# On the Reduction of Disinflation Costs: Fixed Exchange Rates or Central Bank Independence? *

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## I. Introduction

The Exchange Rate Mechanism (ERM) of the European Monetary System (EMS) is in shambles. Repercussions may be serious as the ERM is often regarded as a tool to combat inflation. Giavazzi and Pagano (1988) argue, for instance, that by pegging the exchange rate to the mark, the authorities of high-inflation countries have been able to convince the public of their commitment to reduce inflation. Moreover, by "tying their hands" authorities of the weaker ERM countries could reduce the costs of disinflation. Such reasoning is based on the assumption that a policy of no inflation is best in the long run, but that incentives exist which may induce governments to deviate from this optimal policy in the short run.[1] As the public has rational expectations, it will adjust its inflation expectations accordingly. So countries where monetary authorities have a weak anti-inflationary reputation may be caught in a trap of high inflationary expectations. Disinflation will entail a loss of output and higher unemployment, unless policy-makers can convince the public that they will not re-inflate in the future. Fixing the exchange rate *vis-à-vis* the mark may enhance the anti-inflation reputation of the authorities, thereby reducing inflationary expectations. In this way, disinflation

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[1] The basic credibility model is well described in Barro and Gordon (1983).

may be accelerated and come about at lower output cost. In this view, the ERM is a way to transfer some anti-inflationary credibility from Germany to the other member countries of the system (Gros and Thygesen 1992).

Apart from participating in the ERM, various other methods have been suggested to make low-inflation commitments of policy-makers credible, such as central bank independence. In this approach, the independence of the central bank removes – or at least reduces – a government's options for short-run discretionary policy action. Indeed, the inflation record of countries with a relatively independent central bank generally outperforms that of countries where the central bank comes under the direct control of the government, regardless what measure for central bank independence is used.[2] Whether improved inflation performance has come about at lower costs, however, remains, to be seen.

Empirical studies generally test the credibility hypothesis by comparing the disinflation costs in both ERM and non-ERM countries; most of these studies do not lend much support to the credibility hypothesis.[3] Recently, Egebo and Englander (1992, p. 51) concluded, for instance, that "policy credibility in ERM countries has not significantly reduced the costs of disinflation". A similar conclusion is reached by Dornbusch (1989) and Gros and Thygesen (1992). De Grauwe (1990) even found that the inflation/unemployment trade-off worsened during 1978-88 in the EMS countries. Thus, either expectations about inflation have not responded to the increased credibility of exchange rate policies, or labour market institutions and rigidities have prevented lowered expectations from being translated into lower inflation.

However, most empirical studies take it for granted that exchange-rate policies of monetary authorities are credible. Given the large number of realignments before 1987, this is hardly a realistic assumption. In this paper, therefore, we first test whether exchange rate policies are indeed credible, before examining the costs of disinflation. Our sample consists of four small European countries: Austria, Belgium, Denmark and the Netherlands. These countries

[2] See de Haan and Sturm (1992) for a review and new evidence.

[3] An exception is Giavazzi and Giovannini (1988) who conclude that membership of the ERM decreased the costs of disinflation for high-inflation countries. Similar findings are reported by Robertson and Symons (1992). Kremers (1990) also concludes that ERM membership did help to curb inflationary expectations in Ireland.



provide ample opportunities to test the credibility hypothesis. Austria[4] and, to a lesser extent, the Netherlands have consistently stabilised their exchange rate *vis-à-vis* the mark, while the Danish 1982 stabilization program aimed to stop the previous policy of creeping devaluations and to peg the krone to the mark (De Grauwe and Vanhaverbeke 1989); Belgium has recently also opted for the hard-currency line.

Following a test recently suggested by Svensson (1991), we conclude that exchange-rate policies in these countries lacked long-run credibility most of the time (Section II). So it should hardly come as a surprise that the costs of disinflation were not found to be lower. For those periods with a credible exchange-rate policy, we do find some evidence that the costs of disinflation have been reduced due to (credibly) fixing the exchange rate *vis-à-vis* the mark (Section III).

Finally, we examine whether disinflation costs are lower in countries with an independent central bank. Using a measure of central bank independence based on Grilli *et al.* (1991) we do not find evidence that central bank independence reduces the costs of disinflationary policies (Section IV).

## II. Testing the Credibility of Exchange Rate Policies

In order to determine whether exchange rate policies of the countries concerned have been fully credible over the last decade, we use a simple test which has been developed by Svensson (1991).[5] Given foreign (*i.e.* German) interest rates, limits to the size of depreciation or appreciation as indicated by the existence of a target zone (defined by $\theta u$ and $\theta l$, being the upper and lower limits for the exchange rate) imply limits to domestic currency rates of return on foreign investment. Such limits define a rate-of-return band around

[4] Although Austria is not a member state of the EMS, it has pegged its currency to the Deutsche Mark and can be regarded as a shadow member of the EMS.

[5] For more details about this test and an application to the Swedish krona, see Svensson (1991). See also Knot and de Haan (1993). An alternative test has been suggested by Weber (1991).

the foreign interest rate, where upper ($ru_t$) and lower bounds ($rl_t$) are given by:

$$ru_t = (1+r_t^*)\,[\theta u/\theta_t]^{1/\tau} - 1 \qquad (1a)$$

and

$$rl_t = (1+r_t^*)\,[\theta u/\theta_t]^{1/\tau} - 1 \qquad (1b)$$

where $r_t^*$ denotes the German interest rate; $\theta$ is the price of foreign currency measured in units of domestic currency and $\tau$ is the term to maturity. Assuming sufficiently free capital mobility,[6] so that no international arbitrage possibilities remain, the exchange rate regime can only be completely credible for the time horizon implied by the term of the investment, if the domestic interest rate for that term is inside the rate-of-return band. If it is outside that band, investors must perceive a risk of a change in the exchange rate (shift of the band) before maturity.

Figures 1-4 show the outcomes of this simple test on the credibility of exchange rate policies for Austria, Belgium, Denmark and the Netherlands using long-term interest rates. Monthly data on long-term interest rates have been taken from the IMF's *International Financial Statistics*. The target zone width has been set at plus or minus 2.25 percentage points.

The central parities for the Schilling/DM exchange rate has been taken from Österreichische Nationalbank (1991), while the other central parities have been collected from various issues of *The Quarterly Bulletin of de Nederlandsche Bank* (the Dutch central bank).

From figures 1-4 it follows that in most countries exchange-rate policies have not been credible in the longer run. In Austria, which has consistently chosen the hard-currency option, exchange-rate policy only becomes credible after 1987. Similarly, the Dutch long-term interest rate moves within the band only after 1988. In Belgium and Denmark, exchange-rate policies have not been credible in the long run. These findings provide an interesting opportunity to test the credibility hypothesis: the costs of disinflation in the period

[6] Although Belgium had a two-tier exchange rate system until July 1993, which is equivalent to capital controls, De Grauwe and Vanhaverbeke (1989) note that capital flows were mostly free in Belgium during the 1980s. The Danish capital and exchange controls were abolished in 1982. The Netherlands had a very liberal financial system during the period under consideration. In Austria, liberalization measures were only taken during the second half of the 1980s, so the test results for Austria have to be interpreted with some care.



FIGURE 1

CREDIBILITY OF AUSTRIAN EXCHANGE-RATE POLICY

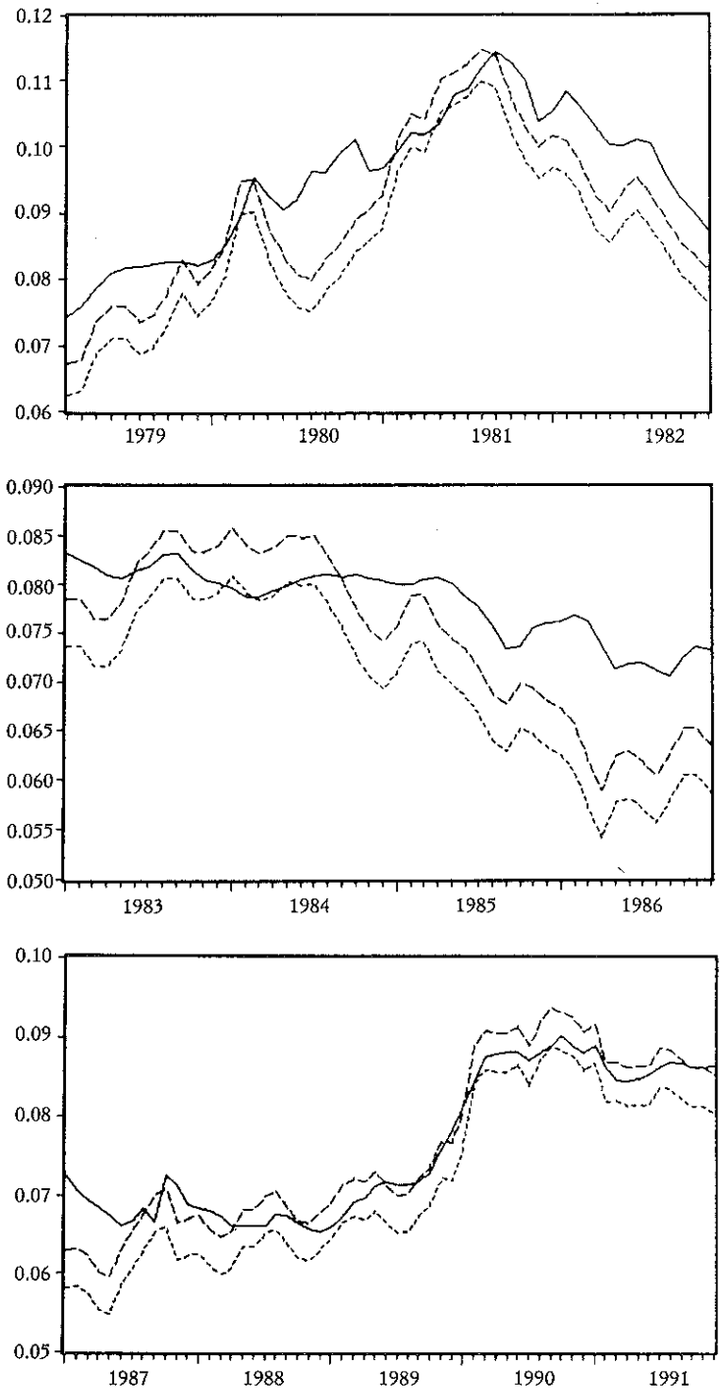


FIGURE 2

CREDIBILITY OF BELGIAN EXCHANGE-RATE POLICY

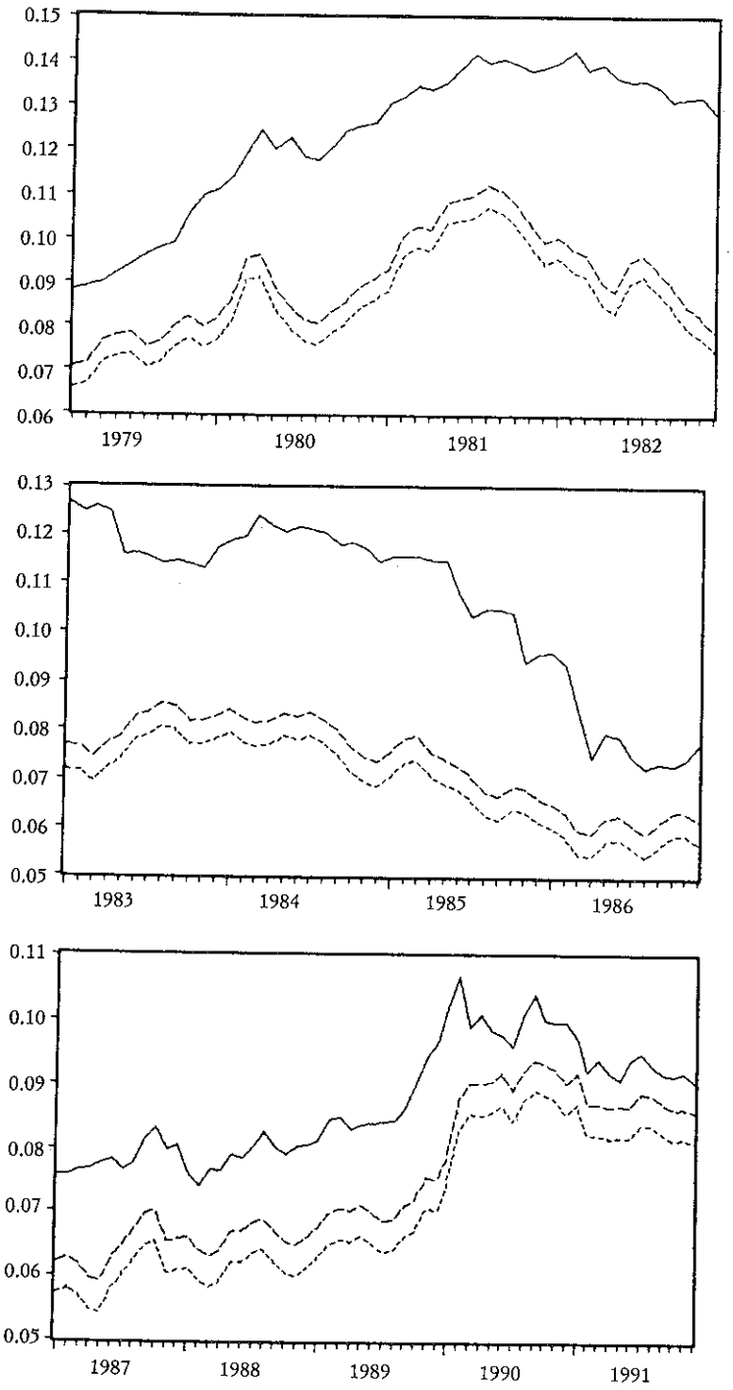





FIGURE 3

CREDIBILITY OF DANISH EXCHANGE-RATE POLICY

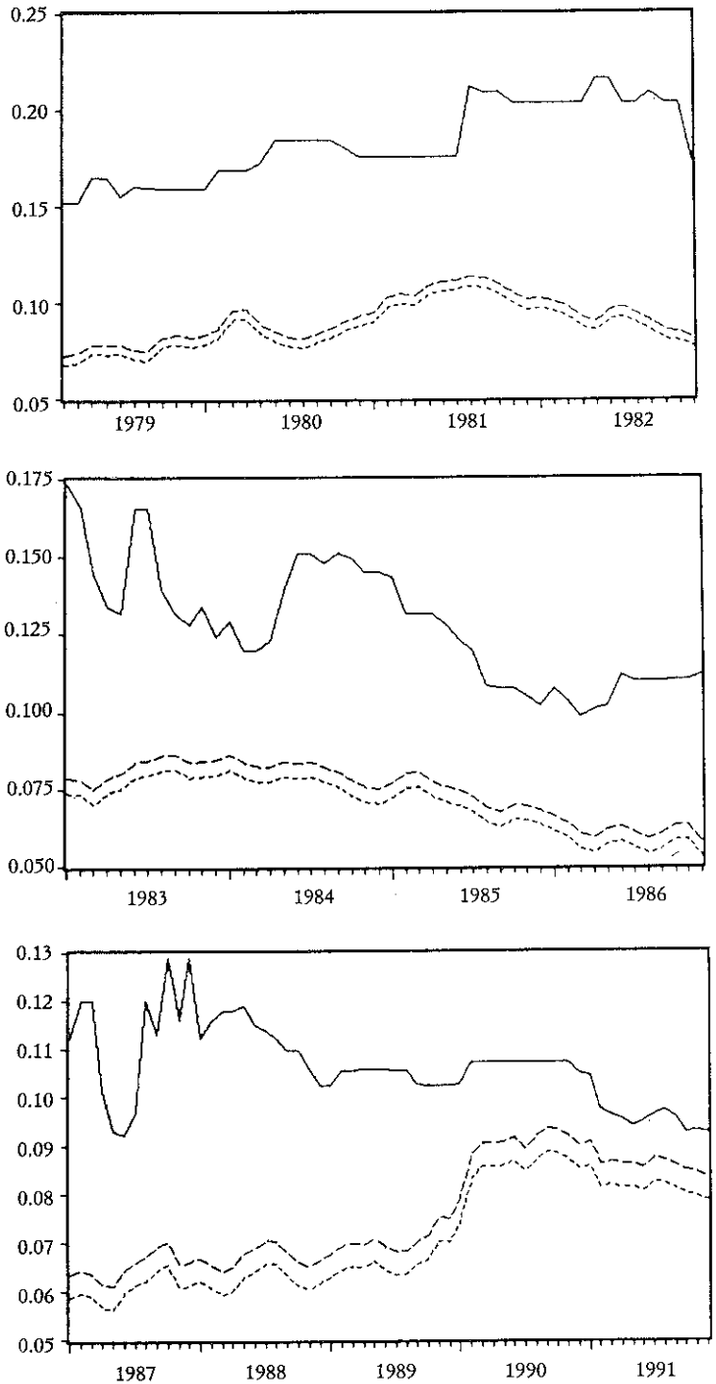
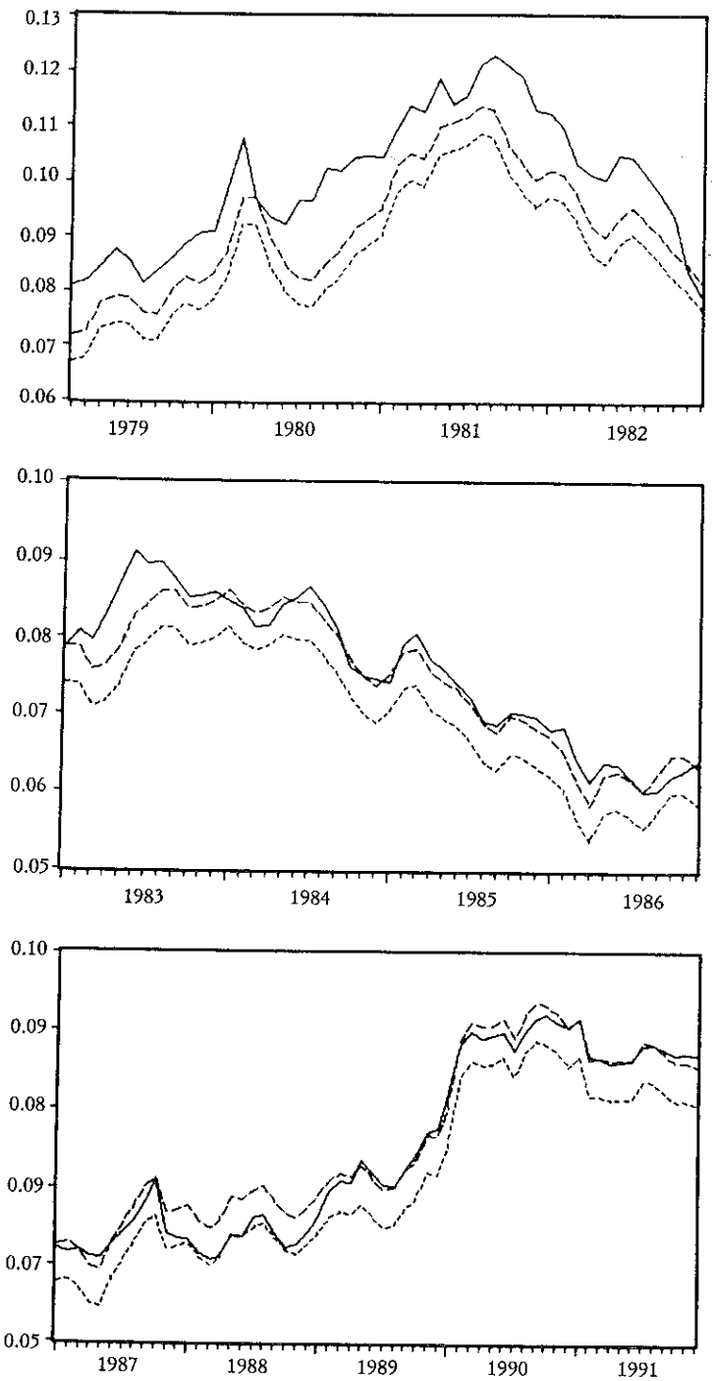


FIGURE 4

CREDIBILITY OF DUTCH EXCHANGE-RATE POLICY






1987-1991 should be lower in Austria and the Netherlands than they were in Belgium and Denmark. Furthermore, disinflation costs should be lower in Austria and the Netherlands for the period 1987-1991 than for earlier periods when the exchange-rate policy lacked credibility. The following section presents evidence on this issue.

## III. Sacrifice Ratios Compared

Probably the most simple way to measure the costs of disinflation is the so-called "sacrifice ratio", which is the ratio of the *changes* in unemployment and inflation over a given period. The sacrifice ratio attempts to measure the costs of reducing inflation in terms of unemployment. This yardstick has been used by Dornbusch (1989), Egebo and Englander (1992) and Gros and Thygesen (1992) to test the credibility hypothesis.

Table 1 displays sacrifice ratios for the three ERM member states and Austria. The data are all taken from various issues of the OECD *Economic Outlook*. The sacrifice ratio is defined as the change in the average unemployment rate over the change in average inflation for the periods indicated. Inflation is measured as the percentage change of the private consumption deflator, while unemployment is measured using the standardised unemployment rate for Belgium and the Netherlands and national unemployment figures for Austria and Denmark. Three periods of equal length have been discerned: 1979-82, 1983-86 and 1987-91. The years 1979-82 are taken as the base period.[7]

TABLE 1

SACRIFICE RATIOS

| Countries | Periods compared: | 1987-91/1979-82 | 1983-86/1979-82 |
|---|---|---|---|
| Austria | | –0.4 | –0.5 |
| Belgium | | 0.3 | –0.9 |
| Denmark | | –0.2 | –0.2 |
| Netherlands | | –0.1 | –0.8 |

*Note:* The sacrifice ratio is defined as the change in average unemployment rate over two periods divided by the change in average inflation during the same periods.

[7] So the first entry in Table 1 is the average unemployment rate in Austria over the period 1987-91 minus the average unemployment rate over the period 1979-82, divided by the average inflation rate during 1987-91 minus the inflation over 1979-82 ($\Delta U/\Delta P$).

It follows from Table 1 that the costs of disinflation during the last sample period – during which the exchange rate policy of Denmark and Belgium was not credible, in contrast to the exchange-rate policies pursued by Austria and the Netherlands – are not systematically lower in countries with a credible exchange-rate policy.

However, it also follows from Table 1 that the sacrifice ratio in Austria and the Netherlands is lower in the period with a credible exchange-rate policy than during the period which is characterized by the absence of a credible exchange-rate policy. So, if one takes the credibility of the exchange-rate policy into account, it is quite clear that our results do not agree with the conclusions of most previous studies: there is *some* evidence that ERM membership reduces the costs of disinflation.

## IV. Central Bank Independence and Disinflation Costs

One may argue that the basic institutional flaw in other EMS member countries than Germany, perhaps explaining why they participated in the ERM in the first place, is their lack of central bank independence (Melitz 1988). Neumann (1991) argues that the provision of a constitutional status of independence to the central bank is an effective device for a government to commit itself to price stability over an infinite time horizon. Indeed, according to Neumann, central bank independence solves the precommitment problem: "Complete independence appears to be the only institutional solution to generate among citizens the necessary trust and expectation that price stability, in the sense of a zero-rate of permanent inflation, will be kept over an indefinite time horizon" (Neumann 1991, p. 109).

If central bank independence enhances the credibility of disinflation, one would expect the costs of disinflation to be typically lower in countries with a relatively independent central bank. In this section, we will test this hypothesis using a recently suggested measure for central bank independence, based on the work of Grilli *et al.* (1991). Table 2 presents this index for central bank independence.



TABLE 2

CENTRAL BANK INDEPENDENCE MEASURE

| Country | (1) Independence measure | (2) Inflation reduction: 1979-89 (% point) | (3) Average inflation: 1979-89 (%) |
|---|---|---|---|
| 1. Australia | 9 | – 3.0 | 8.5 |
| 2. Austria | 7 | – 1.9 | 4.0 |
| 3. Belgium | 5 | – 0.5 | 4.7 |
| 4. Canada | 9 | – 3.8 | 6.4 |
| 5. Denmark | 6 | – 5.5 | 7.0 |
| 6. France | 5 | – 7.2 | 7.6 |
| 7. Germany | 12 | – 1.1 | 3.1 |
| 8. Greece | 4 | – 1.3 | 18.5 |
| 9. Ireland | 7 | –11.2 | 9.5 |
| 10. Italy | 5 | – 8.1 | 11.8 |
| 11. Japan | 5 | – 1.8 | 2.5 |
| 12. Netherlands | 10 | – 2.8 | 3.0 |
| 13. New Zealand | 3 | – 7.6 | 12.0 |
| 14. Portugal | 3 | –12.5 | 18.7 |
| 15. Spain | 4 | – 9.8 | 10.9 |
| 16. Switzerland | 10 | – 1.0 | 3.5 |
| 17. United Kingdom | 6 | – 7.8 | 7.7 |
| 18. United States | 11 | – 4.2 | 5.7 |

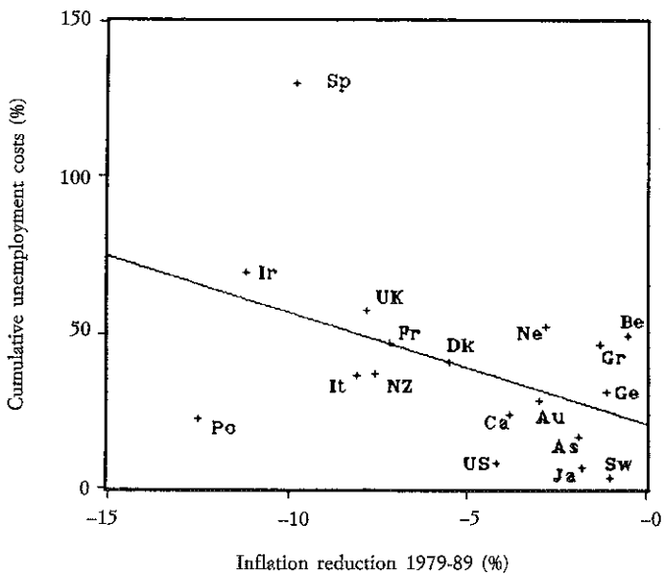
Our central bank independence measure – which is also used in de Haan and Sturm (1992) – is based on Tables 12 and 13 of Grilli *et al.* (1991), measuring both political independence (determined by: *i*) the procedures for appointing board members; *ii*) the relationship between the governing board of the central bank and the government; and *iii*) formal responsibilities for monetary policy) and economic independence (determined by the influence of the government in deciding how much to borrow from the central bank and the nature of the monetary instruments under central bank control). The measure of independence used in our empirical analysis is based on the total number of entries in both tables, except for the entries which are related to supervision of the banking system. Whether or not a central bank has any responsibility for bank supervision provides, in our view, no information as to its independence. Although it is, without doubt, true that the "lender of last resort" function of a central bank may conflict with its task of safeguarding the currency, a transfer of the task of banking supervision to another organization would not remove this potential conflict. Thus, entries included are related to the appointment of the governing board, the relationship with government, the constitution, and monetary financing of the government's budget deficit. A higher number of entries implies more independence.

The second and third column of Table 2 show the inflation reduction over the period 1979-89 and the average rate of inflation during the period, respectively. In accordance with the results reported by de Haan and Sturm (1992), the table gives the impression that countries with a high score on the independence "hit list" have a low level of inflation.[8] Indeed, the Spearmann correlation coefficient is 0.64, which is significant at the 1% level.

In order to test whether the better inflation performance has been achieved at lower costs, we have followed the approach suggested by Robertson and Symons (1992), who estimated a simple model of disinflation costs. The measure of disinflation costs is the cumulated unemployment rate over the period 1980-89 relative to its average level 1973-79. Figure 5 shows the inflation reduction between 1979-89 and disinflation costs.

FIGURE 5

DISINFLATION COSTS




[8] One may, of course, argue that it is not so much central bank independence which really matters, but the sensitivity of the population to inflation. In this view, Germany has the most independent central bank due to its inflation history, which resulted in broad support for a stringent anti-inflation policy.



Regressing the inflation reduction on the unemployment costs yields:

$$(\text{unempl. costs})_i = \underset{(2.0)}{21.2} - \underset{(-2.1)}{3.56}\ (\text{inf. reduction})_i; \qquad R^2\ (\text{adj.}) = 0.16$$

where t-statistics are shown in parentheses and *i* indexes countries. The Jarque-Bera normality test statistic is 5.43 indicating normality of the residuals. Heteroscedasticity is also no problem as the LM-test statistic (with four lags included) on autoregressive conditional heteroscedasticity (ARCH) is 1.61. The regression line is also shown in Figure 5.

Next, we have added a central bank independence dummy as an additional explanatory variable. This dummy is one if the central bank independence measure is above the average independence measure for the 18 countries shown in Table 2, and zero otherwise. This gave the following results:

$$(\text{unempl. costs})_i = \underset{(2.0)}{28.3} - \underset{(-1.7)}{3.07}\ (\text{inf. reduction})_i - \underset{(-0.8)}{10.38}\ \text{dummy}_i$$

$R^2\ (\text{adj.}) = 0.14$

The Jarque-Bera test-statistic (4.54) and the ARCH-test (2.94) indicate normality and homoscedasticity, respectively. The coefficient for the central bank independence variable is not significantly different from zero. So our results suggest that central bank independence does not really help to reduce disinflation costs.

## V. Concluding Comments

Various institutional solutions have been proposed to reduce the costs of disinflation in terms of lost output and increasing unemployment.[9] According to the credibility model, institutional changes may increase the credibility of low-inflation policies, thereby reducing inflationary expectations. As pointed out by Egebo and Englander

[9] Other suggestions not dealt with in this paper include tying policy to a rule, and choosing an individual well known for anti-inflationary views. For a detailed analysis of the implications of selecting such a policy-maker we refer to Rogoff (1985).

(1992), the view that credible disinflationary policies will succeed in curbing inflationary expectations requires the economy to have a specific underlying structure. Wage- and price-setters are assumed to be forward-looking in their behaviour and wages and prices should be flexible so as to permit lower inflationary expectations being translated into prices, which assumption may, for a variety of reasons, not be true. In this paper we have shown that credibly fixing the exchange rate *vis-à-vis* the mark may reduce disinflation costs over time. There is, however, no evidence that countries with credible exchange-rate policies or with an independent central bank have lower costs of disinflation. This does, of course, not imply that these policy options are useless. Indeed, fixing the exchange rate may reduce exchange-rate uncertainty, thereby furthering international trade. Similarly, increasing central bank independence may lead to improved inflation performance. Still, the evidence presented in this paper supports the traditional view that inflation can only be brought down at the expense of rising unemployment.

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