients relating instruments to targets in a single equation reaction function do not

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provide direct information about the authorities' preferences; their changes over time depend on changes in both policy options and economic constraints.

Second, the impossibility of observing the desired values for the ultimate targets. According to the classical Theil approach, the authorities are assumed to react to deviations of target variables from their desired values. However, since in most cases the latter are unobservable, actual values of the ultimate goals often appear on the right-hand side of the reaction function as such.

Third, the hypothesis of invariance of the desired values for the ultimate targets. The problem I have just mentioned is commonly dealt with by assuming that the desired values set by policymakers are constant over the estimation period. This assumption is also made by Hodgman and Resek since they do not explicitly define desired values for policy targets. However, there is no doubt but that the attitude of policymakers towards price stability and full employment has changed. To give just two examples, a few years ago a 13 percent target for the rate of inflation in Italy would have sounded far from "desirable," and the fact that the number of unemployed workers within the EEC was forecast to reach three million was perceived as coming dangerously close to a critical threshold.

Thus the hypothesis of invariance of the desired values set for those variables seems unacceptable to me. In the functions presented by Hodgman and Resek this problem is compounded by the fact that some explanatory variables enter into these equations as levels rather than as ratios or rates of change. In fact, whether or not the desired value for, say, the *rate* of unemployment can be legitimately viewed as constant over time, there is no doubt but that the desired *level* of unemployment cannot be realistically kept constant. Similarly, the relevant fiscal variable should be the ratio of the deficit to GNP or, possibly, to the private sector's saving rather than its level as such; by the same token, the level of official foreign reserves may reasonably be scaled by, say, the value of imports and so on.

## 2. The reaction functions presented in the paper

I will touch upon the choice of instruments and targets, leaving aside the issues of a strictly econometric nature.

First, let us look at the choice of policy tools. If the reaction function is to unveil the intentions of policymakers, the variable on the left-hand side should fall under the direct and exclusive control of the central bank. In some of the equations estimated in this paper the dependent variable is indeed an instrument (as in the case of the United Kingdom); in other cases, though, the "instruments" chosen are jointly determined by the central bank and by market forces. When the dependent variable is removed from the central bank's control, and an operating target is chosen as a proxy for an instrument (with, for example, the monetary base replacing open market operations or a money market interest rate replacing the rate of

discount) it becomes hard to assess whether we are observing the outcome of a reaction on the part of the authorities or the causes of that reaction.

As an extreme example, I would take the reaction function for credit ceilings in France. The results obtained for that equation cannot be properly considered as a means of detecting the way in which such an administrative tool is manoeuvred over time. The negative coefficient found for unemployment, for example, can suggest either that the limits for the growth in bank credit are set so as to stabilize real economic activity or that the expost degree of credit rationing is inversely related to demand pressures. In the light of the puzzling results obtained when the ratio of M2 to GDP is included on the right-hand side of the equation, I would suggest that the latter hypothesis is more likely than the former one.

Next, take the two functions proposed for Italy. Here the Eurodollar rate seems to exert a significant negative impact on the monetary base while it plays no role in the equation estimated for the auction rate for Treasury bills. Now, both the monetary base and the Treasury bill rate are escaping from the exclusive influence of the Bank of Italy. If the coefficient in the monetary base equation were to be viewed as a reaction of the central bank to a change in foreign interest rates in order to avoid undesirable capital flows, the existence of such a policy should be found in the interest rate equation as well. The lack of reaction on the part of the latter may simply show that demand and supply conditions on the market for short-term public debt made it impossible to affect the auction rate in the desired way. At the other extreme, one may argue, as Hodgman and Resek do, that the existence of administrative controls on capital flows sheltered domestic interest rates from the behavior of foreign rates; however, if this is the case, the inverse relationship observed between the monetary base and the Eurodollar rate loses much of its informational content.

Turning to the explanatory variables, I note that intermediate targets never appear on the right-hand side of the equations, except in the unsuccessful attempt made with the M2-to-GDP ratio in the case of France.

Here two issues are really involved: one relates to intermediate targets as such; the other refers to "targetry." On the first issue, the decision to rule out intermediate targets can be justified by assuming that these variables do not belong to the authorities' preference function and that their behavior is only important when the information concerning the performance of final objectives is lacking; if this is the case, then intermediate targets are redundant once the values of ultimate goals are known with a reasonably short lag. One may have doubts (as I personally do) about the validity of this assumption, but in any case, such doubts would lead to an improvement in the specification and not to a fundamental reconsideration of the approach.

"Targetry" poses more serious problems. Even though the four countries examined in the paper have practiced "targetry" in a fairly flexible way, the announcement of monetary and credit growth targets starting in the mid-1970s did indeed affect the role played by intermediate objectives in explaining the authorities' behavior. The importance they attached to the

credibility of their policies may have resulted in intermediate targets entering the welfare function, and, more importantly, have led to a shift to a longer time horizon for the attainment of the desired values for final goals, and to a faster reaction to deviations of intermediate targets from their desired paths.

Here, I wonder whether "targetry" does not shake the very foundation of an approach based on quarterly reaction functions.

If the choice between inflation and unemployment is made once a year and embodied in a monetary or credit target, what is the sense of exploring the criteria according to which instruments are adjusted quarterly to those variables? Should we not consider these reaction functions as the relic of the past era of fine tuning? This objection would be even more valid if central banks sought to achieve a constant rate of growth in monetary aggregates. In practice, of course, they do not follow a Friedmanite rule.

If one wants to understand the conduct of monetary policy over the past few years, the role of targetry should not be overlooked.

### 3. Cross-country comparisons

Two results that are common to the countries under review should be emphasized.

The first concerns shifts in the reaction functions. I was expecting the equations describing the behavior of central banks with respect to the performance of final goals to exhibit a considerably higher degree of instability over the mid 1960-early 1980s period than the one detected by Hodgman and Resek. The 1971 reform of monetary control techniques in the United Kingdom; the growth of the money market and the reduced importance of rediscount policy in France, starting in the early 1970s, and the introduction of monetary targeting at the beginning of the Barre Government in 1976; and the enhancement of the Bundesbank's discretionary power in granting credit facilities to the banking system that followed the suspension of Lombard loans in February 1981 are just a few examples of possible causes of shifts in the conduct of central banks' operations. And even from my own experience of the years spent in a central bank I have the impression that much more was "going on" than the few shifts identified by Hodgman and Resek. Let me suggest a few alternative explanations for this puzzling result. A first explanation could be that *these* particular reaction functions do not capture some shifts that actually occurred (I wonder in this connection whether the use of monthly rather than quarterly data might be of some help).

As a second explanation, however, I would suggest the priority attached to the attainment of a goal that I will loosely refer to as the maintenance of "orderly market conditions." This objective is difficult to define and tends not to be explicitly considered as in the paper. In practice, however, it has a very important role in the deliberations of the central bank and it may constrain the possibility of the monetary authorities to alter their con-

duct significantly in the light of the behavior of "ultimate" economic variables. Thus, many of the shifts and structural changes we have experienced throughout the years refer to the institutional, regulatory, and technical conditions under which instruments are manoeuvred; they may represent upstream factors with respect to the dependent variables appearing in Hodgman and Resek equations.

Finally, one could suggest yet another conclusion. True, in a democratic society the preferences of governments basically conform to those of the people by whom they were elected; however, while we are probably still inclined to believe that, say, election of a "conservative" government will lead to a more restrictive monetary policy than election of a "progressive" government, the results obtained by Hodgman and Resek could be interpreted as an indication that social pressures, political preferences, ideology, and economic doctrines are not all that important in defining the weights to be attached to different policy goals.

The second result concerns the role of the DM. The estimates suggest that starting in 1975 interest rate policy in Italy and in France was significantly affected by the movements of their currencies against the DM, while the importance of the Eurodollar rate diminished. The pound/DM exchange rate does not appear in the reaction function for the United Kingdom; however, this variable seems to have been less unstable than the pound/dollar exchange rate since the end of 1977, with the exception of the second half of 1980 and the first half of 1981.

These observations confirm the shift that occurred over the 1970s between the U.S. currency and the DM. As further evidence of the growing importance of the latter, one can cite the marked increase in the DM's share of total official holdings of foreign exchange : this share rose from slightly less than 3 percent in 1973 to 11 percent in 1981–1982 for the industrial countries as a whole. Some scraps of evidence regarding the use of the DM as an invoicing currency lead to the same conclusion.

The increasing importance of the German currency is far from surprising. It suggests that the links between the countries examined in the paper cannot be overlooked when analyzing the behavior of the individual monetary authorities.

## 4. Interdependence and coordination.

The countries under review are not four economically unrelated countries in the world, as Bolivia, Denmark, Mali, and Korea would be. While none of them, taken individually, can be thought of as a truly "optimal currency area," the European Community, of which they are the largest part, can be viewed as such more legitimately.

As a consequence, even if national monetary authorities succeeded in choosing a policy which is perfectly appropriate for the individual country, the definition of an optimal policy for the area as a whole is an additional task to be undertaken.

This stimulates reflection on how one could describe the policy process of the integrated area using the conceptual framework of "objectives and instruments" that underlies the reaction functions approach. Let me try to draw from my experience with the European Communities to sketch the main features of such a process. Two goals are important at the Community level: first, the maintenance of the open trade system in the area; second, the pursuit of convergence towards monetary stability. With a certain degree of simplification one could say that the two critical variables corresponding to these directives are *real* and *nominal* exchange rates. Turning to the policy tools, coordination of national financial policies and adjustments of the central parities within the EMS are the two basic instruments the Community can use. In my view, the principal merits of realignments lie in the fact that they provide the national monetary authorities with an opportunity to check the consistency between exchange rate policy and overall economic policy.

I am aware of the somewhat provocative nature of this remark; the definition of a reaction function for the Community (or, more generally for a group of strongly interdependent countries) may indeed turn out to be a rather difficult task to carry out. I believe, however, that we would all benefit from the attempt.