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Central Bank Conservatism and Labor Market Reform*

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Abstract

How does central bank conservatism affect labor market reform? In this paper we examine the economic forces at work. An increase in conservatism triggers two opposite effects. It reduces the inflation bias of discretionary monetary policy and hence the benefits of a reform. It also increases unemployment variability, which increases the precautionary benefits of a reform. In combination, the two effects produce a u-shaped relation between conservatism and labor market reform. An empirical investigation provides evidence consistent with this prediction.

JEL-Classification: E58, E63, J38

Keywords: Central bank independence, labor market reform, credibility, flexibility, inflation, unemployment, rigidities.

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”The ECB will continue to cajole governments into implementing necessary and long overdue reforms, but the final and hard decisions - and I acknowledge that they are hard decisions, since the considerable benefits of structural reform often only become apparent with time - lie with the national authorities.”

Speech by Professor Dr. L.H. Hoogduin
on behalf of Dr. Willem F. Duisenberg
on August 27 1999 in Jackson Hole, Wyoming

1 Introduction

Monetary policymakers often express concern about structural problems in the labor market. Typically, they point out that monetary policy is not the solution to structural problems and that such problems therefore need to be addressed via other policy measures. This concern is easy to understand, because apart from having their own merits, policies aimed at solving structural problems would also facilitate the central bank’s efforts to maintain price stability. The problem is that substantial political costs are a major impediment to labor market reforms.

In view of this, it seems interesting to explore to what extent the prospects of labor market reform are influenced by monetary policy. Even though monetary policy is neutral in the long run and cannot by itself reduce equilibrium unemployment, we will argue that the monetary policy regime can have real effects because it influences the government’s preferred labor market policy. For instance, New Zealand’s liberalization of the labor market in 1991 might have been influenced by the dramatic change in monetary policy in 1989.¹

The starting point of our analysis is the well known time inconsistency problem associated with discretionary monetary policy, first analyzed by Kydland and Prescott (1977) and Barro and Gordon (1983). The basic idea is that wage-setters recognize the policymaker’s incentive to exploit the short run Phillips-curve and thus foresee the inflation created by monetary policy. In equilibrium, structural unemployment is unaffected by monetary policy, but inflation is positive. Rogoff (1985) has suggested that appointing a conservative central banker will reduce the inflationary bias at the expense of

¹This refers to the Employment Contracts Act 1991 and the Reserve Bank of New Zealand Act 1989.

greater unemployment variability.

In view of this trade-off, there will be two effects of increased conservatism on labor market reform; a *credibility effect* and a *precautionary effect*. The credibility effect arises because labor market reform, by reducing equilibrium unemployment, reduces the credibility problem and hence equilibrium inflation. Because of the credibility problem, average inflation is relatively low if the central bank is very conservative and there is then relatively little to gain from reducing unemployment in terms of lower inflation. Hence, there will be less reform if the central bank is more conservative. The precautionary effect works in the other direction. Conservatism increases the variability of unemployment and will therefore increase the amount of reform if the government is anxious to avoid very high rates of unemployment.

In this paper, we add a government and labor market policy to a simple Barro and Gordon (1983) model of discretionary monetary policy and analyze the interaction between the credibility and the precautionary effect. We show that in combination, the two effects give rise to a u-shaped relation between conservatism and labor market reform. The reason is that for very high levels of conservatism, the credibility problem is minute. At the same time, the precautionary effect is very strong, since the central bank makes little effort to stabilize output. At the other extreme, very low levels of conservatism give rise to a severe credibility problem, but the precautionary effect is negligible since the central bank puts much effort into stabilizing output. From this it follows that neither effect will be negligible for medium levels of conservatism. But since each effect is relatively weak compared to the extreme cases, the model predicts less reform for medium levels of conservatism.

We also carry out an empirical investigation of the relation between central bank independence and unemployment, labor market institutions as well as three indices of labor market rigidities in 19 OECD countries. The empirical findings provide support for the existence of a u-shaped relation between conservatism and labor market reform.

This paper belongs to a growing literature claiming that monetary regimes influence labor market policy. Unlike this paper, the focus in the literature has been on whether a common monetary policy will promote labor market reforms. Berthold and Fehn (1998) argue that labor market reform will be lower if monetary policy is coordinated (as in EMU). This result hinges on the assumption that decisions on labor market reform are made nationally. Hence, lower unemployment in a single country will only reduce inflation in EMU marginally. Consequently, the incentives for reform are greater out-

side than inside EMU. The same argument has been advanced by Calmfors (1998a), who also recognizes that, if national governments have precautionary motives, there may be more labor market reform within EMU (Calmfors 1998a,b). Sibert and Sutherland (1998) also expect less labor market reform inside than outside EMU, but for slightly different reasons. They argue that due to international spillovers, uncoordinated national monetary policies lead to higher inflation than a monetary union would. Hence, there will be less reform within a monetary union because the reform brings about a smaller decrease in inflation when inflation is already low.

We consider mechanisms similar to the ones mentioned above, but we depart from the focus on monetary union. Since there has been a move towards more independent and conservative central banks across the world, we find it interesting to analyze how this will affect labor market policy.

The rest of the paper is organized as follows. Section 2 introduces the model and analyzes the different effects at work. Section 3 contains a sensitivity analysis. Section 4 investigates the empirical relation predicted by the model. Section 5 offers conclusions.

2 The Model

We use a Barro-Gordon style model to analyze how the government's choice of labor market reform depends on the central bank's degree of conservatism. The government enjoys two benefits from a reform of the labor market. First, reduced unemployment, which apart from being beneficial *per se*, also reduces the cost of variations in unemployment. Second, lower inflation, since the time inconsistency problem of discretionary monetary policy increases with unemployment.

Sequence of Events

We model the interaction between a government and an independent central bank as a sequential game with two stages. In the first stage, the government can change the institutions of the labor market. This choice of reform is captured by a composite variable, R , which reduces unemployment. In the second stage, monetary policy is determined by the central bank. The government's decision is placed in the first stage because the laws and institutions that regulate the labor market are typically fixed for a longer period of time than monetary policy is. The sequence of events is depicted in

Figure 1. In the beginning of the second stage, the private sector forms rational inflation expectations, π^e . Then the economy is hit by a supply shock $\varepsilon \sim [0, \sigma^2]$. Having observed this shock, the central bank sets the rate of inflation, π . Unemployment is given by

$$u = \bar{u} - R - (\pi - \pi^e) - \varepsilon, \quad (1)$$

where \bar{u} is the natural rate of unemployment that would prevail in the absence of expectational errors, supply shocks and reform. Unemployment is affected by inflation surprises, $(\pi - \pi^e)$, and by the supply shock, ε . When the government decides on labor market reform, it has to anticipate how the benefits of the reform depend on future monetary policy. The model is solved by backward induction.

Preferences

We assume that the central bank's loss function is over the target variables π and u and takes the form:

$$L_{cb} = \left| \frac{1}{3} (I_{cb}\pi^3 + (u - u_{cb}^*)^3) \right|, \quad (2)$$

where I_{cb} measures the relative inflation aversion and u_{cb}^* is the unemployment target. Henceforth, I_{cb} will be referred to as conservatism. The government is assumed to minimize the expectation of the following loss function, conditional upon information available in the first stage:

$$L_g = \left| \frac{1}{3} (I_g\pi^3 + (u - u_g^*)^3) \right| + \gamma R, \quad (3)$$

where the cubic form introduces the precautionary motive for reform, and I_g is the government's relative weight on inflation. Absolute values are introduced in order to obtain loss functions which are increasing in deflation. Throughout the analysis, we assume that the government's unemployment target, u_g^* , is zero. The third term represents a political cost which is inflicted upon the government if it carries out reform. This cost arises because the majority of employed insiders have much to lose and relatively little to gain from a reform (see e.g. Saint-Paul, 1996 or Bean, 1998). Moreover, reforms are costly to the government, since the benefits typically occur after the costs. For convenience, we have assumed this cost to be linear in the amount of reform. The political cost does not appear in the loss function of

the central bank because, unlike politicians, central bankers do not have to please the majority of the voters in order to get reelected.

The Precautionary Effect

In order to clarify the logic of the model, we first consider two special cases which highlight the two main effects. To isolate the precautionary effect, we start with a case without the inflation bias.² Because this bias is ultimately due to an overambitious unemployment target, we eliminate the inflation bias by setting the central bank's unemployment target to $u_{cb}^* = \bar{u} - R$. The central bank's choice of inflation and unemployment is found by minimizing (2) with respect to π , using (1) and noting that \bar{u} , R and π^e are predetermined variables. This yields

$$\pi = -\frac{1}{1 + \sqrt{I_{cb}}}\varepsilon \quad (4)$$

and

$$u = \bar{u} - R - \frac{\sqrt{I_{cb}}}{1 + \sqrt{I_{cb}}}\varepsilon. \quad (5)$$

The interpretation of these expressions is straightforward. The central bank does not suffer from the credibility problem; hence there is no inflation bias in equation (4). Labor market reform, R , reduces unemployment but not inflation. The optimal choice of reform is found by minimizing (3) subject to the restrictions given by (4) and (5). This choice is³

$$R = \bar{u} - \sqrt{\gamma - \frac{I_{cb}}{(1 + \sqrt{I_{cb}})^2}\sigma^2}. \quad (6)$$

From this expression it is clear that the precautionary effect of increased conservatism is to increase labor market reform. Increased conservatism reduces the degree of unemployment stabilization. As a consequence, the government reforms more in order to reduce the risk of very bad outcomes. As expected, the amount of reform is increasing in the variance of the supply shock, σ^2 , but decreasing in the political cost, γ .

²The literature contains several proposals for eliminating inflation bias, such as targeting rules or inflation contracts. See Walsh (1998) for a discussion.

³To rule out complex solutions, we have to impose the restriction $\gamma - \frac{I_{cb}}{(1 + \sqrt{I_{cb}})^2}\sigma^2 > 0$. This assumption seems plausible because the slow pace of labor market reform indicates that γ is relatively high.

The Credibility Effect

In order to isolate the credibility effect, two modifications are needed. First, the central bank is assumed to have an over-ambitious unemployment target $u_{cb}^* = 0$. Second, by assuming a zero variance of the supply shock ($\sigma^2 = 0$), the motive for precaution is removed. In this case, the central bank's choice of inflation and unemployment is

$$\pi = \frac{1}{\sqrt{I_{cb}}} (\bar{u} - R) \quad (7)$$

and

$$u = \bar{u} - R. \quad (8)$$

Equation (7) differs from equation (4) in two respects. Average inflation is positive, and without supply shocks, there is no need for the central bank to stabilize unemployment. Now, labor market reform, R , reduces both unemployment and inflation. The optimal choice of reform is found by minimizing (3) subject to (7) and (8). This choice is

$$R = \bar{u} - \sqrt{\frac{\sqrt{I_{cb}}^3}{\sqrt{I_{cb}}^3 + I_g}} \gamma. \quad (9)$$

With this specification, the effect of increased conservatism is to decrease labor market reform. Increased conservatism reduces the credibility problem and hence equilibrium inflation. When inflation is already low, it is less important to reform the labor market in order to reduce inflation even further. After having isolated the two effects, the obvious question is how conservatism affects labor market reform when both effects are at work. We analyze this problem in the next section.

The Interaction between the Precautionary and the Credibility Effect

It follows from the two previous sections that both the precautionary and the credibility effect will be present if the central bank's unemployment target is lower than the natural rate of unemployment ($u_{cb}^* < \bar{u}$) and the variance of the supply shock is positive ($\sigma^2 > 0$). For convenience, we set $u_{cb}^* = 0$. With these assumptions, the central bank will choose inflation and unemployment according to

$$\pi = \frac{1}{\sqrt{I_{cb}}} (\bar{u} - R) - \frac{1}{1 + \sqrt{I_{cb}}} \varepsilon \quad (10)$$

and

$$u = \bar{u} - R - \frac{\sqrt{I_{cb}}}{1 + \sqrt{I_{cb}}}\varepsilon. \quad (11)$$

The interpretation of these expressions also follows from the two previous sections. The optimal choice of reform is once again found by minimizing (3), this time subject to (10) and (11). The optimal choice is⁴

$$R = \bar{u} - \sqrt{\frac{\sqrt{I_{cb}}^3}{\sqrt{I_{cb}}^3 + I_g}\gamma - \frac{I_{cb}}{(1 + \sqrt{I_{cb}})^2}\sigma^2}. \quad (12)$$

Comparing (12) to (9) and (6), it becomes clear that the first term within the square root sign in (12) is associated with the credibility effect and that the second term is associated with the precautionary effect. Conservatism has two counteracting effects on labor market reform and the net effect is ambiguous. Formally, this is shown by taking the derivative of (12) with respect to I_{cb} .⁵ The sign of this derivative is determined by the expression

$$\frac{2\left(\sqrt{I_{cb}}^3 + I_g\right)^2}{I_g}\sigma^2 - 3\gamma\sqrt{I_{cb}}\left(1 + \sqrt{I_{cb}}\right)^3 \stackrel{\leq}{\geq} 0. \quad (13)$$

If (13) is positive (negative) the precautionary (credibility) effect dominates. We see that the precautionary effect tends to dominate if the variance of the supply shock, σ^2 is large. The credibility effect on the other hand tends to dominate if the political cost of reform, γ , is high or if the government puts a lot of weight on inflation.⁶ Perhaps more interesting is the fact that (13) shows that the relation between conservatism and labor market reform is u-shaped.

Figure 2 depicts the u-shaped relation between the amount of labor market reform and the central bank's degree of conservatism. The downward sloping curve shows the credibility effect and the upward sloping curve shows

⁴To rule out complex solutions, we have to impose the restriction $\frac{\sqrt{I_{cb}}^3}{\sqrt{I_{cb}}^3 + I_g}\gamma - \frac{I_{cb}}{(1 + \sqrt{I_{cb}})^2}\sigma^2 > 0$.

⁵ $\frac{\partial R}{\partial I_{cb}} = \frac{1}{2\sqrt{\frac{\sqrt{I_{cb}}^3}{\sqrt{I_{cb}}^3 + I_g}\gamma - \frac{I_{cb}}{(1 + \sqrt{I_{cb}})^2}\sigma^2}} \left(\frac{\sigma^2}{(1 + \sqrt{I_{cb}})^3} - \frac{3}{2}\gamma\sqrt{I_{cb}}\frac{I_g}{(\sqrt{I_{cb}}^3 + I_g)^2} \right)$.

⁶This holds as long as the government cares less about inflation than the central bank does ($I_g < I_{cb}$).

the precautionary effect. When both effects are present we get the u-shaped curve. This means that the amount of reform is high when conservatism is either low or high.

To understand this, note that the precautionary effect will dominate if I_{cb} is high enough. In the extreme case of strict inflation targeting ($I_{cb} \rightarrow \infty$) there is no inflationary bias. Hence, the credibility effect disappears but the precautionary effect remains because the central bank does not stabilize shocks at all. To show that the credibility effect dominates when conservatism is low enough is more involved because the restriction imposed in order to guarantee (12) to be a real number does not allow I_{cb} to be arbitrarily close to zero. However, as long as (12) is always real, (13) will eventually become negative when I_{cb} approaches zero.⁷ Intuitively, when conservatism is low, the central bank's lack of credibility gives rise to a high inflationary bias. On the other hand, the central bank's strong focus on unemployment results in vigorous efforts to stabilize shocks. The amount of reform is lowest for intermediate levels of conservatism. In such cases, the central bank cares more equally about inflation and unemployment. The government is therefore less worried about very high levels of either variable.

3 Sensitivity Analysis

Is the predicted u-shape between conservatism and labor market reform sensitive to changes of the parameters in the model? In this section we show that this is not the case. First, we generalize the preferences of the government and of the central bank by varying the exponents in their loss functions. Second, we generalize the political cost of the reform.

The preferences of the government and of the central bank are generalized in the following way:

$$L_{cb} = \left| \frac{1}{\eta} (I_{cb}\pi^\eta + u^\eta) \right| \quad (14)$$

⁷The condition for real solutions is $\frac{\sqrt{I_{cb}^3}}{\sqrt{I_{cb}^3} + I_g} \gamma - \frac{I_{cb}}{(1 + \sqrt{I_{cb}})^2} \sigma^2 > 0$. Assume the limiting case of equality, solve for $\frac{\gamma}{\sigma^2}$ and substitute into (13). Rewrite to get

$$\lim_{I_{cb} \rightarrow 0} \frac{1}{3} \left(\sqrt{I_{cb}^3} + I_g \right) \frac{2\sqrt{I_{cb}^3} - I_g(1 + 3\sqrt{I_{cb}})}{I_g \sqrt{I_{cb}} (1 + \sqrt{I_{cb}})^3} < 0.$$

and

$$L_g = \left| \frac{1}{\eta} (I_g \pi^\eta + u^\eta) \right| + \gamma R. \quad (15)$$

With this more general specification, the precautionary effect will be present if $\eta > 2$. Then, the crucial assumptions behind the precautionary effect—that the marginal cost of unemployment is convex in unemployment—is satisfied. If we substitute the central bank's choice of inflation into (15), we get

$$L_g = \left| \frac{1}{\eta} \left(\left(\sqrt[\eta-1]{I_{cb}} \right)^\eta + I_g \right) \left(\frac{1}{\sqrt[\eta-1]{I_{cb}}} (\bar{u} - R) - \frac{1}{1 + \sqrt[\eta-1]{I_{cb}}} \varepsilon \right)^\eta \right| + \gamma R. \quad (16)$$

The government's optimal choice of reform was found by numerical optimization.⁸ In the standard case, we used the following parameter values: $\bar{u} = 0.1$, $I_g = 0.5$, $\sigma^2 = 0,005$. With these values, the government values reductions in unemployment twice as much as reductions in inflation. The political cost of reform, γ , is difficult to measure. Throughout this exercise, we have assumed it to be equivalent to the perceived loss of an increase in unemployment from 0 to 10 percentage points.⁹ Otherwise, the cost of reform would not be of the same magnitude as the benefits when we vary η . Figure 3 depicts the relation between central bank conservatism and reform for different values of η . As expected, the relation is u-shaped as long as $\eta > 2$. The figure also reveals that the precautionary effect is more important relative to the credibility effect, the higher is η .

Next, we investigate the consequences of alternative specifications of the political cost of reform. In (3), this cost was assumed to be linear, but if we allow it to take a general functional form, the government's loss is

$$L_g = \left| \frac{1}{3} (I_g \pi^3 + u^3) \right| + \gamma(R). \quad (17)$$

An obvious restriction on $\gamma(R)$ is that (17), subject to (10) and (11), has to be convex in R . Otherwise, there exists no interior solution to the minimization

⁸The optimization was basically done as follows. First we randomly drew 10,000 normally distributed supply shocks, $\varepsilon \sim [0, 0.005]$. Then we minimized the sum of the 10,000 realizations of (16), using an algorithm developed by Davidson, Fletcher and Powell (see Fletcher, 1980).

⁹This means that $\gamma = 0.01$ when $\eta = 3$ and that $\gamma = 0.001$ when $\eta = 4$ etc.

problem. The restriction on $\gamma(R)$ is obtained by taking the second derivative of (17) with respect to R ;¹⁰

$$\frac{\partial^2 L_g}{\partial R^2} = 2 \left(1 + \frac{I_g}{\sqrt{I_{cb}}^3} \right) (\bar{u} - R) + \gamma''(R) > 0. \quad (18)$$

From (18) we see that $\gamma(R)$ can not be too concave. However, as long as this restriction is satisfied, the u-shaped relation between conservatism and reform remains.

Regarding changes in the other parameters in the model, we refer to section 2 but for the sake of completeness, we present figures of the relation between central bank conservatism and labor market reform for different values of γ , σ^2 and I_g in appendix A.

4 Some Evidence

The model predicts that central bank conservatism will affect the amount of labor market reform. For high levels of conservatism, we expect a positive influence of conservatism on reform, whereas for low levels of conservatism, we expect the relation to be negative. To test these implications one evidently needs data on conservatism and labor market reform. Since the concepts conservatism and central bank independence are almost equivalent and most often used interchangeably, we will use an index of central bank independence (CBI) as a measure of conservatism.¹¹ Unfortunately, the picture is different regarding labor market reform, which typically consists of a multitude of different policies. However, reforms do reduce unemployment and we can therefore, as a first pass, examine the relation between CBI and the actual outcome of unemployment.

Unemployment

We use Cukierman and Lippi's (1999) data on unemployment and legal CBI for 19 OECD countries for the years 1980, 1990 and 1994. Figure 4 shows that the relation between CBI and unemployment, in accordance with

¹⁰If we assume $\bar{u} \geq R$ we don't have to worry about absolute values.

¹¹Due to the large amount of studies on the relations between central bank independence and macroeconomic performance, several indices of central bank independence have been constructed. See e.g. Alesina (1988), Cukierman (1992), Grilli et al. (1991), Eijffinger et al. (1998). For a discussion see Mangano (1998).

the prediction of our model, is hump-shaped. In order to provide a statistical assessment of the relation displayed in Figure 4, we estimated three regressions of unemployment on CBI and CBI squared. In the regressions, we control for union coverage, coordination of wage bargaining, a dummy for Spain¹² and dummy variables for 1980 and 1994.¹³ Data on union coverage and coordination of wage bargaining are from Blanchard and Wolfers (1999). The results are displayed in Table 1.

The estimates in column 1 support the prediction of our model. The coefficients for CBI and CBI squared are significant and have the predicted signs. The coefficients for the other variables also have the expected signs. However, if the dummy for Spain is excluded, the coefficients are no longer significant on the five percent level. The estimates in column 3 confirm what numerous studies have found; that there is no linear relation between unemployment and central bank independence.

Labor Market Rigidities

A drawback of the investigation above is that unemployment may not be a very good proxy for labor market reform. Obviously, there are many other factors which affect unemployment but may be excluded from the regressions.¹⁴ Therefore, we also try to find more direct measures of labor market policy.

Nickell (1997) suggests that high unemployment is associated with the following policies: generous unemployment benefits, long duration of benefits, low pressure on the unemployed to obtain work, low levels of active

¹²See e.g. Dolado and Jimeno (1997) and Marimon and Zilibotti (1998) for explanations of why Spain may be seen as a special case. Both studies emphasize unfavourable initial conditions, such as inefficiencies inherited from the old autocratic system.

¹³According to Nickell (1997), high unemployment is associated with high unionization and low coordination of wage bargaining.

¹⁴In a related strand of the literature, unemployment is thought to depend on the interaction between labor unions and the central bank. The contributions include Cukierman and Lippi (1999) and Velasco and Guzzo (1999), who both investigate the effects of conservatism and centralization of wage bargaining on real wages, unemployment and inflation. They argue that, due to the credibility problem, unions are less inclined to moderate their wage demands the more conservative is the central bank. Hence, both models predict a positive relation between conservatism and unemployment. Bratsiotis and Martin (1999), on the other hand, argue that conservatism decreases the degree of monetary accommodation with lower wage demands and hence lower unemployment as the consequence. We believe that the use of labor market institutions as dependent variables enables us to discriminate against hypotheses from this strand.

intervention and high overall taxes or a combination of high minimum wages for young people and high payroll taxes. In view of this, we use seven dependent variables taken from Blanchard and Wolfers (1999).¹⁵ Unemployment benefits are measured by the variables RR1, RR2, RR35 and RROECD. RR1 is an average replacement rate over the first year of an unemployment spell. RR2 is an average over the second year and RR35 is an average over the third, fourth and fifth year. RROECD is a summary measure of replacement rates constructed by the OECD. DURATION measures the duration of unemployment benefits (in years). Another dimension of the unemployment insurance system is active labor market policies, measured by the variable ALMP. Lastly, the variable TAX measures the total tax wedge. Except for active labor market policy, which reduces unemployment, we expect to find a hump-shaped relation between CBI and the policy variables. We include (the logarithm of) openness as a control variable. This is reasonable since Agell (1999) argues that openness may lead to increased demand for social insurance through labor market rigidities. The variable (log) OPENNESS is taken from Penn World Tables (Mark 5.6), where openness is defined as the sum of imports and exports divided by GDP.¹⁶ We also include dummy variables for 1980 and 1994 and, in the case of active labor market policy, a dummy for Sweden. Table 2 contains the results of these regressions. With the exception of the regressions with RR1 and TAX as dependent variable, the coefficients for CBI and CBI squared enter with the predicted sign. The coefficients are, however, significant on the five percent level only in the regressions with RR35 and ALMP as dependent variables. Note that the effect of (the log of) openness is positive and significant in all of the regressions.

Indices of Labor Market Rigidities

Although the results provide some support for the prediction of the model, each dependent variable is only one of many potential parts of a labor market reform. In fact, it is possible to find support for the u-shaped hypothesis in some of these regressions, but still reject the same hypothesis when all potential parts of a reform are considered. For instance, a reduction of unemployment benefits accompanied by an increased duration of these benefits may only reduce unemployment marginally or not at all. In order to tackle

¹⁵See this study and Nickell (1997) for further details.

¹⁶Since the world tables end 1992, we have assumed the logarithm of openness in 1994 to equal the logarithm of openness in 1992.

this problem, one evidently needs a composite measure of labor market reform. As a first step in this direction, we have constructed three indices of labor market rigidities: a continuous index, a discrete index and an index of effective labor market institutions. The continuous and the discrete index are simple averages over four components: unemployment benefits, the duration of benefits, active labor market policies and taxes. The effective institutional index is a weighted average over the same components. We used the composite variable RROECD as the component for unemployment benefits. For the components duration of benefits, active labor market policies and taxes, we used the variables DURATION, ALMP and TAX respectively. Appendix B displays the indices.

In the discrete index, each component is divided into three levels of rigidity; high (score 3), medium (score 2) and low (score 1). For example, next to Sweden, Finland has the highest taxes and is therefore given the score 3 in the tax component. The limits in the discrete index were chosen in order to assign one third of the observations to each score. The upper limit for score 1 and the lower limit for score 3 in index 2 are therefore as follows. RROECD (score 1: ≤ 25.79 , score 3: ≥ 31.00), DURATION (1.00, 3.38), ALMP (7.68, 12.34), TAX (40.25, 52.15).

The continuous index instead uses each country's position on the range between the countries with the minimum and the maximum level of rigidities. Thus, in the tax component of this index, Finland receives the score $(62.75 - 29.75) / (69.80 - 29.75) = 0.82$, since taxes in Finland (62.75) are closer to the maximal taxes in Sweden (69.80) than to the minimal taxes in Australia (29.75). We also constructed a second continuous index (continuous index 2) by using the log of active labor market policy. This was done in order to reduce the variation between the outlier Sweden and the other countries in the sample.

The effective institutional index was constructed in two steps. In the first step, we regressed unemployment on union coverage, coordination of wage bargaining, dummy variables for 1980 and 1994 and the institutional variables RROECD, DURATION, TAX and ALMP. In the second step, we calculated the predicted impact of the last four variables on unemployment for each observation. With this method of construction, we get a measure of the combined effect of labor market institutions on unemployment. This is an improvement on the regressions in Table 1, since we have now isolated the part of unemployment that can be explained by institutional variables.

Table 3 shows the results from regressions of our indices on CBI, CBI

squared, (log) OPENNESS, dummy variables for 1980 and 1994 and, in one case, a dummy variable for Spain. For all specifications, the results are surprisingly well in line with the prediction of our model. In all of the five regressions the coefficients on CBI and CBI squared have the predicted sign. Except for the discrete index without the dummy for Spain, the coefficients are significant on the borderline of the ten percent level. When we used continuous index 2, the coefficients are significant on the five percent level.

To conclude: for all of our approximations of labor market reform, we find a u-shaped relation between central bank conservatism and reform.

5 Concluding Remarks

Although Duisenberg is right in that monetary policy is not the solution to the problem of structural unemployment, labor market reform need not be unaffected by the general policy stance of the central bank. Such an influence, however, seems to contradict conventional wisdom since numerous studies have failed to find a link between unemployment and central bank independence. In this paper, we have argued that a non-linear relation is needed to capture the forces at work. In particular, due to the trade-off between credibility and flexibility, we expect the relation between conservatism and reform to be u-shaped.

Interestingly, our empirical investigation provides some evidence consistent with this prediction. We find that unemployment is affected by central bank conservatism, and that this effect appears to work through labor market institutions. In particular, rigid labor market institutions are associated with medium levels of central bank conservatism.

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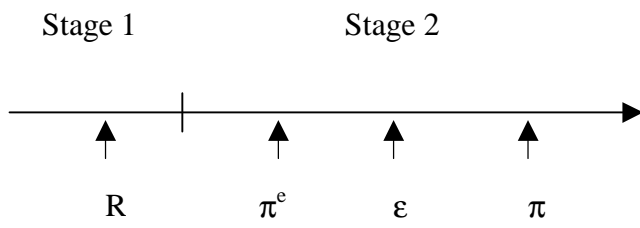


Figure 1 The Sequence of Events in the Model

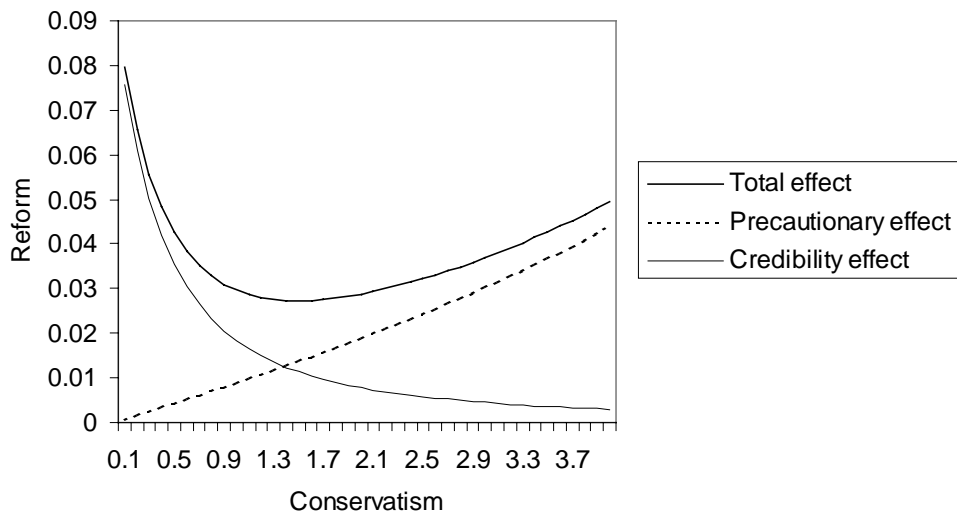


Figure 2 Central Bank Conservatism and Labor Market Reform

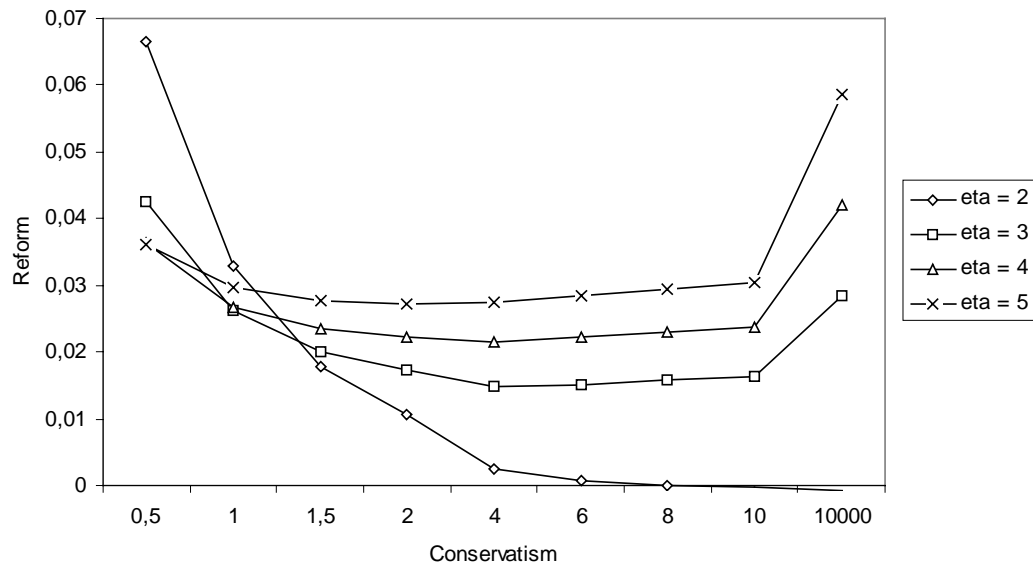


Figure 3 Conservatism and Labor Market Reform with Different Exponents in the Loss Functions

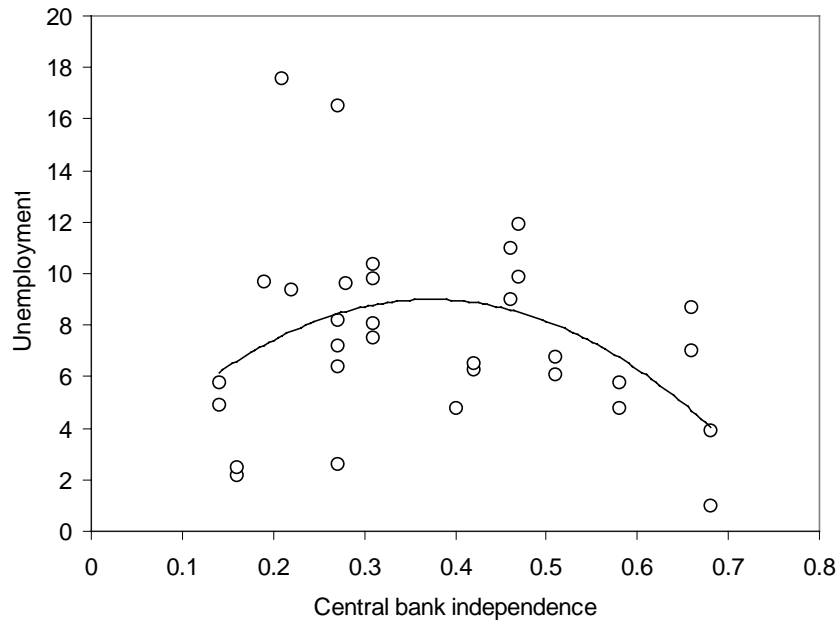


Figure 4 The Empirical Relation Between Central Bank Independence and Unemployment.

Table 1 Dependent Variable: Unemployment

	1	2	3
C	-2.28 (-0.78)	1.66 (0.51)	3.70 (1.66)
CBI	36.30 (2.86)	13.95 (1.03)	0.45 (0.18)
CBI ²	-45.22 (-2.87)	-19.13 (-1.12)	
UNION COVERAGE	2.25 (2.66)	3.34 (3.52)	2.94 (3.35)
COORDINATION	-0.77 (-2.10)	-1.35 (-3.41)	-1.21 (-3.41)
DSPAIN	8.84 (4.20)		6.45 (3.09)
D1980	-1.63 (-2.02)	-1.65 (-1.74)	-1.64 (-1.88)
D1994	1.98 (2.19)	1.76 (1.65)	1.93 (1.97)
Adjusted R-squared	0.51	0.32	0.43
# Obs,	51	51	51

Coefficients are estimated by OLS. t-statistics are reported in parentheses below the coefficient.

Table 2 Dependent Variable: Labor Market Institutions

	RR1	RR2	RR35	RROECD	DURATION	TAX	ALMP	ALMP
C	-14.82 (-0.56)	-59.19 (-2.29)	-63.11 (-3.51)	-49.11 (-3.05)	-1.34 (-0.67)	20.59 (-1.3)	2.00 (-0.5)	-5.04 (-0.27)
CBI	-29.06 (-0.36)	37.4 (-0.47)	113 (-2.04)	63.66 (-1.28)	1.62 (-0.26)	-5.4 (-0.11)	-51.78 (-4.20)	-20.13 (-0.35)
CBI^2	23.83 (-0.24)	-74.85 (-0.76)	-140.25 (-2.04)	-86.59 (-1.40)	-2.75 (-0.36)	-5.28 (-0.09)	73.76 (-4.8)	18.06 (0.26)
(log) OPENNESS	17.61 (-3.09)	22.4 (-4.02)	15.33 (-3.96)	17.54 (-5.05)	0.89 (-2.05)	7.64 (-2.24)	3.64 (-4.23)	5.39 (1.35)
D1980	-6.63 (-1.11)	-8.74 (-1.50)	-2.51 (-0.62)	-4.96 (-1.36)	-0.04 (-0.08)	-0.35 (-0.10)	-0.07 (-0.08)	-0.24 (-0.06)
D1994	1.23 (-0.18)	-0.92 (-0.14)	2.01 (-0.44)	1.43 (-0.35)	-0.07 (-0.13)	0.45 (-0.11)	-0.15 (-0.15)	1.84 (0.39)
DSWEDEN							51.15 (-30.35)	
Adjusted R-squared	0.10	0.22	0.24	0.33	-0.01	0.01	0.95	-0.06
# Obs,	51	51	51	51	51	51	51	51

Coefficients are estimated by OLS. t-statistics are reported in parentheses below the coefficient.

Table 3 Dependent Variable: Indices of Labor Market Rigidities

	CONTINUOUS INDEX 1	CONTINUOUS INDEX 2 (log ALMP)	DISCRETE INDEX	DISCRETE INDEX	EFFECTIVE INSTITUTIONAL INDEX
C	-0.17 (-1.01)	-0.18 (-1.10)	1.21 (1.88)	0.39 (0.65)	-3.37 (-1.79)
CBI	0.82 (1.55)	1.16 (2.27)	1.07 (0.54)	3.34 (1.84)	9.54 (1.63)
CBI ²	-1.11 (-1.70)	-1.56 (-2.46)	-2.53 (-1.03)	-5.00 (-2.24)	-12.14 (-1.67)
(log) OPENNESS	0.15 (4.14)	0.13 (3.52)	0.22 (1.59)	0.30 (2.46)	1.10 (2.71)
D1980	-0.04 (-1.00)	-0.04 (-1.01)	-0.09 (-0.65)	-0.09 (-0.75)	
D1994	0.01 (0.13)	0.01 (0.25)	-0.04 (-0.25)	0.02 (0.12)	
DSPAIN				1.20 (3.91)	
Adjusted R-squared	0.24	0.22	0.07	0.29	0.13
# Obs	51	51	51	51	51

Coefficients are estimated by OLS. t-statistics are reported in parentheses below the coefficient.

Appendix A

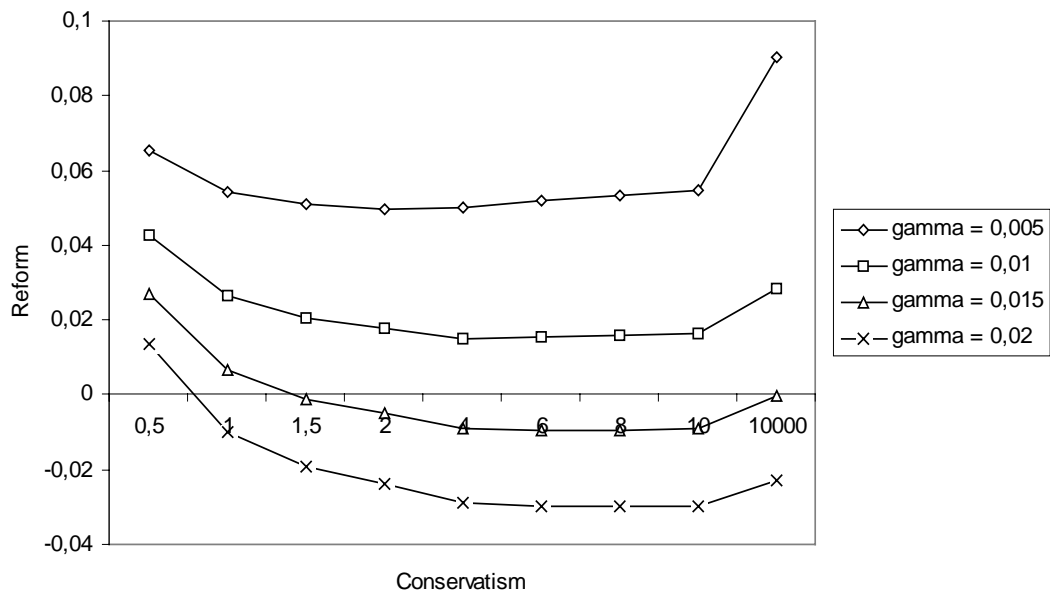


Figure A1 Conservatism and Labor Market Reform with Different Political Costs

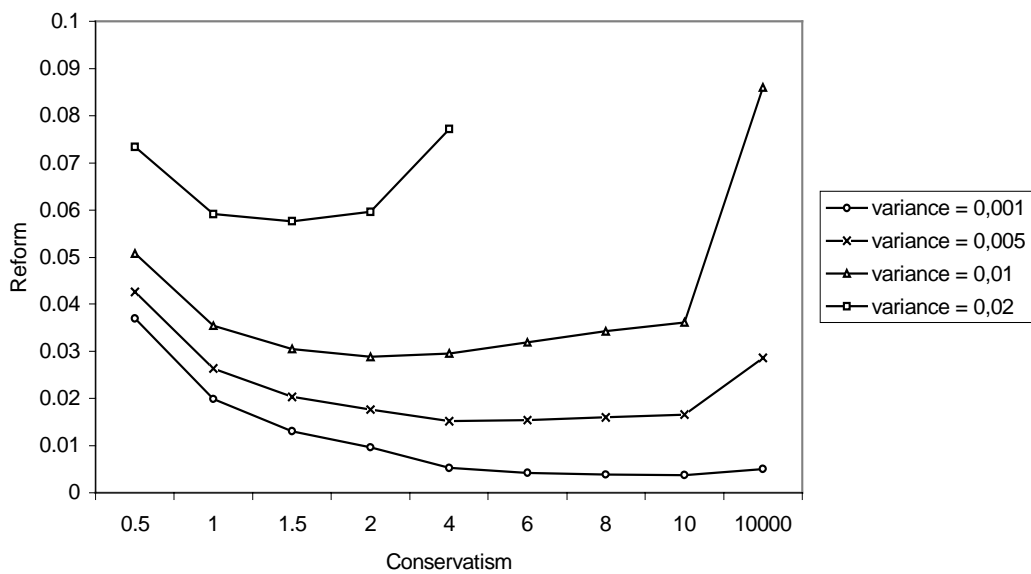


Figure A2 Conservatism and Labor Market Reform with Different Variances of the Supply Shock

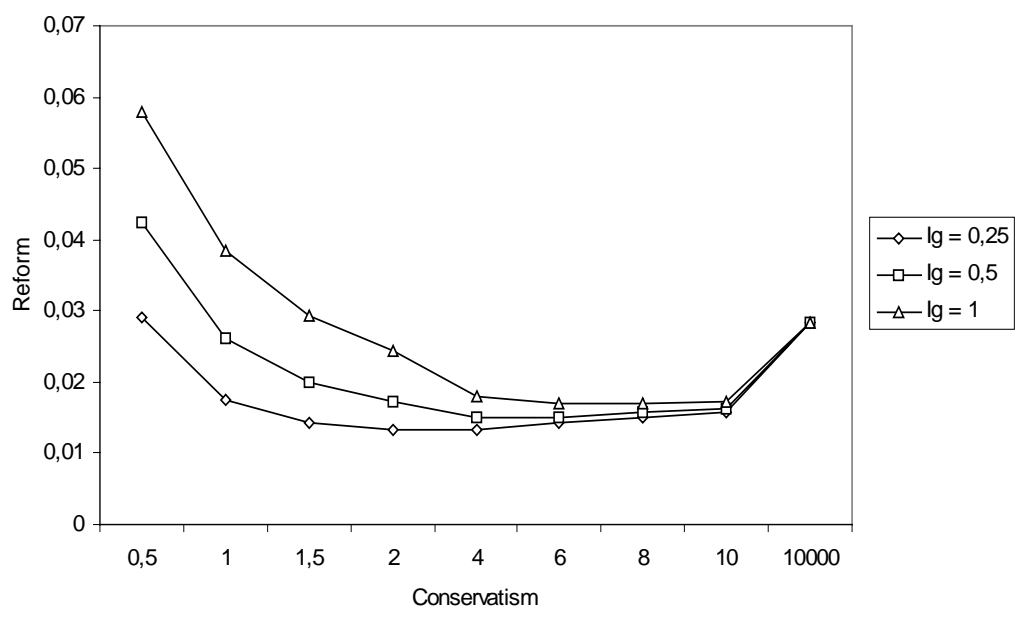


Figure A3 Conservatism and Labor Market Reform with Different Degrees of Government Inflation Aversion

Appendix B Indices of Labor Market Rigidities

COUNTRY	YEAR	CONTINUOUS INDEX 1	CONTINUOUS INDEX 2	DISCRETE INDEX	EFFECTIVE INSTITUTIONAL INDEX
Australia	1980	0.58	0.57	2.00	4.98
Australia	1990	0.59	0.58	2.25	4.98
Australia	1994	0.60	0.59	2.25	4.98
Austria	1980	0.61	0.53	2.00	3.33
Austria	1990	0.62	0.53	2.00	3.33
Austria	1994	0.61	0.52	1.75	3.33
Belgium	1980	0.70	0.63	2.50	4.16
Belgium	1990	0.69	0.62	2.50	4.12
Canada	1980	0.47	0.40	1.75	1.85
Canada	1990	0.47	0.41	1.75	1.84
Canada	1994	0.46	0.40	1.75	1.76
Denmark	1980	0.67	0.59	2.00	3.31
Denmark	1990	0.74	0.66	2.00	4.12
Denmark	1994	0.82	0.73	2.00	5.00
Finland	1980	0.66	0.58	2.00	3.25
Finland	1990	0.69	0.61	2.50	2.95
Finland	1994	0.71	0.63	2.50	2.93
France	1980	0.62	0.55	2.75	1.93
France	1990	0.70	0.62	2.75	2.78
Germany	1980	0.61	0.52	2.25	3.48
Germany	1990	0.60	0.51	2.25	3.45
Germany	1994	0.59	0.51	2.25	3.39
Italy	1980	0.41	0.34	1.75	0.47
Italy	1990	0.47	0.40	1.75	1.01
Japan	1980	0.30	0.24	1.50	0.50
Japan	1990	0.30	0.25	1.50	0.58
Japan	1994	0.31	0.25	1.50	0.58
Netherlands	1980	0.73	0.69	2.75	2.85
Netherlands	1990	0.75	0.72	2.75	3.19
Netherlands	1994	0.72	0.69	2.75	2.93
New Zealand	1980	0.61	0.54	2.00	4.97
New Zealand	1990	0.61	0.54	2.00	4.96
Norway	1980	0.53	0.44	1.75	2.10
Norway	1990	0.60	0.52	2.00	2.77
Norway	1994	0.60	0.52	2.00	2.77
Portugal	1980	0.29	0.22	1.25	0.56
Portugal	1990	0.48	0.41	1.75	2.20
Spain	1980	0.53	0.47	3.00	1.35
Spain	1990	0.56	0.50	3.00	1.79
Sweden	1980	0.38	0.38	2.00	1.11
Sweden	1990	0.39	0.39	2.00	1.13
Sweden	1994	0.39	0.39	2.00	1.12
Switzerland	1980	0.31	0.23	1.00	0.61
Switzerland	1990	0.39	0.31	1.00	1.23
Switzerland	1994	0.42	0.34	1.25	1.54
UK	1980	0.55	0.47	2.00	3.34
UK	1990	0.55	0.48	2.00	3.73
UK	1994	0.56	0.49	2.00	3.89
USA	1980	0.42	0.42	1.75	1.16
USA	1990	0.40	0.40	1.75	0.96
USA	1994	0.40	0.40	1.75	0.88