Constitutions and Central-Bank Independence: An Objection to "McCallum's Second Fallacy"*

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Comments welcome.

Abstract

Most of the literature on monetary policy delegation assumes that the government can credibly commit to the delegation contract, an assumption criticized by McCallum. This paper provides some foundations for the assumption that renegotiating a delegation contract can be costly by illustrating how political institutions can generate inertia in recontracting, reduce the gains from it or prevent it altogether. Once the nature of renegotiation costs has been clarified, it is easier to see why certain institutions can mitigate or solve dynamic inconsistencies better than others. The paper points to institutions which give Western democracies the technology to make credible delegation commitments, and argues that the ECB is an example of credible delegation.

Keywords: constitution, delegation, inertia, renegotiation costs, separation of powers.

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Quis costodiet custodes?

1 Introduction

In an influential paper, McCallum (1995) comments on the literature on optimal delegation contracts for central bankers (e.g. Persson and Tabellini, 1993; Walsh, 1995), and concludes that this literature is flawed in that delegation merely relocates the dynamic inconsistency problem of monetary policy (this flaw is the "second fallacy"). In his words

> [...] Under the proposed arrangement, the government has to enforce the contract (...), but the government has exactly the same incentive not to do so as identified by the Kydland-Prescott (1977) and Barro-Gordon (1983) analysis. Indeed, if the absence of any precommitment technology is actually a problem, then it must apply to the consolidated central-bank-government entity just as it would to an entirely independent central bank. If the technology does not exist, then it does not exist. Nor is this problem overcome by saying that the objective function must be specified at the "constitutional stage" of the political process. [...] No constitutional amendment has ever taken the United States off of the metallic standard that is clearly implied by Sections 8 and 10 of the Constitution.

While McCallum's intention was to argue that an independent central bank does not need performance-related incentives[1], his words raised the more fundamental question of what guarantees independence in the first place. If the government is free not to "enforce the contract" (with or without performance incentives) through which it delegates control of monetary policy to the central bank, then it can regain such control at will. Then delegation indeed relocates the time-inconsistency problem, from the promise not to overinflate to the promise not to violate/change the delegation contract (in order to overinflate).

The purpose of this paper is to show that - on the contrary - in modern democracies legal institutions, and constitutions in particular, do provide delegation contracts and analogous institutional devices with sufficient credibility to mitigate (and possibly eliminate) many time inconsistencies, among which the inflation bias.

To deal with McCallum's criticism and make delegation matter, part of the most recent literature on monetary delegation, in particular Jensen (1997), assumes that renegotiating the delegation contract is costly (see also Lohmann, 1992). The assumption of exogenous costs and the assumption that the size of the costs can be set by the government (once and forever) have both been used, and in both cases the nature of these costs is not completely clear (see the discussion in Section 3). Since the outcome depends crucially on the size

[1] This is clarified in McCallum (1997).

of renegotiation costs and on whether they are exogenous or not, it is indeed unfortunate that their nature is unclear.

Another strand of the literature (e.g. Al-Novaihi and Levine, 1996 and Herrendorf, 1998), shows that delegation can be relevant in a repeated game framework with asymmetric information, where it is not clear to the public whether inflation is due to bad shocks or bad policy. Then delegation can improve the equilibrium outcome by making the government's policy more transparent.[2]

But everybody - with the exception of Persson and Tabellini (e.g. 2000, Ch. 17) - seems to have acknowledged that with symmetric information and no exogenous renegotiation costs delegation is irrelevant.

Instead, we show here that even in the standard framework with complete information and per se costless renegotiation, in stable democracies the inflation bias can be mitigated, and possibly eliminated, by appropriately specifying the process required to modify the delegation contract/law at the constitutional stage – thereby endogenously generating lags and costs of renegotiating**.** More broadly, we point out why in modern democracies institutions do matter and commitment technologies are not exogenous.

2 Contracts, constitutions and commitment

2.1 The enforcement of contracts

We are not convinced by McCallum's first quoted statement, namely that "*the government has to enforce the contract*". The literature on monetary delegation focuses on modern constitutional democracies where, fortunately, governments do not enforce contracts (courts do). This division of powers is of course never complete and it varies from time to time and from country to country. Nevertheless, separation of powers, which implies that the government does not enforce contracts, is a good approximation for certain countries. Constitutions with separation of powers emerged as means to constrain rulers' discretion and opportunism, which brought as a by-product an increase in rulers' ability to commit through contracts (North and Weingast, 1989). Borrowing a quotation from Laffont's recent book (2000),

> "A society in which the guarantee of rights is not assured, nor the separation of powers provided for, has no constitution". (Article 16, French Declaration of Rights of Man, 1789)

A sufficiently independent and benevolent judiciary, customarily assumed in political economy, constrains the government to respect certain constitutional rules and the contracts it signs or bear the legal penalties from infringement. This assumption is of course more reasonable for some countries than for others, and often clearly unreasonable. We do not deny that everywhere in the world governments maintain the ability to exercise pressure on the judiciary. Our argument can accommodate different degrees of separation of powers, in the sense

[2] A point also raised by Canzonieri (1985).

that the probability that the judiciary will be swayed by the government can go from zero to one. In the end, differing degrees of separation of powers will imply different abilities to mitigate the inflation bias (and dynamic inconsistencies more generally).

A contract is commonly defined as a "legally binding agreement" (Oxford Advanced Learner's Dictionary 1990, p. 255) between two or more parties. An agreement, before being written down as a contract, is nothing else than a couple (or more) of reciprocal promises. Therefore, we can say that enforceable written contracts are legal instruments that add credibility to promises, that allow contracting parties to credibly commit to certain future courses of actions. They increase the costs of violating the contractual promise by the threat of legal penalties. The time-inconsistency problem in monetary policy consists of a suboptimal outcome reached because the government's promise not to overinflate lacks credibility. McCallum argues that the presence of a delegation contract makes no difference regarding the credibility of a government's promise. On the contrary, we maintain that contracts have the precise purpose of making promises credible, and therefore that the time-inconsistency problem is more easily solvable through a contract.[3]

2.2 Commitment technologies

McCallum's statements "if the absence of any precommitment technology is actually a problem..." and "If the technology does not exist, then it does not exist" have been interpreted as suggesting that contractual delegation cannot help governments to commit. However, one reason why delegation may matter is that the normal situation is *not* the absence of *any* precommitment technology. Rather, we typically have technologies that allow us to commit to certain actions (e.g. not to suddenly or secretly renegotiate/cancel/amend a contract/law/constitution), but no technology to commit to certain other actions (e.g. not to inflate when we retain control on monetary policy). This is what contract theorists' distinction between verifiable and merely observable actions (or states) is meant to capture. Suppose the institutional technology for enforcing explicit (written) contracts, a well functioning independent judicial system, does exist. Basic contract theory defines only *observable* (or *non verifiable*) the actions that – although observable for contracting parties – cannot be observed/verified (at reasonable cost, or with reasonable precision) by a third enforcing party like a court, so that they cannot be explicitly contracted upon. *Verifiable* actions are observable by the parties and can also be observed/verified by third parties, so that contracts on these variables can be enforced by courts.

An example relevant to our discussion is that of codified procedural rules, such as those required to change laws and constitutions. The conformity of an action to a procedural rule is usually easily verifiable. If procedural rules for changing laws are not followed, any such change is nullified by the competent

[3] Of course, while we will assume that a government may bear costs if acting against the provisions of a contract while the contract is legally valid, we allow for the fact that the delegation contract, if part of a law, can be changed by the government through a new law.

(often specialized) court. If a procedural rule requires a minimum time lag or a public announcement before a given law can be changed, as long as the procedural rule is in place governments are credibly committed not to suddenly or secretly change the law.

We think that the articles of the US Constitution that McCallum mentions are not an example of a verifiable statement prohibiting fiat money. We interpret them as aimed at giving monetary authority to the Federal Government alone and forbidding individual states from establishing their own currency rather than at preventing the Federal Government from printing fiat money. All clauses of section 10, article 1, start with "*No state shall...*".[4]

As another example of time-inconsistency problem in monetary policy, the respect of a law constraining the Treasury to "pursue good monetary policy" or "to keep inflation low" is hardly verifiable, as it is unclear what "good" and "low" means. On the other hand, consider a constitutional rule stating that the central bankers' contract can only be changed/cancelled through an "impeachment procedure" that must start with a given public act and must be completed a minimum of three months after the public act with the approval of at least two thirds of the members of each the two Houses of Parliament. Clearly, the compliance with such rule is easily verifiable by courts, which may make the promise not to suddenly or secretly change the central banker's incentives credible.

2.3 Renegotiation and constitutions

We have argued that governments are not completely free to decide whether to respect a contract or not, in the sense that the expected cost of violation is positive. Does this imply that any delegation contract between a government and an agent (e.g. the central banker) has commitment power towards other parties (e.g. the private sector)? Of course not. In all modern legal systems the (two or more) parties that signed a contract are left free to cancel or change the contract, if they all agree on doing so. Dewatripont (1988) and Katz (1991) proved that if a contract between two parties can be secretly and costlessly renegotiated, it cannot have commitment power toward a third party. In the monetary policy framework, the renegotiation need not even be secret: it can be done openly since agents are assumed unable to adjust to the changes until the next period. Then sudden and costless renegotiation deprives delegation of any commitment power.

Here comes our third point of disagreement with McCallum's quoted statement, in particular with his words *"Nor is this problem overcome by saying that the objective function must be specified at the "constitutional stage" of the po-*

[4] We report the debated statements (Article 1, Section 8 and Section 10).

"The Congress shall have power to (....) coin money, regulate the value thereof, and of foreign coin, and fix the standards of weights and measure".

"No state shall enter in any treaty, alliance or confederation; grant letters of marque and reprisal; coin money, emit bills of credit; make anything but gold and silver coin a tender of payment in debts (....)".

litical process". It is true that when sudden renegotiation is feasible and per se costless a simple delegation contract between a government and a central banker (or a "delegation law" that can be easily modified) would not have the desired commitment effect in the standard framework: the private sector would foresee that once their expectations are formed (contracts are signed), government and banker could simply renegotiate the contract (change the law).[5] However, we will show in the next sections that embedding the delegation contract in the constitution *is* one way to mitigate or solve this problem. Most democratic constitutions require a public debate, a time lag, and a qualified majority to be amended. A delegation contract guaranteed by the constitution is therefore hard(er) to change, and cannot be suddenly or secretly renegotiated.

3 The standard framework

We will base our discussion on the standard model presented, for example, in McCallum (1995).

Log output is given by

$$y_t = \alpha(\pi_t - \pi_t^e),\ \alpha > 0 \tag{1}$$

The government (or the central banker) is assumed to control inflation directly. The government loss function is given by

$$E_t \sum_{i=0}^{\infty} \beta^i L_{t+i},\ \text{where} \tag{2}$$

$$L_t = \lambda(y_t - y^*)^2 + \pi_t^2,\ \lambda > 0, \tag{3}$$

where $y^* > 0$, while potential output is zero. The inflation bias does not arise if $y^* = 0$.

Monetary policy can be delegated to a central banker whose preferences and incentives are such that the inflation bias is eliminated if delegation is fully credible. For example, the central bank may have the same loss function as the government, but $y^* = 0$. In this framework, McCallum's statement implies that the government cannot commit (make delegation credible): it can change the delegation contract at will (say, through a law, if the delegation contract is written in a law) and therefore, absent renegotiation costs and asymmetric information, delegation is irrelevant.

Jensen (1997) augments this model by assuming that if the government delegates monetary policy, it then faces a given cost of renegotiation. We mentioned in the introduction that we find these exogenous renegotiation costs unclear.

[5] Using the term "renegotiation" when talking of monetary policy delegation implemented by law rather than by contract is perhaps confusing, as then the government can change the status and objective of the central bank unilaterally. "Renegotiation" should then be read as "changing the terms of the delegation law."

They cannot be reputational: inflating once, reputation is lost forever since the true preferences of the government are revealed, while Jensen's main argument relies on costs that must be faced each time that the government inflates.[6] If they are "transactions costs", then their size would be arguably too small to influence a government's policy.

In any case, if exogenous renegotiation costs are zero, the following protocols are equivalent:

1. No delegation.
2. No delegation, objective function constitutional but non verifiable.
3. Delegation, non-contractual.
4. Delegation, contractual, non constitutional.

By "contractual" we mean that the terms of the delegation are set forth in an explicit and enforceable contract.

We define delegation "constitutional" if the process through which the delegation contract is changed is specified in the constitution. The contract itself need not be part of the constitution; it suffices that the constitution states, for example, that "The status of the Central Bank and the compensation scheme for the central banker are modified following the same procedure needed to amend the constitution".[7]

In this framework, with no exogenous renegotiation costs nor reputation or punishments, (1)-(4) yield equivalent outcomes. In (3), no contract specifies the terms of delegation, which therefore can be changed at will by the government. In (4), breaking the contract involves an expected cost (assuming that the government does not completely control the judiciary), but the government can change the contract at no cost through a law, therefore we are back at (1). McCallum's statement that "*Nor is this problem overcome by saying that the objective function must be specified at the "constitutional stage" of the political process*" is assumed to hold for situation (2). For example, a constitutional law stating that "Monetary policy is conducted by the government in a way compatible with price stability" does not solve the problem. The reason is that the government retains control of monetary policy, and its intentions ex-post are hard to verify in a stochastic environment. Moreover, there is no clear consequence of not meeting the objectives. As long as McCallum's statement refers to cases (1)-(4), it is true in our framework. If, on the other hand, the statement is interpreted to mean that no constitutional norm can provide a commitment technology, the statement is definitely unconvincing. We see at least two ways in which a combination of delegation and commonly observed

[6] Reputation can arise only in an asymmetric information framework. The strandard references are Kreps and Wilson (1982) and Milgrom and Roberts (1982a, and 1982b).

[7] Of course, the contract should be public and the central banker should not be allowed to undertake transactions that may generate conflicts of interest, as customary for high-ranking public servants.

constitutional norms can solve or moderate the inflation bias: constitutional inertia and qualified majority.[8]

4 Constitutional Inertia

4.1 Main result

Consider the case where delegation is contractual and constitutional, where changing the delegation contract requires the same procedure needed to amend the constitution. We make the following assumptions:

1. The delegation contract is such that the central banker has the right preferences/incentives to pursue a policy free of inflation bias.

2. The constitution can be legally changed only following the procedures set in the constitution itself. Constitutional changes operated in other ways and other violations of easily verifiable constitutional norms are punished with probability π and sanctions Σ, with $\pi\Sigma \geq 0$.[9]

3. The procedure of constitutional revision requires every amendment to be approved twice before becoming effective, with a minimum time span between the two deliberations or, alternatively, that a certain period of time passes before an approved amendment becomes effective.

4. Separation of powers guarantees that if the (risk-neutral) government does break the delegation contract – possibly by trying to corrupt the central banker – it receives the punishment S with probability p, with $0 \leq pS \leq \pi\Sigma$.[10]

Complete or partial commitment can be reached, depending on auxiliary assumptions, as illustrated in the following proposition.

Proposition 1 *In the standard model, if i) assumptions (1)-(4) hold, ii) the lag at point (3) is at least one period, iii) future (after the contract is renegotiated) options for the central banker are not enhanced if she inflates, and iv) pS exceeds the gains from inflating, then the inflation bias is completely eliminated.*

[8] Note that with separation of power many contractual devices other than constitutional delegation can be designed to solve the same problem. For example, a well designed high-powered constitutional incentive scheme for the government itself, or a non constitutional multilateral contract between government, banker and representatives of the private sector.

[9] The first part of this assumption is clearly realistic, since compliance with procedural rules is easily verifiable (we do not need to assume that all constitutional rules are respected, but only that the easily verifiable ones are). Regarding the second part, it is sensible to assume $\pi\Sigma$ strictly positive in most cases, although its value varies wildly between different countries (otherwise, we should continuously observe incumbent Western governments illegally modifying the constitution - e.g. electoral rules - in their favor).

[10] Then when the government has complete control over the judiciary $p \simeq 0$, when separation of powers is complete $p \simeq 1$.

Proof. To change monetary conditions, the government needs to change the delegation contract because of iv) and (4). Changing the delegation contract requires a lag because of (3). Since this lag is at least as long as the time required for agents to update expectations (assumption ii), the gain from inflating is zero as long as the central banker behaves according to the incentives of the currently valid contract, as guaranteed by iii). ■

If the lag required to change the constitution (and hence the delegation contract) is smaller than one period, some gains from inflating will remain. The same is true if pS (the expected punishment from infringement) is smaller than the gains from inflating. Likewise, if the lag is sufficient, but the central banker may be in a more favorable situation once the contract is renegotiated if she inflates, the commitment solution is not reached. In all cases the equilibrium inflation will lie between zero and the discretionary level, so there is a partial gain from delegation. To model this situation, we introduce the parameter γ, with $0 \leq \gamma \leq 1$, where $1-\gamma$ is the fraction of the period needed to change the contract (alternatively, γ reflects an inverse function of the expected punishment – pS – or the fact that the central banker may find herself in a better position when recontracting if she inflates). Then output follows

$$y_t = \alpha\gamma(\pi_t - \pi_t^e), \tag{4}$$

and the equilibrium inflation in the one-shot game is

$$\pi_t = \lambda\alpha\gamma y^*, \text{ implying } \frac{\partial\pi}{\partial\gamma} = \lambda\alpha y^* > 0. \tag{5}$$

Thus we obtain the intuitive results that each of the followings reduces the inflation bias monotonically in the one-shot game equilibrium:

a) Increased inertia.

b) Increased expected punishment of violating the delegation contract.

c) Improved exit options for the central banker that does not inflate.

These results are obtained when the government can modify the constitution without any support from the opposition. Section 5 discusses the implication of assuming, more realistically, that the constitution cannot be changed unilaterally by the ruling party.

4.2 Extension: repeated interaction

Modeling repeated games requires additional assumptions. We investigate the simple tit-for-tat strategy proposed by Jensen in a repeated (infinitely many times) game. The private sector strategy is assumed to be:

$$\begin{aligned} \pi_t^e &= 0 \text{ if } \pi_{t-1} = \pi_{t-1}^e. \\ \pi_t^e &= \lambda\gamma\alpha y^* \text{ otherwise.} \end{aligned} \tag{6}$$

The outcome $\pi_t = 0$ is an equilibrium if $\gamma = 0$ or if

$$\beta \geq \frac{1}{1+\lambda\gamma\alpha^2}.$$

Therefore, as $\gamma \to 0$, the no-commitment outcome improves but the optimal policy becomes more difficult to sustain given this strategy. This result is the same obtained by Jensen with exogenous renegotiation costs. That is, larger renegotiation costs in Jensen's framework and smaller benefits of inflating in our framework generate the same results: the equilibrium inflation in the one-shot game decreases but the optimal rate of inflation is less likely to be the outcome of the simple proposed tit-for-tat strategy.

In Jensen's model the parameter determining renegotiation costs is taken as exogenous by the government designing the optimal delegation (incentive) scheme, reflecting the common interpretation of McCallum's words that a government cannot tie its own hands. Here, instead, we are trying to establish foundations for the assumption of positive renegotiation costs, and showing that these costs are typically not exogenous**:** they can be influenced by institutional arrangements, so that the commitment technology is not given prior to any political decision. If the lag can be chosen by the government (giving rise to endogenous renegotiation costs) and, as natural in our framework, it needs not be set once and forever but can be changed at every period, what process will arise in equilibrium for the lag level? Proposition 2 shows that the government will optimally choose lag≥ 1.

Proposition 2 *Consider an infinite horizon model a la Barro-Gordon-Jensen, and let the time lag for (or the cost of) renegotiation be determined/modified by the government at the beginning of each period. Then, the unique equilibrium has lag*≥ 1 *and (therefore) full commitment.*

Proof. If lag<1 and the government inflates, it cannot be punished in any way, since it can optimally set a lag≥ 1 from the next period on. It follows that, for any discount rate, whenever lag<1 the government wishes to inflate. But since the private sector knows this, no surprise inflation is possible, and setting lag<1 is strictly dominated by setting lag≥ 1. ■

As a theoretical result, Proposition 2 says that a government that can commit to delegation will do so. On an empirical level, it raises the question of why we do not universally observe such commitment. A first answer could be that in the last decades we have observed many moves towards such commitment. The statutes of the Italian and French central banks have recently been modified in this direction. The ECB is arguably the most important example: the statute of autonomy of the ECB and its goals are specified in the Maastricht Treaty. Modifying the Treaty, in turn, calls for an international conference where the unanimous vote of all signing states is required. There is a large dose of both inertia and qualified majority (see the next section) in this procedure.

But why have we not observed more credible delegation in the past? Possible explanations include:

- Politicians chose not to commit because they were using the wrong model; or thought that the private sector was either using the wrong model or

forming expectations irrationally.[11]

- Inertia may imply a loss of flexibility (Lohmann, 1992), and politicians judged flexibility more important than low inflation.
- Politicians valued more authority on monetary policy than policy outcomes, and voters failed to punish them (e.g. because of the bundling of problems in general elections).
- For less stable democracies, lack of commitment technology. In our framework, this means that laws and constitutions were not sufficiently binding ($\pi\Sigma$ close to 0).

5 Qualified majority

5.1 Main result

We appeal to the literature on political business cycle in conjecturing that the inflation bias does not arise from the fact that a benevolent government is targeting a positive output gap because it believes that potential output is kept down by distortions. Rather, we assume that the government's loss function describes the probability of winning the next election, as in

$$\Pr(\text{re-election}_{t+1}) = c_t + \delta L_t^{-1}, \tag{7}$$

where c_t depends on factors that are uncorrelated with output and inflation. We do not derive (7) from a model, but we believe that it gives a more plausible explanation of why a government may want to induce a positive output gap. If this is indeed the case, an increased aversion to inflation in public opinion would reduce the value of the parameter λ[12], thus reducing the inflation rate in the one-shot game (see equation 5). Then an inflation-averse public opinion can reduce the inflation bias independently of delegation, which seems realistic.

We keep assumptions (1)-(2) and (4), disregard constitutional inertia by assuming no lag for constitutional amendments, and add the following assumptions:

5. The expected utility of both government and opposition is equal to the probability of winning the next elections. The probability of re-election is given by equation (7).
6. The political system is bipartisan and the opposition votes compactly on issues that involve a change in the probability of success in the next elections.

[11] For example, the government may have thought that the Phillips curve could be used to generate a long-run tradeoff between inflation and output.

[12] The parameter associated with π^2 is normalized to one.

7. Changing the constitution requires a share of the votes which cannot be reached if the opposition votes compactly against.

8. pS is larger than expected gains from inflating.

We then obtain the following result.

Proposition 3 *If assumptions (1)-(2) and (4)-(8) hold, the inflation bias is completely eliminated.*

Proof. To change the delegation contract, a constitutional reform is needed (the contract is not violated because of 8). This reform increases the chances that the party holding the government is re-elected. Let Pr(G) be the probability that the ruling coalition will win the next election. Then the probability that the opposition will win the next election is given by Pr(O)=1-Pr(G), making elections a zero sum game (because of Assumption 5). In a zero sum game there is no scope for gain-splitting, therefore there is no Pareto superior outcome in which the opposition votes to pass the constitutional reform. ■

5.2 Extension: multipartisan systems

Many existing democracies are not bi-partisan, majority and opposition are composed of coalitions of smaller or larger parties. It is therefore worthwhile to verify what happens to Proposition 3 if Assumption 6 does not hold. Suppose that assumption (8) holds but that the ruling majority can use side transfers to "buy" the number of additional votes it needs to modify the constitution. Let n be the number of seats in the parliament, $\frac{2}{3}n$ be the minimum fraction of votes required to amend the constitution, and m, with $\frac{2}{3}n > m > \frac{n}{2}$, be the number of seats held by the majority. Moreover, let $v > 0$ denote a parliament member's net value of winning the next elections, p the probability of the incumbent majority to win the next election without surprise inflation, and $\Delta p > 0$ the maximal increase in p it can achieve by inducing surprise inflation. The majority's gain from inducing surprise inflation is therefore $mv\Delta p$.

To obtain the $\frac{2}{3}n-m$ votes required for a constitutional amendment allowing for renegotiation and surprise inflation, the majority has to compensate $\frac{2}{3}n-m$ opposition members through side transfers. By being loyal, each opposition member expects a net reservation payoff included between $(1-p)v$, the payoff it obtains if strictly less than $\frac{2}{3}n-m$ opposition members vote with the majority (so that renegotiation is prevented), and $(1-p-\Delta p)v$, the payoff it obtains if at least $\frac{2}{3}n-m$ opposition members vote with the majority, so that renegotiation and surprise inflation take place. We assume that if an opposition member votes with the majority favoring renegotiation and surprise inflation, she is excluded from the next election.

As in the literature on takeovers, the per capita transfer t the majority must offer to capture a sufficient number of opposition members will depend on the details of the offer process: whether it is simultaneous or sequential, whether information on acceptance is private or public, whether offers can be

conditional on success or not, and so on. The transfer required to persuade a sufficient number of opposition members will also depend on the details of the institutional framework. For example, if politicians at the extremes of the political spectrum have a strong aversion to vote with each other, so that the majority is restricted to make an offer to the $\frac{2}{3}n-m$ opposition members closer to the center, each of these less extreme opposition members is pivotal (or almost so), which means that all (or most) the majority's gains from surprise inflation are captured by the switching voters.

Whatever model one uses, a lower bound for the per capita transfer to an opposition member is $(1-p-\Delta p)v$, which she can always obtain by not betraying her party. So the total transfer T that the majority has to offer to obtain the constitutional amendment and inflate must always be $T > (1-p-\Delta p)v(\frac{2}{3}n-m)$. Therefore, given that $mv\Delta p$ is the majority's gain from surprise inflation, a minimal necessary (not sufficient) condition for renegotiation to take place is

$$mv\Delta p > (1-p-\Delta p)v(\frac{2}{3}n-m) \tag{8}$$

or, equivalently,

$$\frac{\Delta p}{1-p-\Delta p} > \frac{\frac{2}{3}n-m}{m}. \tag{9}$$

Since there is no reason to expect this condition to either hold or not hold in general, we can state the following proposition.

Proposition 4 *Suppose (1)-(2), (4)-(5) and (7)-(8) hold and that pS is larger than the gain from inflating. Then:*

1. As long as $\frac{\Delta p}{1-p-\Delta p} \leq \frac{\frac{2}{3}n-m}{m}$ constitutional delegation completely eliminates the inflation bias.

2. When $\frac{\Delta p}{1-p-\Delta p} > \frac{\frac{2}{3}n-m}{m}$ the inflation bias need not be completely eliminated by constitutional delegation; however, the cost for the ruling majority of renegotiating the delegation contract and induce surprise inflation is at least $(1-p-\Delta p)v(\frac{2}{3}n-m)m$.

Since modern constitutions typically have a rigid structure requiring amendments to be passed by a qualified majority, Propositions 3 and 4 imply that inertia is not needed for constitutions to provide a credible commitment device. It is the sheer fact that the minority loses from inflation surprises to prevent them or reduce their gains.

At this point, a remark is in order.

Remark 5 *We have assumed that it is costless to change an ordinary law, which requires a simple majority. Relaxing this extreme working assumption strengthens our results and eliminates the equivalence of non-constitutional delegation and no delegation.*

This is another possible source of renegotiation costs. One could think of many reasons why passing such a law could be costly: for example, the opposition could delay its approval (oppositions do have means of delaying the approval of a law, for example by proposing hundreds of amendments), inducing inertia and therefore reducing gains from inflating.[13]

6 Discussion: assumptions and results

At a theoretical level, Propositions 1-4 provide a much needed foundation for the "*renegotiation costs*" used by Jensen (exogenous costs), Lohmann (costs set by government) and others. It is not, however, a foundation which delivers exactly the same object as the previously postulated one. In our framework "*renegotiation costs*" are not necessarily given exogenously to the government. Moreover, our foundation can give guidance as to the context-specific nature and size of these costs. At the level of application, Propositions 1-4 imply that constitutions do offer tools to mitigate the inflation bias, and that the effectiveness of these tools depend on the degree of separation of powers.

Long before Kydland and Prescott (1977), a primary function of constitutions has been to reduce dynamic inconsistencies. The inconsistencies arise because, once in power, each government has an incentive to pursue policies that increase its chances of maintaining power. We believe that the desire to engineer an output expansion has the same origin as the desire to manipulate the media, the judicial system and the electoral process, and that it can be disciplined in much the same way: by requiring the opposition to agree if certain rules are to be modified.

To iterate our point, Western-style constitutions have been designed (and can be modified) to generate costs able to mitigate dynamic inconsistencies arguably more severe (in terms of loss of welfare and of temptation for the ruling government) than those arising in monetary policy. The share of votes needed to change Western-style constitutions typically oscillates between 2/3 and 3/4, a percentage designed with the obvious purpose that a share of the opposition should agree on the change, reflecting the liberal principle that political minorities be guaranteed certain fundamental rights. In addition, many constitutions require a lag between two votes. The American Constitution (article 5) does so implicitly, requiring two thirds of all votes from both Houses and the ratification of three fourth of the legislatures of the states, a procedure that could hardly be carried out overnight. Similarly, the German Constitution (art. 79 and 82) requires two third of all votes from both Houses, then the signature

[13] We have also mentioned in the Introduction that reputational costs can arise in an asymmetric information, repeated game framework.

An example of the commitment power of a law is the Bundesbank, perhaps the most independent central bank, whose independence is guaranteed by a normal law (and a strong public opinion). German politicians resisted for ten years (between 1947 and 1957) to the Americans' pressing request for a law guaranteeing the Bundesbank's independence (see Buchheim, 2001). If laws and constitutions can be enforced or changed at will by governments, why did such a lengthy political fight take place?

of the President, and then the publication on the official journal. The Italian Constitution (art. 138) explicitly requires a lag of at least three months. The Swedish Constitution even calls for a general election between the two votes. Assumption 7 is also usually satisfied, together with Assumption 3, so that in reality the effects of inertia and of qualified majority reinforce each other.

The conclusion that constitutional inertia alone can completely eliminate the inflation bias depends on the central banker not having higher options, when the time of renegotiating the contract comes, if she has inflated. The applicability of this assumption varies from case to case. In economies with a well developed private financial sector, the central banker could find high paying jobs elsewhere. Public opinion may also play an important role, awarding prestige to bankers jealous of their independence. Increased public awareness of inflation may then reduce inflation through this simple mechanism, which grants popularity and respectability to independent central bankers. Finally, one also expects promises and threats from the government to be balanced to some extent by pressure and promises from the opposition, since the latter is assumed to be damaged by the engineered expansion.

Assumption 2 only excludes that an amendment to the constitution may, for example, be voted by a 1/2 majority rather than by a 2/3 majority. These highly verifiable procedural rules are respected in Western countries, and trying to break them would imply large expected costs when compared with the gains from surprise inflation.

Is the assumption of separation of powers (Assumption 4) a reasonable and useful one? It is, in our view, for certain countries. Of course there are countries in which power is absolute, so that the ruling government is not constrained to respect either contracts or procedural rules (and may not even face elections). Nothing is left of the relevance of delegation if the government is not constrained in any way by procedural rules nor by a judicial system (so that $pS = 0$). On the other hand, constitutional delegation has some degree of commitment – giving rise to renegotiation costs – as long as the judiciary is not completely controlled by the government (for any $pS > 0$). This implies that societies which have built an effective separation of powers are better able to deal with dynamic inconsistencies than societies which have not.

Finally, in our simple model the central banker is not facing any exogenous shock. If a model economy populated by forward-looking agents is hit by non-policy shocks, then even if the inflation bias is assumed away, a stabilization bias will generally be present if output is persistent (policy reacts less strongly to inflation deviations and more strongly to output deviations under discretion than it would under commitment). While the inflation bias can be solved or mitigated through a constitutional arrangement, we have said nothing about the stabilization bias. The literature has devised incentive schemes for the central banker aimed at solving the stabilization bias (see Persson and Tabellini (2000) for bibliography and a summary of the literature). Nothing of what we have said reduces the relevance of this literature. On the contrary, it could provide a foundation for it. In designing the appropriate contract for the central banker, this literature often assumes that the delegation contract is credible,

that is, that it cannot be broken or renegotiated. McCallum's critique states that this assumption is a weak one, since the government cannot commit to any specific delegation contract. We see our contribution as clarifying some (sufficient, not necessary) conditions under which the assumption of a credible delegation contract is appropriate. We think we have gone some way in the direction suggested by Persson and Tabellini, who "*think that the premise of the literature (*which assumes that delegation is credible) *is generally appropriate*", but that "*It would be more convincing to derive the institutional inertia as the result of a well-specified non-cooperative strategic interaction between different actors, something the literature–so far–has failed to do.*"[14]

7 Conclusion

Most of the literature on monetary policy delegation assumes that the government can credibly commit to the delegation contract, or that renegotiation involves costs. This paper provides foundations for this assumption by illustrating how political institutions can generate inertia in recontracting, reduce the gains from it or prevent it altogether. It argues that in modern democracies the commitment technology is not exogenous, focusing on two factors that help in solving dynamic inconsistency problems: inertia and qualified majority. Since amending Western constitutions typically requires both, those constitutions are clearly capable of providing credibility to monetary delegation. The delegation contract itself needs not be inserted in the constitution to ensure that there are gains from delegation, as long as changing the contract requires either inertia or qualified majority (both of which give rise to renegotiation costs).

By providing a better understanding of why delegation can be credible, we hope to have given a more solid background to the literature on optimal contracts for central bankers, which assumes credible delegation. In the end, monetary delegation should be seen as a new instance of the separation of powers: from the triple legislature-executive-judiciary, to the quartet legislative-executive-judiciary-monetary. And it is hard to see why legal institutions that often succeed in keeping the hands of governments away from the judiciary would not be able to do the same with respect to monetary policy.

[14] Persson and Tabellini (2000), p. 524. This research direction was also suggested by Lohmann (1992), who wrote: *"Another task for future research is to model explicitly the technology by which a sovereign, heterogenous policy-making body commits to an institution. [...] By analyzing the connection between political institutions and economic performance, one may come to a better understanding of why some countries cope very well with time-consistency problems, other very poorly."*

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