

# The exchange rate mechanism of the European monetary system: a review of the literature

*This review,<sup>(1)</sup> which follows an article on the mechanics of the exchange rate mechanism in the November Bulletin,<sup>(2)</sup> assesses the academic literature to have emerged in recent years on the operation and performance of the exchange rate mechanism (ERM) of the European monetary system. It examines the evolution of some of the more important operational aspects of the ERM and considers the system's empirical performance in reducing the volatility of exchange rate movements and in fostering convergence of inflation and of other macroeconomic aggregates.*

## Introduction

It is widely accepted that the European monetary system (EMS) has been successful in moving towards its goal of creating a zone of monetary stability in Europe: since around 1983 most exchange rate mechanism (ERM) countries have converged on lower and more stable rates of inflation than seen in the years immediately preceding and there has been no general realignment of the currencies in the system since 1987. Moreover, this increase in exchange rate stability has been achieved without a corresponding decrease in interest rate stability. The extent to which the ERM has in fact *contributed* to this greater monetary stability is, however, a question demanding rigorous analysis. It is a question which is particularly important in the current climate of debate about the future of monetary arrangements in Europe.

Within the academic literature there remains some debate regarding the precise importance of the channels through which the system operates. For example, there is as yet no standard framework for modelling the ERM analytically—although this is perhaps understandable, given the changes that have taken place to the operating characteristics of the system and the policies of its participants. Some of the more important operational aspects of the ERM and their evolution are discussed below. The difficulties of developing comprehensive analytical models of the ERM help explain why so great a reliance has been placed upon empirical appraisals of the system's performance. These studies generally confirm the view that the ERM has contributed actively to greater monetary stability in Europe. Data limitations, however, have meant that the conclusions from these studies have sometimes been guarded.

This article attempts to derive a considered consensus from the wide range of issues discussed in the academic literature to date. Two of the more important of these issues, in the

context of the stabilising role of the ERM, are the system's capacity to reduce the volatility of exchange rate movements, both real and nominal, and its capacity to foster convergence of inflation and of other key macroeconomic aggregates. The article also discusses the so-called 'New EMS' regime, evident in recent years as the process of financial integration in the EC has gained pace.

## Operational aspects of the ERM's evolution

The EMS aims to promote a *zone of monetary stability* in Europe. Although the system also provides credit facilities to help smooth temporary balance of payments problems (for example, through the Medium Term Financial Assistance facility), its centrepiece is the exchange rate mechanism. The EMS formally came into operation in March 1979, with all Community member states participating, but with the United Kingdom initially not forming part of the ERM. Following their accession to the Community, Spain, Greece and Portugal are all now EMS members, with Spain also participating in the ERM since June 1989. The United Kingdom became the ERM's newest participant in October 1990.

The operation of the ERM requires that each participating currency establish a central parity against the European currency unit (ECU), from which a bilateral parity grid of exchange rates between member countries can be derived. Fluctuation margins of  $\pm 2\frac{1}{4}\%$  ( $\pm 6\%$  in the case of Spain and the United Kingdom) are permitted around these central parities. Additionally there is a 'divergence indicator', the aim of which is to gauge the relative extent of each currency's divergence from its central ECU parity. Any movement of a currency beyond 75% of its maximum permitted divergence against the ECU (the 'divergence threshold') carries a presumption that appropriate action will be taken. Intervention to support bilateral parities is obligatory at the margins, with unlimited amounts of credit available between central banks for this purpose through the

(1) Written by A G Haldane in the Bank's Economics Division.

(2) Adams (1990): see references.

very short term financing (VSTF) facility. Since the advent of the Basle-Nyborg Accord in November 1987, VSTF has been available, on a voluntary basis, for the financing of intra-marginal intervention, providing central banks with additional lines of credit to finance pre-emptive action against incipient exchange rate pressures.<sup>(1)</sup>

Much of the original EMS blueprint was motivated by a desire to counteract some of the less favourable features implicit in the earlier Bretton Woods fixed exchange rate system. Such features fell into three broad categories: asymmetry, capital immobility and destabilising realignments.

### Operational asymmetries in the ERM

In any exchange rate system there must exist a *numeraire* or nominal anchor determining the *absolute* level of prices in the system.<sup>(2)</sup> For example under the Bretton Woods system, gold acted as the *de jure* (if not the *de facto*) numeraire. The ERM originally intended having the ECU (as a weighted basket of the participating currencies) as its numeraire, with the ERM parity grid thereby defined relative to ECU parities. On a related point, it was intended that policy adjustment between ERM member countries should be *symmetric*. A special institutional device—the divergence indicator—was set up to promote such symmetry of adjustment. Countries whose exchange rates triggered the divergence indicator, whether strong or weak, were expected to take necessary adjustment measures. The aim of this was to remove many of the operational asymmetries which had emerged under the Bretton Woods regime and which often had forced adjustment upon only the weak currencies in the system.

In practice, the evolution of the system appears to have taken a quite different course. The deutschemark is now widely acknowledged as the *de facto* nominal anchor of the ERM, just as the dollar became the *de facto* nominal anchor under Bretton Woods. Furthermore, many commentators have alleged an *asymmetry* in the ERM's operation, with the burden of adjustment, as under Bretton Woods, carried disproportionately by the weak currency countries.<sup>(3)</sup> The evident reliance placed upon maintaining bilateral deutschemark, rather than ECU, parities by non-German ERM members lends support to the first of these contentions; while the marked under-utilisation of the divergence indicator lends support to the second. The two features are related: ERM members have found themselves constrained more often by bilateral limits relative to the strongest currency in the system (usually the deutschemark) than by divergence thresholds.

Econometric studies have drawn somewhat mixed conclusions regarding this so-called *German-leadership*

proposition. A number of empirical studies have been able to reject a *strong* form of the German-leadership hypothesis: there is little evidence of one-way causality from German monetary policy operations to those in other ERM countries.<sup>(4)</sup> This conclusion is true of the relationships between a range of monetary policy instruments (short and long interest rates and money supplies). In particular, econometric studies suggest that there is some reciprocal influence from non-German ERM members upon policy in Germany (for example from France and Italy).

Weaker forms of the German-leadership proposition, in which Germany is assumed to play a dominant, but not unique, role in co-ordinating monetary policy in the system in the long run, have proved more difficult to reject.<sup>(5)</sup> For example, the clearest evidence of an asymmetric functioning of the ERM has been found by studies considering the (offshore) interest rate responses of member countries to the expectation of a realignment,<sup>(6)</sup> in particular the large interest rate adjustments observed among non-German ERM members relative to those seen in Germany in an attempt to dampen realignment pressures. These observations suggest that the ERM has indeed worked in an asymmetric fashion, with Germany often used as the focal point for the operation of monetary policy, but that there has not been absolute German leadership of the system.

The precise origin of this asymmetry has proved rather harder to pinpoint. One school of thought believes the ERM's asymmetric operation to have been *intentional*, in the sense that it has emerged as a result of the policy preferences of participating countries. Specifically, it has been suggested that non-German ERM members may be able to 'import' Germany's credibility in countering inflation by following the Bundesbank's monetary policy lead via an exchange rate peg with the deutschemark. The resulting boost to domestic anti-inflation credibility has been termed the 'advantage of tying one's hands',<sup>(7)</sup> and goes some way towards explaining why high-inflation countries might accept voluntarily some dependence upon German monetary policy.

Others have stressed the potentially *systemic* nature of asymmetries within semi-fixed exchange rate mechanisms,<sup>(8)</sup> with the average inflation of these systems regressing naturally towards that of the country following the most contractionary stance: these regimes will be imbued with a disinflationary bias. The intuition behind this result is simple enough. Under a fixed exchange rate regime, the countries building up their stock of reserves the fastest will be those with the most restrictive monetary stance. Conversely, those countries following the most expansive monetary policy will be losing reserves the fastest. Since a country's stock of reserves is finite, the burden of adjustment

(1) A fuller discussion of the mechanics of the ERM's operation is provided in Adams (1990).

(2) This 'N-1' problem (Mundell (1969)) emerges because exchange rates, by themselves, define only *relative* prices in the system.

(3) See, for example, Giavazzi and Pagano (1985, 1988), Giavazzi and Giovannini (1988), de Grauwe (1989a).

(4) See Cohen and Wyplosz (1989), Artis and Nachane (1990), Fratianni and von Hagen (1990), Weber (1990).

(5) See Artis and Nachane (1990), MacDonald and Taylor (1990), Weber (1990).

(6) See de Grauwe (1989a), Giavazzi and Giovannini (1990).

(7) Giavazzi and Pagano (1988). A fuller discussion of the importance of these credibility effects is provided below.

(8) See Wyplosz (1989).

is more often placed upon the expansionary/weak currency country (whose stock of reserves is being depleted) than upon the contractionary/strong currency one (whose reserves are being added to). The weak currency country will therefore be forced to tighten policy to hold the exchange rate fixed, with the strong currency country insulated from this policy adjustment. The result is convergence on the strong currency standard.

Mastropasqua et al (1988) present evidence to suggest that Germany plays a negligible role in intra-marginal interventions involving ERM currencies (which comprise the vast majority of total intervention) and that any movements in reserves in Germany are fully sterilised, with the opposite generally being true among other ERM countries. These observed trends indicate a potentially important role for the adjustment mechanism outlined above, with Germany, as the inflation leader, targeting nominal interest rates and the other ERM countries largely targeting foreign exchange reserves.

In summary, it seems likely that the asymmetric operation of the ERM has emerged as a result of both inherent and intentional aspects. The role played by the ERM in ensuring a disinflationary configuration for the currencies in the system, with low inflation currencies near the top of the system exerting discipline upon high inflation currencies situated near the system's floor, appears unambiguous. Indeed, this configuration has been dubbed by some the *classic* ERM situation, as observed during much of the latter half of the 1980s.

### The ERM and capital mobility

The second feature of the Bretton Woods system which EMS protagonists have sought to counteract, at least over the longer term, is capital immobility. The United Kingdom formally abolished exchange controls in 1979. Great strides have been made towards realising this objective elsewhere in the EC more recently, largely under the impetus of the 1988 Capital Liberalisation Directive. For example, 1990 saw the removal of remaining exchange controls in France and Italy and the abolition of Belgium's dual foreign exchange market. Although some exchange controls remain in Spain, Portugal, Ireland and Greece, they do so in a much-diluted form compared with the 1970s. While concerns have been voiced regarding potential covert capital controls within the EC—and their potentially destabilising impact once removed<sup>(1)</sup>—some progress has already been made towards removing remaining indirect discriminatory restrictions upon freedom of cross-border capital flows.<sup>(2)</sup>

The principal empirical means of detecting the presence and importance of short-term capital controls has been to study the onshore-offshore interest rate differential, which in the

absence of controls should offer a pure arbitrage opportunity. De Grauwe (1989a) and Giavazzi and Giovannini (1990) show how capital controls enabled the non-German ERM countries to preserve a relatively high degree of monetary independence during the early 1980s despite asymmetries in the system's operation, allowing a decoupling of behaviour in the domestic money and eurocurrency markets.

Two empirical observations suggest that capital controls may have played a stabilising role for some ERM members during the system's turbulent formative years, preventing excessive speculative capital flight from countries facing devaluation:<sup>(3)</sup> first, the historical coincidence of large covered interest arbitrage opportunities together with expectations of an ERM realignment in France and Italy; and second, the increase in the volatility of the onshore-offshore interest differential for the lira and the franc between the periods 1973–79 and 1979–86, with the opposite being true for the deutschemark and the guilder.<sup>(4)</sup> In principle, the possibility of capital flight from a currency facing devaluation, ie of a 'speculative attack', is plausible enough given a finite probability of a discrete exchange rate jump at some future point. To this extent, capital controls may indeed have acted as a *stabilising* device upon exchange and interest rates in the ERM's early years.<sup>(5)</sup> In practice, realignment procedures in the ERM were modified so as to reduce the probability of discrete market exchange rate movements and hence of speculative attack (see below). The provisions of the Basle-Nyborg Accord appear also to have lowered markedly the probability of a successful speculative attack, allowing for the more widespread use of (intra-marginal) intervention in a pre-emptive manner and concerted interest rate actions between members. Finally, it is likely that enhanced financial market credibility, associated with the success achieved in fostering inflation convergence within the ERM bloc, has acted further to discourage speculative attack in recent years.

### The ERM and the realignment process

Finally, the record of the Bretton Woods system in dramatising parity realignments is something which EMS participants have aimed to guard against, in part by adopting a more symmetric approach to realigning currencies than was seen in earlier semi-fixed exchange rate regimes. The ERM has undergone twelve realignments in its twelve-year history, seven of which occurred in the system's first four years in operation and the last of which, in January 1990, had the sole purpose of enabling the lira to move to the narrow band. The last general realignment of the currencies in the ERM occurred in January 1987.

(1) See, for example, Bishop (1989).

(2) The dynamic implications of this 'New EMS' regime of enhanced financial integration and liberalisation are discussed below. The existence and role played by capital controls in the ERM countries is analysed by, among others, Giavazzi and Giovannini (1990), and for the United Kingdom by Artis and Taylor (1989).

(3) The elements of this 'speculative attack' scenario in anticipation of a realignment (in the absence of capital controls) are assembled in Driffill (1988), Obstfeld (1988) and Wyplosz (1989).

(4) See Artis and Taylor (1989), Giavazzi and Giovannini (1990).

(5) Though it might also reasonably be argued that, by delaying necessary policy adjustments, capital controls hindered macroeconomic convergence in France and Italy.

Padoa-Schioppa (1985) observes that while early realignments were *de facto* unilateral decisions, from around 1982 the realignment process became more collective. Giavazzi and Giovannini (1990) isolate the differential interest rate responses of member countries in anticipation of a realignment and interpret this as evidence of some form of German leadership in the realignment process. Collective realignment decision-making and German leadership are not necessarily incompatible. Indeed, realignment consultations may have provided one effective channel through which Germany exerted its counter-inflationary influence over other ERM members in the mid-1980s by limiting the number of devaluations within the system.

More important from the speculative attack perspective, however, is the observation that more recent ERM realignments have been *non-provocative*;<sup>(1)</sup> that is the shift in the bands has been overlapping with the new band encompassing the existing market rate such that the realignment itself has required no discrete jump in the market rate of exchange. Such realignment practice is to be considered an improvement upon the Bretton Woods realignment procedures which effectively offered speculators a one-way bet on currency.

### The ERM and exchange rate stabilisation

One of the dominant strands of empirical research, and closely related to the EMS's original objective of promoting monetary stability, concerns the system's role in fostering exchange rate stability.<sup>(2)</sup> Following Williamson (1983, 1985), the distinction typically made is between high-frequency (*nominal* exchange rate *volatility*) and low-frequency (*real* exchange rate *misalignment*) deviations from the exchange rate fundamentals. Although exchange rate volatility has attracted far greater academic attention, there is little empirical evidence able to link it effectively to a reduction in welfare-enhancing economic activity, whether on current or capital account.<sup>(3)</sup>

#### High-frequency measures of exchange rate stability

Early empirical studies concentrated on descriptive measures of volatility (as measured by, for example, the standard deviation of the percentage change in the exchange rate), using real, nominal, and/or effective exchange rates over a variety of time periods and frequencies.<sup>(4)</sup> The majority of evidence using real and/or nominal *bilateral* exchange rates points towards the system having acted as a stabilising

influence upon ERM cross-rates, but as having been associated with some increase in exchange rate volatility between ERM and non-ERM members. The sum of these two offsetting influences, as reflected in the stability of ERM *effective* exchange rate indices, is found to be ambiguous in most early empirical studies.<sup>(5)</sup>

In part, these inconclusive early empirical findings using descriptive measures of effective exchange rate variability may have been a symptom of inappropriate econometric practice. For example, it is exchange rate *uncertainty* (unanticipated changes in currency prices) rather than volatility per se that is generally deemed relevant to rational agents. This is increasingly the case in the presence of liquid and efficient forward markets, which allow hedging of short-term exchange rate positions. More recently, a number of empirical studies have attempted to construct such exchange rate uncertainty (*conditional* variability) measures.<sup>(6)</sup> The evidence from these conditional variability studies is generally in keeping with that from earlier studies: the ERM has helped stabilise both real and nominal intra-ERM bilateral exchange rates, but has had little effect upon the stability of members' global effective exchange rates. These observations may be attributed to the fact that the ERM is concerned primarily with *internal*, rather than *external*, exchange rate stabilisation.

#### Interest rate stability

A related question is whether lower intra-ERM exchange rate volatility has been achieved at the cost of greater short-term interest rate variability.<sup>(7)</sup> In practice, the experience of many countries on joining the ERM has been that interest rate variability has increased initially, but that this increased uncertainty has died away over time as financial market credibility has been acquired. Most empirical studies corroborate this anecdotal evidence in suggesting there to have been no detectable increase in short-term interest rate uncertainty among ERM members post-1979.<sup>(8)</sup>

#### Low-frequency measures of exchange rate stability

The medium-run behaviour of real exchange rates in the ERM, and in particular the potential for misalignments therein, appears to be attracting ever-greater attention following the work of Williamson (1983, 1985). There is, however, some disagreement in the literature about how best real exchange rate *equilibrium* is to be defined. For

(1) See Artis (1989).

(2) Great progress has recently been made at the *theoretical* level towards understanding exchange rate behaviour inside a credible target zone, following the influential work of Krugman (1988). An important implication of the Krugman model is that credible managed exchange rate regimes are *inherently stabilising*, reducing the intervention required to hold an exchange rate within its band. See Miller, Weller and Williamson (1988), Flood and Garber (1989), Svensson (1989), Bertola and Caballero (1990) and Miller, Sutherland and Ichikawa (1990) for extensions of this model. Empirical analyses of the efficacy of the Krugman class of models have thus far, however, proved rather less encouraging (see, for example, Flood, Rose and Mathieson (1990)).

(3) See, for example, Akhtar and Hilton (1984), the Bank of England (1984), though also Cushman (1986).

(4) See, for example, Ungerer et al (1983), Padoa-Schioppa (1985).

(5) See, for example, Ungerer et al (1986).

(6) A variety of assumptions regarding the structure of agents' exchange rate forecasting schemes have been employed in the academic literature, including forward rates (Rogoff (1985a)) and random walks with autoregressive conditionally heteroscedastic (ARCH) disturbances (Artis and Taylor (1988)). MacDonald and Taylor (1990) use a multivariate co-integration technique to test long-run convergence of real and nominal ERM bilateral exchange rates.

(7) See, for example, Batchelor (1983). Vinals (1990) reports this to have been an important concern for the Spanish authorities prior to joining the ERM.

(8) See Ungerer et al (1986), Artis and Taylor (1988). There is, however, less evidence of the ERM having stabilised *long-term* interest rates among members: Ungerer et al (1986).

example, the practical usefulness of classical purchasing power parity exchange rate theory has recently been questioned by Wren-Lewis et al (1990), who use as their equilibrium exchange rate benchmark Williamson's concept of the fundamental equilibrium exchange rate (FEER), ie that real exchange rate which is capable of supporting internal and external balance in the medium term. The lack of consensus about what constitutes the 'best' equilibrium concept for the real exchange rate, the relative complexity of any such calculation and the alternative ways in which this equilibrium could be achieved, may in part explain why little attention has been paid thus far to measures of misalignment in the literature: only recently have studies sought to formalise the link between sluggish adjustment of real exchange rates to their equilibrium values and inter-sectoral factor movement. Consequently it is not yet possible to form a view as to whether the system does contribute, actively or passively, to exchange rate misalignments among members.

### The ERM and macroeconomic convergence

There has been much informal discussion of the ERM's capacity to foster economic, and in particular inflation, convergence in the latter half of the 1980s. Within the academic literature, however, there is still some debate as to whether the (inflation) convergence witnessed during the 1980s is specific to the ERM *arrangements*, or whether it is a more general feature of the EMS *period* in which there was a determined shift towards the control of inflation in both ERM and non-ERM countries. Indeed, given that they will tend to produce equivalent results, disentangling the two influences empirically has proved difficult.<sup>(1)</sup>

### The EMS credibility hypothesis

The literature supporting the view that the ERM has exerted a strong and independent influence upon members' counter-inflationary stance typically emphasises the disciplining role played by Germany *vis-à-vis* other ERM members; in particular the 'reputational' benefits that can result if high inflation countries tie their nominal exchange rate to that of the country with highest anti-inflation credibility. This is the so-called *EMS Credibility Hypothesis*.<sup>(2)</sup> Since the credibility question is concerned with the strategic interaction between agents in financial and labour markets (who form inflationary expectations) and the authorities (who formulate policy), analytical models of this hypothesis have usually been cast in a game-theoretic framework, often in the spirit of Barro and Gordon (1983). Equilibrium inflation in the Barro-Gordon framework is determined by the credibility of a policymaker's commitment to price stability, ie where actual and expected inflation—the decisions of the authorities and private sector

agents respectively—coincide. High inflation countries can 'import' credibility by fixing their nominal exchange rate relative to the lowest inflation currency, thereby pre-committing to an anti-inflation strategy and hence placing a credible constraint upon their policy *actions*. The result, provided this commitment is credible, is a lowering of the threshold of inflationary expectations among agents—offsetting any 'inflationary bias' which might otherwise emerge<sup>(3)</sup>—and thus a lowering of equilibrium inflation in the game. This result is directly analogous to Rogoff's (1985b) observation that inflation inefficiencies can be offset by handing control over to a 'conservative' central bank with a declared anti-inflation strategy. This in turn alters the policy *preferences* (rather than constraining the policy actions) of the authorities, hence lowering the equilibrium level of inflation expectations.

Credibility models of inflation convergence set within a game-theoretic framework have encountered a number of problems. First, the inflation gains from participating in a fixed rather than floating exchange rate regime have been shown to be ambiguous *a priori*. If a fixed exchange rate regime is to deliver inflation benefits then the necessary conditions are: that the system work asymmetrically, ideally centred around the lowest inflation currency; that the exchange rate peg be fully credible; and that the *credibility gap* between the high and the low inflation currencies be large relative to the incentive to adopt a 'beggar thy neighbour' policy of nominal appreciation to export inflation.<sup>(4)</sup> Alternatively, the inflation gains from a fixed exchange rate regime can be shown to be unambiguous provided there exists a *political cost* to engineering a devaluation.<sup>(5)</sup>

A number of authors have stressed the important role played by the *real* exchange rate as a disciplining device upon high inflation countries, given that any adverse movements in relative inflation will automatically result in a worsening of competitiveness under a fixed nominal exchange rate regime.<sup>(6)</sup> The ERM practice of *under-indexing* realignments, ie adjusting the nominal central rate by less than is needed to compensate fully for the cumulative inflation differential, has added to the discipline imposed through this real exchange rate channel. In particular, this has meant both that the autonomous inflationary stimulus provided by a realignment in high inflation countries has been muted, and that realignments have proved more costly in terms of competitiveness (and hence acted as more of a discipline) than fully accommodating parity adjustments. In the parlance of game theory, under-indexed ERM realignments may therefore have acted as *punishment mechanisms* upon imprudent policymakers, inducing a monetary/fiscal policy adjustment in these countries to help

(1) See, for example, Fratianni and von Hagen (1990).

(2) See, for example, Collins (1988), Giavazzi and Giovannini (1988, 1990), Giavazzi and Pagano (1988).

(3) See Kydland and Prescott (1977).

(4) See Giavazzi and Giovannini (1988), Giavazzi (1989) and Fratianni and von Hagen (1990).

(5) See Melitz (1988).

(6) Giavazzi and Pagano (1988) illustrate that the equilibrium outcome of a Barro-Gordon-type game, once allowance is made for this competitiveness effect, is both a lower steady-state rate of inflation and a higher equilibrium level of welfare (lower output cost for a given fall in inflation) than under a freely floating exchange rate regime.

prevent the perpetuation of losses in competitiveness. This scenario appears to characterise accurately the policy responses of many ERM members as they acclimatised to the disciplines of the system, in particular after 1983.<sup>(1)</sup>

As a counterpart to the under-indexing of realignments, the anchor (lowest inflation) country would make absolute gains in competitiveness during any transitional phase of inflation convergence. This in turn would provide a rationale for the anchor country's participation in the system, which otherwise is difficult to explain within a theoretical framework. More plausibly, however, it has been suggested that it is the desire for a *stabilisation of*, rather than absolute gains in, competitiveness which better explains Germany's interest in participating in the ERM.<sup>(2)</sup> In particular, there is clear evidence of the ERM having helped stabilise German competitiveness with European partners, reducing the volatility of the German real effective exchange rate after 1979.<sup>(3)</sup>

Finally, analytical models of ERM credibility have often been seen as deficient because of the sensitivity of their conclusions to the way in which the 'rules of the game' are specified.<sup>(4)</sup> Significantly, no single model has yet been able to explain both the divergence of ERM inflation differentials up to around 1983 and the convergence thereafter. This observation supports the view that there have been changes both to the operating characteristics of the ERM (ie a shift towards a more asymmetric regime of greater capital mobility and infrequent realignments) and to the policies of its members over time. Each of the ERM's sub-periods may thus require quite separate treatment for modelling purposes, be it analytical or empirical.

### The EMS credibility hypothesis and inflation convergence: empirical evidence

Several attempts have been made to verify, in empirical terms, some of the implications of the EMS Credibility Hypothesis.<sup>(5)</sup> Specifically, attempts have been made to capture ERM-inspired shifts in agents', and in particular wage-bargainers', inflation expectations, as implied by the credibility class of models.<sup>(6)</sup> Giavazzi and Giovannini (1988) find evidence of inflation expectations having undergone some downwards revision after around 1983, though this structural shift is not statistically significant. Kremer (1990) finds relatively strong evidence of inflation expectations in Ireland having followed United Kingdom prices before 1979, but having been more closely related to

the price behaviour of ERM partners thereafter.<sup>(7)</sup> In a similar vein, Artis and Nachane (1990) find a significant role for German inflation expectations in the price equations of other ERM members, while the same is not true either of non-ERM members or of ERM members in the pre-ERM period. In general, these studies point towards there having been some adjustment of inflation expectations during the EMS period in the direction suggested by German monetary policy. However, this expectational adjustment was not typically achieved immediately on entering the ERM but some time after as agents 'learnt' the true policy preferences of the authorities as they adapted to the new regime.<sup>(8)</sup>

A number of studies have attempted to capture credibility shifts indirectly by calculating the output (or unemployment) costs of disinflation: these costs are lower the higher the credibility which attaches to a disinflation because of the effects of credibility in lowering inflation expectations (and hence in lowering real wages). De Grauwe (1989b) finds no evidence of the ERM having lowered the output costs of disinflation relative to countries outside the ERM—an implicit rejection of the ERM Credibility Hypothesis in its strongest form. (Dornbusch (1989) reaches a similar conclusion when discussing the circumstances surrounding Ireland's 'failed stabilisation policy' of the 1980s.) Indeed, de Grauwe views the process of earning credibility as potentially *asymmetric*: ERM membership may have actually *lengthened* the time taken to acquire credibility in high inflation countries because it ruled out the 'short sharp shock' of a nominal exchange rate overshoot. Once acquired, however, policy credibility within the ERM may then have proved more robust than under a floating exchange rate regime because of the additional constraints placed upon member countries.

The similarity in the inflation profiles implied by, on the one hand, the EMS Credibility Hypothesis and, on the other, the shift generally in policy emphasis towards a more restrictive stance in both ERM and non-ERM countries during the 1980s presents further problems when interpreting evidence on inflation convergence within the ERM. Ungerer et al (1986), using pooled cross-section data from ERM member countries, interpret a significantly negative ERM dummy variable in price equations as evidence in favour of the ERM arrangements having exercised an independent disciplinary influence upon member countries. Later studies, however, have reached somewhat more mixed conclusions. (See, for example, Collins (1988), Artis and Nachane (1990), Barrell

(1) The example often quoted is the French experience following the March 1983 ERM realignment, after which point a package of budgetary and monetary austerity measures were implemented.

(2) Though the importance of non-monetary gains, for example arising from enhanced goods and financial market integration, should also be recognised.

(3) Correspondingly, a number of commentators have noted a weakening of the *dollar-deutschmark polarisation* (that is, the historical coincidence of periods of deutschmark strength against European currencies with dollar weakness and vice-versa) between the periods before and after the inception of the ERM: see Giavazzi and Giovannini (1990) and Haldane and Hall (1991).

(4) For example, while *average* inflation falls in all of the stylised game-theoretic ERM regimes looked at in Collins (1988), not all of these regimes are associated with a narrowing of inflation *differentials* between members.

(5) Cohen and Wyplosz (1989), for example, assess the interest risk premium between France and Germany before and after the inception of the ERM. To the extent that their study is concerned with financial market, as distinct from goods/labour market, credibility, however, it is less of a direct test of the EMS Credibility Hypothesis than alternative studies.

(6) Note, however, that these are tests of the joint hypothesis that inflation expectations have undergone some revision and that wages are affected by expectations of future inflation.

(7) Significantly, Kremer also finds evidence of an important role for competitiveness effects in moulding Irish inflation expectations.

(8) This is consistent with the theoretical analysis of, for example, Backus and Driffill (1985), of the way in which policy credibility is acquired over time.

et al (1990).) In general, much of the empirical evidence to date has found it difficult to disentangle statistically the global disinflation of the 1980s from that which may have been ERM-inspired. Consequently, many of the analytical implications of the EMS Credibility Hypothesis have as yet gone unverified in empirical terms.

#### Convergence of other macroeconomic indicators: empirical evidence

Ungerer et al (1983, 1986) report an extensive array of summary statistics and correlation coefficients between key policy aggregates and performance indices for the ERM countries. In broad terms, their results indicate that progress has been made towards convergence of monetary policies and inflation rates among ERM members during the EMS period, but that less progress has been made towards an equilibration of relative fiscal and external positions.<sup>(1)</sup> This lack of convergence of some real side indicators suggests that significant differences may have existed between members during the EMS period. Indeed, it is these differences which have often provided the adjustment mechanism through which ultimate convergence in the performance of the system has been established. For example, divergences in the relative external positions of ERM members is clear evidence of the importance which attaches to the real exchange rate as a means of fostering convergence between high and low inflation members: while policy differences between member countries can be expected to be ironed out in static equilibrium, this does not rule out differences remaining in the dynamic transition to this equilibrium.

#### The 'New EMS' and the 'Excess Credibility' problem

A number of commentators have highlighted an apparent 'paradox' which has occasionally emerged within the ERM in more recent years, for example in Spain and Italy during periods in 1989 and 1990.<sup>(2)</sup> The paradox is characterised by high-inflation currencies operating near the tops of their bands and low-inflation currencies operating near their floors, the opposite to what is expected from the 'classic' ERM configuration of currencies.

The emergence of such a paradox has been linked directly to enhanced financial integration, and specifically to capital liberalisation, across the ERM bloc. Giavazzi and Spaventa (1990) show the narrowing of the differential between the variability of onshore and offshore interest rates in France and Italy after 1987 to illustrate this enhanced capital mobility. They also indicate that this narrowing differential is due more to a reduction in offshore interest rate variability than to an increase in the volatility of onshore rates, which is

taken as evidence of a stabilisation of exchange rate expectations in the ERM after 1987. It is this regime shift in ERM financial market credibility, resulting from enhanced financial integration, which Giavazzi and Spaventa believe to be the essence of the *New EMS*.

The effect of this enhanced exchange rate stability and financial integration has often been to stimulate large-scale capital inflows into those countries with the highest nominal inflation and interest rates and offering fastest growth. For Spain and Italy the result was a rapid swelling of reserves as their currencies moved towards the top of their ERM bands. These large increases in reserves often proved difficult to sterilise fully, inducing monetary relaxation in these high interest rate/high-inflation countries.<sup>(3)</sup> To the extent that upward pressure on ERM parities results in such a monetary easing in high-inflation countries, the 'paradoxical' situation may be capable of generating positive feedback effects onto inflation causing dynamic instability.<sup>(4)</sup> Moreover, since enhanced financial integration now limits the scope for realignments for fear of sowing the seeds of future speculative attack, it is possible that parity adjustments may be less well equipped to defuse such instabilities currently than was the case during the early 1980s.

A formal exposition of the paradox is provided in Artus and Dupuy (1990), Giavazzi and Spaventa (1990) and Miller and Sutherland (1990). The general conclusion reached is that short-run inflation instabilities can emerge only when expectations in the financial market are inconsistent with those in the labour market; specifically when there exists 'excess credibility' (of monetary policy) in financial markets relative to that in labour markets. The likelihood of instability, then, is greater the less forward-looking are wage-bargainers relative to participants in financial markets, ie the less credible the ERM in labour than in financial markets.<sup>(5)</sup> Intuitively, the effect of differential credibility is to cause a lowering of nominal interest rates in high inflation countries (as a result of excess financial market credibility) at a time when inflation expectations have not yet fully responded to the new regime (there is deficient labour market credibility, potentially because wage-bargainers are backward-looking). The resulting fall in real interest rates fuels inflationary pressures in the (already) high inflation countries.

While differential credibility in financial and labour markets is possible in the short run, inconsistent expectations between the two markets (and hence instabilities) are improbable in steady-state. The real exchange rate will act as an additional stabilising channel over the long run. Excess credibility problems are therefore likely to be transient. Indeed, Giavazzi and Spaventa illustrate that, by accelerating inflation at the beginning of the adjustment

(1) Broadly similar conclusions are reached by Cohen and Wyplosz (1989) and Weber (1990) using slightly more sophisticated analysis.

(2) See Artus and Dupuy (1990), Giavazzi and Spaventa (1990), Vinals (1990).

(3) Indeed, it was because of the difficulties involved in full sterilisation of increases in reserves that Spain sought to impose selected administrative controls on capital inflows during 1989.

(4) See Walters (1986). The paradox can be alternatively interpreted as an attempt to control two targets—price and exchange rate stability—with a single instrument—monetary policy: see, for example, Artus and Dupuy (1990).

(5) For example, short-run instabilities are less manifest in the semi-forward-looking overlapping wage contracts model of Miller and Sutherland (1990) than in the completely backward-looking wage contracts model of Giavazzi and Spaventa (1990).

process and hence shifting competitiveness losses towards the early stages of a disinflation, excess credibility problems may actually *accelerate* convergence towards equilibrium. The external adjustment costs of disinflation, ie current account deficits, incurred in the transitional period of inflation convergence may therefore be lower if a country 'suffers' an initial excess financial market credibility problem than would be the case otherwise.<sup>(1)</sup>

## Conclusions

The last decade has seen a burgeoning literature on the operation and performance of the ERM. The ideas and opinions of academics and policymakers expressed in this literature are diffuse. This diffusion of ideas mirrors the evolution of the system itself which has, on the whole, been fragmented and episodic. The ERM's operational framework, in particular, is unlikely to have been constant over time: the system now functions in a largely asymmetric fashion, rather than symmetrically as intended; capital mobility between ERM members is much greater currently than during the system's formative years; and ERM

realignments are now both infrequent and non-provocative, in contrast to the early 1980s. The policies of ERM member countries during the 1980s likewise have been subject to frequent and often marked alteration. Correspondingly, no standard framework for analytically modelling the system has emerged.

Partly in response to these deficiencies of analytical models of the ERM, a plethora of empirical appraisals of the system's performance have emerged. Limited degrees of freedom and the somewhat disparate historical experiences of member countries have meant, however, that conclusions from these studies have rarely proved unambiguous. On the other hand, empirical evidence that the ERM has stabilised bilateral exchange rates between members (in the sense of reducing short-term volatility) and that the system has contributed actively to the process of inflation convergence among ERM countries is relatively clear cut. More conclusive answers to the questions being asked of the ERM today are nevertheless more likely to come with time, data and further experience of the regime, rather than through more elaborate econometrics.

(1) Artus and Dupuy (1990) illustrate the potential importance of adjustments in fiscal policy (a point also raised, in the Spanish context, by Vinals (1990)) and in wage-bargaining structures as alternative routes through which potential short-run dynamic instabilities might be defused.

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