THE EXCHANGE-RATE QUESTION IN EUROPE

Francesco Giavazzi[1]

[1] Universita' di Bologna, CEPR and NBER. I thank Luigi Spaventa for discussions and Daniel Gros and Richard Portes for comments on an earlier draft. Many of the ideas discussed in this paper have been developed in a joint research project with Alberto Giovannini on the European Monetary System (see Giavazzi and Giovannini [1989b].)

CONTENTS

TABLES

FIGURES

ABSTRACT

This paper reviews the arguments for and against monetary unification in Europe, taking into account the recent shift in emphasis in the analysis of exchange-rate regimes. It discusses the merits of irrevocably fixed versus flexible exchange rates in the light of the literature on international strategic interactions, where inefficiences arise from countries' incentives to pursue "beggar-thy-neighbor" policies. The paper also discusses the effects of the exchange-rate regime on inflation. In the long run, inflation is determined by the "credibility" of the monetary authorities: the exchange-rate regime modifies the constraints faced by monetary authorities and thus affects the equilibrium inflation rate. The paper finally discusses monetary unification from a public finance perspective: in some European countries--particularly in those where debt-levels are high--money creation is an important source government revenue. The possibility that monetary unification may substantially cut this source of revenue, and thus destabilize the budget, is an important argument against monetary uniication.

"Europe today stands at a monetary cross-roads. [...] The only way to establish a unified financial market is to kill the sporadic and unsettling speculation over currency prices that ravages European markets and permits discounts and premia to develop on currency futures. [...] The exchange rate should be taken out of both national and international politics within Europe." [R. A. Mundell, 1973]

1. Introduction

The choice of the exchange-rate regime is a central issue in Europe today. The current system, the European Monetary System, has performed surprisingly well during the past nine years. It has forced inflation convergence starting from very large inflation differentials, and it has survived unprecedented swings in the value of the dollar.[2] To a great extent, however, the success of the EMS must be ascribed to the presence of exchange controls that severely limit the possibility of speculative attacks against central banks' reserves. The possibilty of fighting speculative attacks through the imposition of exchange controls has often enabled central banks to postpone parity realignments. This has been a key factor in forcing inflation convergence, because the discipline that the EMS imposes upon its high inflation members requires that the interval between successive realignments be sufficiently long. If high-inflation countries could realign as soon as higher-than-average inflation (combined with the rigidity of the nominal exchange rate) starts hurting competitiveness, the system would be indistinguishable from a crawling-

---

[2] On the role of the EMS in the European disinflation see Collins [1988] and Giavazzi and Giovannini [1989b, chpt. 4]. On the asymmetric response of European currencies to dollar fluctuations see Giavazzi and Giovannini [1986].

peg: all discipline gains would vanish.[3] Exchange controls have also allowed central banks to avoid calling a realignment during periods of "crisis" in the system, for example when the dollar falls.

In order to survive, the EMS has thus become addicted to a mechanism that precludes further financial integration. This is a major problem in view of the fact that item number one on the policy agenda in Europe is the full integration of financial markets. Will the EMS survive the removal of exchange controls? This is a controversial issue: theoretical analyses suggest that a system of fixed but adjustable parities cannot survive in the absence of a mechanism that limits the volume of speculative attacks.[4] The recent experiences of liberalization have had mixed outcomes. No sooner had the Italian monetary authorities removed controls on "leads and lags" (in May 1987) than they were faced with a severe speculative attack. Because of the level and maturity structure of the Italian public debt, the authorities could not accept a rise in domestic interest rates large enough to stop the capital outflow.[5] The Bank of Italy was thus forced to decide between giving in, and accepting a realignment that it viewed as unwarranted by "fundamentals", or reintroducing administrative controls. Financial liberalization was temporarily suspended. The French experience has been more successful so far, notwithstanding a few attacks on the French franc. There are two likely explanations for such success. The first is that France does not have a public debt problem, so that the French authorities

---

[3] On the disciplinary role of the EMS see Melitz [1988], Giavazzi and Pagano [1988b].

[4] See for example Wyplosz [1986], Driffill [1988], Obstfeld [1988].

[5] Giavazzi and Pagano [1988a] discuss the link between the maturity of public debt and the sustainability of fixed excange rates with perfect capital mobility.

have been more prepared than the Italian to let domestic interest rates bear the burden of adjustment. The other possible explanation is that foreign lending in domestic currency is still controlled, so that the volume of funds that can be mobilized to stage an attack is limited.

If full financial integration remains the primary political objective in Europe, and if the current system of fixed but adjustable parities cannot survive full financial liberalization, the choice is between allowing greater exchange-rate flexibility, or giving up realignments altogeher, moving toward a system of credible, and thus irrevocably fixed rates--that is a monetary union.[6]

As documented by Mundell, there exists a time-honoured tradition of debates and analyses of monetary unification in Europe. The high point of this tradition is the 1975 All Saints' Day Manifesto.[7] The rationale behind the proposal to create a European monetary union rests on the comparison of classical arguments for and against optimal currency areas. Among the advantages of a common currency, the manifesto listed the informational advantages of using a common numeraire; the efficiency of a single money as unit

---

[6] The decision to lift capital controls fits well Richard Cooper's description of an integration strategy: "Integration as a process involves establishing a situation that is not in long run equilirium: partial integration creates new problems that, in turn, call for further integrative measures." (Cooper 1976].)

[7] "All Saints' Day Manifesto for European Monetary Union" by G. Basevi, M. Fratianni, H. Giersch, P. Korteweg, D.O'Mahony, M. Parkin, T. Peeters, P. Salin and N. Thygesen, The Economist, November 1, 1975. The manifesto recommended that European central banks issue a parallel currency, Europa, against national moneys. Europa's exchange rate would be determined so that the new currency would maintain a constant purchasing power in terms of a European basket of goods. The purpose of this parallel currency was to substitute national moneys with a single money of stable value. Currency substitution would have taken place spontaneously in the market, because Europa would have offered a more stable store of value and unit of account. This tradition has recently been revived in the papers collected in De Cecco and Giovannini [1989].

of account and store of value; lower transaction costs in international trade; and the elimination of exchange-rate risk. The proposal recognized that the social cost of monetary unification would arise from the deep regional diversity that exists across Europe. It therefore suggested that the institution of a common currency be accompanied by a series of supply-side policies, fiscal reforms, and transitory income transfers, designed to eliminate the causes of regional imbalances and to alleviate the costs of sectorial shocks in the transition.

This paper reviews the arguments for and against monetary unification in Europe. One motivation for doing this now has been discussed above: irrevocably fixed exchange rates may be the necessary condition to liberalize European financial markets. Another motivation is that the emphasis in the theoretical discussion of exchange-rate regimes has shifted since the early seventies. The effects of strategic interactions among countries is a central issue in present-day analysis of exchange-rate regimes: it was rarely found in the list of items discussed in the early seventies. The way we think about inflation has also changed. In the early seventies one of the arguments against irrevocably fixed exchange rates stated that in such a regime countries might be forced to accept undesirable positions along a stable long-run tradeoff between inflation and unemployment. Today we tend to think of the long-run level of inflation as determined by the "credibility" of the monetary authorities: the choice of the exchange-rate regime modifies the constraints faced by the monetary authorities and may thus modify the equilibrium inflation rate. Another important aspect is the "public-finance" role of inflation. Since the early seventies, budget deficits and public-debt levels have become a major source of concern in many European countries. In some countries where debt levels are higher, money creation remains a significant source of government revenue. The possibility

that currency unification may substantially reduce the revenue from seignorage, and thus destabilize the budget, is an important argument against a monetary union.

The paper adds these items to the cost-benefit analysis of a monetary union. Section 2 discusses the benefits from irrevocably fixed exchange rates in the light of the literature on international strategic interactions. Section 3 discusses the effects of the exchange-rate regime on the equilibrium level of inflation. Section 4 discusses the role of inflation in public finance, and the effects of financial integration. The main conclusions of the paper are summarized in section 5.

2. Policy Interactions, Structural Asymmetries and the Optimality of Fixed Exchange Rates

The analysis of international policy interactions has added new insights to the comparison of exchange-rate regimes by studying the world-wide efficiency losses that arise from "beggar-thy-neighbor" policies.[8] Under flexible exchange rates a noncooperative equilibrium is inefficient because each country perceives that it faces a more favorable output-price level tradeoff than it actually does. Each country sets monetary policy taking its partners' monetary policy as given: therefore it believes that a change in its money stock can affect the exchange rate. If the exchange rate feeds back into domestic prices through aggregate supply channels (imported materials' prices, or wage indexation rules), each central bank believes that by engineering a real appreciation it can reduce the price level at a comparatively small cost in terms of output.

---

[8] The literature originates from Hamada [1974]. Recent developments are discussed in Bean [1985], Buiter and Marston [1985], Fischer [1987].

Following a world-wide negative supply shock, for example, each country has an incentive to overcontract money, but, if countries are identical, in equilibrium the exchange rate does not move: the outcome is a lower level of output than what could be obtained if countries had recognized the spillover effects of domestic monetary policy.

The inefficiency associated with noncooperative equilibria carries through to alternative exchange-rate regimes. Consider for example a two-country world in which one country (the N-th country) sets monetary policy for the entire region, while the other country retains the power to affect the bilateral exchange rate.[9] In such a regime the two countries perceive different output-price level tradeoffs. The N-th country faces the region-wide output-price level tradeoff, and therefore does not attempt to run a "beggar-thy-neighbor" policy: its asymmetric position at the centre of the international monetary system removes the inefficiency associated with the strategic interaction. The country that retains control of the exchange rate, on the contrary, will still have an incentive to improve its output-inflation tradeoff by affecting the exchange rate. The equilibrium keeps being characterized by a world-wide efficiency loss, but losses from lack of international cooperation are not equally shared by all countries. The country that controls the exchange rate can generate domestic price-level deflation by changing the exchange rate at the expense of the foreign country: following a supply shock it is thus better off than the N-th country.

---

[9] A regime where countries manage their exchange rates (by pegging to a numeraire currency and adjusting their peg at will) is relevant to study experiences such as the Bretton Woods system. It is also often argued (see for example Emerson [1982]) that such a regime best describes the working of the EMS. Policy interactions under managed exchange rates are studied in Giavazzi and Giovannini [1989a].

The analysis of noncooperative equilibria points to the superiority of permanently and credibly fixed exchange rates in a world of identical countries and identical world shocks. Fixed rates would reproduce the outcome of a command world economy, where the inefficiencies stemming from countries' incentives to run "beggar-thy-neighbor" policies are ruled out by construction. However, when countries' macroeconomic structures differ, or when identical countries are hit by asymmetric shocks, exchange-rate changes may be the easiest instrument to use for redistributing the effects of exogenous disturbances. Thus, the analysys of international policy interactions points to an important tradeoff which lies behind the choice of the exchange rate regime. On the one hand, the theoretical appeal of fixed exchange rates is that they eliminate the incentive to use inefficient "beggar-thy-neighbor" policies. On the other hand, in the absence of significant international factor mobility and of fiscal redistributions, adjustable parities can be efficient in the short run at evening out country-specific imbalances, but can also be used for selfish purposes, at everybody's loss.

In Giavazzi and Giovannini [1987] we illustrate the suboptimality of fixed exchange rates when realignments can be used effectively to counteract external shocks. We show for example that in the presence of cross-country asymmetries in the intermediate input-wage-price transmission mechanism, common external shocks are transmitted unevenly to different countries: under these circumstances, exchange-rate realignments--to the extent that they have some real effect--are part of the optimal (centralized) response to the common external shocks. What is the empirical importance in Europe of asymmetries in the intermediate input-wage-price transmission mechanism? Some evidence is also presented in Giavazzi and Giovannini [1987]. Using input-output tables for five European countries we estimate the aggregate and sectorial response of domestic

prices to a change in the world price of materials. These estimates are interesting in two respects. On the one hand, they permit us to assess the cost of keeping exchange rates fixed in the face of common external shocks and structural asymmetries. On the other hand, they provide a structure for the computation of the optimal (centralized) setting of intra-European exchange rates and monetary policy in the face of external shocks. The results demonstrate the empirical importance of asymmetric transmissions of price disturbances.

3. Inflation and the Exchange-Rate Regime

The analysis of international strategic interactions discussed in section 2 assumes that monetary policy can affect real variables, at least in the short run. In doing so, it overlooks the strategic interaction between central banks and the private sector that takes place within each country, and that may undermine the effectiveness of monetary policy. This issue is taken up in the present section.

The observation (originally due to Kydland and Prescott [1977] and Calvo [1978], and later developed by Barro and Gordon [1983]) that optimal plans may be time-inconsistent has brought the credibility and reputation of monetary authorities to the centre of the analysis of inflation.[10] The basic point is that in the presence of nominal wage contracts, monetary authorities face an output-inflation tradeoff that is not the equilibrium one. Since nominal wages are fixed for the time of the contract, monetary authorities have the power to affect real wages through unanticipated inflation. If the equilibrium level of

---

[10] The problem of time-consistency in an international setting is addressed, for example, in Currie and Levine [1986], McKibbin and Sachs [1986], van der Ploeg [1987] among others.

output is below the social optimum (for example because of distortions or externalities), monetary authorities will also have an incentive to affect real wages. Because their power and their incentives are public knowledge, they are rationally discounted by wage-setters in forming their forcasts of inflation, so that the equilibrium will have two properties: (a) monetary authorities do not succeed in their attempt to affect real variables (this is why the tradeoff they perceive is not the equilibrium one); (b) the expected, and actual, rate of inflation is higher than the inflation rate that would prevail if the central bank could credibly tie its hands.

Two ideas have been proposed in order to improve upon the inefficiency of time-consistent equilibria. The first is to modify the preferences of policy-makers: this is Rogoff's [1985a] idea to appoint "conservative" central bankers, i.e. officials whose relative dislike for inflation exceeds that of society. An alternative is to modify the constraints, rather than the preferences, of policymakers. In an open economy, the exchange-rate regime modifies the constraints faced by the monetary authorities, and may thus modify the equilibrium inflation rate. [11] Consider two identical countries characterized by a domestic inflation inefficiency arising from the time-consistency problem discussed above. Under flexible exchange rates the two central banks have an incentive to try to engineer a real exchange-rate appreciation to disinflate. Each has an incentive to tighten monetary policy to appreciate its currency, thus reducing domestic inflation. This is the deflationary bias of flexible exchange rates discussed in section 2. As noted by Rogoff [1985b], the presence of an externality at the international level also affects the outcome of the

---

[11] Another possibility is to sustain more efficient equilibria through reputational mechanisms. See for example Backus and Driffill [1985].

game that takes place between wage-setters and the central bank within each country: the deflationary bias that arises from the incentive to run a "beggar-thy-neighbor" policy internationally, partly offsetts the domestic inflation inefficiency. What we have is a typical second-best situation in which fixed exchange rates, by eliminating the externality associated with the flexible exchange-rate equilibrium, may produce an inferior outcome.

Are there any conditions under which fixed exchange rates could still help alleviate a domestic inflationary bias? Consider a fixed exchange-rate regime that works asymmetrically: one central bank sets monetary policy for the entire region; the other gives up monetary autonomy, and passively pegs the exchange rate. The result is that both countries will end up with the inflation rate that would prevail in the centre country if it were a closed economy. If the centre country is less inflation-prone than its partner, the latter can gain by credibly pegging. There are thus three conditions that must be satisfied for fixed exchange rates to be able to correct a domestic inflation inefficiency. First, the fixed exchange-rate regime must work asymmetrically: monetary policy for the entire region must be independently set by the less inflation-prone country; the other countries must passively accomodate, thus effectively losing all monetary sovereignty. Second, the "credibility-gap" between the centre country and its partners must be large, relative to the incentive that central banks have to affect the exchange rate. Third, the committment to peg the exchange rate must be credible: this in contrast to the authorities' inability to precommit to a monetary rule under flexible exchange rates.[12]

---

[12] The credibility of exchange rate targets is discussed in Giavazzi and Giovannini [1989b, chpt. 4].

4. Inflation, Public Finance and Fixed Exchange Rates

If inflation were only a source of inefficiency, a regime of irrevocably fixed exchange rates would be effective at reducing the degree of inefficiency, provided that it worked asymmetrically. The approach taken in section 3, however, completely overlooks the public finance role of inflation. The ability of governments to generate revenue through money creation is an important item in the design of optimal monetary policy. Countries resolve to the inflation tax not only in extreme situations when this becomes their last resort, but also in more normal times, as an alternative to increasing the distortions induced by the tax system; or as a way around the rigidities of the fiscal-decision process; or simply as a way around the difficulties of collecting taxes. Differences in fiscal structures may therefore justify differences in the "optimal" revenue from money creation. An important argument against irrevocably fixed exchange rates is thus the difficulty of agreeing on the optimal inflation rate for all countries involved.[1]

The basic facts are summarized in table 1. The data show that in those European countries where tax revenues are lower, the Treasury tends to finance a larger share of the budget through loans by the central bank. I have emphasized the fiscal asymmetry across Europe by drawing a line between the south and the north. Money financing amounts to 4-5 percent of GDP in Portugal, 2-3 percent in Greece, 2 percent in Italy; in Spain there has been a sharp turn-around in recent years, when money financing has fallen from 1.5 percent of GDP to zero. In the north of Europe money financing accounts for a negligible share of GDP--less than one half of one percent.

---

[1] Dornbusch [1988a,b] points to the public finance role of inflation as an important factor in choosing an exchange-rate regime for Europe. Aizenman [1987] derives explicitly the dependence of "optimal" inflation on tax-collection costs.

The evidence presented in Table 1 suggests that in the south of Europe it should be possible to reduce money financing by raising tax revenues to the EEC average. In some southern European countries, however, low tax revenues reflect the structure of the economy, and it is not clear that they could be raised very fast. Low tax revenues often reflect a narrow tax-base, rather than lower-than-average tax rates. In discussing the Greek economy, for example, the OECD writes: "There is [in Greece] a relatively heavy tax burden on incomes and transactions that are easily taxable (wages and salaries, purchases of cars and some consumer durables, real estate and inheritance transactions). Tax evasion and avoidance are partly responsible, but the most important factor is the structure of the economy characterized by a large share of agriculture in GDP (18%), and of self-employment in the non-agricultural labour force (33%)." [OECD, Economic Survey of Greece, 1987]. The case of Portugal is similar: "Low tax yield is attributable to the narrowness of the tax-base, which is not unrelated to the high marginal tax-rates." [OECD, Economic Survey of Portugal, 1986]. In Greece and Portugal raising taxes to reduce money financing may not be possible without adding distortions to the tax system.

The fiscal asymmetry documented in table 1 raises two questions: (i) do optimal taxation arguments justify differences in the degree of money financing across Europe? (ii) what are the implications of money financing for the conduct of monetary policy and thus for the ability of the central bank to peg the nominal exchange rate? The two questions are closely linked.

Consider a central bank that decides to join a monetary system where exchange rates are fixed and interest rates are set independently by a centre country. A primary source of concern for such a central bank is the extent to which the Treasury may turn to it in order to finance the budget. If capital mobility is high, an increase in domestic credit will induce an outflow of

foreign exchange reserves and may force the central bank to give up the exchange rate target. These concerns of central bankers reflect the more general point (illustrated for example in Helpman and Razin [1987], and Cumby and van Wijnbergen [1987]) that an asymmetric fixed exchange rate regime not only implies a loss of monetary sovereignty, but imposes also a constraint on fiscal policy: the menu of taxes and money financing must be consistent with the exchange rate target.

4.1 Inflation and Public Finance

In a world in which governments could finance public expenditure through non-distortionary taxes, the optimal inflation rate would simply be the negative of the real interest rate. At that level of inflation the nominal interest rate is zero, and the cost of carrying over real money balances equals the social opportunity cost of supplying money--namely zero. Unfortunately, governemnts must resort to distortionary taxes in order to finance public expenditure. It has long been recognized that because taxes are distortionary, it may be optimal to tax money balances to the point where the marginal welfare cost of raising revenue through the inflation tax equals the marginal welfare cost of raising revenue through other forms of taxation. This was first pointed out by Phelps [1972]. The result, however, is by no means uncontroversial. One way to think about it is to look at the tax rate on money as a determinant of the relative price of cash and credit goods: if tax rates are set optimally, it is unclear that the tax rate on money should be positive--that is, that money-using goods should be taxed more heavily than credit- or (barter-) using goods. [14] However, if the main existing taxes are on some factor input, especially labor,

---

[14] See Lucas [1984], and also Drazen [1979], Kimbrough [1986].

then it may be desirable to tax all inputs, including monetary services.[16]

Another important argument (suggested for instance by Barro [1988]) is that a positive tax rate on money allows the government to tax some black-market activities where final output escapes taxation. The argument can be illustrated considering the optimal mix of money and tax financing for a government whose goal is to minimize the expected present value of social losses. Consider the government's intertemporal budget constraint:

$$\dot{b} = (r-n)b + (g - \tau) - \frac{\dot{C}}{py} \qquad (1)$$

where b is the public debt, as a share of national income; r is the real rate of interest; n is the growth rate of income; g is the ratio of government expenditure to income; τ the average tax rate. C/(py) represents credit to the government by the central bank, also as a share of GDP. Suppose that velocity is constant, so that demand for money (currency and bank deposits) can be described by the quantity equation:

$$\frac{M}{py} = k \qquad (2)$$

where k is a constant. Banking regulations and the structure of the financial system determine the relation between M and high-powered money, H. We simply describe it as:

$$H = g(\rho)M, \qquad g'>0 \qquad (3)$$

---

[16] Feldstein's [1976] distiction between "tax design" (tax laws being written de-novo on a clean sheet of paper), and "tax reform" (taking as starting point the existing tax system and the fact that actual changes are slow and piecemeal) is relevant on this point.

where ρ is the reserve requirement ratio: for any given level of M an increae in required reserves raises H. Substituting from (3) for M in (2), differentiating and neglecting central bank intervention in the foreign exchange market (so that $\dot{C} = \dot{H}$), we obtain:

$$\frac{\dot{C}}{py} = g(\rho)\ k\ (\pi+n) \tag{4}$$

(where π is the rate of inflation) and therefore:

$$\dot{b} = (r-n)b + (g - \tau) - g(\rho)\ k\ (\pi + n) \tag{1'}$$

From equation (1') we see that different combinations of π, τ and ρ can be used to finance any given level of government expenditure and to service the existing stock of debt, so as to keep the debt-to-income ratio constant.

What is the optimal combination π, τ and ρ? Assume that the deadweight losses incurred by taxation and the social costs of inflation are linear in output.[17] The government's objective is:

$$\min_{\pi,\ \tau} \int_0^{\infty} e^{-rt}\ [f(\tau_t) + h(\pi_t)]\ y \tag{5}$$

where the functions $f(\cdot)$ and $h(\cdot)$ (with f', h', f'', h'' all positive) describe

---

[17] As Fama [1980] and others have argued, reserve requirements have something in common with a tax on interest on bank deposits: the deadweight loss they give rise to should thus also be included in equation (5). Romer [1988] shows however that such a proposition is not necessarily true. In what follows I overlook the possible distortions associated with reserve requirements.

the social losses per unit of output associated with the two forms of raising revenue. The government minimizes (5) subject to (1') and to a transversality condition that rules out indefinite accumulation of public debt. The ratio of the two static first-order conditions of the optimal taxation programme is:[18]

$$\frac{h'[(\pi)]}{f'[(\tau)]} = \frac{g(\rho)ky}{y} = g(\rho)k \qquad (6)$$

The ratio of the marginal social cost of inflation to the marginal deadweight loss of taxation is equal to the ratio of the two tax bases: y for taxation and $g(\rho)ky = (H/p)y$ for inflation. For given tax bases, equation (6) implies--as well known--that the two tax rates are positively related. For instance if permanent expenditure rises, both tax rates have to increase.[19]

Equation (6) has important implications for the design of an optimal tax programme. Consider first the case of tax evasion. In the presence of an underground economy *where* transactions are settled in cash and escape taxation, the two real income terms that appear on the numerator and on the denominator of the right-hand-side of equation (6) measure quite different phenomena, and their ratio is proportional to the relative size of the underground economy. For a given velocity of high-powered money, the marginal cost of inflation relative to taxation should be higher in countries where the phenomenon of tax evasion is more widespread. The intuition runs as follows. The larger is the tax base,

---

[18] The intertemporal first-order conditions of this problem describe the "tax-smoothing" property of optimal fiscal policy, as discussed in Barro [1979]. Mankiw [1987] shows that allowing velocity to respond to the rate of inflation does not modify the basic point of equation (6).

[19] This of course depends on the assumption of increasing marginal costs. Pagano [1988] discusses the solution of the optimal tax problem allowing inflation and tax rates to affect the level of output.

the larger is the revenue raised with a given tax rate: since distortions only depend on tax rates, a larger tax base optimally justifies a larger distortion. Whether this also implies that the ratio of π to τ should be higher in countries where tax evasion is a relatively more important phenomenon, depends on the form of the f and h functions: it would be true if for example $[h(\pi)+f(\tau)]$ were homogeneous.

Consider next the effect of an increase in the social cost of inflation. From equation (6), when the ratio of the two marginal costs rises, so should the ratio of the two tax bases. An optimal response to an upward shift in h' is thus an increase in the base of the inflation tax. This can be accomplished by raising reserve requirements.[20] An increase in reserve requirements is indeed often observed at the outset of a disinflation. Figures 1 and 2 document the increase in reserve requirements in Italy, Greece, and Spain in the early 1980s.[21] When Italy joined the EMS marginal reserve requirements were raised in a few years from 15 and 3/4 to 25 percent;[22] in Spain average reserve requirements were below 10 percent up to 1982, and jumped to 25 percent in 1983; in Greece average reserve requirements were also raised from 12 to almost 30 percent in the early 1980s. In each country the timing of the increase in reserve requirements corresponds to a policy shift aimed at stabilizing the

---

[20] I assume that an increase in reserve requirements raises the monetary base. If the demand for deposits is very sensisite to the interest rate on deposits, an increase in reserve requirements could lower the monetary base (see for instance Calvo and Fernandez [1983].) For a recent review of the literature on seigniorage and reserve requirements see Spaventa [1989].

[21] The figures plot total reserves (including free reserves) at end of period, as percent of bank deposits, as available from the I.M.F. International Financial Statistics. More recent data on reserve requirements are reported in Table 2.

[22] For an analysis of the Italian experience see Bruni et al. [1988].

price level. As discussed in section 3, a disinflation is often associated with a change in the preferences of the monetary authorities--be it the appointment of a "conservative" central banker or the decision to peg the exchange rate to a low-inflation country. Both cases can be described as an increase in the relative cost of inflation in the authorities' objective function.

4.2 Monetary Financing and the Conduct of Monetary Policy

The view that central banks in southern Europe may have used (perhaps even "optimally") reserve requirements to widen the inflation tax base in the presence of a falling inflation tax rate is attractive. Table 2 shows that the increase in reserve requirements that occurred in each of the four countries (Italy, Greece, Spain and Portugal) in the early 1980s was not, at least fully, offset by a fall in bank deposits, and thus produced an increase in the ratio of base money to GDP.

This view however runs into two difficulties. The first is that bank reserves in these countries pay some interest--5.5 percent for example in Italy. The implicit tax rate thus falls along with the fall in inflation and in nominal interest rates. Table 3 shows the implicit tax rate and the corresponding tax revenues in the case of Italy. In the late 1970s and early 1980s, when the difference between the lending rate and the interest rate paid on bank reserves was above 10 percent, the yearly tax revenue was above 1 percent of GDP; in 1986-87, when the interest rate wedge became much smaller, the revenue fell to less than one half of one percent of GDP.[23]

The second difficulty is that central banks provide quite different motivations for their decision to raise reserve requirements. According to the

---

[23] In Spain too reserves pay an interest, that is a fraction of the market rate. Gros [1988] also points to the role of the interest paid on bank reserves.

Bank of Italy, for instance, "an increase in the reserve coefficient was necessary in order to reduce the value of the bank multiplier and dampen the impact of disturbances originating from central bank lending to the Treasury."[24] These motivations suggest that it is important to draw a distinction between Treasury access to the central bank and money creation: the important question is not whether the central bank is obliged to lend to the Treasury, but whether, given that obligation, it is still in a position to conduct a monetary policy, and whether the ability to use reserve requirements provides an additional instrument.[25]

Changes in reserve requirements affect the multiplier, and can thus be used to control the money supply. From equation (3):

$$dM = -H(g'/g)d\rho + (1/g)\ dH \qquad (7)$$

(1/g) is the multiplier: an increase in ρ reduces the multiplier. Equation (7) shows the two effects of a change in reserve requirements. An increase in ρ--as in Spain and Italy from the late seventies to the mid-eighties--allows the central bank to sterilize its lending to the Treasury (this is the first term in equation (7).) At higher values of the reserves coefficient, the variance of the money supply is lower for any given variance of credit creation by the Treasury (this is the second term in the equation.) Reserve requirements can

---

[24] Banca d'Italia, La Mobilizzazione della Riserva Obbligatoria: Motivazioni e Indicazioni, Rome, October 1988.

[25] Distinguishing between the Treasury and the central bank may however be misleading in situations where the Treasury is able to shift expenditure to the central bank. In Turkey, for instance, a substantial part of the interest payments on the government's foreign debt is handled directly by the central bank without being recorded in the government's budget. See Van Wijenbergen et al. [1988].

thus shelter the central bank from the effects of its obligation to lend to the Treasury. However, since ρ is bounded, reserve requirements cannot be used indefinitely. Over time, as ρ stabilizes, the only effect is to reduce the variance of the money supply.

The possibility to use bank reserves to sterilize central bank lending to the Treasury can be seen even more clearly rewriting equation (7) in the following form:

$$dM/M - dp/p = (C/H)dC/C - [(R/H)(dp/p - \bar{r}) + (Cu/H)dp/p + \eta\, d\rho/\rho] \qquad (7')$$

where I have assumed that a fixed rate of interest $\bar{r}$ is paid on bank reserves. C denotes, as above, central bank lending to the Treasury, and R and Cu the two components of the monetary base, bank reserves and currency respectively; dp/p is the inflation rate, and η the elasticity of the multiplier with respect to a change in the reserve coefficient. The first two terms that appear in the square brackets are the seigniorage on currency and bank reserves, respectively; the last term measures the effect of a change in reserve requirements.

Consider first a steady state with constant reserve requirements and with $\bar{r}=0$. From equation (7') $(C/H)dC/C = dM/M = dp/p$: Treasury borrowing from the central bank determines the rate of money growth (overlooking the effects of central bank intervention in the foreign exchange market), itself equal to the rate of inflation. Consider now a change in monetary regime, for example a disinflation driven by a reduction in the growth rate of money.[26] If the

---

[26] Alternatively equation (7') could be used to study the shift toward a fixed exchange rate regime run by a "low inflation" country. With fixed exchange rates and high capital mobility money demand is exogenous, and the excess of central bank lending to the Treasury over the growth rate of money demand results in a loss of foreign exchange reserves.

Treasury does not adjust the amount it borrows from the central bank, the latter has only two options. It can sterilize through an open market operation, or it can adjust the term in square brackets on the right-hand-side of equation (7'): this can be done changing reserve requirements.

There are two reasons why the central bank may decide not to run an open market operation. First, if the financial system is not well developed, there may be no market: this was the case in Italy in the mid-seventies when reserve requirements were first increased. Second, the central bank may want to avoid accompanying the shift in monetary regime with a build-up of public debt.

There is, however, a limit to the ability to use reserve requirements as a substitute for open market operations: eventually the increase in ρ will have to stop; moreover, if reserves pay a fixed interest--as for instance in Italy--when inflation falls, so does the seigniorage attached to bank reserves.[27] For some time, however, the use of reserve requirements allows the central bank to run a monetary policy consistent with the new monetary regime even <u>before</u> the menu of taxes and money financing has been set consistently with the new regime, and without putting additional pressure on public debt. If the central bank can set reserve requirements, a reduction in the degree of money financing is no longer a <u>precondition</u> for the shift in monetary regime.

This has clearly been the experience of Italy since the start of the EMS. In the mid-eighties--1983 to 1985--when the reserve ratio was growing at one percent per year, and the interest rate paid on bank reserves was 6 percentage points below the inflation rate, the Bank of Italy was able to sterilize through

---

[27] If reserves pay no interest the tax on bank deposits will eventually reduce the role of banks as financial intermediaries and thus also the revenue attached to bank reserves. The experience of the southern European countries shows that this may be a long process provided you do not allow foreign banks to operate in the domestic market subject to home reserve requirements.

bank reserves two thirds of its total lending to the Treasury, equal on average to 2 percent of GDP per year. Another third was sterilized through the increase in demand for currency (the middle term in equation (7'.)

4.3 Inflation, fixed exchange rates and financial liberalization

The bottom line of the previous two sections is that in countries where money financing is a relatively important source of revenue, a shift to a less expansionary monetary regime implies a choice between higher taxes now and higher taxes in the future, and if it is "now", between different types of taxes. If the tax base is relatively small, and (at least in the short run) tax revenues can only be increased by raising marginal tax rates, it may be optimal not to shift at once the entire burden of the fiscal correction on explicit taxes. An increase in reserve requirements can avoid building up a debt problem in the transition.

The analysis of the role of bank reserves has important implications for the plans to create a unified market for financial services in Europe. If reserve requirements work like a tax on the interest paid on bank deposits, banks subject to relatively higher reserve requirements would tend to go out of business: it would be difficult to keep different reserve requirements in an integrated financial market.

In countries such as Greece and Portugal, where inflation is still relatively high, it may be unwise to erase reserve requirements as a policy instrument and, at the same time, suggest a shift in monetary regime. On the contrary, in countries such as Italy, where the shift in monetary regime has already occurred, and where the possibility to use bank reserves as a buffer in the transition appears to have been exhausted, the setting of reserve requirements at the European average would, at this point, have only minor effects, subtracting no more than one half of one percent of GDP to the budget.

In the case of Italy, however, a long transition--ten years since the start of the EMS--seems not to have been sufficient for the adjustment in fiscal policy required by the new monetary regime. As the safety nets provided by exchange controls and reserve requirements have become less effective, debt started to accumulate. This brings us back to the question about the optimality of common inflation rates throughout Europe discussed at the beginning of this section.

5. Summary and Conclusions

The paper has analyzed some of the merits and of the difficulties of a transition toward fixed exchange rates in Europe. The motivation for such an analysis was the observation that the real "shock of 1992" will come from the integration of financial markets: financial integration is inconsistent with the current system of fixed but adjustable parities. The main points of the paper can be summarized as follows:

(1) the analysis of international policy interactions points to an important tradeoff which lies behind the choice of the exchange rate regime. On the one hand, the theoretical appeal of fixed exchange rates is that they eliminate the incentive to use "beggar-thy-neighbor" policies. On the other hand, in the absence of significant international labor mobility and of fiscal redistributions, adjustable parities can be efficient in the short run at evening out country-specific imbalances, but can also be used for selfish purposes, at everybody's loss;

(2) for fixed exchange rates to be able to correct the inflationary bias of the more inflation-prone countries in Europe, the exchange-rate regime must work

asymmetrically. Monetary policy for the entire region must be independently set by the least inflation-prone member of the group; the other countries must passively accommodate, thus effectively loosening monetary sovereignty. This point has important implications for the organization of a European central bank;

(3) the analysis of the public finance role of inflation, and the evidence on fiscal asymmetries, point to the risks of a change in monetary regime in countries characterized by a relatively small tax base and a relatively large ratio of money financing to tax revenues.

Table 1

The Fiscal Asymmetry

	Monetary Financing of the Budget (percent of GDP)		Tax Revenue (percent of GDP)	
	1976-87	1984-87	1976-86	1984-86
Portugal	5.3	4.5	29.6	32.0
Greece	3.0	2.1	30.9	35.6
Italy(a)	2.1	2.2	31.2	35.3
Italy(b)	1.8	1.8	n.a.	n.a.
Spain	1.5	-0.5	25.4	29.5
Ireland	0.5	0.7	35.8	39.5
France	0.4	0.2	41.8	44.4
Belgium	0.1	0.4	44.5	46.1
Germany	0.0	-0.0	37.6	37.6
Netherlands	0.06	0.0	45.1	45.2
Denmark	0.6	-3.4	45.4	49.0
United Kingdom	-0.4	-0.3	36.4	38.5

Source: Monetary financing is the change in central bank's claim on the government (line 12a of IFS). Money financing for Italy is computed as a share of GDP according to: (a) the old national income accounts, and (b) the new national income accounts. Tax revenues are from the OECD, Revenue Statistics of OECD Member Countries; they refer to total tax revenues, including taxes on personal and corporation income, employers' and employees' social security contributions, property taxes, consumption taxes and excises.

Table 2

Base Money, Currency and Bank Reserves
(percent of GDP)

	Monetary Base		Currency		Bank Reserves	
	1981	1987	1981	1987	1981	1987
Portugal	25.0	27.8	12.5	9.2	12.5	18.6
Greece	22.6	25.5	12.9	10.1	9.7	15.4
Italy	15.1	15.2	6.3	5.5	8.8	9.7
Spain	13.6	22.6	7.8	7.7	5.8	14.9
Ireland	9.9	8.7	6.5	5.6	3.4	3.1
France	6.0	5.6	5.1	4.3	0.9	1.3
Belgium	10.6	8.1	10.1	7.7	0.5	0.4
Germany	9.8	10.4	5.5	6.2	4.3	4.2
Netherlands	6.6	8.1	6.3	7.6	0.3	0.5
Denmark	3.7	3.5	3.5	3.0	0.3	0.5
United Kingdom	5.1	4.2	4.2	3.4	0.9	0.8

Source: IMF, IFS.

Reserve Requirements of Commercial Banks
(percent of demand deposits in banks, mid-1988)

Italy	25.0
Spain	18.0
Portugal	15.0
Ireland	1.0
Greece	7.5
Germany	6.6-12.1
France	5.0
United Kingdom	0.5
Belgium	0.0
Netherlands	0.0
Denmark	0.0

Source: J.P. Morgan, World Financial Markets, 1988, no.5.
In Spain, Italy and Greece required reserves are remunerated to some degree. In Italy 25% percent is the marginal rate. The average rate is 20 percent.

Table 3

Italy: The Tax on Bank Reserves

	Reserves (% of bank deposits)	Interest Rate Wedge	Implicit Tax Rate	Tax Revenue (% of GDP)
1976-81	14.9	13.5	1.75	1.35
1982-85	17.6	14.7	2.19	1.15
1986-87	20.1	9.1	1.55	0.40

Sources: Pagano [1988]. The interest rate wedge is the difference between the lending rate and the interest rate paid on reserves. The implicit tax rate is the product of the wedge times the reserve ratio.

References

Aizenman, J. [1987], "Inflation, Tariffs and Tax Enforcement Costs", Journal of International Economic Integration, 2, 2, pp. 12-28

Backus, D. and J. Driffill [1985], "Inflation and Reputation", American Economic Riview, vol. 75, pp. 530-38.

Barro, R. J. and D. Gordon, [1983], "Rules, Discretion, and Reputation in a Model of Monetary Policy", Journal of Monetary Economics 12, July, pp. 101-121.

Bean, C. [1985] "Macroeconomic Policy Coordination: Theory and Evidence", Recherches Economiques de Louvain, vol 51, pp. 101-21.

Bruni, F., A. Penati and A. Porta [1988], "Financial Regulation, Implicit Taxes and Fiscal Adustment in Italy", mimeo, Milan: Bocconi University.

Buiter, W.H. and R.C. Marston [1985], International Economic Policy Integration, Cambridge (UK): Cambridge University Press.

Calvo, G. A. [1978], "On the Time Consistency of Optimal Policy in a Monetary Economy", Econometrica, 46, 6, pp.1411-28.

Calvo, G. A. and R. Fernandez [1983], "Competitive Banks and the Inflation Tax", Economic Letters, 12, pp. 313-317.

Canzoneri, M. B. and D. W. Henderson [1987], "Is Sovereign Policymaking Bad?", Carnegie-Rochester Conference Series.

Collins, S. [1988], "Inflation and the EMS", in F. Giavazzi, S. Micossi and M. Miller (eds.), The European Monetary System. Cambridge (UK): Cambridge University Press.

Cooper R. [1982], "Worldwide versus Regional Integration", in F. Machlup (ed.) Economic Integration. London: MacMillan.

Cumby, R. and S. van Wijenbergen [1987], "Fiscal Deficits, the Crawling Peg and Speculative Attacks on the Central bank: an Empirical Analysis of Argentina", NBER Working Paper no. 2376.

Currie, D., and P. Levine [1986], "Credibility and Time Consistency in a Stochastic World", CEPR Discussion Paper no. 94.

De Cecco, M. and A. Giovannini [1989], (eds.) "A European Central Bank?". Cambridge (UK): Cambridge University Press.

Dornbusch, R. [1988a], "The EMS, the Dollar and the Yen", in F. Giavazzi, S. Micossi and M. Miller (eds.), The European Monetary System. Cambridge (UK): Cambridge University Press.

Dornbusch, R. [1988b], "Money and Finance in European Integration", mimeo.

Drazen, A. [1979], "The Optimal Inflation Tax Revisited", Journal of Monetary Economics, 5, pp. 231-48.

Driffill J. [1988], "The Sustainability and Stability of the EMS with Perfect Capital Mobility", in F. Giavazzi, S. Micossi and M. Miller (eds.), The European Monetary System. Cambridge (UK): Cambridge University Press.

Emerson, M. [1982], "The Experience of the EMS and Prospects for further Progress towards EMU", in M.T. Sumner and G. Zis (eds.), European Monetary Union. London: St. Martin's Press.

Fama, E. [1980], "Banking in the Theory of Finance", Journal of Monetary Economics, 6, pp. 39-57.

Feldstein, M. S. [1976], "On the Theory of Tax Reform", Journal of Public Economics, 6, pp. 67-104.

Fisher, S. [1987], "International Macroeconomic Policy Coordination", NBER W.P. no. 2244.

Giavazzi, F. and A. Giovannini [1986], "The Dollar and the EMS", in Economic Policy, n.2.

---------- [1987], "Exchange Rates and Prices in Europe", Weltwirtschaftliches Archiv, December, pp.

---------- [1989a], "Monetary Policy Interactions Under Managed Exchange Rates", Economica, forthcoming.

----------[1989b], Limiting Exchange Rate Flexibility: The European Monetary System, Cambridge (Mass.): MIT Press.

----------[1988], "Is the EMS Exportable?", mimeo.

Giavazzi F. and M. Pagano [1988a], "Confidence Crises and Public Debt Management", mimeo.

Giavazzi F. and M. Pagano [1988b], "The Advantage of Tying One's Hands: EMS Discipline and Central Bank Credibility", European Economic Review, 32, 5, pp. 1055-1082.

Gros, D. [1988], "Seignorage in the EC: The Implications for the EMS and Financial Market Integration", mimeo.

Hamada, K. G. [1974], "Alternative Exchange Rate Systems and the Interdependence of Monetary Policies", in R. Z. Aliber (ed.) National Monetary Policies and International Financial Systems Chicago: Chicago University Press.

Helpman, E. and A. Razin [1987], "Exchange Rate Management", American Economic Review, March, pp. 107-123.

Kimbrough, K. P. [1986], "Inflation, Employment, and Welfare in the Presence of Transaction Costs", Journal of Money, Credit and Banking, vol. 18, no. 2, pp. 127-40.

Kydland, F. E. and E. C. Prescott [1977], " Rules rather than Discretion: The Inconsistency of Optimal Plans", Journal of Political Economy, vol. 85, no. 3.

Mankiw, G. N. [1987], "The Optimal Collection of Seignorage", Journal of Monetary Economics, 20, pp. 327-41.

Mankiw, G. N. and J. Rotemberg [1988], "Inflation and Taxation with Optimizing Governments", NBER working paper no. 2567.

McKibbin W. and J. Sachs [1986], "Comparing the Global Performance of Alternative Exchange Arrangements", NBER Working Paper no. 2024.

Melitz J. [1988], "Germany, Discipline and Cooperation in the EMS", in F. Giavazzi, S. Micossi and M. Miller (eds.), The European Monetary System. Cambridge (UK): Cambridge University Press.

Mundell, R.A. [1973], "A Plan for a European Currency", in H.G. Johnson and A. Swoboda (eds.) The Economics of Common Currencies, London: George Allen and Unwin.

Obstfeld, M. [1988], "Competitiveness, realignment and speculation: the Role of Financial Markets", in F. Giavazzi, S. Micossi and M. Miller (eds.), The European Monetary System. Cambridge (UK): Cambridge University Press.

Pagano. M. [1988], "Monetary Policy, Capital Controls and Seignorage in an Open Economy: Discussion of A. Drazen", De Cecco, M. and A. Giovannini (op. cit.)

Phelps E. S. [1973], "Inflation in the Theory of Public Finance", Swedish Journal of Economics, 75, pp. 67-82.

Ploeg F. van der [1987], "International Policy Coordination in Interdependent Monetary Economies", Journal of International Economics.

Rogoff, K. [1985a], "The Optimal Degree of Commitment to an Intermediate Monetary Target," Quarterly Journal of Economics, 100, 4, pp. 1169-90.

_____ [1985b], "Can International Monetary Cooperation be Counterproductive?" Journal of International Economics, vol. 18, pp. 199-217.

Romer, D. [1985], "Financial Intermediation, Reserve Requirements and Inside Money: A General Equilibrium Analysis", Journal of Monetary Economics, 16, pp. 175-194.

Spaventa, L. [1989], "Seignorage: Old and New Policy Issues", European Economic Review, forthcoming.

van Wijenbergen, S. et al. [1988], "Inflation, External Debt and Financial Reform", mimeo, The World Bank.

Wyplosz, C. [1986], "Capital Controls and Balance of Payments Crises", Journal of International Money and Finance, June.

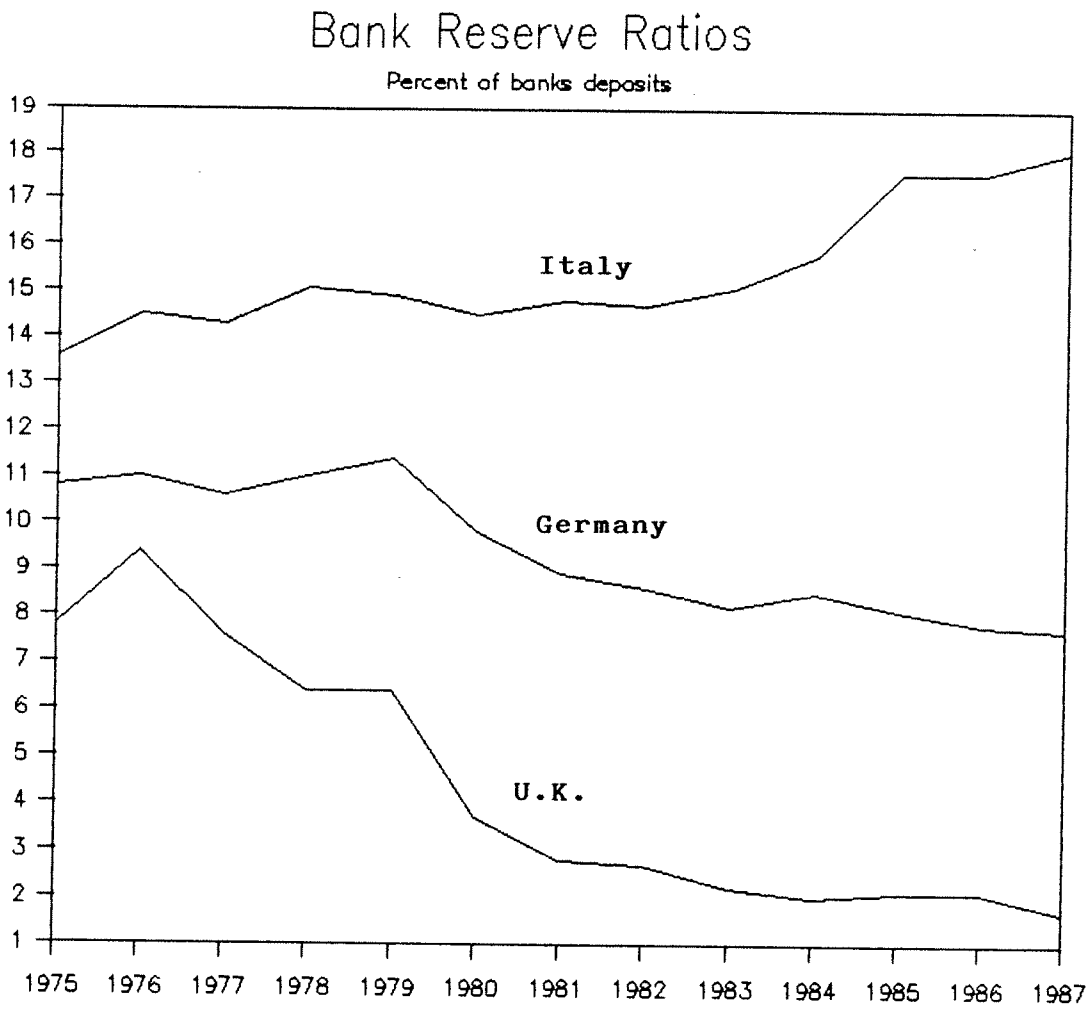
Bank Reserve Ratios
Percent of banks deposits
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Italy
Germany
U.K.
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987

FIGURE 1

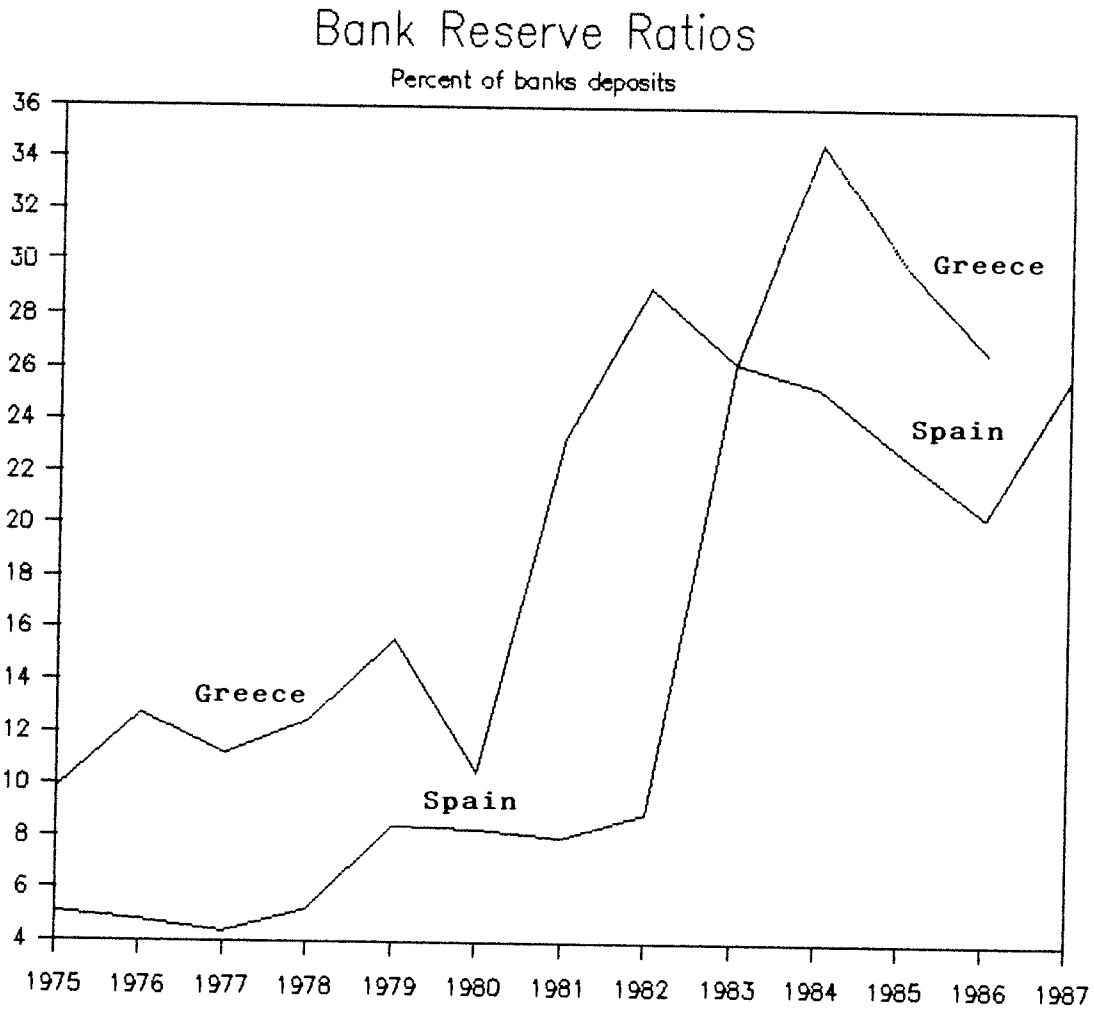
Bank Reserve Ratios
Percent of banks deposits
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
Greece
Spain
Greece
Spain

FIGURE 2