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Credibility of Central Bank Independence Revisited¹

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Abstract

The specific role of central bank independence in determining the overall credibility of monetary policy is addressed in this paper. It is argued that the credibility of delegating monetary policy to an independent central bank is endogenous to the credibility of the inflation target because a “conservative” inflation target may not be compatible with the fiscal policy stance. Also, lack of transparency in designing the institutional set-up is shown to be welfare-reducing.

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I. INTRODUCTION

The credibility of monetary policy has received ample attention since the seminal contribution by Kydland and Prescott (1977). Their insight, further elaborated by Barro and Gordon (1983a), was that optimal (non-inflationary) monetary policy is not credible as long as monetary shocks can be used by the “policymaker” to boost output above its equilibrium level. This lack of credibility in monetary policy yields a sub-optimal outcome, characterized by an inflationary bias with no output gains. Proposed resolutions to the credibility problem included the build-up of an anti-inflationary reputation by the “policymaker” (Barro and Gordon (1983b)), as well as the appointment of a “conservative” central banker to conduct monetary policy (Rogoff (1985), Lohmann (1992)). The latter proposal, however, led McCallum (1995, 1996) to observe that even though the “conservativeness” of the central banker may be credible, his independence in conducting anti-inflationary monetary policy may not be credible; hence, the delegation of monetary policy merely re-locates the initial credibility problem without eliminating it. This intuition was formalized by Jensen (1997), who analyzed the determinants and consequences of the credibility of monetary delegation, albeit without explicitly recognizing the difference between the credibility of monetary targets and the credibility of monetary delegation.

While the focus has thus shifted from the credibility of monetary targets to the credibility of monetary delegation, the distinction between these two components of the overall credibility of monetary policy has remained blurred. So far, the literature has ignored the explicit distinction between them, probably because they have been perceived as inherently equivalent. The lack of credible monetary delegation has implicitly been assumed to stem from the same source as the lack of a credible monetary target, namely from the policymaker’s temptation to generate surprise inflation in order to boost output. As long as this temptation exists, it has been reasoned, it really does not matter *how* the policymaker attempts to go about cheating the private sector. Put differently in Tinbergian terms, the incompatibility of the policymaker’s targets (inflation, output) and directly available instruments (inflation control) induces him to try to resort to an indirectly available instrument, namely surprise inflation, and whether surprise inflation is attempted by reneging on the commitment to an inflation target or to central bank independence does not really matter.

The absence of an explicit decomposition of the overall credibility of monetary policy into its two components has deprived the analysis of at least three important insights. First, the source of lack of overall credibility in monetary policy cannot be properly identified unless the credibility of the monetary target and that of monetary delegation are analyzed separately. Second, the design of remedial measures against the lack of overall credibility is bound to remain *ad hoc* by nature unless it is known what the source of the lack of credibility is. Third, an unblurred focus on the credibility of monetary delegation will help us to better identify its determinants, thus further facilitating the analysis and alleviation of the lack of overall credibility in monetary policy. It is important to acknowledge that there is no *ex ante*

reason to believe that the determinants of the credibility of monetary delegation coincide with the determinants of the credibility of monetary targets.

The purpose of this paper is to clarify the analysis of monetary credibility by explicitly focusing on the role of central bank independence. In particular, the aim is to make an explicit distinction between the credibility of monetary targets and the credibility of monetary delegation in order to be able to focus solely on the latter. We are interested in analyzing what determines the credibility of central bank independence and how it can be achieved. It will be argued that inconsistency of monetary and fiscal policies is a potential source of lack of monetary credibility because of its negative impact on the credibility of the independence of a “conservative” central bank. On the other hand, even if monetary and fiscal policies are consistent, monetary policy may lack credibility - but then the problem is no longer with central bank independence but with the monetary target.

The remainder of the paper is organized as follows. The analytical framework is presented in section II, which is followed in section III by a decomposition of the overall monetary credibility into the credibility of monetary target and that of monetary delegation. The attainability of credible central bank independence is discussed in section IV, and section V concludes, paying particular attention to the results’ relevance for policy design.

II. ANALYTICAL FRAMEWORK

This section contains a brief intuitive outline of the game between the public and private sectors as well as a formalization of the building blocks of that game. The game is similar to the ones that have been analyzed in earlier literature, except for the incorporation of fiscal policy and the interaction between monetary and fiscal policies. The value that these extensions add to the analysis will become apparent in the following sections, where the game itself is analyzed in detail.

Consider an economy where the public sector consists of a Fiscal Authority (FA for short; corresponding to the “policymaker” in earlier literature) and a Monetary Authority (MA for short; corresponding to the central bank(er)). The FA is assumed to be in charge of economic policies - a task it can undertake alone or in co-operation with the MA. The choice variable of the public sector is either the rate of inflation or the fiscal deficit. Consequently, whether monetary policy complies with fiscal policy or the other way around is ultimately determined by the FA².

²Consequently, the focus is on the central bank’s “goal independence”, i.e. its ability to set the inflation target independently of the FA, rather than its “instrument independence”

(continued...)

The private sector influences the economy through its inflation expectations, but the public sector is assumed to have a last-mover advantage in its game against the private sector. Expectations are set for one period at a time before the period starts. Expectation formation is preceded by an appointment of a MA by the FA, possibly accompanied by an announced commitment by the FA to delegate monetary control to the MA, but whether or not the MA is indeed allowed to pursue independent monetary policy is decided upon by the FA after the private sector has already set its expectations. Should the MA be allowed to pursue independent monetary policy, it can exercise inflation control knowing the private sector's expectations.

A one-period game between the public and private sectors can in principle result in any of three equilibria. First, the private sector may expect fiscal dominance, which subsequently materializes. This equilibrium is equivalent to the so-called discretionary equilibrium in earlier literature. Second, the private sector may expect monetary dominance, which subsequently materializes. This, in turn, is equivalent to the "rule" equilibrium in earlier literature, and can be interpreted as credible central bank independence. Third, the private sector may expect monetary dominance, which does not materialize. In this case, the FA has lured the private sector into expecting central bank independence in order to generate surprise inflation by renegeing on its delegation announcement.

Let us begin the formalization of the building blocks of the one-period game by identifying the link between the two authorities. In accordance with Alesina and Tabellini (1987), De Kock and Grilli (1992), and Jensen (1992), the public sector's binding budget constraint is assumed to take the form:

$$g - \tau = \pi \geq 0 \tag{1}$$

The public sector must cover the fiscal deficit (the difference between expenditures (g) and revenues (τ) on the left-hand side) with seigniorage (π), and budget surpluses are excluded by assumption. Should the FA prefer to control the fiscal deficit, it makes the MA generate enough seigniorage so that (1) is satisfied. On the other hand, should the MA gain independence it chooses the inflation rate and hence the amount of seigniorage, which then determines the size of fiscal deficit.

The aggregate output (y) in the economy can be affected by both monetary and fiscal policies according to:

²(...continued)
(Debelle and Fischer (1994)).

$$\begin{aligned}
 y &= \bar{y} + \alpha(\pi - \pi^e) + \beta(g - \tau) \\
 &= \bar{y} + \theta\pi - \alpha\pi^e; \\
 \theta &\equiv \alpha + \beta
 \end{aligned}
 \tag{2}$$

where, on the first line, the first term on the right-hand side denotes the natural-rate level of output; the second term denotes the output effect of surprise inflation (with superscript e denoting expected value), and the third term denotes the output effect of fiscal policy.

The one-period objective functions of the FA and the MA are of traditional form:

$$\begin{aligned}
 L_{FA} &= \lambda_1 \pi^2 + \lambda_2 (y - y^*)^2; \\
 y^* &= k\bar{y}
 \end{aligned}
 \tag{3}$$

$$L_{MA} = \mu_1 \pi^2 + \mu_2 (y - y^*)^2
 \tag{4}$$

where y^* denotes the target level of output, which is customarily assumed to exceed the natural-rate level ($k > 1$). The target level of inflation is zero. Although the authorities agree on these target levels for inflation and output, they are assumed to differ in the importance that they assign to these targets:

Assumption 1: The MA is more concerned about inflation than the FA ($\mu_1 > \lambda_1$), while the opposite is true for output ($\mu_2 < \lambda_2$).

The two authorities' reaction functions can now be derived from the first-order conditions for the optima of (3) and (4). The reaction functions are:

$$\pi_{FA}^* = \frac{\lambda_2 \theta [\bar{y}(k-1) + \alpha\pi^e]}{(\lambda_1 + \lambda_2 \theta^2)}
 \tag{5}$$

$$\pi_{MA}^* = \frac{\mu_2 \theta [\bar{y}(k-1) + \alpha\pi^e]}{(\mu_1 + \mu_2 \theta^2)}
 \tag{6}$$

The second-order conditions for minima of (3) and (4) are satisfied. Note that Assumption 1 implies that the MA is “harder” on inflation than the FA ((6) < (5)). Whether (5) or (6) is the equilibrium inflation rate depends on whether fiscal or monetary policy dominates. Let us, however, ignore the issue of policy domination for the time being, and conclude this section by incorporating the private sector’s behavior into both cases.

Assuming that the private sector forms its inflation expectations rationally, (5) and (6) can be re-written as:

$$\pi_{FA}^{RE} = \frac{\lambda_2 \theta \bar{y}(k-1)}{\lambda_1 + \lambda_2 \theta \beta} \quad (5')$$

$$\pi_{MA}^{RE} = \frac{\mu_2 \theta \bar{y}(k-1)}{\mu_1 + \mu_2 \theta \beta} \quad (6')$$

Again, (5') and (6') satisfy the second-order conditions for minima of (3) and (4), respectively, and Assumption 1 implies that (6') < (5').

III. DECOMPOSITION OF THE CREDIBILITY PROBLEM

This section contains an analysis of the game outlined above, and links it to the analysis of the credibility of monetary policy. The game, and the overall credibility, are both decomposed into two components: one related to monetary delegation and the other related to monetary target.

As already mentioned in the previous section, the public sector has a last-mover advantage in the game. The private sector will have to make its move as soon as the MA has been appointed and the FA has announced the policy package (which boils down to announcing the intended status of the MA), which leaves the public sector actors a chance to make the final move with full knowledge of the private sector’s behavior. Should the FA prefer to grant the MA independence in monetary policy, the MA can exercise inflation control knowing what the private sector has expected. Similarly, should the FA subordinate monetary policy to fiscal policy, it can exercise fiscal control, and by implication monetary control, knowing the private sector’s expectations.

The game consists hence of two sub-games. First, the private sector has to react to the FA's announcement concerning the MA's independence. If the FA announces that the MA will conduct monetary policy independently, the private sector has to assess the credibility of this announcement. Second, the private sector has to set its inflation expectations conditional on the likely pattern of policy domination.

To determine these two moves, the private sector is postulated to minimize the following objective function:

$$E|\pi - \pi^e| \quad (7)$$

The minimization of (7) rather than the expected squared deviation of the actual inflation rate from the expected one is postulated for two reasons. First, the minimization of (7) ensures analytical ease because it always results in a "pure strategy" in the sense that the private sector always expects either (5) or (6) to materialize, never a (linear) combination of them. Second, the choice of a pure strategy by the private sector highlights the binary nature of the credibility of central bank independence: either the MA's independence is fully credible or not at all credible, there is no intermediate possibility.

Conditional on its assessment of expected policy domination, the private sector sets its inflation expectations. As is evident from the reaction functions (5) and (6), both authorities suffer from the well-known credibility problem associated with their respective inflation targets. Both the FA and the MA are tempted to cheat the private sector by creating surprise inflation if the private sector expects an inflation rate below (5) or (6), respectively. Assumption 1 implies that the MA's temptation is smaller than the FA's, but as long as the MA is concerned about output (i.e. as long as $\mu_2 \neq 0$), it is not optimal for the MA to strive after zero inflation. Consequently, the private sector's expectation formation will result in either (5') or (6') being the equilibrium inflation rate.

It is obvious that under the current assumptions the equilibrium will be characterized by fiscal dominance, and the inflation rate will equal (5'). The private sector knows that if it expects delegation (that is, if it expects (6)) it will be cheated, since the FA will act according to its reaction function (5). Consequently, there is no way for the FA to make a credible delegation announcement; the private sector will expect fiscal dominance, and the only rational response by the FA is to subordinate monetary policy to fiscal policy; otherwise output would fall below its natural-rate level and the FA would be worse off.

Thus far, we have replicated the original game of Kydland and Prescott (1977) in a somewhat different set-up. In both cases, the omnipotent FA's temptation to boost output by surprise inflation makes any inflation rate below the FA's discretionary optimum (5') unattainable. It therefore seems tempting to conclude that it really does not matter whether

the overall credibility of monetary policy is undermined by a monetary target that is not credible or by delegation that is not credible.

We can, however, already anticipate that there is more to the story. We have been able to identify two distinct sources of credibility problems associated with monetary policy: first, the FA may renege on its delegation announcement, and second, both authorities may renege on their inflation targets. Although the consequence is invariably the lack of monetary credibility, we have no reason to expect *ex ante* that the credibility of delegation is determined simultaneously and similarly as the credibility of monetary targets. If we can show that there is a way to make delegation credible even when the MA suffers from a credibility problem with respect to its own inflation target, we have identified a novel Pareto-improvement.

IV. CREDIBILITY OF MONETARY DELEGATION

The main aim of this section is to argue that an equilibrium with credible delegation is attainable. By showing that credible delegation can co-exist with the lack of credibility of the monetary target, the point of the paper has been made: the decomposition of the overall credibility problem adds value. The main argument will be preceded by the introduction of a few tools of analysis, and it will be succeeded by the extension of the analysis to cover asymmetrically distributed information between the public and private sectors.

To start with, let us formally rank the three possible equilibria (described early in section II) from the FA's viewpoint and consider the implications of this ranking. Let us call the equilibria "discretion" (expected and materialized fiscal dominance), "rule" (expected and materialized monetary dominance), and "cheating" (expected but unmaterialized monetary dominance). These naming conventions are adopted so as to keep the link to earlier literature clear; however, the discussion in the preceding section points to some emerging inaccuracies. The "rule" equilibrium is, in fact, a discretionary one, too, as long as the MA's inflation target is not credibly zero. Furthermore, while "cheating" refers here only to the FA's renegeing on its delegation commitment, it could also arise with respect to an inflation target. These labeling inaccuracies aside, the following ranking of equilibria can be established by simply inserting the relevant equilibrium values for inflation and output into (3):

Proposition 1:

$$L_{FA}^{cheating} < L_{FA}^{rule} < L_{FA}^{discretion} \Leftrightarrow \hat{\pi}_{FA} \equiv \pi_{FA}^{RE} |_{\alpha=0} < \frac{\pi_{MA}^{RE} + \pi_{FA}^{RE}}{2}$$

Cheating is hence the FA's preferred strategy, and as the private sector knows this, the rule equilibrium becomes unattainable as well. Note that the ranking between rule and discretion is subject to the adjoining qualifier, where the introduction of $\hat{\pi}_{FA}$ is of

considerable importance. It equals (5') evaluated at $\alpha = 0$, being thus interpreted as the FA's (unattainable) commitment optimum. As opposed to earlier literature where the commitment optimum equaled zero, it is here strictly positive following the introduction of the fiscal output effect in (2). So, as long as the FA's commitment optimum is closer to the MA's (discretionary) inflation optimum than the FA's own (discretionary) inflation optimum, the FA would be better off in the rule equilibrium than it is in the discretionary equilibrium.

A corollary of Proposition 1 is that the optimal MA is such that its (discretionary) inflation optimum equals the FA's commitment optimum. Formally:

Corollary: The optimal MA is such that
$$\frac{\mu_1}{\mu_2} = \frac{\theta \lambda_1}{\beta \lambda_2}$$

This Corollary can be further interpreted to convey that the optimal MA's relative inflation-aversion is greater than the FA's relative inflation-aversion by a factor of $(1 + \alpha/\beta)$. Note that in earlier literature $\beta = 0$ and the optimal MA has hence been infinitely inflation-averse.

Based on the ranking established in Proposition 1, and following Barro and Gordon (1983b), we next define the magnitudes of the FA's *Temptation* to renege on its delegation announcement and the FA's *Incentive* to attain credible delegation as follows:

Definition 1:

$$Temptation \equiv L_{FA}^{rule} - L_{FA}^{cheating} = (\pi_{MA}^{RE} - \pi_{FA}^* |_{\pi^e = \pi_{MA}^{RE}})^2 (\lambda_1 + \lambda_2 \theta^2) > 0$$

Definition 2:

$$Incentive \equiv L_{FA}^{discretion} - L_{FA}^{rule} = (\pi_{FA}^{RE} - \pi_{MA}^{RE}) [(\lambda_1 + \lambda_2 \beta^2) (\pi_{FA}^{RE} + \pi_{MA}^{RE} - 2\hat{\pi}_{FA})] > 0$$

where the concluding inequality holds by Proposition 1.

It is noteworthy that the relative magnitudes of the Temptation and Incentive are unimportant; only their signs matter. Even if the FA's Temptation to cheat is insignificant relative to its Incentive to attain the second-best (rule) equilibrium, delegation cannot be made credible as long as the Temptation is strictly positive. On the other hand, as long as the Incentive is strictly positive, it is in the best interest of the FA to remove its Temptation to cheat so as to make credible delegation attainable.

We have thus identified the necessity of an enforcement mechanism by which the FA can eliminate its temptation to generate surprise inflation by reneging on its delegation announcement. In the absence of such enforcement the discretionary equilibrium prevails, but the introduction of sufficient and credible enforcement will make delegation credible and hence the second-best equilibrium attainable. The ultimate function of the enforcement mechanism is to allow the FA to credibly commit itself to delegation before the private sector makes its move; in other words, the enforcement is to enable the FA to remove its last-mover advantage in the game.

A possible and feasible enforcement mechanism can be obtained by relaxing the implicit assumptions that both delegation and cheating are costless. It is obvious that a (legal) reform granting the central bank independence and thus changing the economy's institutional set-up is a costly process involving time, legal and administrative efforts, and even political bargaining. In addition, cheating the private sector will also incur a cost to the FA in terms of loss of credibility and good-will³. Let us denote these costs C_L and C_C , respectively, with the sub-index "L" referring to "law" and "C" to "credibility". Naturally, $C_L, C_C \in \mathfrak{R}_+$.

In the presence of these costs, it can be proven that:

Proposition 2: Credible delegation is the FA's first-best strategy if, and only if $C_L \in [Temptation - C_C, Incentive)$.

Proof: The FA is better off in the "rule" equilibrium than in the "discretion" equilibrium as long as $C_L < Incentive$. The FA is better off in the "rule" equilibrium than in the "cheating" equilibrium as long as $C_L + C_C \geq Temptation$. Consequently, credible delegation is the dominant strategy when C_L satisfies: $Temptation - C_C \leq C_L < Incentive$.

The game can now result in two equilibria: if the condition in Proposition 1 holds, the "rule" equilibrium will emerge; otherwise the "discretion" equilibrium materializes. The intuition behind this result is clear: the private sector knows *ex ante* whether or not the costs are sufficient to ensure the optimality of credible delegation from the FA's viewpoint. Conditional on this knowledge, the private sector can correctly anticipate whether the equilibrium inflation rate will be (5') or (6').

³However, it is by no means obvious that this cost is infinite, as Rogoff (1985) and Lohmann (1992) implicitly assume. If the analysis were extended to cover repeated games the good-will cost of cheating could be endogenized with respect to the FA's reputation of overriding the MA, and it could conceivably be shown that the two ways to tackle the credibility problem (building up an anti-inflationary reputation and appointing a conservative central banker) are mutually reinforcing.

It has hence been shown that credible delegation can occur, and is optimal to the FA, even when the MA's inflation target suffers from lack of credibility. The relaxation of the implicit assumptions concerning the costlessness of delegation and cheating allowed us to identify a possible and feasible way to introduce a novel Pareto-improvement. Notably, the identification of this Pareto-improvement was conditional on us first decomposing the overall credibility of monetary policy.

How are we to interpret the difference between the "states of nature" in which one or the other of the two possible equilibria now emerges? Provided that the cost of granting the MA independence (C_L) is not prohibitive, the crucial difference is the potential of the cost of cheating (C_C) to outweigh the benefit of cheating. How exactly this situation arises will be discussed below. First, the current assumptions are maintained, but later the (implicit) assumption that information is symmetrically distributed between the public and private sectors will be relaxed.

A. SYMMETRIC INFORMATION

The elimination of the FA's Temptation through C_C is essentially equivalent to the elimination of an inconsistency between monetary and fiscal policies. If C_C is sufficiently high to eliminate the Temptation, then monetary and fiscal policies are compatible in the sense that the FA loses rather than gains by renegeing on its commitment to central bank independence; that is, the MA's monetary policy does not create an incentive for the FA to override the MA.

How monetary policy could create an incentive for the FA to override the MA is best seen by considering the credibility of delegation as a function of the MA's characteristics. That is, rather than considering whether C_C is sufficiently high to eliminate the FA's temptation, we now consider whether the Temptation is small enough, given C_C . For that purpose, it is helpful to note that:

$$\frac{\partial \text{Temptation}}{\partial \pi_{MA}^{RE}} < 0 \quad (8)$$

The more "conservative" the MA is, the greater the FA's gain from successfully cheating the private sector is. The intuition is straight-forward: the more "conservative" the MA is, *ceteris paribus*, the larger the positive output effect from successful cheating is (see (2)).

The credibility of delegation is consequently a function of the credibility of the MA's inflation target. The more "conservative" the MA is, the more unlikely it is that C_C is large enough to eliminate the FA's temptation, and the less likely, therefore, it is that delegation will be credible. To put it differently, the more "conservative" the MA is, *ceteris*

paribus, the further away its (discretionary) inflation optimum (6) is from the FA's (5) and, consequently, the larger the inconsistency between monetary and fiscal policies is. Another way of interpreting this finding is that there is a trade-off between the "conservativeness" of the MA and the credibility of delegation.

The question then naturally arises, What if the optimal MA, identified in the Corollary to Proposition 1, is too "conservative" given C_C ? Obviously, it would then pay off for the FA to appoint a "softer" MA in order to ensure minimum consistency between monetary and fiscal policies and thereby render delegation credible. To formalize this insight, let us consider the FA's problem of appointing a MA in general form as:

$$\max_{\pi_{MA}^{RE}} [Incentive] \text{ s.t. } C_L \in [Temptation - C_C, Incentive] \quad (9)$$

If there is a solution to this problem the FA appoints the MA implied by the solution, and delegation to such an MA is credible. If the problem has no solution the FA must accept the "discretion" equilibrium.

A general solution to (9) can be obtained by re-writing Proposition 2 in terms of the MA's characteristics. The existence of a solution necessitates the MA to be such that:

$$\max[2\hat{\pi}_{FA} - \pi_{FA}^{RE} + C_D; \pi_{FA}^* |_{\pi^c = \pi_{MA}^{RE}} - \sqrt{\frac{C_L + C_C}{\lambda_1 + \lambda_2 \theta^2}}] \leq \pi_{MA}^{RE} \leq \pi_{FA}^{RE} - \frac{1}{\lambda_1 + \lambda_2 \beta^2} \quad (10)$$

Conditional on (10) holding, the solution to (9) is:

$$(1) [\pi_{FA}^* |_{\pi^c = \pi_{MA}^{RE}} - \sqrt{\frac{C_L + C_C}{\lambda_1 + \lambda_2 \theta^2}}] \equiv \Sigma > [2\hat{\pi}_{FA} - \pi_{FA}^{RE} + C_D] \equiv \Omega \Rightarrow \pi_{MA}^{RE} \geq \pi_{FA}^* |_{\pi^c = \pi_{MA}^{RE}} - \sqrt{\frac{C_L + C_C}{\lambda_1 + \lambda_2 \theta^2}}$$

$$\Omega < \Sigma \leq \hat{\pi}_{FA} \Rightarrow \pi_{MA}^{RE} = \hat{\pi}_{FA}$$

$$\Sigma > \max[\hat{\pi}_{FA}; \Omega] \Rightarrow \pi_{MA}^{RE} = \pi_{FA}^* |_{\pi^c = \pi_{MA}^{RE}} - \sqrt{\frac{C_L + C_C}{\lambda_1 + \lambda_2 \theta^2}}$$

$$(2) \Sigma \leq \Omega \Rightarrow \pi_{MA}^{RE} = \hat{\pi}_{FA}$$

The intuition behind this solution is that it is optimal for the FA to appoint a MA whose optimal (discretionary) inflation rate is as close to the FA's commitment optimum as possible. In other words, it is optimal for the FA to eliminate the inconsistency between monetary policy and optimal fiscal policy (the FA's commitment optimum) to the maximum possible extent. **While the cost of this kind of policy consistency may be a sub-optimal "softness" of the central banker, the benefit is the subsequent attainability of a better equilibrium.** Case (1) covers the case where the elimination of the FA's Temptation is sufficient for its Incentive to be positive. Case (2) covers the case where the FA's Incentive being positive is sufficient for its Temptation to vanish. Taken together, the two cases are exhaustive.

B. ASYMMETRIC INFORMATION

It is by no means obvious that information about the enforcement is evenly distributed between the public and private sectors. For example, the private sector may not be aware of the costs caused by granting the MA independence. This would be particularly true if a significant share of those costs were made up of political bargaining in which the proponents of central bank independence had to make concessions in other policy areas in order to persuade the opponents to support monetary delegation. Let us therefore consider the implications of:

Assumption 2: The private sector does not know the magnitude of C_L .

The FA has an incentive to remove the informational asymmetry only when C_L is such that it satisfies the condition in Proposition 2 ($C_L \in [Temptation - C_C, Incentive]$); that is, when it makes credible delegation the FA's first-best strategy.

If this is not the case the FA's first-best strategy is cheating, and the FA attempts to make the private sector expect monetary dominance. In case C_L is smaller than the lower bound of the interval, the FA grants the MA independence in order to send a false signal to the private sector, and simply cancels the MA's independence as soon as the private sector has set its expectations. In case C_L exceeds the upper bound of the interval, the FA will not grant the MA independence in the first place, which is a sure signal to the private sector that fiscal dominance will characterize the period to come.

The private sector's problem is hence to distinguish sincere delegation from insincere delegation. Unless the private sector knows with certainty that credible delegation is the FA's first-best strategy, it will expect fiscal dominance so as not to be cheated; by doing so the private sector can ensure the *ex post* correctness of its expectations. Consequently, the private sector's problem has been transformed into a problem for a sincere FA, who will have to invent a way to signal that the probability of delegation in equilibrium is unity.

The question is, then, how to ensure that

$$\Pr [C_L \in [Temptation - C_C, Incentive]] = 1.$$

The answer is: By **appointing a “softer” MA than under symmetric information.** As noted above, the private sector can conclude that C_L is below the upper bound of the interval as soon as the FA has granted the MA independence. On the other hand, the only way to ensure that C_L is at or above the lower bound is for the lower bound to be zero since $C_L \in \mathfrak{R}_+$. And the only way for the lower bound to equal zero is for the Temptation to equal C_C . Since the Temptation now has to be lowered to $Temptation = C_C$, which is below its symmetric-information minimum (which would naturally be $Temptation = C_L + C_C$), the MA must be “softer” than in the symmetric-information case (by (8)). Since the extra “softness” makes the FA unambiguously worse off (by increasing the distance between the FA's commitment optimum and the MA's (discretionary) optimum), we can conclude that this **informational asymmetry unambiguously induces a welfare loss.**

V. CONCLUSIONS AND POLICY IMPLICATIONS

Five main conclusions arise from our exercise. First, the credibility of monetary delegation should not be mixed up with the credibility of monetary targets because they are differently determined; in fact, the credibility of delegation is endogenous to the credibility of the central bank's inflation target. Second, the credibility of monetary delegation is achievable even when the monetary targets are not credible. Third, the attainability of credible delegation necessitates the presence of *both* an enforcement mechanism which removes the omnipotent “policymaker's” temptation to generate surprise inflation in order to boost output *and* the consistency of monetary and fiscal policy targets. Fourth, to achieve the required consistency between monetary and fiscal policies, the “policymaker” may have to appoint a sub-optimally “soft” central banker. Fifth, the sub-optimal “softness” of the central banker is aggravated by the private sector's lack of familiarity with the enforcement mechanism by which credible central bank independence is attempted.

These conclusions are hoped in particular to make a normative contribution to the analysis of monetary policy credibility. Most importantly, while earlier “time-inconsistency” literature (starting with Rogoff (1985)) has implied that a “conservative” central banker

should conduct monetary policy independently of other economic policies, it is concluded here that the central bank's "conservativeness" must be compatible with other economic policies. Furthermore, while earlier literature has ignored the importance of transparency in making institutional reforms (granting the central bank independence in conducting monetary policy), it is concluded here that lack of transparency unambiguously aggravates credibility problems and reduces welfare.

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