

INFLATION, DISTORTIONARY TAXATION AND THE DESIGN OF MONETARY POLICY:
the role of social cohesion

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Research Memorandum WO&E nr 508/9723

July 1997

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1 INTRODUCTION

The relationship between central bank independence and inflation has received considerable attention in the recent literature on monetary policy. The theoretical literature, using concepts from game theory, predicts a lower inflationary bias in countries where the central bank is not subject to governmental interference. Empirical studies attempt to show that this relationship between independence and price stability indeed exists in the real world. The principal-agent approach to monetary policy design, finally, recommends an institutional environment in which the central banker is rewarded for keeping prices stable, while stabilizing the economy against real shocks that reduce output 'too much' (for an overview, see Prast (1996b)).

Despite the overwhelming amount of literature, many questions in this area remain unresolved. The measurement of central bank independence is not undisputed. Furthermore, if a correlation exists between independence and inflation, it may be the result of a third factor, or the causation may run from the latter to the former. Moreover, if the theory holds, in the real world some other characteristics would have to show up. For example, the inflationary bias would have to be higher, c.p., in countries with more rigidities and distortions in the labour market or monopoly power by firms (Goodhart, 1994; Blanchard and Fischer, 1989). These issues have thus far been neglected in most empirical studies, exceptions being Goodhart (1994) and Heylen and Van Poeck (1996).

The aim of this paper is to analyze the issue of independence and inflation, taking the degree of labour market distortions as well as other relevant characteristics into account. Our conclusion will be, that the predicted relationship between distortions and the inflationary bias does not show up in the real world. Rather, the opposite is true: countries with more distortionary taxation exhibit lower inflation and more commitment to a monetary policy directed at achieving price stability. In our view, this reflects the importance of another factor -

social cohesion - affecting both inflation and the regime of monetary policy. If social cohesion is measured by the expenditures on social protection as a fraction of gdp, the data for the European Union indeed show a significant downward effect on inflation. As taxes are levied partly in order to finance these expenditures, this may explain why no positive correlation is found between the degree of distortionary taxation and the inflationary bias, if no account is taken of the degree of social cohesion. If the latter is included, the predicted positive effect of distortionary taxation shows up. Gdp per head turns out to be a significant factor as well: the higher per capita income, the lower inflation. Insofar social cohesion is lower in poor countries, this would provide additional support for our hypothesis that social consensus is crucial for the feasibility of a monetary policy regime directed at price stability.

The paper is structured as follows. In the next section, we outline the theoretical model underlying the literature on the inflationary bias of monetary policy. Section 3 assesses the results of existing empirical work on independence and inflation. Sections 4 and 5 present the results of our empirical investigation into the role of distortionary taxation and social cohesion in the context of inflation and the monetary policy regime. The paper ends with a summary and conclusion.

2 THE THEORETICAL FRAMEWORK

Underlying the game-theoretic analysis of monetary policy is the Lucas supply model, which assumes that real output effects can be established through surprise inflation. An important feature of the analysis is that the government wishes to bring output above the 'natural' level, i.e. the level where expected inflation equals actual inflation. As this can be realized only by surprising the private sector, it is obvious that in a world with rational expectations and perfect information this attempt is bound to fail. The second-best solution - zero inflation and zero inflationary expectations - is not attainable because there is an incentive for the government to deviate from the zero inflation rule. Therefore, the third-best solution is the likely outcome. The result

implies that the inflationary bias will be higher, the more the government wishes to bring output above the natural level. The traditional approach to analyze monetary policy in a game-theoretic framework is to define an objective function for the policy maker. Usually, this is assumed to be the social welfare function, containing output and inflation as arguments. The government wants to minimize deviations from the equilibrium level of output, defined as the output level in the absence of rigidities and distortions (Blanchard and Fischer, p. 577). As rigidities and distortions cause the natural rate of output to be too low (i.e. lower than the equilibrium level), the government aims at bringing output at a level above the natural rate (Cukierman, 1989; Goodhart, 1994). Hence the inflationary bias can be expected to be positively related to the degree of labour market distortions in the economy. Distortions may take the form of taxation, minimum wage legislation, social security regulations and the like. We shall turn to this in section 4. Formally, the relationship between distortions and the inflationary bias can be derived as follows. The model of the economy is given by

$$y = \hat{y} + \pi - \pi^e \quad (1)$$

where y is output, \hat{y} is natural output, π is inflation and π^e is expected inflation.

The social welfare function is given by

$$W = -a\pi^2 - (y - k\hat{y})^2 \quad (2)$$

where $k\hat{y}$ is the target rate of output, with $k > 1$. As $(k-1)\hat{y}$ is the difference between the socially optimal output and the natural rate of output, $k-1$ can be interpreted as a measure of the degree of distortion in the economy.

Optimizing the social welfare function (2) with the help of monetary policy (assuming that the rate of inflation is the instrument), subject to the constraint given by the economic model (1), yields:

$$\pi = [1/(1+a)][(k-1)\hat{y} + \pi^e]$$

which under rational expectations ($\pi = \pi^e$) implies:

$$\pi = \pi^e = (1/a)(k-1)\hat{y} \quad (3)$$

Equation (3) reflects the relationship between the inflationary bias on the one hand and the government's (or society's) inflation aversion, a , and society's degree of distortion, $k-1$, on the other. Obviously, a and k are difficult to identify empirically. Moreover, they may be interrelated, as some authors argue that the benefits from price stability depend positively on the degree of distortions in an economy (Feldstein, 1996).

Empirical studies, focusing on the effect of the institutional design of monetary policy, have neglected the role of distortions in explaining the inflationary bias. In terms of equation (3), the focus has been on the monetary policy maker's inflation aversion a . By appointing a conservative central banker, (very large a) and granting him independence, the inflationary bias can be reduced according to this approach 1). No attention has been paid to the underlying factors influencing society's inflation aversion, however.

As equation (3) shows, the bias could also be reduced by eliminating the degree of distortions, bringing $k-1$ close to zero. However, labour market distortions are difficult to eliminate. Often they are the result of deliberate policy considerations regarding income distribution, social security, social consensus and peaceful relations in the labour market. Changing the design of monetary policy is easy to imply and is assumed not to have adverse side effects: it can be regarded as a free lunch. This may explain why the focus in discussions about ways to eliminate the inflationary bias has been on the monetary policy design. Still, when measuring the effect of the institutional framework of monetary policy on inflation other relevant factors should be taken into account. Otherwise, the effect of central bank independence might be

1) Rogoff (1985) has shown, that in a two-party system society chooses a central banker that is more conservative than the median voter.

misunderstood. Furthermore, the determinants of society's inflation aversion deserve attention. To this we shall turn in sections 4 and 5.

3 CENTRAL BANK INDEPENDENCE AND INFLATION: AN ASSESSMENT OF THE EMPIRICAL EVIDENCE

Most empirical studies into the relationship between central bank independence and the inflationary bias conclude that autonomy for the central bank is good for price stability. This is seen as a confirmation of the theory in this area. It is also used to advocate institutional changes towards central bank independence in the real world. In our view the role of central bank independence is overstated in a number of respects, however. In reality central banks are much less independent than is usually assumed. For example, the independence measures do not take account of the fact that in all countries it is the government that decides over the direction of exchange rate policy. Of course, the day to day management lies in the hands of the central bank. But if a country adheres to an exchange rate mechanism, the interest rate cannot be freely used as a monetary policy instrument (Neumann, 1991) 2). Moreover, if by central independence is meant that the government delegates some functions to a monetary policy maker, than it is a trivial meaning (Friedman, 1962). A truly independent central bank is outside the regular political channels. The Maastricht Treaty (art. 107) and the Statutes of the ESCB (art. 7) guarantee such a position for the future European Central Bank, but thus far no existing central bank is given true legal independence. As Capie and Goodhart (1995) argue, in extreme situations - that make disagreement between the government and the central bank more likely - the government has the final say. A standard example is of course a situation of war, but maybe the German unification is more illustrative. A recent example is given by the row between the Bundesbank and German Finance Minister Waigel over the valuation of gold reserves and, more importantly, the subsequent announcement by the Bundesbank of its planned revaluation of dollar

2) It should be kept in mind, that decisions over exchange rate policy have always been in the hands of the government, even during e.g. the Gold Standard.

reserves, with the profits going to the German budget. According to Capie and Goodhart it is, moreover, the political and economic philosophy in an era that is decisive for the direction of monetary policy. The financial sector as an interest group may also play a key role. For a set of 32 countries Posen (1995) shows, that the degree of effective financial opposition explains both inflation and central bank independence. The latter is measured by the index developed by Cukierman et al. (1992) and includes elements reflecting the central bank's freedom to decide over monetary policy, as well as the degree to which society has chosen price stability as the major goal of monetary policy. From Posen's study it appears that the structure of a country's financial sector may be regarded as a third-factor effect, influencing both the institutional design of monetary policy, and inflation. Most independence measures tend to be biased at finding the hoped-for relationship between independence and inflation (Romer, 1995). In this regard it is useful to keep in mind that what is called independence is not so much legal autonomy, but rather the commitment of society to use monetary policy for achieving price stability. If evaluation takes place according to true independence, the empirical relationship between independence and inflation is quite weak (Prast, 1996a). Finally, some authors argue that empirical validation of the theory should focus on long nominal interest rates rather than inflation, as - in contrast with the assumption made in the theory - current inflation is not under control of the monetary authority (Rovelli, 1997). Anyway, a conclusion to be drawn from the empirical evidence is that it is society's commitment to a monetary policy rule, rather than legal independence, that is decisive both for the central bank's actual freedom to manage monetary policy, and for price stability. In the remainder of this paper it is investigated, first, how the relationship between the monetary policy regime and inflation is affected if account is taken of distortions and, second, where society's commitment to price stability may come from.

4 DISTORTIONS, COMMITMENT TO PRICE STABILITY AND THE INFLATIONARY BIAS OF MONETARY POLICY.

As the model set up in section 2 shows, both society's inflation aversion, a , and the difference between the equilibrium level of output and the natural rate of output, $k-1$, affect the inflationary bias. The inflation aversion may be reflected by the monetary policy design. The 'distortion gap' is the result of, among other things, distortions, especially in the labour market.

To see whether the latter does indeed affect inflation, in this section we shall develop a measure for a country's degree of (labour market) distortions. We shall investigate whether there is empirical evidence for a relationship between the design of monetary policy and inflation if account is taken of the differences in the degree of distortion between countries.

Taxation, unionization, minimum wage legislation and the system of social benefits are all factors influencing the behaviour of groups in society. The theory predicts the incentive to stimulate output, and hence the inflationary bias, to be larger in countries with more labour market distortions. Goodhart (1994) analyzes the effect of unionization on inflation separately and finds no significant effect. We shall concentrate on labour market distortions through income taxation. Obviously, any tax other than lump sum may affect decisions of labour supply. Thus, a value added tax on consumption goods reduces the amount of consumption that can be bought out of labour income. It may therefore affect the choice between consumption and leisure. Taxation of savings may also affect choices of labour supply, e.g. through retirement behaviour. A complicated tax system itself may be socially sub-optimal, diverting resources from efficient use (from a macroeconomic point of view) to rent-seeking behaviour (OECD, 1995). Furthermore, taxation of capital and labour may affect the demand of labour, which can reduce employment for a given level of output. In what follows we shall concentrate on income taxation and social security contributions, as these are likely to have the most direct effect on the labour market. If income taxation is used to measure distortion, there is a range of possible indicators from which to choose: total income tax revenues as a

fraction of gdp, marginal rates, average rates etc. We have looked at three different measures, namely the average income tax rate for an average production worker (one-earner family, two children), total revenues from personal income taxation, and the sum of revenues from personal income taxation and social security contributions, both expressed as a percentage of gdp at market prices.

Although it is obvious that social security contributions do affect the difference between wages paid and disposable income of employed just as do taxes, we do not believe they should be treated in an identical manner. As a rule, social security contributions entitle those who pay them - the employed - to benefit from various funds that are not open to those outside the labour force. For example, they ensure income in case the worker gets ill. In that sense, they can be treated more or less on an equal footing with private insurances. The revenues from taxation, on the other hand, are used for government expenditures on goods and services that are not merely available to those who pay taxes. Still, it is obvious that an obligatory system of social security contributions limits the workers freedom of spending and may therefore distort incentives. Moreover, part of the revenues from social security contributions are used for expenses that accrue to all in the labour force. When analyzing the effect of distortionary taxation on inflation, we evaluate central bank independence with the measure introduced by Cukierman et al. (1992). Although we are critical of this measure (see Prast (1996a), it is often used by or referred to by other authors, which is why we employ it here. It should be stressed, that this measure entails both elements reflecting central bank autonomy (i.e. protection against dismissal, final authority in case of conflicts) and elements reflecting commitment to price stability, which limit rather than increase the central bank's freedom to choose monetary policy according to its own goals (i.e. price stability as sole legal objective of monetary policy, limits on lending to the government). We memorize that this measure does not take into account that, even if the central bank formulates policy and has final authority in case of conflicts, it is the Minister of Finance who decides over the exchange rate. This is especially important, of course, in countries that participate in an exchange rate agreement. Our empirical analysis focuses on the 15 countries of the European Union (EU).

As an additional explanatory variable we use the actual turnover rate of the central bank president, as this may be a measure of the degree to which the central banker's view of the monetary policy to be implemented is in conflict with that of the government. To assess the effect of distortionary taxation as well as the effect of central bank independence taking account of differences in taxation across countries, we have estimated the following type of equation:

$$\pi_i = b + a_1 \text{INDEPCUK}_i + a_2 \text{TAX}_i + a_3 \text{TURNOVER}_i$$

where π is the average rate of inflation in country i in the period , 1961-1996, INDEPCUK is the degree of independence according to Cukierman's index mentioned in section 3, TAX is a measure of the degree of distortionary taxation and TURNOVER measures the actual turnover rate of the central bank governor since the Second World War. For TAX we have used the various variables mentioned earlier (see also the explanatory note to Table 1).

As Table 1 shows, income taxation does not seem to increase inflation; often, the sign is even negative, and sometimes (in equation 1c) significant. This suggests, that there is no empirical evidence of the upward effect of distortionary taxation on the inflationary bias of monetary policy as predicted by the standard theoretical model. However, this may be due to another factor, which we shall investigate in the next section. Furthermore, legal independence does not seem to matter very much for monetary policy. This may be because, inside the European Union, governments decide over the exchange rate. Where it is decided to participate in the ERM, central bankers adjust monetary policy to keep their exchange rate pegged, whether they are independent or not. The degree to which they succeed in doing so may depend on factors outside

Table 1 Inflation, central bank independence and taxation

	Equation 1a	Equation 1b	Equation 1c
CONSTANT	7.86 (3.44)	13.35 (2.19)	11.94 (3.33)
INDEPCUK	-1.78 (0.35)	-2.64 (0.63)	-3.21 (0.90)
TURNOVER		3.55 (1.26)	3.76 (1.67)
TAX	-0.02 (0.31)	-0.18 (1.76)	-0.27 (2.88)
R ² (adj)	-0.15	0.29	0.48
number of observations	15	15	15

Explanatory note:

t-values in parentheses

INDEPCUK = index of legal central bank independence developed by Cukierman (1992)

TURNOVER = turnover rate of central bank governor, 19 to 19 (source: Cukierman et al, 1992)

TAX (source: OECD, 1994 en 1995) =

in equation 1a: average personal income tax rate for an average production worker in 1990

in equation 1b: personal income tax revenues as a fraction of GDP, 1990

in equation 1c: personal income tax and social security contributions as fraction of GDP, 1990

the monetary sector, rather than on the institutional design of monetary policy. To this we turn in the next section. The results presented in Table 1 also indicate, that the actual turnover rate of the central bank president has a closer relationship with inflation than legal independence.

5 SOCIAL CONSENSUS, CENTRAL BANK INDEPENDENCE AND INFLATION

Society's inflation aversion can be measured in different ways. First, it can be evaluated by applying the 'revealed preference' concept to the design of monetary policy: the more directed at price stability this regime is, the higher the inflation aversion. Another approach is to investigate to what degree price stability is likely to be in a country's interest. It can be expected that a country's inflation

aversion depends on the benefits the country has from price stability. As Alesina and Wacziarg (1997) argue, small economies benefit most from (international) trade. Price- and exchange rate stability are likely to increase trade, hence it may be in the interest especially of small countries to keep prices stable. According to this reasoning one would expect country size to affect inflation aversion. We shall turn to this issue later. As we mentioned in section 2, Feldstein (1996) argues that the more distortions there are in an economy, the larger are the welfare effects of price stability. If this is true, countries with more distortionary taxation are likely to have a higher inflation aversion.

In the previous section we have searched for empirical evidence to support the theoretical prediction that labour market distortion through e.g. taxation has an upward effect on inflation. This effect would have to show up because distortions increase the divergence between the socially optimal and the natural rate of output or employment. No significant effect of either taxation or the legal design of monetary policy (combining central bank independence and society's legal commitment to price stability) on inflation was found in section 3, however. Society's revealed preference for price stability through the actual turnover rate of the central bank president, on the other hand, was found to reduce inflation significantly.

In our view, society's revealed preference for price stability originates in the real sector of the economy. Social consensus and a more equal income distribution are likely to increase the willingness of society to 'sacrifice' monetary policy totally to price stability. Income redistribution through the government may play an important role. It is quite likely that the countries with higher taxation are precisely those that have higher expenditures on social protection. This may result in a higher value of a , as in these countries inflation is not used as an instrument in a struggle over the income distribution. This effect - higher a - may more than compensate the upward effect on the bias of the distortionary taxation. In addition, satisfaction with the existing income distribution is likely to be greater in richer countries.

In this section we shall use the degree of social protection as a measure of social consensus. Social protection is measured by government

expenditures on a range of income transfers to those in society that are less capable of earning income. These transfers include widow and orphan protection, maternity and child care allowances, old age pensions, unemployment benefits, and invalidity/disability and sickness benefits. We have estimated the following equation:

$$\pi_i = b + a_1 \text{INDEPCUK}_i + a_2 \text{TURNOVER}_i + a_3 \text{SOCPROT}_i + a_4 \text{TAX}_i + a_5 \text{ERM}_i \\ + a_6 \text{GDPHEAD}_i$$

where SOCPROT measures the government expenditures on social protection as a fraction of gdp and ERM measures the number of years that a country has participated in the ERM since its start. We have introduced the latter as an explanatory variable because it may reflect a country's degree of inflation aversion.

The results are given in Table 2. As our analysis is based on a cross section for a limited number of countries (15), it was not feasible to introduce all possible explanatory variables in one regression equation. Therefore, Table 2 gives the results for various different combinations of the explanatory variables.

From Table 2 a number of interesting conclusions can be drawn. The first is, that social protection has a significant downward effect on inflation. This result is robust, as both Table 2 and additional estimation results not presented here have shown. The second is, that the number of years of participation in the ERM does have a significant correlation with price stability. The direction of causation is not obvious here, however. Another important explanatory variable is GDP per head, which has a significantly positive (and robust) effect on price stability.

Table 2 Inflation, central bank independence and social protection

	Eq 2a	Eq 2b	Eq 2c	Eq 2d	Eq 2e	Eq 2f
CONSTANT	14.97 (4.46)	11.23 (4.46)	10.60 (2.77)	18.59 (8.30)	15.83 (6.95)	19.03 (8.81)
INDEPCUK	-3.11 (0.75)		-1.94 (0.51)			
TURNOVER		5.84 (3.15)	4.51 (1.88)			
SOCPROT	-0.25 (2.55)	-0.36 (4.08)	-0.21 (2.29)	-0.14 (2.06)	-0.26 (3.36)	-0.26 (2.76)
GDPHEAD				- 0.08 (3.98)		-0.05 (1.94)
TAX		0.15 (2.87)				0.07 (1.37)
ERM					-0.18 (2.95)	-0.09 (1.45)
R ² (adj)	0.25	0.64	0.38	0.66	0.54	0.70
number of obs.	15	15	15	15	15	15

Explanatory note:

t-values in parentheses

SOCPROT = expenditures on social protection as a fraction of GDP, namely expenditures on invalidity/disability and sickness benefits, unemployment benefits, maternity benefits and child allowances, old age pensions, widow and orphan protection and miscellaneous, 1993 (sources: Purton (1996), OECD, Eurostat)

TAX = average rate of personal income taxation for an average production worker, 1990

GDPHEAD = gdp per head, as % of EU average, 1996 (ppp)

ERM = number of years that a country has participated in the ERM since its start in 1979

for other explanatory variables: see note to Table 1.

Hence richer countries do find it easier, *ceteris paribus*, to keep inflation low. As we observed earlier, in richer countries social cohesion may be higher. Table 2 also shows, that the introduction of social protection as an explanatory variable changes the sign of the coefficient of taxation, making it in line with the theoretical prediction. As equation 2b shows, this effect is significant. Social cohesion can also be measured by peace in the labour market. Strikes are a sign of protest, usually against the existing income distribution. As

additional regressions not shown in Table 2 suggest, the number of hours lost through strikes has a significant upward effect on inflation. Another conclusion from Table 2 is that legal central bank independence still does not seem an important factor influencing inflation (see equations 2a and 2c). The effect of the actual turnover rate is significantly positive. The causation here may run in two directions. In our view it is most likely that the turnover rate is the explanatory variable. Although it cannot be excluded that central bankers are replaced because they have created price instability, we rather believe that the turnover rate reflects dissensus between society pressing for inflationary policy and a central banker refusing to create inflation 3).

6 CONCLUSION

From the analysis in this paper the following conclusions can be drawn. First, in the European Union legal central bank independence, if measured by the Cukierman index, does not seem to be a decisive factor for inflation if account is taken of distortionary taxation and/or social cohesion. A low turnover rate of the central bank governor, which may reflect consensus between the central bank and the government over monetary policy, has a small effect on price stability. At first glance, distortionary taxation does not seem to have a significant upward effect on the inflationary bias. However, this result is modified if account is taken of expenditures on social protection. Social cohesion, whether measured by expenditures on social protection, approximated by gdp per head, or by peace in the labour market, does significantly contribute to price stability. Finally, participation in the ERM, as a reflection of commitment to a monetary rule, is shown to be conducive to price stability.

3) According to Alesina and Wacziarg (1997), social consensus is likely to be larger where there is more cultural homogeneity, hence in smaller countries. They argue that smaller countries do have relatively large governments. Hence taxation must be higher. This effect on the inflation aversion α in equation (3) may offset the distortionary effect of taxation on $k-1$ in equation (3). We have not found an effect of country size, however.

In the introduction to this paper we stated that empirical research into the importance of monetary policy institutions for price stability should take factors into account that have thus far been neglected. We also argued, that the correlation between the institutional design of monetary policy and inflation may be due to a third factor. In this paper we have shown that social consensus does have a significant effect on price stability, but we have not found a significant effect of social cohesion on the legal design of monetary policy, as measured by the Cukierman index. Therefore, we cannot draw the conclusion that social cohesion acts as a third factor. Further research may be directed at explaining the institutional design of monetary policy and inflation simultaneously, taking various measures of central bank independence into account.

The results found in this paper may have important implications for the European Economic and Monetary Union. If social consensus in the Union as a whole is lower than that in individual countries - which seems likely -, then unification bears the risk of higher inflation as a result of dissent over e.g. the income distribution. On the other hand, if unification increases per capita income, especially in the relatively poor countries, then inflationary pressures may be reduced. Still, countries where the degree of social harmony is relatively high are likely to lose some of the benefits of the social stability that has been crucial to their low inflation record.

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APPENDIX

		infl	cbi	turn	tax1	tax2	tax3	erm	soc	gdp
1	Austria	4.4	0.61	0.77	4.0	41	22.0	2	30	110
2	Belgium	4.6	0.17	0.64	11.2	45	29.0	18	27	111
3	Denmark	6.4	0.50	0.23	35.5	49	27.3	18	34	115
4	Finland	6.7	0.28	0.61	23.0	45	26.5	1	35	96
5	France	6.0	0.24	0.77	0	44	29.0	18	30	106
6	Germany	3.4	0.69	0.51	7.9	37	25.0	18	31	109
7	Greece	12.1	0.55	0.74	5.6	37	16.0	0	15	65
8	Ireland	7.8	0.44	0.75	16.5	35	16.0	18	21	97
9	Italy	8.6	0.25	0.41	13.3	39	21.0	14	26	103
10	Luxembourg	4.2	0.33	0.39	0	49	24.0	18	25	166
11	Netherlands	4.3	0.42	0.23	9.9	45	24.0	18	24	107
12	Portugal	12.2	0.41	1.03	1.8	31	13.0	4	19	67
13	Spain	9.4	0.23	1.00	5.8	34	18.0	8	24	76
14	Sweden	6.4	0.29	0.83	33.3	56	35.0	0	40	99
15	United Kingdom	7.3	0.27	0.50	15.4	37	17.0	2	29	96

Explanatory note:

infl = average rate of inflation, 1961 - 1996

cbi = index of legal central bank independence (for details, see Cukierman et al (1992))

turn = turnover rate of central bank governor, 1945 -

tax1 = average personal income tax rate for an average production worker (one-earner family, two children) in 1990

tax2 = personal income tax revenues as a fraction of GDP, 1990

tax3 = personal income tax and social security contributions as fraction of GDP, 1990

erm = number of years that a country has participated in the ERM since its start in 1979 and up to 1997

soc = expenditures on social protection as a fraction of GDP, 1993 (invalidity/disability and sickness benefits, unemployment benefits, maternity benefits and child allowances, old age pensions, widow and orphan protection and miscellaneous)

gdp = gdp per head as percentage of EU average, 1996 (purchase power parity)

Sources: Cukierman et al (1992), OECD (1994, 1995), Eurostat, Purton (1996)