When Does Delegation Improve Credibility?
Central Bank Independence and the Separation of Powers

Philip Keefer and David Stasavage

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Philip Keefer
Development Research Group
World Bank
1818 H Street NW
Washington DC 20433, USA

David Stasavage
St. Antony's College and
CSAE
21 Winchester Road
Oxford, OX2 6NA, UK

Abstract: Delegation and policy rules are frequently suggested strategies for governments to establish credible commitments. Existing literature on rules and delegation in macroeconomic policy has generally avoided the question of why governments that delegate or establish rules do not subsequently reverse this decision. Either the decision is assumed to be irreversible, or reversal is assumed to be "politically costly" without further explanation. We develop several hypotheses which suggest that the difficulty in reversing a decision to delegate (or to establish a rule) depends on the structure of a country's political institutions. Credible commitment through delegation can only be obtained in countries where political institutions provide for checks and balances on executive authority. Checks and balances ensure that the decision to override a legally independent central bank is not the prerogative of a single actor (or veto player). In countries with these characteristics, the extent of credibility gains will be greatest when political instability is moderate and when polarization is high. We find support for these hypotheses in tests using cross-country data – from both developed and developing countries – on central bank independence and political institutions.

1.   Introduction

For government actions ranging from utility rate-setting to monetary policy, the importance of credibility for eliciting optimal responses from private actors is well-known. When monetary policy lacks credibility, private sector actors write contracts that build in high inflationary expectations; when utility rate-setting is not credible, private actors do not invest in the expansion of electricity generation capacity. However, it is also well-known that credibility is difficult for governments to acquire. One alternative for governments is to build a reputation for sound policy, but building a reputation takes time. A second set of alternatives is for governments to delegate policy making to an independent agent (like an independent central banker) or to adopt a policy rule (like an exchange rate peg). Each of these possibilities is thought to "tie the hands" of politicians with respect to their involvement in economic policy making, thereby increasing the credibility of the resulting policies.

The literature that analyzes the impact of rules and delegation on policy outcomes, however, often fails to ask two critical questions: why would politicians ever willingly limit their own discretion? and what prevents current or future governments from untying the institutional knots that limit their discretion? We argue that the extent to which rules or delegation improve the credibility of policy depends upon a country's political institutions.

Like Moser (1996) and Lohmann (1998), we hypothesize that the presence of checks and balances (multiple veto players) in government should enhance the effects of delegation. The framework we present, however, is more general. First, the theory here encompasses both fixed rules and delegation. Second, it extends beyond checks and balances to encompass polarization among political decision makers and instability of government. We describe conditions under which checks and balances can have an impact on policy credibility even when it is no more difficult for governments to change delegation or policy rules than to change policies directly. Briefly, these conditions are that there be a moderate degree of political instability (a positive probability that some, but not all, government decision makers will be replaced in the future) and some political polarization. Our empirical tests suggest that the introduction of these concepts is crucial to explaining the success or failure of central bank independence in lowering inflation.

While we believe that our analysis generalizes to all forms of agency independence, ranging from judicial and regulatory to central banks, the availability of cross-country data on central bank independence makes it convenient to focus on this area of policy for our empirical work. We test several hypotheses concerning the conditions under which delegation in monetary policy will improve policy credibility and the conditions under which governments will choose to delegate to an independent central bank. These tests advance the empirical literature on credibility and political institutions in several ways.

First, they show that by taking checks and balances into account, one can demonstrate that legal central bank independence is significant in both developed and developing countries. Our results also shed light on contrary predictions regarding checks and balances – on the one hand, that greater checks (more divided government) should lead to larger budget deficits and, presumably, more inflation, and on the other hand, that checks help to insulate the inflation-fighting ability of central banks from political meddling. Second, the tests below demonstrate that the role of checks and balances depends crucially on the level of polarization and instability in the political system. At low levels of social polarization, we find that checks and balances have little effect on central bank independence; the opposite is true at higher levels. Third, we test different rationales for the creation and sustainability of independence, which distinguish between two theories. One, by Alesina and Gatti (1995), predicts that more polarized countries will exhibit greater independence. A second, following from the theory we develop below, is that central bank independence is

more likely to last in countries with both polarization and checks and balances. The second is supported in the empirical tests below.

The remainder of this paper is structured as follows. Section 2 introduces the different credibility problems which exist in monetary and fiscal policy making, and it briefly reviews existing theoretical and empirical literature on rules and delegation in macroeconomic policy. Section 3 develops several hypotheses regarding the political conditions under which rules and delegation will be more effective. Section 4 conducts empirical tests of these hypotheses using data on central bank independence. Section 5 considers alternative explanations and section 6 concludes.

2.   Rules and delegation as solutions to credibility problems

There are two different circumstances under which government policy commitments are not credible. The first is time inconsistency, which arises if politicians announcing a certain policy today have an incentive to deviate from the policy at some point in the future. In the presence of time inconsistency, economic agents respond slowly or not at all to current policy changes, in the belief that if they do respond – for example, by locking themselves into long-term fixed price contracts – political actors can benefit by reneging, for example, by switching to an expansionary monetary policy to spark a temporary output boom. Seminal articles by Kydland and Prescott (1977) and Barro and Gordon (1983) conclude that time inconsistency problems in monetary policy exist even when politicians are social welfare maximizing. This problem is of course more severe if politicians are interested in re-election, giving them a particularly strong incentive to engineer a temporary boost in output during pre-electoral periods.

Even when a particular government, given its objective function, is not expected to renege on current policy commitments in the future, credibility problems remain in both monetary and fiscal policy. These derive from the possibility that a current government will be replaced by a new government with different preferences, or that the constituencies of the current government will change, leading to a change in its preferred policies.[1] For fiscal policy, Persson and Svensson (1989) and Tabellini and Alesina (1990) have shown that a current government may issue excessive amounts of debt if a successor government is likely to have different preferences over the level of public spending or the type of public goods provided. Cukierman, Edwards, and Tabellini (1992) suggest that a current government may refrain from reforming a country's tax system in order to avoid bequeathing increased revenues to a successor. The by-product is likely to be continued monetary financing of government spending. Alesina (1987) shows how uncertainty over the outcome of elections can create a tendency for post-electoral macroeconomic cycles in both monetary and fiscal policy.[2] All of the above problems are exacerbated when political polarization and instability are high.

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[1] While much of the literature equates credibility problems exclusively with situations where a government has an *ex post* incentive to inflate once private sector actors have formed their expectations, we also include instances where a current government's incentives change are influenced by the positive probability that a government with different preferences will be elected in the next period. Persson and Svensson (1989) refer to this as the difference between time-inconsistent *constraints* and time inconsistent *preferences*. [1] The objective function of a sitting government can change because, for example, of demographic trends in a country, such as a decline in rural relative to urban areas or the aging of the population, weakening their incentives to adhere to prior policy commitments.

[2] A temporary boom when left-wing governments win elections, or a recession when right-wing governments win. The difference between left wing and right wing depends upon the relative weight placed on price stability vs. output stabilization.

A substantial literature concludes that delegation of monetary and/or fiscal policy to an agency, or establishment of a policy rule, can mitigate credibility problems, provided that delegation or fixed policy rules are themselves politically costly to revoke. In most existing contributions these political costs are assumed rather than explained.

Delegating to a central bank

Rogoff (1985) sparked a large literature by arguing that governments can counter problems of time inconsistency by delegating monetary policy to a central banker who has full discretionary power and who places a higher priority than the median voter on stabilizing prices rather than output. He concludes that delegation allows governments to achieve a second-best outcome that involves lower average inflation at the cost of higher variability in output. Rogoff's model assumes that once a decision to delegate is made, it cannot be undone.[3] Empirical investigation of the merits of monetary policy delegation awaited the development of indices of legal central bank independence. Cukierman, Webb, and Neyapti (1992), using an index of independence that they constructed and which we utilize in this study, examine 72 countries and find that legal independence is significantly, negatively associated with inflation in 21 industrial countries, but not in 51 developing countries.[4] They suggest that the divergence results from less adherence to the rule of law in developing countries. We show below that central bank independence, interacted with different institutional variables, is a significant predictor of inflation in a sample of both developed and developing countries.

Delegation in fiscal policy

Giving authority over policy making to an agent who prefers prudent policy can also be a tactic for addressing credibility problems in fiscal policy. Delegation operates differently here, however. Delegating to an independent central bank involves giving full authority over a domain of policy to agents who do not formally report to political actors. Delegation in fiscal policy tends to involve delegation of budget preparation responsibility to a bureaucratic agency that does ultimately report to a politician. Fiscal delegation also entails reducing the power of line ministries or legislative actors and increasing the authority of budget bureaus or finance ministers, either of which ultimately report to the prime minister or president.

Several studies of the effects of fiscal delegation have been undertaken of European countries and Latin American countries. Hallerberg and von Hagen (1997) find for a sample of 15 EU countries that public debt is more likely to fall either when a delegation arrangement is in place, or when cabinets collectively adopt a spending ceiling before initiating the budget process. In contrast, an index designed by Alesina, Haussmann, Hommes, and Stein (1995) to measure the strength of the finance minister's bargaining power in budget negotiations is not significantly correlated with the average size of primary deficits in a sample of Latin American and Caribbean countries.

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[3] More recent work investigates the possibility of designing optimal contracts with central bankers (Walsh (1993) and Persson and Tabellini (1993). These papers assume that once written, contracts are respected by both parties.

[4] These findings for advanced industrial countries have been repeated by Alesina and Summers (1993) and Grilli, Masciandro, and Tabellini (1991). When they measure independence as the frequency of turnover of central bank governors, however, Cukierman, Webb, and Neyapti (1992) find that independence and inflation are significantly negatively correlated, even for the developing country group.

Monetary policy rules

Policy rules are a common alternative to delegating authority in order to enhance credibility. While they obviate the necessity of finding the "right" agent to delegate to, rules also make it difficult to respond to shocks and to conduct counter-cyclical policy. One of the most common rules aimed at enhancing policy credibility is an exchange rate peg with full currency convertibility. When it is adhered to, it prevents governments from running an independent monetary policy. Theoretical work on exchange rate pegs assumes that it is politically costly for governments to renege on its commitment to the peg, but does not explain these costs in any detail. It is not clear, for example, why governments would not incur the same political costs if they had committed to pursuing a specific inflation rate, for example, and then failed to deliver on their promise. Cukierman, Kiguel, and Liviatan (1992) argue that the political cost of reneging on a peg varies with the complementary policies that governments adopt; since a currency board represents the most binding commitment, its introduction is supposed to raise the political costs of reneging the most. The underlying reasons for this are not clear.

Nevertheless, there is empirical support for the proposition that adopting an exchange rate peg with full convertibility is associated with better inflationary performance.[5] There have also been several attempts to examine the duration of exchange rate pegs as a function of political stability, but no more detailed analyses of how the effectiveness of an exchange rate peg might be endogenous to political conditions.

Fiscal policy rules

Policy rules in this domain involve numerical limits on fiscal deficits or public sector borrowing. These limits are sometimes stringent, as when budgets are required to be cash-balanced throughout the year; and sometimes porous, as when the balanced budget rule encompasses only a part of total public spending. International evidence on the effect of budgetary rules on fiscal policy is limited, but there is a sizable empirical literature on fiscal policy rules adopted by US state governments. Poterba (1994) and Bohn and Inman (1996) find evidence that in US states with more restrictive budgetary rules, governments take swifter action to raise taxes or cut spending in response to shocks. Bohn and Inman (1996) also make an attempt to endogenize the political environment by considering whether the fiscal policy rules in US states are statutorily or constitutionally grounded and by proxying for the independence of enforcing authorities (the judiciary). They find that fiscal policy rules are more effective when they are constitutionally grounded, and thus more difficult to change, and when the judicial authorities that must enforce them are directly elected, rather than being political appointees.

3.   Conditions under which rules and delegation are credible

The previous section suggests that government policies confront credibility problems when current governments have incentives to renege on policy commitments in future periods, or if future governments are likely to have different policy preferences than current governments. It is well-recognized that political institutions can make policy more credible. For example, Clague, Keefer, Knack and Olson (1996) provide evidence that countries with

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[5] Ghosh, et al. (1995) present econometric evidence from a dataset of over 100 developing and industrialized countries over a thirty year period. Controlling for annual dummies, output growth, the rate of turnover of the central bank governor, and openness, they find that countries with fixed exchange rate regimes experienced lower and less variable inflation. This was particularly true of countries that pegged their own currency to a single foreign currency (as opposed to a basket).

more checks and balances and greater regime stability offer better protection to property rights and attract more investment, which they interpret as signs of greater credibility. The issue in this paper is whether political institutions of countries also increase the impact of delegation and policy rule arrangements on credibility.

The analysis of this issue is facilitated by introducing a modicum of notation. Assume policy outcomes (such as inflation) are given by $\boldsymbol{p}_t = f(x_t) + e_t$ where the outcome is a function of policy choices x, and e represents shocks or control errors in every period t .[6] The outcome of a set of credible policies is given by $\boldsymbol{p}_c$. Politicians can achieve this either through delegation or a fixed rule. Delegation requires giving policy making authority to an independent agent whose preferences will be close to those of the credibility outcome ($\boldsymbol{p}_c$).[7] In the central bank literature, the agency (the central bank) is assumed to attach a high weight to price stability in its objective function, such that it gains less from opportunistically expanding the money supply than do political authorities. Second, politicians can establish a policy rule of pursuing some policy outcome, $\boldsymbol{p}_t = \bar{\boldsymbol{p}}$ for all t and for all $\boldsymbol{e}_t \neq 0$. The rule constitutes a commitment by the government to allow policies x to change whenever necessary (i.e., in the face of shocks) to ensure that the targeted outcome is sustained.[8]

Both of the above strategies improve the credibility of policies only to the extent that it is more difficult for governments to overturn delegation arrangements or fixed policy rules than it is for them to change policy itself. In the literature on macroeconomic policy making it has sometimes been suggested that this can be achieved by making the decision to delegate or to create a rule "constitutional", but no fully elaborated version of this argument has been developed, and it leaves unanswered the question of whether a country's constitution might itself be easily changed. The constitutional argument applies to one particular kind of delegation or rules arrangement, given in Condition 1.

Condition 1: Reversal of rules or delegation requires the approval of a greater number of veto players than is necessary to change policies x.

When this condition is met, it is straightforward to describe the conditions under which delegation increases the credibility of policy commitments: more politicians are needed to dissolve a delegation arrangement than would ordinarily be needed to agree on a change in economic policy. This implies that, where there are multiple veto players, a larger fraction of them must be replaced (or undergo a change in their preferences) in order to overturn delegation than to replace existing policies with new policies. To the extent that

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[6] This simple formulation assumes that only government policy decisions and exogenous shocks influence policy.

[7] In our analysis, for reasons of simplicity, we assume that politicians are able to find a perfect agent to whom they can delegate monetary policy.

[8] It is important to note that our discussion here applies only to policy rules which make some provision for automatic changes in existing policies in order to sustain $\bar{\boldsymbol{p}}$. For example, balanced budget rules may simply disallow any taxation and expenditure decisions that deviate from the balanced budget, rendering policy change automatic in the face of exogenous shocks. In the American states studied by Bohn and Inman (1996) and others, balanced budget rules sometimes have this characteristic. The adoption of a fixed exchange rate anchor does not always imply any explicit policy changes that must be made in the event of shocks that make the anchor unsustainable. Changing interest rates to make a peg sustainable is left to the discretion of political officials. If opponents of the anchor can veto interest rate changes that ensure sustainability of the peg, establishment of the anchor does not improve credibility. However, in practice the exclusion of opponents from decision making on policy changes is generally accomplished through delegation. For example, if a currency board is established by the legislature, the policy changes needed to sustain it in the face of shocks may be delegated to the central bank (interest rates) and the finance ministry (establishment of spending ceilings).

veto players have different preferences, delegation to an independent agent can solve both time-consistency problems in monetary policy and credibility problems tied to polarization and instability. Condition 1 can be satisfied if delegation is "constitutional", as has already been suggested in the literature. This would be the case if a 2/3 vote or two consecutive majority votes of the legislature was required to dissolve a delegation arrangement while policy changes in the absence of delegation could be made by simple majority vote. Similarly, delegation would be effective if dissolving the delegation arrangement required the approval of both the executive and legislature while policy changes in the absence of delegation could be made by the executive alone.

Moser (1996) and Lohmann (1998) are the first to have explicitly examined the notion that central bank statutes are more insulated from political influence in the presence of checks and balances (multiple veto players with divergent policy preferences). They are less clear about the arrangements under which policy would be made in the absence of delegation, however. Lohmann (1998) examines central bank independence in Germany, arguing that the government can exert pressure on the Bundesbank by threatening to revise its charter. Any such revision would require the agreement of both houses of parliament. It would therefore be an empty threat when the majority party in the *Bundestag* is not also well represented in the *Bundesrat*, the second chamber of the German legislature. In support of this argument, Lohmann provides econometric evidence that Bundesbank monetary policy is more expansionary, relative to underlying economic variables, during pre-electoral periods when the same party controls both houses.

Moser (1996) makes a similar argument, and tests it on a sample of 22 OECD countries using data on central bank independence, inflation, and an index designed to measure whether a country's political system is characterized by strong checks and balances (essentially a bicameral system where both chambers have equal powers), weak checks and balances, or none. He finds that the negative impact of central bank independence on inflation is strengthened in the presence of strong checks and balances, and that countries with stronger checks and balances tend to have more independent central banks.

Neither analysis is clear on the counterfactual (decision making in the absence of delegation). In Moser's analysis, for example, the design of the counterfactual has the effect of exaggerating the benefits of delegation, because he requires political decision makers to choose the Nash bargaining outcome, rather than giving them the option of doing nothing and maintaining the *status quo*.[9] The arguments of Lohmann and Moser are convincing in showing that central bank independence depends on the level of checks and balances. They are less convincing in demonstrating that the credibility of policy making under central bank independence is greater than policy credibility without delegation when checks and balances are strong. Condition 1, above, is crucial to making this point.

However, Condition 1, and the literature on the political economy of policy delegation, leave unanswered the question of whether delegation or rules can have any positive effect on policy credibility when the same decision makers must approve either the dissolution of a delegation arrangement or a change in policy, as in Condition 2. One of the contributions of this paper is to offer an answer to this question.

Condition 2: Policy changes, on the one hand, and decisions to delegate authority or to establish rules, on the other, require the approval of the same veto players.

Often condition 1 is not satisfied. This is the case when policies, fixed policy rules and delegation of policy making authority are all established under the same decision rules

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[9] Imagine two veto players with opposing preferences on monetary policy, as in Moser. If the *status quo* policy is one of moderate monetary expansion, the more conservative player will veto any attempt to modify it. The credibility benefits of delegation are less clear in this case.

(e.g., majority vote for both, rather than majority for the first and super-majority for the last two). Can delegation or fixed policy rules nevertheless mitigate credibility problems? In the case of credibility problems induced by time inconsistency – the incentive of current policy makers to renege on their own policy commitments in the future – the answer is no, unlike with Condition 1. If policy makers gain from reneging on policy commitments, then they also gain from reneging on institutional changes that are meant to guarantee those commitments. If it is no more difficult to renege on the one than the other, the time-inconsistency problem remains unchanged.

However, delegation or fixed policy rules can still relieve the credibility problems that result from the possibility of change in government or in the preferences of government decision makers. For this to be true, first there must be multiple decision makers with potentially different preferences, as under condition 1. Second, there should be some possibility that a subset of current government veto players will survive a change of government and retain veto power over attempts by future governments to change policy. This would be the case if the new government were a coalition government in which some members of the coalition were also members of the previous government's coalition. Third, there must be some possibility of an exogenous economic shock ($\varepsilon_{t+i} \neq 0$) that creates dissatisfaction among all government decision makers with existing policy.

The importance of the exogenous shock condition is easy to see. Assume to the contrary, that there is a change of government, with some veto players carried over from the previous government, and no exogenous shock. If policy authority has been delegated, the new government is unable to change either policy or the delegation arrangement without gaining the agreement of representatives from the previous government. However, policies enjoy the same insulation from change as delegation and fixed policy rules, so there is no increase in credibility as a consequence of adopting these measures.

Under most circumstances, the assumption that economic actors expect exogenous shocks in the future is a modest one. Once a shock occurs, it modifies the *status quo* such that the policies *x* that were originally approved in order to achieve some agreed policy outcome p_1 instead lead to a different policy outcome p_2. As a consequence, a change in policies is needed to restore policy outcomes to the originally agreed p_1. The policy that emerges will crucially depend on whether delegation or policy rules have been previously adopted.

In the absence of either delegation or policy rules, whether or not these policy changes are made depends on whether all government veto players prefer the old outcome p_1 to the new *status quo*, p_2. Consider a new government that has inherited some veto players from the previous government, who prefer outcome p_1, with the remainder of the veto players preferring the new *status quo*, p_2. Under this circumstance, no policy change is possible to honor the previous government's commitment to policy outcome p_1. More generally, any new policy outcome that emerges in response to a change in outcomes to p_2 will be the product of a bargain between the old and new veto players. The outcome of this bargain will be some p_3 that lies between whatever policy outcome the new veto players prefer and p_1, the preferred outcome of the old veto players. The credibility of policy commitments cannot be guaranteed against a change in government in the presence of economic shocks.

The outcome is different if policy authority has been previously delegated, or if a rule has been adopted. In the case of delegation, a government assigns policy making authority to an independent agency. The expectation of government officials and private sector actors is that the agency will modify policy as underlying economic conditions change (that is, when

$e_t \neq 0$) such that it always comes as close as possible to p_c. Now assume that there is a new government and an economic shock. Under delegation, the agency automatically chooses a new set of policies to restore outcomes to p_c. Under some types of fixed policy rules, policies automatically change to restore $\bar{p}$. As long as some veto players from the previous government exercise veto power in the new government, the new government can do nothing to overturn delegation or fixed policy rules that lead to this outcome. Whereas before all veto players of the new government had to agree before the earlier policy outcome could be restored following a shock, under delegation and fixed policy rules (under Condition 2) all veto players must agree in order to move away from the earlier policy outcome. Delegation and fixed policy rules with automatic policy change therefore enhance the credibility of government policy commitments in systems with shocks and multiple independent political actors.

4. Three hypotheses about central bank independence and the separation of powers

This paper is part of a large research program that is examining the effect of political conditions on the influence of monetary rules and fiscal delegation. In other work (see Keefer and Stasavage, 1998) we establish conditions under which governments might prefer to delegate or adopt fixed policy rules. In this paper, we confine ourselves to developing hypotheses from the foregoing analysis that can be tested using information on central bank independence. The first of these hypotheses is:

Hypothesis 1: The delegation of monetary policy making authority will have a greater effect on credibility when there are a larger number of veto players.

The previous section showed that under either conditions 1 or 2, the credibility of rules or delegation depends upon the existence of multiple veto players. As long as veto players have different preferences, which they almost always do given the fact that they are elected at different times, or from different constituencies and jurisdictions, or are controlled by different parties, the decisions of an independent central bank will be more difficult to reverse than the policy decisions of the executive branch alone. This suggests that the credibility of monetary policy will be greater and inflation therefore lower for any given rate of monetary expansion. Multiple veto players may be present even in situations where basic constitutional precepts are flouted, as long as no one individual, party, or group controls all the levers of power.

However, the effects of multiple veto players should not be independent of other political conditions, particularly the extent of political instability and political polarization in a country. The second hypothesis, emerging from the arguments of the previous section, captures these issues:

Hypothesis 2: The interaction of checks and balances and central bank independence will have a larger positive effect on credibility when there is some political instability and polarization.

Whether condition 1 or condition 2 prevails, delegation will have a greater effect on one credibility problem (not time-consistency, but rather the threat to credibility created by changes in the identity and preferences of policy makers) when there is some political instability, and when the actual and potential governing parties exhibit some differences over policy preferences – that is, some polarization. In the absence of instability, there is no threat of policy reversal by a new government, because new governments are unlikely. In contrast, when instability is very high, meaning that all decision makers from the current government are replaced when the new government enters, delegation will have little effect in reducing

these credibility problems.[10]   Veto players in current governments, which approved the original decision to delegate, will not be present in future periods to veto attempts to reverse the decision.   Finally, when instability is moderate at least some members of current governments may hold veto power under future governments, meaning that credibility problems can be solved through delegation.

Without the second characteristic -- political polarization -- successor governments are likely to have the same policy preferences as the current government, again making policy change less likely. New governments are likely to approve of, and hence retain, the policies of the old governments. Credibility problems deriving from the possibility of government change would then not exist. Delegation of policy should therefore have stronger effects in countries that exhibit some polarization.

Finally, the logic in the previous section implies the following about the likelihood that central bank independence will endure in countries that adopt it.

Hypothesis 3: Central bank independence is more likely to endure in countries that exhibit multiple veto players in government and either moderate political instability or polarization.

Countries adopt legal provisions that grant independence to central banks for a number of reasons. Some governments might wish to insulate their monetary policies against amendments by future governments. This effort is more likely to succeed if governments are characterized by multiple veto players and if there is incomplete replacement of veto players from one government to the next. However, if there are few veto players, if instability is severe, or if polarization is low, delegation is likely to be easily overturned (in the case of few veto players and severe instability) or pointless (where all parties agree on monetary policy). In this case, governments might not expend the effort to adopt central bank independence. If they nevertheless adopt legal provisions to guarantee independence, despite the absence of these conditions (perhaps because it requires little effort to pass a law granting independence), the law is more likely to be reversed subsequently, as the hypothesis states.

One potential weakness in this argument is that if future governments are likely to have multiple veto players, so also are current governments. Where there are multiple veto players it is likely to be difficult to approve legislation creating central bank independence in the first place. If there are two political parties in a country, one of which is highly averse to inflation and one much less so, then delegation may only occur during atypical periods when the inflation-averse party controls all veto points.[11]

Governments need not, and often do not, adopt central bank independence in order to insulate policies from meddling by future governments. They also adopt central bank independence as a last-ditch effort to demonstrate to investors and others their commitment to fight inflation, much as countries adopt currency boards or fixed exchange rate pegs to demonstrate commitment. Such measures are, once again, less likely to endure if there are few veto players, if political instability is extreme, or if political actors exhibit similar preferences on policy issues (are not polarized). There is one modification to hypothesis 3, however. If central bank independence is intended as a signal rather than an effort to insulate policies against the meddling of future governments, the chances of central bank independence enduring would always fall the greater is instability. The relationship would be monotonic rather than quadratic, as suggested in the hypothesis.

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[10] Note, this definition of instability is different from that which is commonly used in the political economy literature.

[11] Thanks to Stewart Wood for this observation.

Alesina and Gatti (1995) construct an argument about polarization and central bank independence that generates a similar prediction. They argue that in a system where there are two polarized political parties and where electoral outcomes are uncertain, delegating to an independent central bank can lead to both lower inflation *and* lower variability of output, because it minimizes not only time inconsistency problems but also the post-electoral cycles identified in Alesina (1987). They suggest that it would therefore be in the interests of both parties to delegate. They assume, however, that the inflation averse party cannot renege on this deal once it arrives in office. To the extent such reneging is anticipated, no deal would be agreed to in the first place. Indeed, the greater is polarization, the more likely such reneging might be. Our analysis suggests that the scenario Alesina and Gatti envisage will only occur in countries where political institutions allow both sides to retain veto power over any attempt to renege on the agreement.

The structure of hypotheses 1 and 2 and hypothesis 3 might seem to demand joint testing. Hypothesis 3 says that central bank independence is more likely to survive under the very conditions that hypotheses 1 and 2 suggest will give independence a greater impact on inflation. For the moment, we have postponed this issue for future research. Our primary concern at this stage is to identify the role played by political institutions in determining the efficacy of delegation arrangements.

5.   Testing the hypotheses

This paper generally follows the empirical specifications utilized by Cukierman (1992), Cukierman and Webb (1995) and Cukierman, Webb and Neypati (1992) in their extensive research on central bank independence, augmented by the political and institutional variables highlighted in the foregoing analysis.

Data

The theory presented earlier suggests conditions under which delegation improves policy credibility. Credibility is not directly measurable, of course. The literature, however, generally assumes that lack of credibility in monetary policy leads to higher inflation. Our dependent variable is therefore inflation, transformed as the rate of depreciation of money computed from the Consumer Price Index in *International Financial Statistics*.[12]

The first of our key explanatory variables is a measure of central bank independence. Cukierman, Webb, and Neyapti (1992) propose an index of legal central bank independence based on twelve different characteristics of central bank statutes involving issues such as the term of office for the governor and provisions for replacement, provisions for central bank lending to government, and resolution of conflicts over monetary policy between government and central bank. Their data covers 72 countries with separate values for each decade from 1950 to 1990. This is the measure of central bank independence that they and others have found to be have a significant negative impact on inflation in developed but not developing countries. One of the contributions of this paper is to show that when political and institutional characteristics of a country are taken into account, legal central bank independence is influential in all countries.

These investigators also employ a *de facto* measure of independence, based on the frequency of turnover of central bank presidents, which is associated with lower inflation in all countries. They argue that in countries where the rule of law is weak, legal protection of

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[12] The rate of depreciation moderates the influence of outlier countries that experience hyperinflation. We will follow Cukierman, Webb, and Neyapti (1992) who, because central bank data is available only by decade, employ geometric decade averages for currency depreciation.

central bank independence is less meaningful, so one must utilize other proxies. We do not consider the *de facto* measure in this paper, primarily because legal measures of central bank independence have greater policy relevance (it is difficult to legislate against turnover). However, we expect (and will verify in future work) that the same political and institutional variables that make legal delegation more durable and effective also make it more difficult to force the resignation of uncooperative central bank presidents.

With respect to checks and balances and polarization, we would ideally like to have information on the number of government decision makers in each country who exercise veto power over monetary policy and central bank delegation decisions, and on the preferences of these decision makers. Given the paucity of cross-country data on this precise concept, we rely instead on a series of proxy variables.

For the effectiveness of checks and balances (multiple veto players) in a country, we use information on executive constraints and party fractionalization. Gurr and Jaggers and others have developed a measure of "executive constraints" based on a subjective assessment of different countries over time, in the Polity III dataset. It ranges from the lowest value (1), where "there are no regular limitations on the executive's actions (as distinct from irregular limitations such as the threat or actuality of coups and assassinations)", to the highest value (7), where groups such as a legislature or a ruling party have "effective authority equal to or greater than the executive in most areas of activity" (Gurr and Jaggers).

An alternative measure of checks and balances, or the number of veto players, is "party fractionalization", a variable running from 0, low fractionalization, to 1, high fractionalization (Banks, 1993).[13] The greater the value of the index, the larger the number of independent actors (political parties) whose agreement will be necessary to build a governing coalition. Each party in a coalition is therefore a potential veto player; where the party system is fractionalized, the number of such veto players potentially rises. As with the index for executive constraints, we predict that legal central bank independence will be more likely to improve credibility when levels of fractionalization are high.

These variables are inevitably imperfect proxies for checks and balances. Executive constraints is subjective, always creating the danger that lack of movement in policy variables might be the indicator that evaluators use to decide that executives are indeed constrained. We consider it highly unlikely that the ability of the executive to interfere in monetary policy, specifically, is a significant criterion used by evaluators, however, and regard the potential for simultaneity bias to be low. The party fractionalization variable does not distinguish between countries with a fractionalized government and unitary opposition, or the reverse. It is only the former that would be predicted to lead to greater checks and balances. However, the inherent measurement error in the proxy biases results against a finding that checks and balances matters for policy outcomes.

Cross-country evidence on the polarization among different veto players of government, or among political parties in or out of government, is not available. A common practice in the literature is to attempt to observe the frequency of "significant" changes in government as a proxy for the presence of both polarization and instability. We employ several, more specific proxies for polarization in societies. All three are invariant over time (there is only one observation per country). The first is income inequality (measured by the Gini coefficient), on the assumption that countries with severe income inequality are likely to be more polarized than those that are not (Deininger and Squire, 1996). Two others are measures of ethno-linguistic fractionalization in countries.

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[13] The formula used to measure party fragmentation is $1 - \sum_{i=1}^{m} t_i^2$ where t_i is the proportion of members associated with the ith party in the National Assembly.

The Atlas variable is the probability that any two individuals drawn randomly from society *do not* belong to the same ethno-linguistic group. This data was assembled by Russian geographers in 1964 (Department of Geodesy and Cartography). This variable runs from 0 to 1, with one indicating higher ethno-linguistic fractionalization. The Sullivan variable, ranging from 0 to 100 and collected in the 1980s, is the fraction of society that belongs to the largest ethno-linguistic group. High values therefore represent low levels of fractionalization.

We have transformed these two variables, following the arguments of Esteban and Ray (1994), that polarization is properly described as highest when there are a few equally sized groups in society with differing preferences. In contrast, when there is one monolithic group and some small ones (low fractionalization) or many small groups (high fractionalization), polarization is lower. Both Atlas and Sullivan were therefore subjected to a quadratic transformation into new variables (Atlas-New and Sullivan-New) which take their highest values at moderate values of the original variable, and their lowest values at either high or low values of the original. That is, Atlas-New was set equal to Atlas - $(Atlas)^2$, with the new variable ranging in value from 0 to .25, and Sullivan-New was set equal to $100*Sullivan – (Sullivan)^2$, with the new variable ranging in value from 0 to 2500.

Available cross-country measures of instability are not closely matched to the form of instability that we specify in the model. Variables generally capture the rate of replacement of entire governments rather than the rate of replacement of veto players.[14] The two measures of instability that we investigate are the rate of executive turnover (taken from the Polity II data set), and the frequency of transition from one authoritarian government to another or from a democratic government to an authoritarian government (Clague, Keefer, Knack and Olson, 1996). These indicate when the executive of a country changes, but do not register whether control in other branches of government has also shifted, or whether all coalition partners have been replaced. As long as executive changes reflected in these variables disproportionately represent replacement of all veto players, their influence on inflation, even at moderate levels, is likely to be positive. In the discussion of the empirical analysis of hypothesis 2, below, these implications are examined more closely.

There is little consensus in the literature on other appropriate control variables to include as explanations for inflation. Moreover, as Cukierman, Webb and Neypati note, the use of decade frequency data reduces possibilities for using economic controls such as lagged inflation, growth or terms of trade to explain inflation. These would, in any case, also be indirectly influenced by the political and institutional variables, giving rise to multi-collinearity that would cloud the underlying relationships we examine. To guard against the possibility that it is country income that explains the success of central bank independence, rather than institutional arrangements (such as executive constraints) that are often associated with income, we examine the robustness of our results to inclusion of real income per capita. To control for the possibility that there is a shift in preferences in a particular decade both to low inflation and, correspondingly, low inflation rates, we always control for decade dummy variables, matching the different periods for which central bank independence data is available. More generally, decade averages are taken of all variables, to correspond to the measure of central bank independence that we use.

Testing hypothesis 1

One important motivation for further research into the importance of central bank independence is the apparent lack of influence of legal measures of independence on inflation

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[14] Alternatively, some have used the frequency of coups d´état or of extra-constitutional changes in government as a proxy for polarization and instability.

on a sample that includes both developed and developing countries. Column 1 of Table 1 indicates this clearly. The effect of legal central bank independence on the rate of currency depreciation is not significantly different from zero.

To test hypothesis 1, we use ordinary least squares to examine the effect on inflation of executive constraints and party fractionalization, interacted with central bank independence, controlling for period dummies. The assumption implicit in these regressions is that entities that constrain the executive, and the parties that are fractionalized, have different policy preferences, as hypothesis 1 requires.

Columns (2) and (4) offer significant support for hypothesis 1. In each, the interaction terms is of the correct sign and highly statistically significant. Results for the executive constraints measure are especially strong. The explanatory power of the model, after including the executive constraints and interaction terms, rises from an R^2 of 0.13 in column 1 to 0.22 in column 2.

Columns (3) and (5) comprise one possible rigorous test of robustness, the inclusion of income per capita. The test is rigorous because the variable is highly correlated with both party fractionalization (.59) and executive constraints (.60) in the sample. Nevertheless, the magnitude of the coefficient on the interaction term falls only slightly and remains statistically significant in the case of executive constraints. The interaction with party fractionalization drops much more, and although the term retains the predicted sign, it is no longer statistically significant.

Table 1 has two other interesting implications. First, it has frequently been suggested that divided governments (whether because they are coalition governments or because different branches are controlled by different parties) lead to fiscal excess (McCubbins, 1991) or delayed fiscal stabilizations (Alesina and Drazen, 1991). One reason to care about budget deficits is inflation. What is clear from Table 1, however, is that the net effect of two proxies for divided government – executive constraints and party fractionalization – have a net *negative* impact on inflation.

Looking at column (2), when central bank independence is at its lowest value in the sample (.09), the net effect of an increase in executive constraints from its lowest sample value (1) to its highest (7) is a drop in average yearly currency depreciation of 0.04.[15] This is approximately one-third of the sample standard deviation of currency depreciation. This effect rises to 0.27, or more than two standard deviations, when central bank independence is at its highest value in the sample.

Results for party fractionalization are somewhat weaker, but nevertheless provide no support for the notion that inflationary pressures are greater when governments are divided. When central bank independence is at its lowest, an increase in party fractionalization from 0 to its highest value (.98) actually leads to an increase in inflation of .54 standard deviations (.06). When central bank independence is at its highest level, this increase in party fractionalization results in a reduction in inflation of .20, or 1.67 standard deviations.

The results for executive constraints are inconsistent with the theory in the existing literature, since both the linear and interactive executive constraint coefficients are negative. Results for party fractionalization are not especially supportive of the theory, particularly given the results at high levels of central bank independence. Both highlight the fact that multiple political actors who tie their own hands through the use of central bank independence can achieve lower levels of inflation than single unconstrained executives acting without central bank independence.

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[15] $-0.006 \quad (7 \quad 1)*0.064*.09$.

Table 1: Checks and balances, central bank independence and inflation

Dependent variable: currency depreciation	All countries (1)	Executive constraints* CBI (2)	Executive constraints* CBI (3)	Party Fractional-ization*CBI (4)	Party Fractional-ization*CBI (5)
Intercept	0.063 (0.021)	0.009 (0.049)	0.02 (0.052)	0.014 (0.035)	0.44 (0.036)
Central Bank Independence	-0.017 (0.050)	0.39 (0.17)	0.337 (0.188)	0.203 (0.120)	0.12 (0.12)
Exec. Const. or Party Frac. (see column heading)		-0.006 (0.007)	0.006 (0.007)	0.104 (0.065)	0.087 (0.063)
Interaction term (see column heading)		**-0.064 (0.025)**	**-0.05 (0.029)**	**-0.45 (0.21)**	**-0.18 (0.20)**
Real income/capita			-0.004 (0.002)		-0.009 (0.002)
Dummy, 1950-59	0.004 (0.017)	0.014 (0.017)	Dropped	0.007 (0.018)	-0.008 (0.018)
Dummy, 1960-71	Dropped	Dropped	-0.002 (0.017)	Dropped	Dropped
Dummy, 1972-79	0.073 (0.017)	0.064 (0.016)	0.017 (0.019)	0.069 (0.016)	0.085 (0.017)
Dummy, 1980-89	0.106 (0.023)	0.108 (0.023)	0.116 (0.029)	0.103 (0.023)	0.12 (0.025)
R^2	0.13	0.22	0.23	0.15	0.20
p-value for F statistic	0.00	0.00	0.00	0.00	0.00
Number of observations	218	210	199	216	205

Note: Ordinary least squares with White's heteroskedastic-consistent standard errors in italics. CBI = Central bank independence

The second implication of Table 1 is for the literature on central bank independence. The two central bank terms in every equation have opposite signs, indicating that in the absence of any checks and balances, central bank independence is actually associated with higher, rather than lower inflation. Why might this be? One significant possibility is the signaling hypothesis mentioned earlier.

Governments that have no way to demonstrate their credibility to investors (for example, governments lacking in checks and balances) are more likely to announce legal measures that enhance central bank independence when they are confronted with severe inflationary pressures. Governments that exhibit greater checks and balances might also be

tempted to do this, but are likely to find it more difficult for two reasons. First, the sheer difficulty of decision making is greater in these countries, given the number of actors who must agree. Second, multiple veto players will regard the decision with greater seriousness, since they will be more concerned than in the single actor case that the independent agency will take future actions with which the actors disagree, but about which they will be able to do little. Given this asymmetry, it is no longer surprising that central bank independence is associated with higher inflation where governments exhibit fewer checks and balances. This result also casts doubt on the utility of announcements of central bank independence as useful devices for signaling the credibility of government monetary policies.

The results in Table 1 also provide an explanation for Cukierman *et al.*'s finding that legal central bank independence is significantly and negatively correlated with inflation in advanced industrial countries but not in developing countries. Table 1 suggests that this can be attributed to differences in political institutions across these countries. However, many developing countries possess at least some level of checks in government. The results in Table 1 are robust in sub-samples of either developing or developed countries.

Testing hypothesis 2

To examine hypothesis 2, we adopt a straightforward methodology. We ask whether the interaction of checks and balances with central bank independence is greater when polarization or instability are high than relative to when they are low. That is, we split the sample at the means of the polarization and instability variables, and run ordinary least squares on each sub-sample, using the specifications of columns (2) and (4) in Table 1. Provided that our measures of polarization and instability are appropriate to it, hypothesis 2 would be rejected if the coefficients on the interaction terms are larger (less negative) when polarization or instability are high than when they are low. That is, support for hypothesis 2 emerges if the interaction of central bank independence with the checks and balances variables has a stronger negative effect on inflation when polarization and instability are higher relative to when they are lower.

Tables 2 and 3 display the results of this experiment for the three polarization variables described in the data section: Atlas-New, Sullivan-New, and the Gini measure of income inequality. Most of the results are strongly consistent with hypothesis 2. The interaction with executive constraints is significantly more negative at higher levels of Atlas-New and Sullivan-New; the difference in coefficients is of the right sign in the case of the Gini measure, but insignificant. The interaction with party fractionalization, in Table 3, is also more negative under higher values of the three polarization variables, although this difference is not significant with Atlas-New.

Table 1 offers more comprehensive evidence than has previously been available showing that the effects of central bank independence depend on the level of checks and balances in a country. However, the paper offers an alternative and arguably more general account of when checks and balances are likely to matter. Tables 2 and 3 provide significant evidence for part of this account, that checks and balances make a larger contribution to policy credibility when societies are more polarized.

The theory we develop above also suggests that checks and balances are more likely to matter when there is some instability in the identity or preferences of veto players. As the description of the data on political instability indicates, however, data on replacement of veto players is not available. When we included the two variables on executive change described in the data section, following the specifications in Tables 2 and 3, we find not surprisingly that the interaction of checks and balances with central bank independence has a strong negative influence on inflation at *low* levels of instability rather than high. At high levels of instability, the effects of central bank independence are generally insignificant. Given these

variables, and the correctness of our interpretation of them as reflecting rates of *complete* replacement of veto players in government, these results are consistent with the theory set out earlier. When there is a high rate of replacement of all veto players, central bank independence is more difficult to preserve, and therefore is less likely to have a positive effect on the credibility of monetary policy in a country.

Table 2: Polarization and Executive Constraints as Complements to Central Bank Independence

Dependent variable: currency depreciation	Sullivan-New <mean (1)	Sullivan-New >mean (2)	Atlas-New <mean (3)	Atlas-New >mean (4)	Gini Income Inequality <mean (5)	Gini Income Inequality >mean (6)
Intercept	0.22 (*0.13*)	-0.076 (*0.062*)	0.53 (*0.22*)	-0.014 (*0.049*)	0.067 (*0.042*)	-0.030 (*0.097*)
Central Bank Independence	-0.103 (*0.35*)	0.63 (*0.25*)	-0.76 (*0.60*)	0.437 (*0.167*)	-0.39 (*0.20*)	0.37 (*0.28*)
Exec. Const.	-0.022 (*0.019*)	0.017 (*0.010*)	-0.069 (*0.032*)	0.011 (*0.009*)	-0.004 (*0.006*)	0.022 (*0.017*)
Exec Const*CBI	**0.005** (***0.051***)	**-0.10** (***0.039***)	**.10** (***0.087***)	**-0.064** (***0.030***)	**-0.063** (***0.029***)	**-0.083** (***0.046***)
R^2	0.29	0.21	0.44	0.17	0.31	0.23
p-value for F statistic	0.00	0.0017	0.0001	0.0001	0.00	0.00
Number of observations	110	100	87	123	104	104

Note: Period dummies not reported. Ordinary least squares with White's heteroskedastic-consistent standard errors in italics. CBI = Central bank independence. Mean of SullivanNew=1558. Mean of AtlasNew=.15. Mean of Gini Income Inequality=42.

Testing hypothesis 3

Hypothesis 3 predicts that central bank independence is more likely to be adopted, or to endure, in countries that exhibit checks and balances and either regular, partial replacement of veto players or polarization. This is in contrast, for example, to the prediction of Alesina and Gatti (1995), whose theoretical argument concludes with the prediction that polarization alone (in the form of polarized parties in a two party system) is more likely to lead to the adoption of central bank independence. Unfortunately, the data on political stability do not permit us to test the element of hypothesis 3 pertaining to instability. This section therefore focuses on the interaction of polarization and checks and balances.

In order to test hypothesis 3, we performed a third series of regressions with legal central bank independence as the dependent variable, regressed first on executive constraints interacted with measures of polarization, and then on party fractionalization interacted with polarization. There is little theory to guide the choice of variables that belong in a country's decision to approve and maintain legal central bank independence, so we include only income per capita and period dummies in addition to the relevant institutional and political variables.

One consequence of this under-specification is the very low explanatory power of the models. Nevertheless, as Table 4 illustrates, the estimated coefficients of interest are generally significant and supportive of hypothesis 3.

Table 3: Polarization and Party Fractionalization as complements to Central Bank Independence

Dependent variable: currency depreciation	Sullivan-New< mean (1)	Sullivan-New> Mean (2)	Atlas-New<mean (3)	Atlas-New>mean (4)	Gini Income Inequality< mean (5)	Gini Income Inequality> mean (6)
Intercept	0.36 (*0.14*)	-0.003 (*0.053*)	0.15 (*0.20*)	0.029 (*0.041*)	0.062 (*0.026*)	-0.038 (*0.067*)
Central Bank Independence	-0.56 (*0.32*)	0.33 (*0.18*)	-0.06 (*0.53*)	0.17 (*0.12*)	0.10 (*0.12*)	0.30 (*0.18*)
Party Fractionalization	-0.44 (*0.22*)	0.15 (*0.09*)	-0.07 (*0.32*)	0.04 (*0.08*)	-0.004 (*0.052*)	0.41 (*0.14*)
Party Frac*CBI	**0.73** (***0.51***)	**-0.47** (***0.30***)	**-0.16** (***0.84***)	**-0.17** (***0.26***)	**-0.24** (***0.20***)	**-1.02** (***0.35***)
R^2	0.28	0.13	0.23	0.12	0.18	0.22
p-value for F statistic	0.00	0.041	0.0023	0.0065	0.00	0.00
Number of observations	115	101	90	126	103	111

Note: Period dummies not reported. Ordinary least squares with White's heteroskedastic-consistent standard errors in italics. CBI = Central bank independence. Mean of SullivanNew=1558. Mean of AtlasNew=.15. Mean of Gini Income Inequality=42.

The results presented in Table 4 have two major implications. First, they offer support for the prediction of Hypothesis 3 that central bank independence is more likely to be approved and to endure in countries with checks and balances, and that this effect is stronger in the presence of some polarization. Second, there is little support for the prediction that polarized countries are more likely to possess independent central banks absent the mediating impact of checks and balances.

Columns (1) and (4) in Table 4 offer one test of the hypothesis that polarization contributes positively to the presence of checks and balances. In both cases, the polarization variable (Atlas-New and Sullivan-New) actually have negative coefficients and are insignificant. The interaction terms with the two measures of checks and balances and both measures of polarization, on the other hand, provide some support for the thesis that checks and balances in combination with some polarization increases the likelihood that countries will have independent central banks. The interaction of Atlas-New with executive constraints is positive and highly significant, and a similar result is obtained when Atlas-New is interacted with party fractionalization. Results with Sullivan-New are weaker. However, the interaction of Sullivan-New with party fractionalization is of the correct sign and statistically significant using generous criteria (the *p* value is 0.14). The interaction of Sullivan-New with executive constraints is of the wrong sign, but is highly insignificant (with a *p* value of 0.90).

Results with income inequality are different. First, income inequality without an interaction term is positively – though not statistically significantly – associated with central bank independence. Second, interactions between income inequality and both executive constraints and party fractionalization are associated with less central bank independence, rather than more as in Table 4 and as predicted in hypothesis 3. This result seems to be idiosyncratic to this particular measure of polarization, however.

We can suppose that in countries with high inequality there are a large number of poor and a few rich. It is likely that the rich always control at least one veto gate in these countries. Fractionalization and executive constraints are likely, therefore, to indicate that the poor control a larger number of veto gates. If central bank independence is viewed as a mechanism to limit the ability of the government to finance redistributive spending, the poor would resist it. Therefore, greater fractionalization or more effective executive constraints would interact with income inequality to reduce the chances that independence would be adopted. This does not undermine the argument motivating Tables 2 and 3, which says that, once adopted, central bank independence will be more effective as both checks and balances and income inequality increase, an interaction that makes independence more difficult to reverse.

This argument is also consistent with the signs of the Atlas-New and Sullivan-New interaction terms in Table 4. These variables do not presuppose any particular situation or policy preference of the polarized groups, as does the Gini coefficient. Similarly, it is much less plausible to assume in the case of ethno-linguistic polarization that an increase in checks and balances necessarily entails increased strength for a particular position for or against a particular monetary or fiscal policy. In this sense, these polarization measures appear to be more generalizable.

5. Relevance of these results to other analyses of central bank independence

There are several alternative hypotheses in the literature for both the effect of central bank independence on policy credibility and the factors which lead governments to delegate monetary policy. These hypotheses involving signaling, interest group politics, and the need to solve intra-government conflicts. Our findings are relevant to each of them.

Signaling

Delegation or fixed policy rules might be viewed as signaling devices, through which governments signal their true type and thus distinguish themselves from governments that make promises to pursue sound policies but have no intention of actually doing so (Maxfield, 1997). In order for a signal to communicate the credibility of government commitments, it must be costly to send and it must provide a low-cost means for investors to gather information.[16] The costs of signaling in the case of central bank independence are not generally detailed. Maxfield and Clark (1997) suggest that when multiple veto players must agree on central bank independence, the cost of using central bank independence as a signal increases. However, if the signal is costly to send because of these institutional considerations, it may well be that private economic actors respond positively not because they have better information about government policy preferences, but simply because it is difficult for the government to override the central bank once independence is granted.

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[16] It is not clear why investors would not also find other signals such as money supply growth, interest rates and foreign exchange rates to be at least as valuable, however.

Table 4: Determinants of central bank independence:

polarization and checks and balances

Dependent variable: central bank independence	Atlas-New* Executive Constraints (1)	Atlas-New* Executive Constraints (2)	Atlas-New* Party Frac (3)	Sullivan-New*Exec Constraint (4)	Sullivan-New*Exec Constraint (5)	Sullivan-New*Party Frac (6)
Intercept	0.32 (*0.04*)	0.54 (*0.09*)	0.58 (*0.05*)	0.32 (*0.04*)	0.32 (*0.060*)	0.44 (*0.050*)
Polarization measure (see column heading)	-0.13 (*0.14*)	-1.38 (*0.44*)	-1.46 (*0.31*)	-0.00002 (*0.000013*)	-0.00002 (*0.00003*)	-0.00006 (*0.00003*)
Executive constraints or Party Fractionalization (see column heading)	0.10 (*0.05*)	-0.028 (*0.14*)	-0.43 (*0.10*)	0.0057 (*0.004*)	0.007 (*0.01*)	0.41 (*0.14*)
Interaction term		**0.215** (*0.07*)	**2.20** (*0.57*)		**-6.54e^{-7}** (*5.55e^{-6}*)	**0.00007** (*0.00005*)
R^2	0.05	0.13	0.10	0.12	0.05	0.05
p-value for F statistic	0.14	0.041	0.0011	0.0065	0.27	0.23
Number of observations	186	186	190	126	196	202

Note: Period dummies and income per capita not reported (income per capita is always highly insignificant). Ordinary least squares with White's heteroskedastic-consistent standard errors in italics.

Interest groups

Posen (1995, 1993) argues that the degree of financial sector opposition to inflation explains both a country's inflationary performance and its degree of central bank independence. Its core idea is that the more financial intermediaries have balance sheet structures that make them highly averse to unanticipated inflation, the more they will lobby to oppose any excess monetary expansion. Financial intermediaries will be more averse to inflation the greater the mismatch in maturities between liabilities (like short-term deposits) and assets (like long-term loans which are not easily marketable).[17] However, financial intermediaries must eventually work through the political process to achieve their goals. As the theory in this paper suggests, if there is substantial political instability, or an absence of checks and balances, financial intermediaries cannot count on central bank independence to achieve monetary stability.

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[17] One problem with this argument is that it assumes that financial intermediaries will prefer to use their resources to lobby rather than to adjust to a new policy environment. Over time, commercial banks could alter their balances sheet structures accordingly if a country becomes inflation prone. Posen (1995) touches on this issue but does not explore it in depth.

Intra-government conflicts

Bernhard (1998) has recently suggested that politicians may delegate monetary policy to a central bank in order to solve potential intra-governmental conflicts. Empirical results support his hypothesis, and are broadly consistent with our own arguments. Bernhard argues that when a government retains control of monetary policy, choices to raise or lower interest rates may be likely to generate conflicts between different members of the majority coalition. This could be the case if the timing of elections for different members of the majority coalition differs (so some would benefit from surprise inflation while others would not), if the preferences of constituents of different legislators within the majority coalition are heterogeneous, or if backbenchers are unable to discern whether an inflationary outcome is due to circumstances beyond the government's control. Conflicts will only arise, however, if backbenchers are able to sanction the government, for example by bringing down a coalition government. Under these conditions it may be beneficial for both sides to make a decision to delegate monetary policy to an independent agent. However, like Alesina and Gatti, who make a broadly similar argument, Bernhard does not ask what keeps backbenchers and ministers from reneging on a deal to delegate once it is made.

He conducts statistical tests based on a small sample of 18 OECD countries and finds that indices designed to measure heterogeneity of constituent interests and the ability of backbenchers to sanction ministers are both significantly associated with greater legal central bank independence. He also finds that strong bicameralism (which he suggests is likely to be associated with heterogeneous preferences of legislators) is significantly correlated with greater legal central bank independence. While Bernhard's theory of when governments will delegate to a central bank differs from our own, the correlation between countries with strong bicameralism and central bank independence is consistent with our own hypothesis 3. More broadly, countries where political institutions produce majorities where legislators have heterogeneous preferences and where backbenchers (or coalition members) are able to sanction governments are also likely to be countries where the number of veto players with different preferences necessary to agree to an override of central bank independence is relatively high.

6. Conclusion

The importance of the study of central bank independence lies both in its own potential importance for the conduct of macroeconomic policy and in the implications it has for a host of other government functions. The independence of the judiciary and of administrative agencies, the relevance of fixed government policy rules of all kinds, can all be informed by a better understanding of when central bank independence matters for economic outcomes. This paper is an attempt to advance our understanding of these issues by deepening the political arguments surrounding independence and testing them on a broad and disparate set of countries.

The paper has several messages. First, theoretically, the importance of checks and balances depends on other dimensions of the political environment, including levels of political instability (measured as the rate of replacement of veto players) and the extent of polarization in society. Second, by examining a large set of countries, we can say more conclusively that monetary delegation is only a potential solution to credibility problems when political institutions provide for multiple veto players with different preferences. This generalizes earlier results by Moser (1996) and Lohmann (1998), who restrict their attention to industrialized countries. Third, unlike previous studies we show that the combined effect of the presence of multiple veto players and monetary delegation is much stronger in countries with higher levels of polarization, and much lower in countries with significant rates of replacement of crucial government decision makers.

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