

Central Bank Conservatism, Partisanship and Policy

by Committee

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Abstract

Differing wage structures across different sectors of the economy will cause the benefits and costs of central bank policies to differ as well. In particular, sectors will differ as to their choice of a conservative central banker. It is shown that if partisanship is allowed to influence the choice of conservative central banker, then the central banker will be ‘too conservative’ on average. This means that the average rate of inflation will be too low relative to the social optimum. It is shown that creating a central bank committee composed of a partisan chairman and committee members chosen from different sectors can replicate the social optimum. The key is that certain sectors are over-represented on the committee. This puts relatively more emphasis by the central bank on output stability and overcomes the excess conservatism of the chairman.

1 Introduction

Most economies are characterized by some labor markets being competitive and others being unionized, which in turn creates differing degrees of nominal wage rigidity. Consequently, these different sectors of the economy incur different benefits and costs regarding the central bank's monetary policy. In a seminal paper, Rogoff (1985) suggested the appointment of a conservative central banker to reduce an inherent inflation bias in the economy.¹ The cost of such action is that output is stabilized less. Waller (1992) subsequently showed that different sectors of the economy will desire different degrees of conservatism since the cost of great output variability differs across sectors. This then leads to partisan preferences over monetary policy based on underlying economic differences across sectors of the economy.²

The open question from that paper is how should the central bank's policy be determined when this type of economic heterogeneity exists? Should one central banker be appointed? If so, how should the appointment process be done? Furthermore, is a committee composed of representatives from different sectors of the economy preferred to a single central banker? These are the issues addressed in this paper.

In particular, it is shown that if a single central banker is appointed in a partisan fashion as political power changes hands, then the central banker will be too conservative on average. The reason is that when central bankers are appointed in a non-cooperative fashion, a negative externality occurs—the flexible wage sector does not take into account the excessive amount of output variability borne by the unionized sector when choosing a conservative

¹Walsh (1995) has demonstrated that the inflation bias can be eliminated, without any distortion in the stabilization response, by offering the central banker a performance contract. This suggests that appointing a conservative central banker is unnecessary. However, one has to believe that performance contracts are feasible and not-subject to time inconsistency problems (see McCallum (1995)). Furthermore, Herrendorf and Lockwood (1997) show that if wage setters have any information about supply disturbances when setting nominal wages, performance contracts cannot solve the inflation bias problem perfectly and thus there is still a need to appoint a conservative central banker. Furthermore, Waller (1995) argues that the performance contract approach advocated by Walsh is not based on a well-specified principal-agent problem.

²A key aspect of Waller (1992) is that partisan differences are derived from the underlying structure of the economy. This is in sharp contrast to the standard approach in the literature, which is to simply *assume* central bank committee members have different preferences, without explaining in a deeper sense why they differ.

central banker. As a result, the average degree of conservatism is too high. The key implication of this finding is that society is willing to pay an inflation ‘premium’ (accept a higher average equilibrium inflation rate) to avoid partisan-induced fluctuations in the trend inflation rate.

I then consider monetary policy determined by a large committee structure with a chairman. The committee members are chosen from each sector and the number of committee members chosen from each sector is chosen by society as part of the central bank constitution. The chairman is chosen in a partisan fashion and his views on inflation are part of the central bank’s loss function. However, the weight placed on each sector’s output stability is determined by its representation on the central bank committee. It is shown that society wants the unionized sector of the economy to be over-represented on the central bank committee. This puts relatively more weight on output stability in the central bank loss function and thus internalizes the negative externality that occurs from the partisanship in appointing the central bank chairman.

Several approaches for studying monetary policy in partisan environments have been studied. The simplest approach is the appointment of a single central banker by the ruling political party. This has been examined by Alesina (1987), Alesina and Gatti (1995) and Waller and Walsh (1996). In Alesina’s original paper, the party winning the most recent election appoints its most preferred central banker to implement policy. In this sense, monetary policy is determined by a single central banker. Due to electoral fluctuations, monetary policy varies as political power changes hands. I will refer to this as the *non-cooperative* or ‘winner-take-all’ appointment process. Alternatively, Alesina and Gatti assume that the two political parties agree on a common conservative central banker in order to offset the effects of electoral uncertainty on the variability of output. To assume that the same type of central banker will be appointed no matter which party is in power implicitly assumes some type of cooperative appointment process that is ‘free’ of partisan influences. However, they do not describe how the two parties come to agree on a common central banker or how tolerant

of inflation the central banker should be.³ In what follows, I will call this the *cooperative* appointment process.

A second approach is to delegate policy to a committee of central bankers. The earliest work on monetary policy by committee was done by Waller (1989, 1992, 2000), Cothren (1988), Tabellini (1987) and Faust (1996). This early work looked at the dynamics of policy resulting from turnover on the committee and reputation. Thus, the changing committee member preferences were the source of fluctuations in policy. However, committee members did not vote strategically (voting was sincere) and there was no private information. More recently, Bullard and Waller (2004) and Riboni and Ruge-Marcia (2006) look at how alternative voting rules in a dynamic model lead to strategic voting even though there is no private information. A later generation of papers looks at strategic voting with private information [Gersbach and Hahn (2004), Geerats (2002), Sibert (2002, 2003), Sibert and Mihov (2006)] and examine how reputations, information revelation, transparency, etc. affect the policy choices of the central bank committee.

The structure of the paper is as follows. In Section 2, the basic model is described. Section 3 analyzes the optimal choice of a conservative central banker. It also contains the analysis when a committee sets policy. Finally, Section 4 concludes.

2 The Basic Model

2.1 The Economic Structure

The basic macroeconomic model that is used is Waller's (1992) two-sector discretionary policy model which has its roots in the multi-sector models of Blinder and Mankiw (1984) and Duca (1987). There are two distinct goods produced in this economy which are sold in

³One could argue that if society could agree to view the central banker as a 'technocrat' rather than a true political appointee, then the socially optimal central banker could be jointly agreed on. Similarly, incorporating this degree of inflation tolerance into the central bank constitution is another form of cooperative commitment.

perfectly competitive markets, however the firms that produce each type of good buy labor in markets with different employment practices. "Classical" goods producers buy labor in a perfectly competitive or spot labor market, whereas firms producing the "non-classical" good buy labor after negotiating nominal wage contracts with workers. Wage contracts are formed as in Gray (1976) and Fischer (1977) and are set prior to the realizations of shocks and monetary policy. The expected nominal wage is set equal to its full-information or Walrasian value, after which firms determine the level of employment. Labor is assumed to be immobile in the short-run, hence wage differences cannot be arbitrated away immediately. Goods, however, are traded across sectors.

The economy is essentially static. Since there are no state variables or overlapping wage contracts, this is not a serious issue. Obviously, a more interesting model would be one based on New Keynesian foundations, as in Mondora (2007), but in order to focus on details of the decision-making process for monetary policy, I abstract from dynamic issues.

This economy is characterized by the following equations:

$$\begin{array}{ll}
 (1) \quad y^{s*} = al^* + u & (1') \quad y^s = al + u \\
 (2) \quad l^{d*} = b(p^* - w^* + u) \quad b \equiv 1/(1 - a) & (2') \quad l^{d*} = b(p^* - w^* + u) \\
 (3) \quad l^{s*} = c(w^* - \hat{p}) & (3') \quad l^s = c(w - \hat{p}) \\
 (4) \quad y^{d*} = m - p^* & (4') \quad y^d = m - p \\
 (5) \quad \hat{p} = \alpha p^* + (1 - \alpha)p & (6) \quad \bar{w} = E_{-1}w \\
 (7) \quad y^f = y^{f*} = (1 + \phi)u \quad \phi \equiv abc/(b + c) & = E_{-1} \left[p^* + \frac{\alpha c}{b+c} (p^* - p) \right]
 \end{array}$$

where y is the log of real output, l is the log of employment, u is a random supply shock, p is the log of the price level, w is the log of the nominal wage, m is the log of the money stock, and E_{-1} denotes the expectation of a variable given information available at the end of the previous period. The aggregate consumption price index is given by \hat{p} . Asterisks will denote values associated with the classical sector. All parameters are positive and time subscripts

and constants are suppressed for notational convenience.⁴ The supply shock is common to both sectors with mean zero and variance σ^2 .

Equations (1) and (1') are production functions, equations (2) and (2') are the corresponding labor demand schedules, equations (3) and (3') are the ex ante labor supply functions for each sector, and equations (4) and (4') are the demand curves for each sector's output. Equation (5) is the aggregate price level. Equation (6) is the contracted nominal wage (ex post labor supply) in the non-classical sector. Since both sectors are identical except for the nominal wage contracts, the full-information level of output is the same for each sector and is given by equation (7). From (5) it follows that the aggregate inflation rate is given by $\pi = \hat{p} - \hat{p}_{-1}$ where \hat{p}_{-1} will be set to zero for analytical convenience.

A key feature of the model is that there are "spillovers" from one sector to another through the labor market. Because workers supply labor based on the real consumption wage and firms hire labor based on the real production wage, there is a potential for nominal demand movements to cause real output effects in the classical sector even though prices and wages are perfectly flexible in that sector. For example, equal nominal demand shocks to both sectors cause prices to rise but, due to the nominal wage rigidity in the non-classical sector, the output price in this sector does not rise as much. Workers in the classical sector demand a smaller increase in their nominal consumption wage than the classical firms are willing to pay them and, as a result, employment and output increase in the classical sector from a nominal shock.

2.2 Preferences Over Inflation and Output Variability

Each sector and "society" as a whole is assumed to incur a welfare loss from output deviations around its full-information level as well as inflation deviations from the desired rate of inflation, which is assumed to be zero. The "social loss" function is assumed to be a

⁴This simply normalizes the equilibrium solutions to be 1 in levels.

weighted average of the sectors' loss functions.⁵ The monetary authority's preferences are similar to the "social loss" function except that it may have different weights on the inflation and output variability terms. The loss functions are given by:

$$L_c = (y^* - y^f - k)^2 + \beta\pi^2 \quad (8a)$$

$$L_n = (y - y^f - k)^2 + \beta\pi^2 \quad (8b)$$

$$\begin{aligned} L_s &= \alpha L^* + (1 - \alpha) L \\ &= \alpha (y^* - y^f - k)^2 + (1 - \alpha) (y - y^f - k)^2 + \beta\pi^2 \end{aligned} \quad (8c)$$

$$L_m = \alpha (y^* - y^f - k)^2 + (1 - \alpha) (y - y^f - k)^2 + e\beta\pi^2 \quad (8d)$$

where $e \geq 1$. Equation (8a) is the classical sector loss function, (8b) is the non-classical sector loss function, (8c) is the social loss function and (8d) is the monetary authority's loss function. The parameter e measures the "conservativeness" of the central banker. For $e = 1$, the monetary authority has the same preference weights as the rest of society and simply minimizes the social loss function but if $e > 1$, then the monetary authority puts relatively more weight on stabilizing inflation than the rest of society.

As is standard in these policy-game models, society would like to increase output above the full-information level of output by a constant amount, k .⁶ Furthermore, deviations of the inflation rate from its socially optimal value are considered costly even when they are fully anticipated and the marginal cost of inflation is increasing in the level of inflation. This feature of the loss function from inflation play an important role in the analysis that follows. In order to have stabilization powers, the policy-maker is assumed to set policy in a discretionary fashion after shocks to the economy are observed.

⁵Because α determines the relative expenditure share on the respective goods, it will be used throughout this paper as a weighting parameter when aggregating over the two sectors. Hence, the classical sector produces α percent of total output and the non-classical sector produces $1 - \alpha$ percent of total output.

⁶The reason for this is that, due to some distortion in the economy, society feels the full information level of output is sub-optimal. If the goods market was modeled as a monopolistically competitive market, as is standard in the New Keynesian literature, then output would be too low due to the monopolistic distortion.

The aggregate supply equations for firms in each sector are

$$y^s = x(p - p^e) + \phi\alpha(p^{*e} - p^e) + (1 + x)u \quad (9a)$$

$$y^{s*} = \phi(1 - \alpha)(p^* - p) + (1 + \phi)u \quad (9b)$$

where $x = ab$.

Examination of (9a) shows that the central bank can expand output in the sticky wage sector by creating unexpected inflation, which is the standard effect. It can also change output if there is an expected change in relative prices across the two sectors, which would cause a reallocation of consumption expenditures between the two sectors. Inspection of (9b) shows that by creating a relative price change between the traded goods, output can also be increased in the classical sector. This is due to the fact that workers base their labor supply decisions on the consumption real wage while the firms base their labor demand on the production real wage. Thus, an increase in the classical sector price relative to the aggregate price leads to an expansion of output in the classical sector. In a purely classical world this would not be possible, which can be seen by setting $\alpha = 1$. It is important to note that the strength of this relative price effect depends on the elasticity of the labor supply curve, c , since $\phi = abc/(b + c)$. If $c = 0$, then $\phi = 0$ and this relative price channel disappears. Therefore, the integration of the two sectors creates an opportunity for the monetary authority to expand output in the classical sector as well as the non-classical sector. It is also important to note that this relative price effect will also make output more variable in the classical sector than it would be otherwise.

2.3 Equilibrium Solutions

The model is solved as follows. First, solve for output and inflation as functions of the money stock and the expected money stock. Substitute these expressions into the monetary authority's loss function and minimize with respect to m treating the expected money stock

as a constant. Determine the rational expectations solution based on the optimal setting of m . Substitute the expressions for m and m^e into the output and inflation expressions to obtain the rational expectation, equilibrium solutions for output and inflation,

$$y - y^f = \frac{\beta(1 + \alpha x + q)(x - \phi)(1 + q)}{[\alpha q^2 + (1 - \alpha)(1 + q)^2]x^2} \left(\frac{e}{1 + e\delta} \right) u \quad (10)$$

$$y^* - y^f = \frac{q}{1 + q} (y - y^f) \quad (11)$$

$$\pi = \frac{[\alpha q + (1 - \alpha)(1 + q)]x}{e\beta(1 + \alpha x + q)} k - \frac{(1 - \phi/x)}{1 + e\delta} u. \quad (12)$$

where

$$q = (1 - \alpha)\phi \quad \text{and} \quad \delta \equiv \frac{\beta(1 + \alpha x + q)^2}{[(1 - \alpha)(1 + q)^2 + \alpha q^2]x^2}.$$

These results show that, in an attempt to expand output, the central banker creates excessive monetary growth which leads to an inflationary bias. The bias is given by the first term in equation (12). But this excessive inflation does not generate any additional output since the parameter k does not appear in (10) and (11). Furthermore, note that output in the classical sector is away from the full-information value because of the relative price effects.

Substituting (10)-(12) into the respective sector and social loss functions and taking expectations yields

$$L_c = k^2 + \left(\frac{e}{1 + e\delta} \right)^2 \frac{q^2 \delta \Omega \sigma^2}{(1 - \alpha)(1 + q)^2 + \alpha q^2} + \left(\frac{1}{1 + e\delta} \right)^2 \Omega \sigma^2 + \frac{\Phi k^2}{e^2} \quad (13)$$

$$L_n = k^2 + \left(\frac{e}{1 + e\delta} \right)^2 \frac{(1 + q)^2 \delta \Omega \sigma^2}{(1 - \alpha)(1 + q)^2 + \alpha q^2} + \left(\frac{1}{1 + e\delta} \right)^2 \Omega \sigma^2 + \frac{\Phi k^2}{e^2} \quad (14)$$

$$L_s = k^2 + \left(\frac{e}{1 + e\delta} \right)^2 \delta \Omega \sigma^2 + \left(\frac{1}{1 + e\delta} \right)^2 \Omega \sigma^2 + \frac{\Phi k^2}{e^2} \quad (15)$$

where the constants

$$\Omega \equiv \beta(1 - \phi/x)^2, \quad \Phi = \frac{1}{\beta} \frac{[\alpha q + (1 - \alpha)(1 + q)]^2 x^2}{(1 + \alpha x + q)^2}$$

do not depend on e .

The first term of (13)-(15) is the deadweight loss resulting from the underlying distortion; the second term measures the weighted aggregate loss from output variability; the third term is the loss from inflation variability and the fourth term measures the loss from the inflation bias. Note that the non-classical sector suffers more output variability than the classical sector. Otherwise, all other terms are the same.

3 The Optimal Choice of a Conservative CB

Since the inflationary bias yields no offsetting benefits in equilibrium, society would benefit from institutional arrangements that eliminate or reduce the inflationary bias. Rogoff (1985) suggested society should appoint a "conservative" central banker, i.e., someone who dislikes inflation relatively more than the rest of society. In the context of the current model, this involves choosing some agent in the economy with a value of $e > 1$. From equations (10)-(12), it is easy to see that a larger value of e would produce a smaller inflationary bias but would alter the central bank's stabilization response towards lower inflation variability at the expense of greater output variability. The optimal choice of a conservative central banker (CCB) involves choosing e .

3.1 Disagreement over the CCB

In Rogoff's model, the optimal choice of e is found by minimizing the social loss function with respect to e . At the optimum, the marginal benefit from reducing the loss from the inflationary bias and inflation variability just equals the marginal cost of increased output variability. In a homogeneous society, the marginal benefits and marginal costs are the same for everyone and there is complete agreement on the optimal degree of conservatism of the central banker. But as Waller (1992) shows, in a multi-sector economy where the degree of nominal wage rigidity varies across sectors, output variability will differ across sectors

even though shocks are common to all sectors. Sectors characterized by more nominal wage rigidity will have greater output variability, and thus larger welfare losses, than sectors with flexible wages. This can be seen above by looking at the second terms of (13) and (14); the non-classical sector suffers a larger loss from output variability since $(1 + q) > q$. Consequently, the marginal cost of increased output variability associated with a conservative central banker will differ across sectors.

When analyzing the optimal choice of a central banker, it turns out that working with the inverse of "conservatism" actually makes the analysis easier. This is because the inflation bias is a function of $1/e$, hence calculating average inflation rates involves working with the inverse of e . Let $\lambda = 1/e$ measure the central banker's inflation "tolerance." Thus, a conservative central banker implies $\lambda < 1$. The more conservative is the central banker the smaller is his tolerance of inflation. Making this substitution in equations (13)-(15), differentiating with respect to λ and rearranging yields the following first-order conditions:

$$\frac{\partial L_c}{\partial \lambda_c} = \frac{\lambda_c (\lambda_c + \delta)^3}{\Omega \sigma^2} \Phi k^2 + \lambda_c - \frac{q^2}{\alpha q^2 + (1 - \alpha)(1 + q)^2} = 0 \quad (16a)$$

$$\frac{\partial L_n}{\partial \lambda_n} = \frac{\lambda_n (\lambda_n + \delta)^3}{\Omega \sigma^2} \Phi k^2 + \lambda_n - \frac{(1 + q)^2}{\alpha q^2 + (1 - \alpha)(1 + q)^2} = 0 \quad (16b)$$

$$\frac{\partial L_s}{\partial \lambda_s} = \frac{\lambda_s (\lambda_s + \delta)^3}{\Omega \sigma^2} \Phi k^2 + \lambda_s - 1 = 0 \quad (16c)$$

The first term is the marginal loss from an increase in the level of inflation and the second term is the marginal loss from an increase in inflation variability caused by an increase in the inflation tolerance (decrease in conservatism) of the central banker. These costs are common across sectors. They are zero at $\lambda = 0$ and monotonically increasing in λ . The last term is the marginal benefit of increased output stability generated by a more inflation tolerant central banker and this benefit differs across sectors in the economy. However, it is independent of λ . It is obvious that there are unique, positive values λ_c, λ_n and λ_s solving (16a)-(16c). Furthermore, when $k > 0$, we see that $\lambda_s < 1$.

Since the classical sector already has relatively low output variability, it receives a smaller marginal benefit from increased output stability than the non-classical sector does. Hence, it prefers the central banker to have a lower tolerance for inflation (i.e., be more conservative). Consequently, the inflation bias and inflation variability would be relatively lower but the variability of output would be relatively higher if the classical sector rather than the non-classical sector were allowed to select the central banker. The socially optimal central banker is selected by comparing a weighted average of the marginal benefits from increased output stability against the marginal losses from increased inflation variability and an increase in the level of inflation⁷. The socially optimal CCB is too "liberal" by the classical sector's standard and is too "conservative" by the non-classical sector's standard. Thus we have the ordering $\lambda_c < \lambda_s < \lambda_n$.

Because there is disagreement regarding how tolerant the central banker should be of inflation, the question of how the central banker is selected becomes important. Since the multi-sector model lends itself nicely to a 'partisan' theory of monetary policy, it would appear to be a natural way of describing the political process underlying the choice of central banker. Following Alesina (1987), assume there are two political parties, one representing the classical sector and the other representing the non-classical sector. Since these two parties represent sectors with specific preferences over the degree of conservatism of the central banker, we are faced with the problem of appointing a conservative central banker in a partisan policy model. To simplify the analysis, let the classical party's probability of winning be equal to its relative size in the economy, α , which makes the non-classical party's chances of winning equal to $1 - \alpha$.

As a benchmark, I will use the 'cooperative appointment solution' whereby the sectors (somehow) agree to appoint the socially optimal conservative central banker λ_s . I will then consider two possible appointment structures. First, each party nominates its most preferred

⁷It should be noted that regardless of what type of central banker is chosen, he still minimizes the social loss function. The central banker's job is to stabilize an "aggregate" measure of output variability. It is simply the magnitude of e , and thus the marginal response to a supply shock, that there is disagreement over.

central banker. This is the winner-take-all appointment process. The outcome under this process will be compared to the benchmark. Second, I analyze policy by central bank committee, where the fraction μ of the members represent the classical sector and $1 - \mu$ represent the non-classical sector. There is also a chairman of the central bank who is appointed by the party in power. I then solve for the optimal choices of the chairman by each sector and then determine the socially optimal composition of the committee by looking at the socially optimal choice of μ . This committee structure allows the winning party to pursue policies desired by its constituents, yet the composition of the committee acts as a "check and balance" on the power of the chairman.

3.2 Non-cooperative Appointment Structure

Is society better or worse off under one type of appointment process or another? One immediate consequence of the winner-take-all process is that the expected level of inflation and the expected variability of output and inflation will change as power switches between parties since different stabilization policies are enacted. Hence, a certain amount of "politically" induced variability in the economy will occur. However, it is important to note that this type of variability is not of the Alesina (1987) variety – output variability, inflation variability and trend inflation change due to different central bankers being appointed, not due to electoral surprises. Consequently, partisanship in the appointment process will lead to changes in the variability of the economy as administrations change.

But will the *average* inflation rate and the *average* variability of output and inflation in the non-cooperative regime be the same as in the cooperative regime? The answer to this question is given in the following proposition:

Proposition 1 *In the winner-take-all appointment process, the central banker will be ‘too conservative’ on average causing the inflation rate to be lower on average and output to be more variable on average than is socially optimal.*

Proof. Add (16a) and (16b), weight by α and $1 - \alpha$ respectively and subtract the resulting expressions from (16c) to get

$$\frac{\Phi k^2}{\Omega \sigma^2} \left\{ \lambda_s (\lambda_s + \delta)^3 - [\alpha \lambda_c (\lambda_c + \delta)^3 + (1 - \alpha) \lambda_n (\lambda_n + \delta)^3] \right\} + \lambda_s - \lambda_a = 0 \quad (17)$$

where $\lambda_a = \alpha \lambda_c + (1 - \alpha) \lambda_n$. Note that, if there is no output distortion and the inflationary bias is zero, then $k = 0$, and the socially optimal CCB is equal to the average CCB (and in fact, $\lambda_s = 1$).⁸ When an inflationary bias exists, $k > 0$, for $\lambda_s = \lambda_a$ to be true then the second term of (17), evaluated at $\lambda_s = \lambda_a$ must be zero. Since $\lambda(\lambda + \delta)^3$ is a convex function in λ , by Jensen's inequality the second term in (17) is negative at the point $\lambda_s = \lambda_a$. Consequently, it follows that for (17) to hold, we must have $\lambda_s > \lambda_a$. As a result, the central banker is too conservative on average relative to the social optimum. ■

Figure 1 illustrates Proposition 1. The marginal loss from the level of inflation, as a function of λ , is increasing at an increasing rate. The average degree of tolerance in this case corresponds to the point where the average marginal benefit of lower output variability intersects a line between the two individually optimal points. Due to the convexity of the marginal cost of the level of inflation, the average degree of tolerance will be to the left of the socially optimal degree of inflation tolerance.

This is clearly inefficient – on average, the marginal benefit of output stability exceeds the average marginal cost of inflation at λ_a . Society would benefit by appointing a single central banker who is slightly more tolerant of inflation and avoid the volatility of policy associated with movements between λ_n and λ_c .

The economic reasoning behind this is similar to an insurance argument. Society is willing to pay an "inflation premium" and accept a slightly higher but certain inflation rate to avoid fluctuations in the inflation rate caused by random changes in monetary policy regimes. An alternative explanation is that spillovers occur in the non-cooperative regime; the inflation

⁸However, $\lambda_c < 1$ and $\lambda_n > 1$ since they have differential preferences about the tradeoff between output variability and inflation variability.

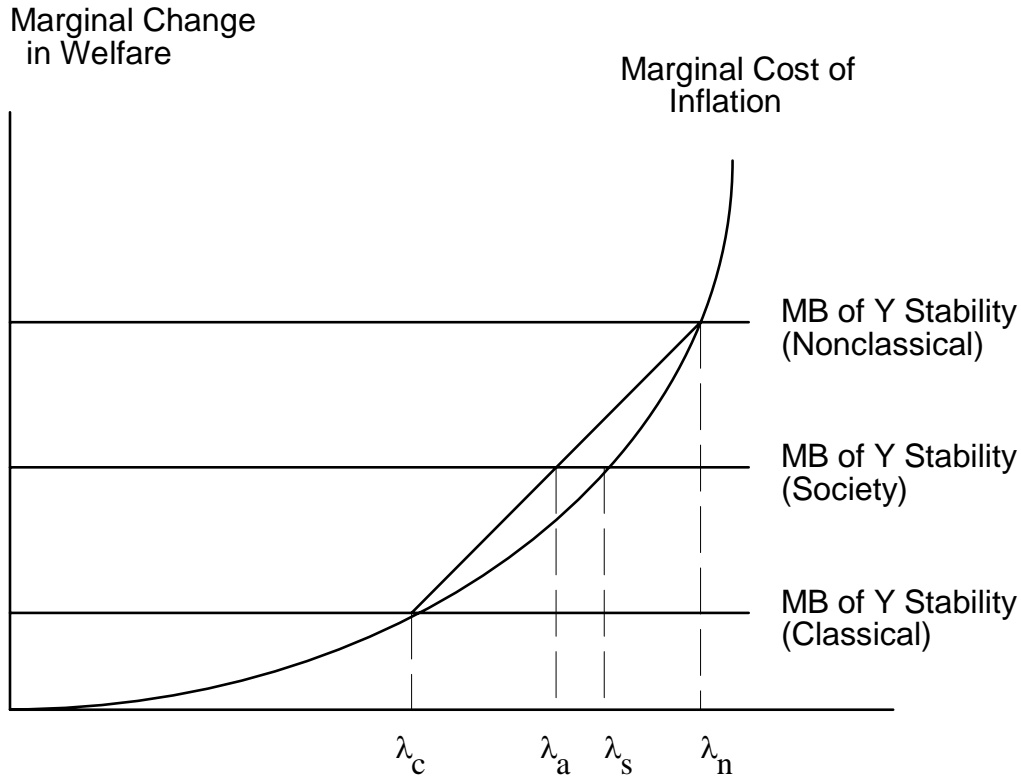


Figure 1:

conservatives do not take into account the excessive amount of output variability borne by the non-classical sector when choosing an excessively conservative central banker. Thus, non-cooperation creates negative externalities and these externalities are internalized when the central banker is chosen in a cooperative fashion.

3.3 A Policy Committee with a Conservative Chair

Now suppose there is a ‘large’ number of committee members on the central bank board as well as a chairman. For ease of analysis, consider a continuum of members. The winner of the current election selects a chairman whose inflation tolerance is adopted by the committee. However, society determines the size of the committee. A measure μ of the members are drawn from the classical sector and $1 - \mu$ are drawn from the non-classical sector. These committee members then determine the weight placed on output stability.

The central bank's loss function is thus given by

$$L_i^m = \mu (y^* - y^f - k)^2 + (1 - \mu) (y - y^f - k)^2 + e_i \beta \pi^2 \quad (18)$$

for $i = n, c$. Then the central banks policy yields the following equilibrium solutions

$$y_i - y^f = \frac{\beta (1 + \alpha x + q) (x - \phi) (1 + q)}{[\alpha q^2 + (1 - \alpha) (1 + q)^2] x^2} \left(\frac{e_i}{1 + e_i \delta_\mu} \right) u \quad (19a)$$

$$y_i^* - y^f = \frac{q}{1 + q} (y - y^f) \quad (19b)$$

$$\pi_i = \frac{[\mu q + (1 - \mu) (1 + q)] x}{e_i \beta (1 + \alpha x + q)} k - \frac{(1 - \phi/x)}{1 + e_i \delta_\mu^2} u \quad (19c)$$

where

$$\delta_\mu = \frac{\beta (1 + \alpha x + q)^2}{[\mu q^2 + (1 - \mu) (1 + q)^2] x^2}.$$

Since each sector has no control over the choice of CCB by the other sector, it chooses its optimal value of e_i to minimize its sectoral loss when in power. Thus, the sectoral expected loss functions, with $\lambda_i = 1/e_i$, are given by

$$L_c = k^2 + \left(\frac{1}{\lambda_c + \delta_\mu} \right)^2 \frac{q^2 \delta_\mu \Omega \sigma^2}{(1 - \alpha) (1 + q)^2 + \alpha q^2} + \lambda_c^2 \left(\frac{1}{\lambda_c + \delta_\mu} \right)^2 \Omega \sigma^2 + \lambda_c^2 \Phi_\mu k^2 \quad (20a)$$

$$L_n = k^2 + \left(\frac{1}{\lambda_n + \delta_\mu} \right)^2 \frac{(1 + q)^2 \delta_\mu \Omega \sigma^2}{(1 - \alpha) (1 + q)^2 + \alpha q^2} + \lambda_n^2 \left(\frac{1}{\lambda_n + \delta} \right)^2 \Omega \sigma^2 + \lambda_n^2 \Phi_\mu k^2 \quad (20b)$$

where

$$\Omega \equiv \beta (1 - \phi/x)^2, \quad \Phi_\mu = \frac{1}{\beta} \frac{[\mu q + (1 - \mu) (1 + q)]^2 x^2}{(1 + \alpha x + q)^2}$$

Given this policy, each sector chooses e_c and e_n taking the other sector's choice of e as given. Each sector's optimal choice of e_i is still given by (16a)-(16b) with δ_μ and Φ_μ replacing

δ and Φ . The expected social loss under this committee structure is

$$\begin{aligned} \hat{L}_s &= k^2 + \left\{ \alpha \left(\frac{1}{\lambda_c + \delta_\mu} \right)^2 + (1 - \alpha) \left(\frac{1}{\lambda_n + \delta_\mu} \right)^2 \right\} \delta_\mu \Omega \sigma^2 \\ &\quad + \left[\alpha \left(\frac{\lambda_c}{\lambda_c + \delta_\mu} \right)^2 + (1 - \alpha) \left(\frac{\lambda_n}{\lambda_n + \delta_\mu} \right)^2 \right] \Omega \sigma^2 + [\alpha \lambda_c^2 + (1 - \alpha) \lambda_n^2] \frac{k^2}{\delta_\mu} \end{aligned} \quad (21)$$

The question is whether or not μ can be chosen such that the loss in (21) is equal to that given in (15). In short, can society choose the composition of the board to overcome the excessive average conservatism of the chairman? Doing so requires that the coefficients be equal across the loss functions or

$$\left\{ \alpha \left(\frac{1}{\lambda_c + \delta_\mu} \right)^2 + (1 - \alpha) \left(\frac{1}{\lambda_n + \delta_\mu} \right)^2 \right\} \delta_\mu = \left(\frac{1}{\lambda_s + \delta} \right)^2 \delta \quad (22a)$$

$$\alpha \lambda_c^2 \left(\frac{1}{\lambda_c + \delta_\mu} \right)^2 + (1 - \alpha) \lambda_n^2 \left(\frac{1}{\lambda_n + \delta_\mu} \right)^2 = \lambda_s^2 \left(\frac{1}{\lambda_s + \delta} \right)^2 \quad (22b)$$

$$[\alpha \lambda_c^2 + (1 - \alpha) \lambda_n^2] \Phi_\mu = \lambda_s^2 \Phi \quad (22c)$$

where λ_s solves (16c) and is independent of μ . Rearrange to get

$$\begin{aligned} \alpha \left(\frac{\lambda_s + \delta}{\lambda_c + \delta_\mu} \right)^2 + (1 - \alpha) \left(\frac{\lambda_s + \delta}{\lambda_n + \delta_\mu} \right)^2 &= \frac{\delta}{\delta_\mu} \\ \alpha \lambda_c^2 \left(\frac{\lambda_s + \delta}{\lambda_c + \delta_\mu} \right)^2 + (1 - \alpha) \lambda_n^2 \left(\frac{\lambda_s + \delta}{\lambda_n + \delta_\mu} \right)^2 &= \lambda_s^2 \\ [\alpha \lambda_c^2 + (1 - \alpha) \lambda_n^2] \left[\frac{\mu q + (1 - \mu)(1 + q)}{\alpha q + (1 - \alpha)(1 + q)} \right]^2 &= \lambda_s^2. \end{aligned}$$

Equating the last two expressions, substituting in the expressions for δ, δ_μ, Φ and Φ_μ and rearranging we get

$$\begin{aligned} \alpha \left(\frac{\lambda_s + \delta}{\lambda_c + \delta_\mu} \right)^2 + (1 - \alpha) \left(\frac{\lambda_s + \delta}{\lambda_n + \delta_\mu} \right)^2 &= \frac{\mu q^2 + (1 - \mu)(1 + q)^2}{\alpha q^2 + (1 - \alpha)(1 + q)^2} \\ \left(\frac{\alpha}{1 - \alpha} \lambda_c^2 + \lambda_n^2 \right) (1 - \alpha) \left(\frac{\lambda_s + \delta}{\lambda_n + \delta_\mu} \right)^2 &= [\alpha \lambda_c^2 + (1 - \alpha) \lambda_n^2] \left[\frac{\mu q + (1 - \mu)(1 + q)}{\alpha q + (1 - \alpha)(1 + q)} \right]^2. \end{aligned}$$

Use the first line to substitute out for $(1 - \alpha) \left(\frac{\lambda_s + \delta}{\lambda_n + \delta_\mu} \right)^2$ in the second and rearrange to get

$$\begin{aligned} & \alpha (\lambda_n^2 - \lambda_c^2) \left\{ \left(\frac{\lambda_s + \delta}{\lambda_c + \delta_\mu} \right)^2 - \left[\frac{\mu q + (1 - \mu)(1 + q)}{\alpha q + (1 - \alpha)(1 + q)} \right]^2 \right\} \\ = & \lambda_n^2 \left\{ \frac{\mu q^2 + (1 - \mu)(1 + q)^2}{\alpha q^2 + (1 - \alpha)(1 + q)^2} - \left(\frac{1 + q - \mu}{1 + q - \alpha} \right)^2 \right\}. \end{aligned} \quad (23)$$

At $\mu = \alpha$ and $\delta = \delta_\mu$, which makes the RHS zero and the LHS positive since $\lambda_c < \lambda_s < \lambda_n$. So $\mu = \alpha$ is not a solution even at $k = 0$.

In general, it is difficult to prove that there is a value of μ satisfying this condition. However, consider the special case where $c = 0$, i.e., labor is supplied inelastically. This is the standard assumption in the literature. In this case we have $c = 0 \Rightarrow q = 0 \Rightarrow \lambda_c = 0$ and

$$\delta_\mu = \frac{\beta(1 + \alpha x)^2}{(1 - \mu)x^2}, \quad \delta = \frac{\beta(1 + \alpha x)^2}{(1 - \alpha)x^2}.$$

Furthermore, from (16a) we have $\lambda_c = 0$. It then follows that (22) reduces to

$$\alpha \left(\frac{\lambda_s + \delta}{\delta_\mu} \right)^2 - \alpha \left(\frac{1 - \mu}{1 - \alpha} \right)^2 = \frac{1 - \mu}{1 - \alpha} - \left(\frac{1 - \mu}{1 - \alpha} \right)^2$$

which can be solved for μ to get

$$\mu^s = \left[\frac{\alpha(\lambda_s/\delta + 1)^2}{1 - \alpha + \alpha(\lambda_s/\delta + 1)^2} \right] \alpha < \alpha.$$

So what is the intuition for this result? On average the central bank chairman is too conservative, which means output stability is too low on average from a social perspective. By creating a policy committee where the non-classical sector is over-represented, more weight is put on output stability and this tempers the central bank's incentive to aggressively fight inflation. This allows society to replicate the same loss that occurs if the socially optimal central banker is appointed in all periods.

Note that $\partial\mu^s/\partial\lambda_s > 0$ and $\mu \rightarrow \alpha$ as $\lambda_s \rightarrow \infty$. Thus, as $k \rightarrow 0$ and $\lambda_s \rightarrow 1$, $\mu^s \rightarrow \alpha$ but $\mu^s < \alpha$. Why? Because the two sectors still disagree on the relative importance of inflation and output stability. The classical sector does not stabilize output at all in this case and puts all the emphasis on inflation stability. The non-classical sector trades these two off. So once again, there is too little output stability and this is moderated by having the non-classical sector being over-represented on the central bank committee.

Implications for Appointment Mechanisms This result demonstrates that a cooperative appointment process is preferred to the non-cooperative selection process. This bodes well for U.S. since the structure of the Federal Reserve appointment process involves "cooperation" between Democrats and Republicans through the confirmation process in the U.S. Senate. It also bodes well for the European Central Bank since the board members are appointed by the European Council "by common accord" after consulting with the Governing Council and the European Parliament.

The results here can also be used to explain why some regions or countries are over or under-represented relative to their economic size. For example, the small poorer countries in the EMU have a greater relative representation on the ECB than their economic size warrants. If structural rigidities are more severe in these countries, then they will bear a greater cost of output instability from common shocks than their larger, more developed, and market based neighbors. Thus, a key result of this paper is to explain why it is socially optimal to have a conservative central banker *and* have certain countries or regions over-represented in the central bank committee.

The results also shed light on why the Federal Reserve is structured the way it is. Although there are 12 regional Federal Reserve presidents and 7 members of the Board of Governors, the FOMC gives greater voting rights to the Board than the regional Fed presidents. Since regional presidents are chosen by their respective districts, they reflect the interests of their specific districts whereas members of the Board are chosen by society and

presumably reflect society's interests. Within the context of this model, if there were an equal number regional presidents from each sector, then a regression measuring the degree of inflation tolerance for the regional presidents will capture the "average" degree of tolerance for the regional presidents and this will be lower than estimated average for the Board of Governors. This would imply that policy would be too conservative if the regional Federal Reserve presidents determined policy. By having the Board chosen in a more centralized fashion and giving them greater relative voting weight, this overcomes the inflation conservatism of regional Fed presidents and puts more emphasis on output stability.

4 Conclusions

The structure of central banking institutions has an impact on the types of monetary policies followed and the performance of the economy. This paper illustrates how political non-cooperation can lead to an excessive amount of inflation reduction and an excessive amount of output variability, on average, compared to what would "optimally" be generated in a cooperative political environment. The theoretical results suggest that if a cooperative appointment process is not feasible, the cooperative outcome can be replicated by having a central bank committee that is over-represented by one sector of the economy. As a result, negative externalities arising from non-cooperation will be internalized. The results of this paper suggest that the establishment of appropriate central banking institutions can play a key role in distributing the benefits and costs arising from inflation stabilization programs in a socially optimal fashion.

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