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# Contents

<i>List of contributors</i>	vii
<i>Foreword by Sir Brian Unwin</i>	ix
<i>Acknowledgement</i>	xi
1. Overview Alfred Steinherr	1
Appendix 1: The Werner Report of 1970	10
PART ONE EMU: DESIRABLE? FEASIBLE?	
2. On the architecture of EMU Hans Tietmeyer	31
3. Is Europe an optimum currency area? Peter Bofinger	38
4. From the Werner Plan to the Maastricht Treaty: Europe's stubborn quest for monetary union Francesco Papadia and Fabrizio Saccomanni	57
5. Yes to European monetary unification, but no to the Maastricht Treaty Richard Cooper	69
Appendix 2: Against and for EMU: two manifestos of 1992	72
PART TWO THE EMS CRISES, 1992–1993 AND IMPLICATIONS	
6. Application of the Maastricht Treaty and the experience of a year of crisis in the European Monetary System Miguel Boyer	83
7. Credibility of German monetary policy on the road towards EMU Wolfgang Fik	88
8. Living dangerously: the lira and the pound in a floating world Pier Luigi Gilbert	105
9. The stability of the EMS Patrick Artus and Henri Bourguinat	143
PART THREE NOMINAL AND REAL CONVERGENCE	
10. The year 2000: the European currency's first birthday Valéry Giscard d'Estaing	167
11. The role of convergence in the process of EMU Andrew Crockett	171
12. The debate on nominal convergence before and after the 1992 crisis Alberto Giovannini	184

13. The exchange rate changes of 1992 and inflation convergence in the EMS	Paul De Grauwe and Giuseppe Tullio	192
<b>PART FOUR INSTITUTION-BUILDING</b>		
14. The role of the European Monetary Institute	Phillippe Maystadt	203
15. Reinforcing Stage Two in the EMU process	Niels Thygesen	209
16. What role for the ECB in Europe's financial markets?	David Folkerts-Landau and Peter Garber	227
17. ECU interest and exchange rates: the key role of EMU	Alfred Steinherr	243
Appendix 3: Excerpts from the judgement by the German constitutional court of 1993 regarding the Maastricht Treaty		252
<b>PART FIVE FROM HERE TO EMU: SOME ALTERNATIVES</b>		
18. When and how to introduce the European currency	Sir Edward Heath	257
19. Convergence criteria, extended transition periods, and other obstacles to EMU	Hans Genberg	261
20. Single market, exchange rates and monetary unification	Rainer Masera	266
21. Alternatives to drifting along during Stage Two	Daniel Gros and Alfred Steinherr	288
<i>Bibliography</i>		300
<i>Index</i>		310

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## CHAPTER THIRTEEN

# The exchange rate changes of 1992 and inflation convergence in the EMS

Paul De Grauwe and Giuseppe Tullio\*

## 1. Introduction

Since the outbreak of the speculative crises in the EMS during September 1992, major adjustments in the exchange rates of a number of European countries have occurred. The extent of these changes is shown in Table 13.1. It can be seen that exchange rate changes of 20 per cent or more have not been uncommon.

One would have expected that such large exchange rate changes would have had significant effects on inflation rates and inflation differentials in Europe. However, until the moment of writing (November 1993) these large exchange rate changes had not yet been passed through in inflation rates. At the end of 1993 the inflation rates of the countries whose exchange rates had depreciated by 10 per cent or more were on average only marginally higher than the inflation rates of the other countries in the system (see Table 13.2). In addition, the countries whose currencies had depreciated did not experience an increase in their domestic inflation rates, on the contrary these inflation rates declined in 1993 relative to 1992.

These puzzling phenomena raise several issues. First there is the question of why these exchange rate changes have not yet affected inflation rates. Is this just a matter

TABLE 13.1 Exchange rate changes of some European countries (% change of nominal effective exchange rate from September 1992 to July 1993)

Italy	21.5
Portugal	6.4
Spain	21.7
United Kingdom	10.8

Source: IMF, International Financial Statistics

TABLE 13.2 Inflation rates in the EMS (Consumer Price Index)

	Sep. 1993	1992
Belgium	2.7	2.4
France	2.3	2.4
Germany	3.9	4.0
Netherlands	1.8	3.7
Italy	4.2	5.2
Spain	4.3	5.9
UK	1.8	3.7

Source: *The Economist*, Nov. 6, 1993 (1993 data); IMF, International Financial Statistics for 1992 data

of longer lags? Or has the structure of the transmission of exchange rate changes to prices changed? In this connection the role of the recession in Europe may turn out to be important.

A second issue relates to the inflation convergence requirements as formulated in the Maastricht Treaty. To what extent will the exchange rate changes that have occurred since 1992 hinder the necessary inflation convergence?

These issues are analysed in the present paper. There are several ways one can analyse these issues. One consists in specifying econometric models for individual countries with the aim of tracing the transmission of exchange rate changes to prices. Another approach consists in selecting a sample of countries that have experienced depreciations and to conduct a cross-section analysis of the impact of these exchange rate changes. This is the approach that will be followed in this paper. In the next section the cross-country model is presented. In Section 3 the results are discussed and the implications for the issues raised earlier are analysed. In Section 4 we raise the issue of whether the inflation convergence requirements, as formulated in the Maastricht Treaty, are necessary for a successful transition to a monetary union.

## 2. The model

We start by identifying countries and periods (quarters) during which significant devaluations (or depreciations) have taken place. We then compute the rates of inflation before and after these periods of exchange rate adjustments. We then test whether these changes in inflation can be attributed to the exchange rate changes, after correcting for other variables that affect the rate of inflation.

Formally, we specify the following econometric model:

$$\Delta p_{it} = a_0 + a_1 \Delta S_{it} + a_2 \Delta r_{it} + a_3 \Delta q_{it} + a_4 \Delta p_{wt} + a_5 \Delta q_{wt} + a_6 O_{it} + a_7 \Delta \text{app}_{it} + a_8 D_{\text{fix}_{it}} + u_{it}$$

$p_{it}$  is the inflation rate of country  $i$  in period  $t$ ;  
 $S_{it}$  is the rate of depreciation (appreciation) in country  $i$ ;  $r_{it}$  is the real interest rate in country  $i$ ;

\*We are grateful to Nancy Verret and Danny Decupere for their efficient research assistance.

- $q_{it}$  is the growth rate of industrial output in country  $i$ ;  $p_{wt}$  is the world rate of inflation in period  $t$ ;  
 $q_{wt}$  is the rate of change in world industrial production;  
 $O_{it}$  is the degree of openness of country  $i$ ;  
 $Dapp_{it}$  is a dummy variable with a value 1 for an appreciation;  
 $Dfix_{it}$  is a dummy variable with a value 1 during fixed exchange rate periods;  
 $u_{it}$  is the error term.

The operator  $\Delta$  refers to the change of a variable during the eight quarters after the exchange rate adjustment relative to the eight quarters preceding it. The exception to this rule is the exchange rate. We measure the rate of depreciation from quarter  $t$  to  $t + 1$  as against the average rate of depreciation during the previous eight quarters (two years.) This contrasts with the other variables. For example, the inflation rate variable measures the average rate of inflation during quarter  $t$  to  $t + 7$  as compared with the rate of inflation during the eight preceding quarters. Thus we analyse whether the (acceleration) of the rate of depreciation in quarter  $t + 1$  affects the rate of inflation during the same and the subsequent quarters. We also correct for other influences during those quarters.

### 3. Empirical results

This model was tested using 23 observations of significant exchange rate changes of industrialised countries during the period 1964–86. The list of countries and exchange rate adjustments is shown in the appendix, in Table 13A.1.

The results of estimating Equation [1], are shown in Table 13.3. The variables in equation [1] that exert no significant influence when the whole equation was estimated, were dropped in the second round. We show the results of this second round. (The estimation results of the full equation are shown in appendix in Table 13A.2.) We observe that the exchange rate, the real interest rate and the world inflation significantly affect the rate of inflation. The other variables (the growth rate of industrial production, the government budget deficit, and the openness of the economy) have no significant influence.

The next step in the analysis consists in quantifying the effects of the depreciations of September 1992 on inflation, using the estimated equation of Table 13.3. We

TABLE 13.3 Estimation of equation [1]

Variable	coefficient	t-stat
constant	-2.2	-2.1
exchange rate	0.3	2.8
real interest rate	-0.9	-7.8
world inflation	0.3	2.3
DUMFIX	4.3	1.9
DUMAPPR	0.8	1.2
R <sup>2</sup> = 0.94		
F-stat = 49.4		

Note: DUMFIX is a dummy for observations of fixed exchange rate periods. DUMAPPR is a dummy when an appreciation occurs.

selected the three countries, Italy, Spain and the UK where the exchange rate adjustments of 1992 exceeded 10 per cent. We used the observed depreciations of the last quarter of 1992 as independent variables. For the other independent variables we used the last available data (first quarter of 1993) and assumed no change afterwards.

The results of this exercise are presented in Table 13.4. The interpretation is as follows (we take the case of the UK as an illustration). Due to the depreciation of the pound sterling during the last quarter of 1992 the additional UK inflation rate should on average be 4.4 per cent higher during the two years following the depreciation compared to the two years preceding it. Much of this inflationary effect of the depreciation is offset, however, by the increase in the real interest rate (compared to the one that existed prior to September 1992). As a result, and also as a result of a slow-down of world inflation, the UK inflation rate should accelerate only by 1.7 per cent on average during 1993–94. Similar results are obtained for Italy and Spain.

These results confirm that the low inflationary effects of the depreciations of September 1992 are probably the result of the recessionary forces, captured here by the real interest rate. The results therefore also imply that a pick-up of business conditions triggered by a decline in the real interest rates could uncover the underlying inflationary effects of the depreciations of the last quarter of 1992, and could lead to significant accelerations of inflation.

From the previous discussion one can conclude that much of the weak inflationary effects of the recent currency depreciations can be accounted for by the deflationary effects of the high real interest rates. If these real interest rates should decline in the near future one could expect that the inflationary consequences of the currency depreciations would lead to significant accelerations of inflation in those countries that have experienced large depreciations. From the evidence of Table 13.4 one can infer that a reduction of the real interest rates to their average level of the two years prior to September 1992 would lead to accelerations of inflation of 3 to 4 per cent in the countries with a depreciated exchange rate.

The previous evidence has some implications for the convergence requirements as formulated in the Maastricht Treaty. These require countries to reduce their inflation differential to 1.5 per cent (with respect to the three countries with the lowest inflation rates). An improvement in business conditions triggered by a decline in real interest rates is likely to lead to a significant widening of the inflations differentials. As a result, the Maastricht convergence criteria will be more difficult to achieve, at least for those countries, like Italy and Spain, which care about convergence.

The previous conclusion should be qualified. First, the econometric model on which these conclusions are based should certainly be improved. In particular, the

TABLE 13.4 Increase of inflation rate from 1992.4 to 1994.3 (in percent per year)

Increase due to	UK	Italy	Spain
depreciation	4.4	4.2	3.1
real interest rate	-2.4	-1.5	-1.3
world inflation	-0.3	-0.4	-0.4
Total	1.7	2.4	1.5

role of the deflationary forces which constrain the inflationary effects of the depreciations, is captured by the real interest rate only. We could not find significant effects of budgetary variables, nor of other indicators of the business cycle. As a result, we may not have captured the full effects of these other forces on the inflation rates.

Second, one cannot exclude the possibility that the inflationary consequences of the exchange rate depreciations have been successfully repressed and that only a small part of the inflationary potential will emerge with the economic recovery. Although we could not find empirical evidence for such 'non-linearities', one cannot exclude it either, given the severity of the recession of 1992-93 in Europe.

#### 4. Do we need inflation convergence criteria?

In the previous section it was argued that the recent exchange rate changes are likely to lead to a renewed divergence of inflation rates in Europe. If this happens, it is also likely that nominal interest rates will start diverging. As is well known, the Maastricht Treaty has defined convergence requirements involving the inflation rates and the long-term interest rates. The achievement of these 'nominal' convergence requirements becomes problematic if the inflation rates and the interest rates start diverging. In a floating exchange rate environment such a convergence of inflation rates will be all but impossible. Although the Maastricht Treaty has made nominal convergence a prerequisite for the creation of a monetary union, the question arises whether these nominal convergence requirements are really necessary to start a monetary union.<sup>1</sup>

A necessary condition for a well-functioning monetary union is that inflation rates should be the same throughout the union. Does this mean that inflation rates should converge *prior* to the introduction of the monetary union? Not necessarily. The introduction of a monetary union is a regime shift. When countries join a monetary union, they abolish their national currencies so as to acquire a new and common currency. Since inflation is the loss of purchasing power of the currency, the disappearance of national currencies makes the national inflation rates irrelevant after the monetary reform. As a result, it is quite conceivable that a country with an inflation rate of, say, 6 per cent forms an EMU with countries having an inflation rate of, say, only 2 per cent, without major problems. When the high inflation country joins EMU, its currency disappears. The fact that this currency used to experience a loss of purchasing power of 6 per cent per year becomes irrelevant. Once the monetary union is in place, the same money will be used throughout the union, and will be managed by one central bank. As a result, nominal convergence (inflation rates and interest rates) will be achieved automatically.

One of the perplexing features of the nominal convergence requirement is that it is relatively easy to achieve in the context of a monetary union, whereas it appears to be hard to reach in the context of fixed exchange rates. As a result, most fixed exchange rate arrangements tend to collapse, whereas relatively few monetary unions do.<sup>2</sup>

1. We do not discuss the other entry conditions specified in the Maastricht Treaty. On these other issues see Kenen (1992) and Elchengreen (1992).

2. There is a vast literature on the difficulties of achieving inflation convergence in fixed exchange rates. Some recent papers are Collins (1988), Giavazzi and Spaventa (1990), Bini Smaghi (1993).

As an illustration of this striking difference in the ease with which nominal convergence is achieved in different monetary regimes, we show the divergencies in regional inflation rates in West Germany (a monetary union) and compare these with those observed in fixed exchange rate regimes. We selected the Bretton Woods system during the 1960s and the EMS during its fixed exchange rate period of 1987-92. The results are shown in Table 13.5. They indicate that in the two fixed exchange rate regimes the cumulative national inflation differentials were 10 to 20 times higher than the cumulative differential observed between the German *Länder* during a period of comparable length.<sup>3</sup>

The previous analysis has some implications for the transition to EMU in Europe. The tight nominal convergence requirements defined in the Maastricht Treaty as a *precondition* for starting a monetary union appear to be very paradoxical. The tight convergence criteria for inflation are easily met within monetary unions. They are most unlikely to be observed between countries maintaining separate currencies, except when some of these countries (like the Netherlands) completely abandon their monetary sovereignty. Thus the paradox is that the Maastricht Treaty imposes inflation convergence as a condition for the regime shift to monetary union, while the available evidence indicates that one needs the regime shift to achieve tight nominal convergence. It appears, therefore, that the Maastricht nominal convergence requirement may become an obstacle to monetary union instead of being a condition which facilitates the transition to monetary union.

Why is it that the nominal convergence requirement is so much more difficult to achieve in the context of fixed exchange rate regimes than in a monetary union? As mentioned earlier, inflation in a country is the loss of purchasing power of the money issued by the monetary authorities of that country. In fixed exchange rate systems, each country maintains its own central bank and its own money. Therefore, the existence of different moneys, managed by different institutions with different preferences and policy objectives, makes divergencies in national inflation rates almost inevitable. This is not the case in a monetary union where the same money circulates everywhere, and is managed by the same central bank.

There are certainly a number of problems with this view of the transition to a

TABLE 13.5 Cumulative differentials of national (regional) inflation rates

	standard deviation	range
<i>Fixed Rate systems:</i>		
Bretton Woods (1961-68)	6.1%	20.0
EMS (1987-92)	6.4%	17.7
<i>Monetary union:</i>		
W. Germany (1986-90)	0.5%	1.0

Note: The range is defined as the difference (at the end of the period) between the price index of the country (Land) with the highest rate of inflation and the price index of the country (Land) with the lowest rate of inflation.

3. Lack of available data prevented us from computing differentials for comparable periods.

monetary union. Some of these problems have been discussed by the antagonists in the debate between the 'economists' and the 'monetarists' during the 1970s. The most serious one has to do with the fact that, even after monetary reform, some inertia in prices may continue to exist in the different member countries. For example, wage indexing and overlapping wage contracts introduce inertia in wages. When inflation rate differentials between countries are sizable at the moment of monetary reform, prices in these countries may continue to diverge after the introduction of monetary union. These problems can be solved, however, by introducing transitional clauses of contract adjustment, allowing the old contracts (in the national currencies) to be converted into the contracts expressed in the new currency.

A second problem with the view that a monetary union could be launched without strict adherence to the nominal convergence requirements is the following. The nominal convergence requirements can be seen as showing the commitment to low inflation by the countries wishing to join the monetary union. This show of good behaviour prior to entrance in the union is needed, so it is argued, to guarantee low inflation in the future monetary union.

This view can certainly be questioned. For it is difficult to see why a policy of disinflation pursued by, say, the Italian authorities during the next few years will constrain the future Italian representatives on the board of the ECB in their monetary policy stance. There is no reason why the present policies will act as a disciplining device for future policy-makers.

What matters for the future policies of the ECB are the institutional provisions under which this institution will have to work. The Maastricht Treaty is very clear in this respect. The future ECB will be politically independent. It is now generally accepted that this political independence is of great importance to guarantee a low inflation (Alesina and Summers 1993; Cukierman 1992; Bade and Parkin 1982). The fact that countries have pursued certain policies under different institutional regimes prior to their joining the monetary union appears to be irrelevant for the future monetary policies of the ECB. There is therefore no need for the nominal convergence requirements.

## 5. Conclusion

In this paper we analysed the effects of the recent depreciations of the pound sterling, the peseta and the lira on the inflation rates in the respective countries. We attributed the low pass-through of the exchange rate changes on inflation to the deflationary effects of the high real interest rates. If the latter can come down in the near future, these depreciations are likely to lead to an acceleration of the inflation rates in the countries concerned. These increases in the rate of inflation are then likely to lead to more divergence of inflation in the European Community, thereby making the achievement of one of the entry conditions in the monetary union more difficult.

In the second part of this paper we questioned the need for inflation convergence as a precondition for joining a monetary union. It was argued that a monetary union is like a monetary reform, and that it can start without the tight inflation convergence requirement as defined in the Maastricht Treaty. This also leads to the conclusion that the likely increase in the inflation differentials among the

EMS-countries during the coming years should not be used as an excuse for postponing monetary union. This monetary union, if it is desired by the European countries, can be launched on time even if inflation differentials happen to have increased.

## Appendix to Chapter 13

We selected the following countries periods of exchange rate adjustments:

TABLE 13A.1 The sample of countries and exchange rate changes

Country	Period	Size of exchange rate change
Belgium	1969.4	6.0%
	1973.3	6.5%
	1982.2	5.9%
France	1969.4	9.0%
	1976.4	6.1%
	1982.3	4.4%
Ireland	1968.1	9.8%
	1973.3	13.9%
	1976.4	8.4%
	1986.3	7.0%
Italy	1969.4	6.0%
	1973.2	11.2%
	1976.1	11.9%
	1981.4	5.3%
Netherlands	1969.4	6.0%
Sweden	1969.4	6.0%
	1973.3	6.3%
	1977.4	6.9%
United Kingdom	1968.1	9.8%
	1973.3	13.9%
	1976.4	8.4%
	1980.4	-6.2%
	1986.1	9.1%

Note: a minus sign (-) is an appreciation.

In Table 13A.2 we present the results of estimating the complete equation [1]. The estimation procedure was ordinary least squares.

TABLE 13A.2 Estimation of equation [1]

Variable	coefficient	t-stat
constant	3.8	2.2
exchange rate	0.4	3.2
real interest rate	-0.98	-9.1
industrial production	-0.6	-1.6
Govt. budget deficit	-0.03	-1.9
world inflation	0.1	0.6
world indus. production	0.3	0.5
openness	0.1	0.1
DUMFIX	0.6	0.9
DUMAPPR	-6.6	-2.8

$R^2 = 0.96$

F-stat = 35.9

*Note:* DUMFIX is a dummy for observations of fixed exchange rate periods. DUMAPPR is a dummy when an appreciation occurs.

## PART FOUR

## INSTITUTION-BUILDING