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IAI8620

THE POLITICAL ECONOMY OF CURRENCY AGREEMENTS: THE CASE OF THE EMS

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Introduction and overview

The EMS may be described as a "currency pyramid" (Basevi et al 1983, Micossi and Padoa-Schioppa 1984, Kaufmann 1985). The top of the pyramid is the dollar-mark exchange rate. The base may be divided into two parts: (Basevi et al. 1983) one includes the currencies of the "loyalist" countries which include the smaller European economies and former snake members, while the other includes the currencies of the "disloyal" countries, France and Italy.

The currency pyramid implies a hierarchical mechanism in the operation of monetary policies. The German monetary and exchange rate policies determine the dollar policy of the EMS and provide the trasmission mechanism linking US monetary policy to the European currency agreements. German monetary (and fiscal) policy has been tendentially restrictive and has inspired a deflationary bias on the European economies. The other European countries react to this mechanism in different ways, but it may be argued that they have all accepted the hierarchy so far. In this respect Germany acts as the residual country within the EMS arrangements, i.e. German monetary policy determines the behaviour of the DM-dollar rate (given the evolution of US policy) while all other countries adjust their exchange rate policies to that of the DM in order to respect the EMS currency agreements. (DeCecco and Miller 1984).

In an Appendix to this paper a three country model is introduced in order to analyze the constraints which the formation of a currency area on the part of two countries imposes on them given the behaviour of a third economy which maintains exchange rate flexibility. It is shown that different constraints may emerge according to different scenarios and hierarchical structures, and that the "currency pyramid" is only one among potential scenarios.

The model shows that if absence of cooperation between the two member countries of the currency area is hypothesised, the stronger country will impose its policy options on the other members of the area. In the absence of cooperation the dependent country is totally constrained both in its rate of growth and in financial accumulation. However, different results are achieved if a cooperative scenario is assumed. In this second case the model shows that the two member countries can determine a common value for their rate of growth, and assign the exchange rate to the target of current account adjustment; or pursue a common exchange rate policy (vis a vis the third country) and adjust the common rate of growth to ensure current account equilibrium. Thus the model clarifies that the "pyramid", which has been the mode of operation of the EMS in so far, is not the only possible framework which is consistent with exchange market equilibrium.

Thus the question arises of why is it that the EMS came to be structured as a pyramid and is accepted as such (and for how long)? In the following pages results from an emerging field in international relations, international political economy, are applied to explain why a hierarchical structure is adopted. i.e. why the EMS is operating as a currency pyramid even if other arrangements are possible.

This question may be discussed purely in terms of economic analysis, and it is a well known result that cooperative arrangements are pareto-superior to non cooperative ones (1). However economic analysis usually compares the two polar situations but fails to answer the question of why the cooperative solution is seldom the one effectively adopted. In what follows we will draw on contributions in international political economy to show how answers to this question may be offered.

We will consider three main approaches that are present in international political economy literature. After a brief description of their basic features we will apply them to the EMS. The three approaches are: public choice analysis of currency areas, regime theory, domestic basis of foreign economic policy.

Political economy approaches to currency agreements

Public choice This approach to monetary integration (Hamada 1977, 1979) is based on the assumption that monetary stability is a public good and so is a currency agreement. The problem then arises of the supply of such a public good . A well known result of the theory of collective action (Olson 1965, Olson and Zeckhauser 1966) is that the production efficiency of public goods by a group is inversely correlated with the number of the members of the group as the propensity to take a free ride will increase.

The public good will be supplied, although in lower than optimal amounts, if one of the group members is substantially larger than the others. The larger member will bear a more than proportionate cost in the supply of the public good while the smaller members will enjoy (at least partially) a free ride.

It is necessary to explain why the larger member accepts such a situation i.e. under what conditions the benefits he derives from forming the alliance (monetary agreement) will exceed his private costs. Two explanations may be offered. A first explanation is that the larger member may wish to increase its protection from an outside threat. In the case of monetary relations the threat may be an unstable international environment and/or "undisciplined" monetary behaviour on the part of some particularly large economy (Strange 1979). In so doing the larger member of the alliance increases its bargaining power vis-a-vis the rest of the world. According to the second explanation, the leading member of the group may have an interest in controlling the loyalty of smaller members as these might be tempted to adopt a policy of competitive devaluations. The smaller economies, in turn, will accept the loss of monetary autonomy which the agreement entails in exchange for the benefits derived from a "strong currency option" (Thygesen 1979, Moon 1982), i.e. the public good of monetary stability. The costs which the large member of the agreement will have to bear are represented by interventions which will have to be undertaken in order to stabilize exchange markets (Vaubel 1980, Neumann 1984).

The application of this framework to the EMS is straightforward. Germany has an interest in producing the public good of monetary stability in Europe to respond to US monetary policy. The dominant role of the DM in the international system makes Germany the second largest financial power

(Henrieder 1982) the political result of which is German partecipation in formal and informal agreements such as the G-5. This explains why European monetary policy is often identified with German monetary policy (McKinnon 198). Germany has an interest in stabilizing European monetary relations also for internal reasons. The European economies represent by far the most important export market for German industries and a stable exchange rate is an important element for the maintainance of market shares (De Cecco 1982). Trade dominance and monetary dominance form the basis for strong currency options (Moon 1982).

Smaller European (loyalist) economies accept the loss of monetary autonomy in exchange for strong currency (monetary discipline) benefits and leave to the core economy the determination of their policy vis-a-vis the dollar. In a monetary environment dominated by targeting practices this implies that quantity targeting is pursued only by Germany while the remaining countries pursue exchange rate targets (De Cecco and Miller 1984). This allows Germany to pursue an exchange rate policy vis-a-vis the dollar.

Hamada (1979) has shown that within a currency area a conflict may arise between the provision of the public good of monetary stability and the pursuit of trade surpluses by individual countries. If the preference for trade surpluses is high this will produce a deflationary bias on the currency area which will be greater the lower the propensity of the leader to expand. Monetary stability may then be in contrast with growth (Kindleberger 1981). The trade-off between the provision of these two public goods may produce attrition especially between Germany (whose propensity to expand has always been quite low Kreile 1978, Henrieder 1982) and the disloyal members of the EMS (France and Italy) which, in the long run, might shift their preferences from monetary stability to growth and stop providing their support to the provision of the public good of monetary stability.

International regimes A regime may be defined as a set of "principles, norms, rules and decision making procedures around which the expectations of international actors converge in given issue areas" (Krasner 1983 p.1). When a regime is established members (states) accept voluntarily to forego independent decision making (Stein 1983). A monetary agreement such as the EMS may be easily defined as a regime. Indeed the currency pyramid is a set of rules and norms, both formal and informal, around which the expectations of member states converge. It is also true that, in adhering to the EMS, member states have foregone their independent decision making in monetary policy (although to different degrees).

The stability of a regime depends closely on its credibility. How effective will the enforcement of norms and rules be? A well knowm answer to the problem of regime stability is associated with the so called "hegemonic stability theory". This asserts that an international regime (be it in money, trade, energy etc.) will persist as long as there will be one state -the "hegemon"- powerful enough to enforce the regime either by imposing the rules and/or by pursuing a policy that will benefit the other less powerful nations. The major implication of this theory is that the regime will eventually collapse if the power distribution shifts against the hegemon.

Over the last few years the debate on the theory of hegemonic stability has been impressive and we will not review it here (2). We will only discuss whether the pyramid may be defined an hegemonic system and Germany an hegemonic power.

A conceptual problem has to be solved first. How can we measure the power of a country? Several suggestions have been advanced.

Keohane (1984) defines four conditions which, in his view, the hegemonic economy must meet in order to fulfill its role in the international economy. The hegemon must exert control over: 1) raw materials, 2) capital, 3) markets, and 4) must hold a competitive advantage in the production of highly valued goods. Strange (1982) suggests a definition of financial power directly associated with the role of a country's currency as an international vehicle of exchange, as well as with the capacity of that country to act as a financial centre in the international system. According to this approach the power of a country derives from the necessity that others have to obtain credit from it. This view may be, partially, associated with the one expressed by Fratianni and De Grauwe (1984) who (implicitly) suggest that a measure of the international financial power of a country is associated (inversely) with the cost of supplying lender-of-last-resort support to commercial as well as central banks of other countries. Lake (1984) provides an interpretation of the transformations of the international system based on long run productivity changes. His definition emphasizes real aspects of economic power while Strange's approach centres on financial aspects. Keohane's approach is more comprehensive but it does not provide a full definition of the links between the elements of what could be called a "power vector".

A related point has been raised by Padoa-Schioppa and Papadia (1984). They discuss a classification of national currencies which are ranked according to their relative quality. The quality of a currency, in turn, is directly related to its purchasing power stability (i.e. inversely correlated to the rate of inflation). The determination of the relative quality of a currency is discussed in an oligopolistic setting in which central banks are considered as the oligopolistic firms which produce the quality and quantity of the currency. Each central bank is faced with a trade-off between short term and long term strategies. Quality is achieved only if a long term strategy is pursued.

The approach followed by Padoa-Schioppa and Papadia rests on Hayek's (1976) model of currency competition. In an international setting, deterioration of the quality of a currency (inflation) leads to devaluation. Inflation, in turn, depends only on monetary policy. Market forces will punish central banks who choose short term strategies which let inflation depreciate their currencies. Low quality currencies will be substituted with high quality ones.

The argument of Padoa-Schioppa and Papadia contains useful suggestions for the understanding of international monetary conflicts. However, we believe that the currency competition approach <u>à la</u> Hayek should be rejected. As we have argued elsewhere (Padoan 1986), the international position of a currency (and hence of the issuing country) ultimately depends on the country's creditworthiness. The quality of a currency depends both on its capacity to minimize transaction costs as Hayek holds, and, more importantly, on its capacity to denominate international credit. The quality of a currency as a credit denominator depends on the ability of the issuing country to make profits, i.e. to run a current account surplus (Minsky 1979).

This "creditworthiness" approach to international currencies presents one major advantage with respect to the Hayek approach. It allows us to consider simultaneously real and financial elements as determinants of the quality of a currency. In this respect this approach could reconcile Lake's (1984) suggestion to base the international position of a country on its productivity performance with financial considerations included in Minsky's approach.

To sum up, the financial power of a country may be taken to be an increasing function of three variables: 1) the extent to which the national currency is used in the international system (quantity); 2) the quality of the currency; 3) the country's ability to adjust to changes in the external environment.

The meaning and role of quantity is straightforward. It is useful to note that the extent of the use of a currency in the international system is directly associated with the international spread of its banking industry.

Quality was discussed above. If we follow the creditworthiness approach, quality, in turn, is a multi-dimensional variable. Insofar as it is dependent on the ability of an economy to make a profit in the international system, financial power also depends on real variables (productivity).

The ability of a country to adjust determines the time dimension of power. The higher the adjustment flexibility the less the country's power is dependent on short term or contingent elements. This may also be stated differently. The power of a country will be directly correlated, in the long run, to its ability to give up short term goals for long term ones.

The ability and willingness of a country to make adjustments, in turn, depends on its ability to impose on other countries the costs of such an adjustment if this is needed.

The international position of Germany satisfies the three variables to which power is related. The DM is by far the second most important currency in the world both as a private vehicle of exchange and as an official reserve asset. The German banking system has been rapidly expanding in the recent past (Deutsche Bundesbank 1986). The international position of the DM rests on the international penetration of German industries both in trade and in international investment. In this respect the association between trade and financial elements in determining the internationl role of a currency as predicted by international monetary theory (Krugman 1984), is confirmed.

The international creditworthiness of the DM is certainly high, and it is highly valued by German monetary authorities (Deutsche Bundesbank 1986), whose fundamental stance is characterized by the pursuit of tight monetray and fiscal policies even in the presence of substantial trade surpluses and zero inflation. The operation of the pyramid, which witnessed a sequence of nominal revaluations of the DM since its inception (Thygesen 1984) has undoubtedly increased this component of German financial power.

Indeed the pyramid has offered German authorities a way to resist succesfully to external instability and, in this way has increased Germany's ability to adjust i.e. the third variable on which power may be said to depend.

This brief discussion may well convince the reader that Germany is the most powerful member of the EMS. It is not sufficient however to demonstrate that Germany's power is so large as to make her a full "hegemon" thus allowing Germany to turn the EMS into a full hegemonic regime such as Bretton Woods or nineteenth century Gold Standard. Two arguments may be offered in this respect.

In the first place, although German monetary policy steers the whole operation of the EMS pyramid, the DM is not the currency on which the system is based. Indeed the US dollar still holds the leading position as the reserve asset of EMS central banks. The most obvious candidate to the role of European currency remains the Ecu, in spite of German opposition to its enlarged role. In this respect Germany is not in the position to enjoy the privilege of seignorage, as it was the case for the dollar and the pound in hegemonic regimes of the past.

In the second place Germany's export-led growth (Kreile 1978) and dependence on foreign trade with the smaller European economies is quite large (De Cecco 1983). Consequently the prosperity of German industry cannot be separated from the prosperity of European industry.

German power is too small to allow an hegemonic role, it is however large enough to prevent the pursuit of policies within the EMS which Germany may find undesirable (3). In this respect the pyramid represent a coercive mechanism which serves well the purpose of increasing German power in the international financial system.

Interests groups This approach maintains that the foreign economic policy of a country may be explained by looking at the different interest groups which influence the action of the government in foreign policy making (Katzenstein 1978, Black 1984). In short the foreign economic policy of a country is taken to reflect the interests of the ruling coalition within the country. The interest group approach does not explain why an international system or regime operates the way it does, rather it tries to explain the differences in national policies.

The success of the ruling coalition in influencing the foreign economic policy of a country may be said to depend on two elements. In the first place leading interest groups will be more effective in shaping state policy in "weak" -as opposed to "strong"- states (to use Katzenstein's distinction) i.e. situations in which national governments are highly sensitive to domestic pressures, and state bureaucracies and political elites do not enjoy enough independence to pursue their own goals. In the second place the ruling coalition will be more effective in pursuing its goals in situations in which the number of interest groups is low and/or where an "encompassing" interest group exists which will be able to establish -much like an "hegemon"- the interests of the society at large (Olson 1982).

For our purpose it is sufficient to distinguish three, very broad interests groups: business, finance, and workers (unions), and determine their attitudes (interests) towards national partecipation to a currency agreement. These may be summarized as follows (Katzentsein 1978). Business will be interested in defending industrial competitiveness abroad (hence will favour real devaluation) and market shares at home (this will eventually produce protectionist pressures). The financial community will be interested in the expansion of the banking system and in support of international creditworthiness. Consequently it will favour tight monetary policies (Dean 1984), high interest rates (Badhuri and Steindl 198), and strong currency policies. Banking communities of larger -and stronger- countries will also be in favour of financial liberalization insofar as this will increase penetration in other countries and markets. Labour will favour both high real wages and high employment; exchange rate policy preference will depend on its effect on economic growth (e.g. unions will favour a weak currency policy as long as this supports export-led growth).

Quite evidently, it is very difficult that the same policy will satisfy all groups simultaneously. The policy which will be actually followed depends on the relative power position established within a country. Epstein and Schor (1985) have produced a framework for the determination of monetary policy in open economies which is based on the interest group approach. They maintain that the main goal of central bank policy is to sustain business profitability as far as this is not in contrast with banking interests. The central bank's ability to achieve such a goal will depend on:

1) the position of national capital and finance in the international economy. The international role of a currency will inhibit the use of expansionary/devaluation polices, because these threaten to decrease the international creditworthiness of the national banking system.

2) the degree of institutional independence of the central bank from the government, as this will allow to resist expansionary pressures which may arise from election cycle policies pursued by the incumbent government (Frey Schneider 1981, Woolley 1983). Independence increases with political support from the banking community (Woolley 1985).

3) the extent of agreement between business and finance. In case of disagreement (e.g. over the appropriate level of interest rates and/or the appropriate level of exchange rates) it is reasonable to assume that the Central Bank will favour financial interests. This however will lower the degreee of effectiveness of monetary policy. Disagreement is likely to increase under a flexible or managed exchange rate regime; for this reason too some central banks may favour partecipation in currency agreements.

4) the relative position of labour and capital. A strong labour movement will increase the constraints to monetary policy, making tight policies more difficult to pursue and less effective in the absence of a firmly established incomes policy (Black 1984, Epstein and Schor 1985).

The application of these considerations to German policy in the EMS is illuminating. German tight monetary policy has strenghtened the international position of the DM and has sustained German financial interests. At the same time the pyramid mechanism has increased the competitiveness of German industry by producing, especially in the second part of its experience, a real devaluation of the DM vis-a vis its European partners (4). This development has favoured business interests and has benefitted, at least partially, from labour support in so far as German export-led growth has been favoured. Finally, the Bundesbank has become by far the most independent central bank in the EMS (and perhaps in the world): the power of German monetary authorities increased both domestically and internationally (Kloten et al. 1985) thus strenghtening their core position in the EMS.

The interest groups approach thus explains German monetary policy as well as the interest of the Bundesbank in keeping the operation of the EMS within the framework of the pyramid. It is however less illuminating as far as the symmetrical issue is concerned: why are the other EMS members willing to maintain the pyramid alive? To try to answer to this question it is necessary to consider the different political economy explanations in a unified framework and to add something else as well.

An integrated approach

The basic tenet of the public choice approach is that the public good of monetary stability (which a currency agreement provides) requires the existence of a proportionately larger country which will bear a proportionately larger share of the costs of supplying the public good.

However, pure dimension may be an empty if not misleading concept. International regime theory suggests (Krasner 1983, Keohane 1984) that the public good of an international regime will be supplied if there exists a relatively more powerful country which will act as an "hegemon". If we assimilate dimension and power, it is easily seen that the two approaches

converge in the conclusion that the stability of a regime, i.e. the production of public goods requires persistence of an asymmetric power distribution. Shifts in the distribution of power will alter the capability of larger countries to supply public goods, and regimes will eventually collapse.

There remains the need to define a clear -and measurable- concept of power. Alternative, although not exhaustive solutions have been discussed above. We now propose that the power of a country is related to the power of its leading interest groups.

This proposition seems warranted as in the long run the economic policy of any government cannot sistematically diverge from the interests of its constituency, i.e. of the leading interst groups in the country. (Stein 1983) A given regime (public good) promotes the interests of some groups, and damages those of others. (Krasner 1932) . The monetary pyramid supports the interests of business and finance in the core economy and hence increases the power of both. The financial power of a country depends both on the effectiveness of its monetary and financial policy and on the power of its banking community. Similar arguments can be made for industrial power. The role of interest groups and of their interaction is emphasized in the approach which studies the domestic determinants of foreign economic policies (Katzenstein 1978). However the relation between interests groups and regimes (public goods) is not necessarely always consistent. The role of interest groups in shaping foreign economic policy increases when international regimes are weak (Katzenstein 1978). These observations do not provide a synthesis of different political economy appraches to international monetary relations. Such a task is beyond the scope of this essay. However, they offer some useful insights to explain the operation of the currency pyramid.

The EMS is an example of the sub-optimal supply of certain public goods. Indeed the most relevant public good which is supplied by the operation of the EMS is monetary stability. The costs of production of this public good may be perceived as excessive by the "disloyal" countries if other public goods such as growth (Kindleberger 1981) are undersupplied. In this respect the EMS is not a full "monetary system", such as the Bretton Woods or nineteenth century gold standard. This is not suprising, if we accept that Germany is not powerful enough to act as an hegemon, while, according to the theory of hegemonic stability (Keohane 1984) the enforcement of a regime implies the consumption of power by the hegemon. In some sense it may be argued that Germany "exploits" other countries insofar as the EMS pyramid increases the power of its leading interest groups. Cumulation of power in one country (or with the interest group of one country), however, may result in the loss of power somewhere else. In this case the benefits of supplying the public good of monetary regime would be negative for some member of the pyramid. This would, sooner or later lead to a collapse of the currency arrangements.

The alternative approaches discussed above offer some explanations for the stability of the pyramid. They indicate that various incentives exist for participation to EMS arrangements. These incentives may arise from the defense against an external threat (dollar instability), from the demand for monetary discipline (strong currency option), of from the pressures of domestic interests. It is still not clear, however, whether the distribution of net benefits among EMS members may be stable and positive over the long run.

All approaches considered above are based, directly or indirectly on the concept of power. The conclusion to which they lead is that a currency agreement will persist as long as the international distribution of power on which it was initially established will not be substantially altered.

If this were the case for the EMS the following implication could be drawn: the EMS will reinforce itself as long as the distribution of power will shift in favour of Germany (and hence in favour of German interest groups). In other words the EMS will strenghten to the extent that it will develop into a full hegemonic system.

We have tried to show that Germany does not hold an hegemonic position, and we may add that it is unlikely that its power will grow to such an extent. Thus the EMS would appear to be unstable. It may be argued, however, that the EMS may follow an evolution which is opposite to that suggested by the theory of hegemonic stability.

The EMS, even in its present pyramid structure, may be considered an institution which has increased the propensity to cooperate of the member countries. This appears at each of the two levels at which monetary cooperation or concertation is carried out within the EMS: intervention and financial support (Micossi 1985) and realignements. At both levels the degree of cooperation has increased. This is particularly evident in the case of realignements. While the first realignements were at times notified by telex by the central bank which decided unilaterally the change in parity (Thygesen 1984) they have developed into official and lenghty meetings in which the definition of new parity grids implies the coordination of macroeconomic polices of all member countries. Increasing cooperation in between realignements has made the currency ageements quite flexible. It is interesting to note that this process has developed, in part, also thanks to the implementation of different rules from those initially agreed upon (e.g. intramarginal interventions, role of the divergence indicator, etc.).

Some political economy contributions may help to clarify the latter point. Hamada (1977) has introduced the distinction between the definition of rules of the game (i.e. the establishment of a new regime or agreement) and the playing of the rules. The way a regime effectively operates need not necessarily reflect the rules initially established. Indeed this is a common occurrence in international relations. Hamada also suggest that, while the cost of partecipating into a currency agreement (loss of monetary autonomy) will be perceived immediatly, benefits will be perceived only in the longer run. This second point may be better understood if one accepts the view that economic relations are subject to fundamental uncertainty (in Keynes' sense) (5) and that (Runge 1984) institutions and regimes improve the efficiency of the distribution of information. In this respect the public good nature of currency agreements may be considered as a way to minimize the effects of uncertainty (a public good). In this respect a currency agreement is a regime in Krasner's (1983) sense as it may be envisaged as a set of norms and rules around which expectations converge.

The increased propensity to cooperate, (which has required that new norms and rules be established and that initial rules be at least partially disattended) has increased the effectiveness of the EMS in generating information about reciprocal behaviour and hence benefits arising from its membership have been perceived as increasing. In this resepct the EMS seems to support Axelrod's (1984) idea that cooperation may emerge (or increase) among egotists. It also supports Hirschman's (1970) and Schmitter's suggestion that if a "voice option" is contemplated in addition to exit and loyalty (or suffrance) institutions are strenghtened and -we may add- their efficiency in providing public goods is improved. Indeed, relations among EMS members have quite often been characterized by (loud) voice, while the 1982 and 1983 realignements suggest that, even in situations of dramatic conflict, the exit option was only threatened (by France) but not adopted.

Power based interpretations of the EMS may explain stage one of Hamada's (1977) two stage decision structure in monetary arrangements: the one related to the definition of initial rules of the game. Stage two, the playing of rules, requires the consideration of dynamic behaviour patterns which produce, and are influenced by, the evolution of institutions (Runge 1984).

The partial success of the EMS may be understood as the result of the interaction of a non hegemonial power distribution and of a rapidly evolving cooperative mechanism. Consequently the pyramid might well prove to be quite a stable arrangement. Perhaps the most important threat to its stability will come from the persistance of the deflationary bias which its current operation imposes. In such a case the success of the EMS as a mechanism of monetary discipline may be undermined by its failure as a mechanism of effective demand generation (Guerrieri and Padoan 1986)

Notes

(1) For exceptions see Rogoff 1985; see also Classenn's paper in this book.

(2) For a review of the debate see e.g. Keohane 1984 and Guerrieri and Padoan 1987.

(3) The failure of Mitterrand's early expansionary experiment may be considered a good example. See Sachs and Wyploz 1986.

(4) See the Report of The Economic Commission of the European Communities for the year 1984-85 as well as Tsoukalis' paper in this book.

(5) Uncertainty which cannot be reduced to a certainty equivalent.

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APPENDIX

A model

The model wich is presented in this Appendix is not intended to provide a description of the actual operation of the EMS. It provides the equilibrium conditions which must be met in order for equilibrium in exchange markets to hold under different institutional arrangements. More precisely it intends to set out the constraints which the establishment of a currency agreement imposes on the growth rates and on the real and financial accumulation mechanisms of the member economies.

These conditions are first set out in a two country model and then in a three country model which is presented in order to consider the pyramid hypothesis. The purpose for which this model is built (6) makes a detailed specification of some financial mechanisms unnecessary: they may be assumed to exist but do not need to be investigated. International financial flows are supposed to be allocated according to the relative rate of return, which is left exogenous.

No specific exchange rate theory is assumed. Exchange rate movements are determined by changes in the excess demands for currencies in the exchange markets, and hence by bilateral balance of payments behaviour. This is all that is needed to determine the conditions which must be met for exchange markets to be in equilibrium.

1.1 A two country model The two country model is presented to keep the description of the three country model to its bare essentials. Equations for country 1 are the following:

(1) $p_1 = p_1(z) \qquad p_1' > 0$

(2) $l_1\dot{p}_1y_1+l_1p_1\dot{y}_1 = l_1(\dot{p}_1y_1+p_1\dot{y}_1) = g_1p_1y_1$

(3) $f_1(p_1y_1+p_1\dot{y}_1)-\beta_1(\dot{p}_1y_1+p\dot{y}_1)+zMC_2 = (f_1-\beta_1)(\dot{p}_1y_1+p\dot{y}_1)+zMC_2 = MC_1$

Eq. (1) states that the level of domestic prices, p, is a direct function of the level of the exchange rate z. The other determinants of inflation are exogenous.

Eq. (2) determines the dynamic equilibrium condition between demand and supply of money. The demand for money is a fraction l of nominal income (where y is the level of real income). The supply of money is also a fraction, g, of nominal income which depends on the government deficit.

Eq. (3) determines the excess demand for bonds in country 1 (MC_1). This is the difference beteween the demand for bonds by residents of country 1 -which is a function f of nominal income- and the supply of bonds which is function β of the same expression and which is the result of the accumulation decisions in country 1. MC_2 is the eccess demand for bonds which spills over from country 2.

The assumption below equation (3) , and the whole model for that, is that long run accumulation decisions depend on "structural parameters" f_i and β_i which incorporate long run rates of return and preferences.

Equations (4)-(6) for country 2 do not need further discussion.

$$(4) \quad p_2 = p_2(z) \qquad p_2' < 0$$

$$(5) \quad l_2(\dot{p}_2 y_2 + p_2 \dot{y}_2) = g_2 p_2 y_2$$

$$(6) \quad (f_2 \beta_2)(\dot{p}_2 y_2 + p_2 \dot{y}_2) + (1/z) MC_1 = MC_2$$

Very simple equations for exports and imports of goods and services for country 1 may be the following. Nominal income as a determinant of (the demand for) imports and exports stems from the fact that these, in turn depend on consumption and investment demand which are a function of nominal income

As exports for one country are imports for the other eqs. (7) and (8) complete the description of trade in our two country world.

$$(7) \quad IMP_1 = IMP_1\left(p_1 y_1, \frac{p_2 z}{p_1}\right)$$

$$(8) \quad E_1 = E_1\left(p_2 y_2, \frac{p_2 z}{p_1}\right)$$

The model is closed by the balance of payments identity (9) which imposes external equilibrium on both countries.

$$(9)\quad p_1E_1 - zp_2IMP_1 = MC_1 - zMC_2 = -z(f_2-\beta_2)(\dot{p}_2y_2+p_2\dot{y}_2) = (f_1-\beta_1)(\dot{p}_1y_1+p_1\dot{y}_1)$$

Equation (9) is transformed into eq. (10) by substituting eqs. (1)-(8) into it. This yelds

$$[10]\quad p_1(z)E_1\left[p_2(z)y_2,\ \frac{p_2(z)z}{p_1(z)}\right] - zp_2(z)IMP\left[p_1(z)y_1,\ \frac{p_2(z)z}{p_1(z)}\right] +$$

$$+z(f_2-\beta_2)\left(\frac{\dot{p}_2}{p_2}+\frac{\dot{y}_2}{y_2}\right)p_2(z)y_2 = 0$$

From eq. (10) and considering the derivatives with respect to time the model allows for determination of the rates of growth of nominal income in the two countries (g/l) (7) as well as the determination of the rate of change of the exchange rate which is given by eq. (11). The interpretation of eq. (11) and its implications for currency agreements will be discussed in more detail in the next paragraph. It can be clearly seen, however, that the exchange rate will devalue (increase) in the country which exhibits the highest rate of growth of nominal income ceteris paribus. However this will also be a function of the other variables in the model.

$$[11]\quad \frac{\dot{z}}{z} = \frac{\left(\pi\frac{IMP_1}{E_1}\varepsilon_{IMP,p_1y_1}\right)\frac{g_1}{l_1} - \left(\varepsilon_{E,p_2y_2}+\frac{\Delta AFNE_2}{p_1E_1}\varepsilon_{\Delta AFNE_2,p_2y_2}\right)\frac{g_2}{l_2}}{\left(1-\eta_{p_1,z}\right)\left(\eta_{E,\pi}+\eta_{IMP,\pi}\,\pi\frac{IMP_1}{E_1}-1\right)+\pi\frac{IMP_1}{E_1}\eta_{p_2,z}\left(\eta_{E,\pi}\frac{E_1}{IMP_1}\frac{1}{\pi}+\eta_{IMP,\pi}-1\right)}$$

where

$$\pi = p_2z/p_1 \qquad \dot{z} = dz/dt$$

$$\varepsilon_{i,j} = \frac{d_i}{d_j}\frac{j}{i} \qquad (i=IMP_1, E_1, \Delta AFNE_2)\ e\ (j=p_1y_1, p_2y_2)$$

$$\Delta AFNE_2 = z(f_2-\beta_2)Be^{(g_2/l_2)t}\left(\frac{g_2}{l_2}\right)$$

$$\eta_{p_i,z} = \frac{dp_i}{dz}\frac{z}{p_i} \qquad (i=1,2)$$

$$\eta_{i,\pi} = \frac{\partial_i}{\partial\pi}\frac{\pi}{i} \qquad (i=E, IMP)$$

A three country model We will now extend the model to e three country world which includes the United States, Germany, and Italy. Each country will be represented by the same set of equations and we will have three bilateral exchange rates: the lira-dollar exchange rate ($\underline{z}$), the mark-dollar exchange rate ($\underline{x}$), and the lira-mark exchange rate ($\underline{v}$). Subscripts $\underline{I}$, $\underline{D}$, and $\underline{\$}$, indicate directions of flows.

In this model the exchange rate is determined by the excess demand for currency and hence from the overall balance of payments.

The lira-dollar market is

$$[12] \quad p_I E_{I,\$} - z p_\$ IMP_{I,\$} - MC_{I,\$} + z MC_{\$,I} = 0$$

The mark-dollar market is

$$[13] \quad p_D E_{D,\$} - x p_\$ IMP_{D,\$} + MC_{D,\$} - x M_{\$,D} = 0$$

The lira-mark exchange rate is determined by the arbitrage condition. Taking derivatives with respect to time we get

$$[14] \quad \frac{\dot{v}}{v} = \frac{\dot{z}}{z} - \frac{\dot{x}}{x}$$

The other behavioural equations are:

[15] $p_I = p_I(v, z)$ $\qquad p_{I,v} > 0 \;,\; p_{I,z} > 0$

[16] $p_S = p_S(z, x)$ $\qquad p_{S,z} < 0 \;,\; p_{S,x} < 0$

[17] $p_D = p_D(x, v)$ $\qquad p_{D,x} > 0 \;,\; p_{D,v} < 0$

[18] $E_{I,S} = E_{I,S}(p_S y_S, \pi)$ $\qquad \pi = \dfrac{p_S z}{p_I}$

[19] $IMP_{I,S} = IMP_{I,S}(p_I y_I, \pi)$

[20] $E_{D,S} = E_{D,S}(p_S y_S, \lambda)$ $\qquad \lambda = \dfrac{p_S z}{p_D}$

[21] $IMP_{D,S} = IMP_{D,S}(p_D x_D, \lambda)$

[22] $MC_{I,S} = \alpha_{I,S}(f_I - \beta_I)(\dot{p}_I/p_I + \dot{y}_I/y_I) + zMC_{S,I}$

[23] $zMC_{S,I} - MC_{I,S} = \alpha_{S,I}(f_S - \beta_S)(\dot{p}_S/p_S + \dot{y}_S/y_S)$

[24] $MC_{D,S} = \alpha_{D,S}(f_D - \beta_D)(\dot{p}_D/p_D + \dot{y}_D/y_D) + xMC_{S,D}$

[25] $xMC_{S,D} - MC_{D,S} = \alpha_{S,D}(f_S - \beta_S)(\dot{p}_S/p_S + \dot{y}_S/y_S)$

[26] $l_I(\dot{p}_I/p_I + \dot{y}_I/y_I)p_I y_I = g_I p_I y_I$

[27] $l_D(\dot{p}_D/p_D + \dot{y}_D/y_D)p_D y_D = g_D p_D y_D$

[28] $l_S(\dot{p}_S/p_S + \dot{y}_S/y_S)p_S y_S = g_S p_S y_S$

Eqs. (15)-(17) determine the domestic price level as a function of the exchange rates with respect to the two foreign currencies; eqs. (18)-(21) are bilateral export and import equations.

Eqs. (22)-(26) define the bilateral financial flows. Parameters α_{ij} determine the exogenous allocation of flows of funds from country i to country j. For overall consistency two equations are redundant. In this case eqs. (22) and (24) are r e d u n d a n t .

Finally eqs. (26)-(28) describe the conditions for m o n e t a r y e q u i l i b r i u m i n e a c h c o u n t r y.

By suitable manipulations it is possible to determine the rate of change of two bilateral exchange rates

$$[29] \qquad \begin{cases} \dfrac{\dot{z}}{z} = \dfrac{a}{b} - \dfrac{\dot{x}}{x}\,\dfrac{c}{b} \\ \dfrac{\dot{x}}{x} = \dfrac{d}{e} - \dfrac{\dot{z}}{z}\,\dfrac{m}{e} \end{cases}$$

where a, b, c, d, e, m, are complicated functions of the variables and the parameters appearing in the model and are omitted for brevity's sake. A full description of the model is available from the author on request.

From eq. (14) and considering eq. (29) we obtain the rate of change of the lira-mark exchange rate.

$$[30] \qquad \frac{\dot{v}}{v} = \frac{\dfrac{a}{b}\left(1+\dfrac{m}{e}\right) - \dfrac{d}{e}\left(1+\dfrac{c}{b}\right)}{1 - \dfrac{c}{b}\cdot\dfrac{m}{e}}$$

Eq. (30) provides a simple yet illuminating result. If Italy and Germany form a currency agreement the rate of change of the lira-mark exchange rate must be zero (8). Hence the numerator of the fraction on the right hand side of (30) must be zero. This requires the following condition to hold

$$[31] \qquad \frac{a}{b+c} = \frac{d}{c+m}$$

The lira will devalue with respect to the mark if $a/(b+c)>d/(e+m)$ and if $(c/b)(m/e)<1$; if $(c/b)(m/e)>1$ the lira will revalue with respect to the mark

Eq.(31) allows to examine the conditions under which a currency agreement between the two European economies is sustainable given different assumptions about the hierarchy of the three countries involved. This will be done in the following paragraph.

Alternative currency arrangements The role of the exchange rate in the model described above is to adjust accumulation mechanisms in the three countries by determining a distribution of current accounts which is consistent with the structure of flows of funds.

Flows of funds depend upon two sets of variables: a) the structural parameters alphas and betas which determine the allocations of funds in the international system and b) the rates of growth of the nominal income which depend on the policy stance in each country.

The model determines the equilibrium conditions which must be met to attain balance of payments equilibrium and hence exchange rate stability.

The notion of equilibrium exchange rate which is followed is a "definitional" one. The equilibrium exchange rate is the one associated with a zero balance of payments.

The analysis of the (different) equilibrium conditions required for exchange rate stability shows the constraints which are imposed upon each country by a currency agreement and a given hierarchy of relations among countries.

As it will be shown below the constraints imposed by currency agreements on the two European economies vary with the change in the degree of cooperation (of dependence) between the two countries involved. The possibility of different equilibrium configurations lead to the question of why a given configuration is chosen.

Let us start by focussing on eqs (12)-(14) which determine the equilibrium conditions in the currency markets in the three countries. Let us also assume that the (rate of change of) lira-mark exchange rate is the residual variable on which impulses arising from the remaining two currency markets precipitate. Before considering alternative exchange rate arrangements let us briefly discuss the pure flexible exchange rate case.

Full exchange rate flexibility and arbitrage conditions require that the bilateral balance of payments vis-a vis each country be in equilibrium. These conditions may be rewritten as follows

$$[12\text{ bis}]\quad p_I E_{I,\$} - z p_\$ IMP_{I,\$} = -z\alpha_{\$,I}(f_\$-\beta_\$)p_\$ y_\$\left(\frac{g_\$}{l_\$}\right) \equiv$$

$$\equiv \alpha_{I,\$}(f_I-\beta_I)p_I y_I\left(\frac{g_I}{l_I}\right)$$

$$[13\text{ bis}]\quad p_D E_{D,\$} - x p_\$ IMP_{D,\$} = -x\alpha_{\$,D}(f_\$-\beta_\$)p_\$ y_\$\left(\frac{g_\$}{l_\$}\right) \equiv$$

$$\equiv \alpha_{D,\$}(f_D-\beta_D)p_D y_D\left(\frac{g_D}{l_D}\right)$$

$$[14\text{ bis}]\quad p_I E_{I,D} - v p_D IMP_{I,D} = v\alpha_{D,I}(f_D-\beta_D)p_D y_D\left(\frac{g_D}{l_D}\right) \equiv$$

$$\equiv \alpha_{I,D}(f_I-\beta_I)p_I y_I\left(\frac{g_I}{l_I}\right)$$

Let us add that, in the three country case other structural parameters must be added, to show how financial flows leaving each country are allocated among the other two. It follows that the following conditions must hold

a) $\alpha_{\$,D} + \alpha_{\$,I} = 1$; b) $\alpha_{I,\$} + \alpha_{I,D} = 1$; c) $\alpha_{D,\$} + \alpha_{D,I} = 1$.

Eq. (14bis) is not independent from the other two equations. The equilibrium conditions on the left hand side of eqs. (12bis)-(14bis) are those required for equilibrium in each currency market. Right hand side identities show that financial accumulation must be consistent on a bilateral basis for each pair of countries.

Let us now introduce some assumptions about the hierarchical structure of the system. Let us start with a very simple case. The United States "dominate" German choices (both policy and market) which, in turn dominate Italian behaviour (both policy and market).

This structure allows the United States to ignore the dollar exchange rate and to choose both the rate of growth of nominal income, $g_{\$}/l_{\$}$, and the parameters $f_{\$}$, $\beta_{\$}$, $\alpha_{\$,D}$, $\alpha_{\$,I}$, which determine the long run accumulation behaviour. This implies that, considering the r.h.s. of eqs. (12Bis) and (13bis), Germany and Italy have to adjust their own accumulation parameters

Both the Lira and the DM exchage rates vis-a-vis the dollar will adjust the current accounts of the two countries to make them consistent with the capital accounts. This implies that eq. (14) will determine the change in the lira-mark exchange rate.

Let us now come to the relations between Germany and Italy. Let us also suppose that Germany determines its accumulation choices ($f_D - \beta_D$) as well as its nominal rate of growth. Eq. (13bis) determines $\alpha_{D\$}$ and hence α_{DI}.

It follows that, given eqs. (12bis) and (14bis) parameters (f_I, β_I), $\alpha_{I\$}$, and $\alpha_{I,D}$ are also determined. This means that Italian financial accumulation is determined both in its amount and in its allocation.

In the freely flexible exchange rate case then the partially dependent country (Germany) is free to determine its nominal rate of growth through economic policy and only partially control its financial accumulation. The totally dependent country, instead may determine only its nominal rate of growth while its accumulation choices are completely predetermined by the behaviour of the remaining countries.

The EMS Let us now come to the EMS. In a three country setting Germany will stand for the DM area countries , i.e. Germany and the so-called "loyalist countries" while Italy will stand for the "disloyal" countries , i.e. Italy and France. The hierarchical structure implies that Germany dominates Italian policy and economy.

EMS currency agreements require that condition (31) be satisfied. Magnitudes entering the denominators of the two expressions may be considered as fixed (elasticities) or determined by the rates of growth of nominal income and the exchange rate (nominal imports and exports).

The numerators of the expressions contain the rates of growth of nominal income as well as the capital account balances, i.e. the two sets of variables which must assume appropriate values for the equilibrium in the exchange market to hold.

In the EMS the rate of change of the lira-deutschemark rate must be zero, hence eq. (14) requires that that rate of change of the lira and the mark with respect to the dollar be the same. It follows that the two European economies cannot chose different rates of growth of nominal income. This is necessary in order to maintain current account equilibrium.

It is now necessary to introduce assumptions about the hierarchical structure which prevails in the EMS. We will consider two different states of the world which may be considered as "polar situations". Absence of cooperation and full cooperation betweeen the two EMS nations.

In the first case policy choices will depend on the power structure prevailing in the system. The stronger region (Germany) will impose its policy stance on the remaining economies (both on the other DM zone countries and on the disloyal ones). Such a power structure will allow Germany to pursue its targets vis-a-vis the United States, account being taken of the relative power distribution between the two economies.

In this scenario we assume that Germany will fix a target for the dollar-DM exchange rate.

Within the framework of this model we may assume that Germany wishes to control the exchange rate vis-a-vis the dollar in order to control imported inflation. This implies that Germany will fix the rate of growth of nominal income gD/1D in order to attain current account equilibrium. The United States will ignore exchange rate behaviour and will fix their rate of growth g$/1$ as in the flexible exchange rate case.

The amount and allocation of capital flows will be determined by the "conflict" between the two economies the result of which may be taken as exogenous for our purposes. Flows of funds between the two countries will be mutually compatible by suitable adjustments in structural parameters (e.g. parameters $\alpha_{D,\$}$ and $\alpha_{\$,D}$). We may assume that they are determined also as a function of the degree of flexibilty of financial relations of the two economies.

Let us now considers the effects on the EMS. If the United States and Germany fix their nominal rates of growth eq. (31) requires that Italy's rate of growth must assume a given value. In addition as the lira dollar exchange rate must follow the same rate of change as the mark-dollar exchange rate, and as the lira-dollar market must also be in equilibrium, Italy must adjust one of the structural parameters .

In addition, since the lira-mark exchange market must also be in equilibrium, eq. (14bis) requires equilibrium in the capital transactions between Germany and Italy. As all but one parameter appearing in the equations have been fixed elsewhere the remaining structural parameter for Italy must be fixed as well.

In conclusion the case with absence of cooperation the dependent country is totally constrained both in its rate of growth and in financial accumulation. Different results may be obtained if we assume a cooperative scenario within the EMS.

In this scenario we assume that, while the United States continue to be totally unconstrained in their policy and accumulation options the two European countries adopt a cooperative policy.

The United States determine their growth rate and accumulation parameters while they ignore the behaviour of the exchange rate. The EMS condition requires, as we know, that the rate of change of the lira-mark exchange rate be zero. The two EMS members may assign the exchange rate to the target of current account adjustment. In this case the two countries may determine a common value for their rate of growth according to a common preference pattern which is not specified here.

Alternatively the two European countries may pursue a common exchange rate policy, i.e. a common rate of change of the exchange rate vis-a-vis the dollar. In this case eq. (31) requires that the common rate of growth for the two countries be adjusted to allow current account equilibrium. In both cases a cooperative solution is possible. The flexibility of the exchange rate vis-a-vis the rest of the world allows an independent growth policy.

Eq. (31) requires that conditions of financial accumulation be also consistent with exchange market equilibrium. Since the United States are totally unconstrained both Germany and Italy must adjust their accumulation parameters. We may assume that $\alpha_{I,\$}$ and $\alpha_{D,\$}$ are adjusted (and hence $\alpha_{I,D}$ and $\alpha_{D,I}$). Eq. (14bis) requires that one of the two expressions $\beta_i - \beta_i$ be adjusted as well. If cooperation prevails these adjustments may be the result of coordination within the EMS.

We have presented only a few of the situations which may arise within our framework. The purpose of this taxonomy is to show that the way in which the EMS has been operating so far, i.e. the "pyramid", which is based on a hierarchical situation among European countries is not the only possible framework which is consistent with exchange market equilibrium.

NOTES

(6) This is a modified version of a model originally presented in Martinengo, Padoan 1983

(7) For a complete proof the reader is referred to Martinengo, Padoan 1983.

(8) This implies considering the Ems a perfectly fixed exchange rate system.