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Policy Rules and Political Polarization

Abstract

We develop a model to analyze policymakers' incentives to install policy rules, comparing the case of no rule with a binding and a contingent policy rule that allows policymakers to suspend the rule in response to a sufficiently large shock. First, abstracting from political polarization, we show that the choice of the policy rule depends on policymakers' policy targets. Depending on the policy target, there is an unambiguous ranking going from a no-rule regime to a contingent rule to a binding rule. Next, allowing for political polarization, the incentive to install the different types of rules changes with political polarization between different policymakers and their probability of being elected into office. Increasing political polarization when there is a sufficiently high election probability for policymakers with a high policy target increases the preference for more binding policy rules. It also leads to stricter rules in a contingent rule regime.

JEL-Codes: D780, E600.

Keywords: contingent policy rules, political polarization, time inconsistency, electoral uncertainty.

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1 Introduction

Economic policymaking is often subject to rules that constrain the use of policy instruments. For example, formal rules on the use of exchange rates were part of the Bretton Woods System and the European Monetary System (Eichengreen 2019, James 1996). In recent years, many countries have introduced fiscal rules that constrain public debt, budget deficits, fiscal expenditures, or even fiscal revenues (Braendle and Elsener 2023, Budina et al. 2012). The bindingness of these rules varies across countries. Moreover, in some cases, they are combined with contingent policy rules that provide flexibility and allow governments to opt out in the case of rare events, conditional on, for instance, significant growth slowdowns, natural disasters, or fundamental disequilibria in the balance of payments.

There are several reasons to install rules to constrain policymakers. One reason for this is to correct the tendency for excessive policy use, such as the public debt rules of the European Union. Another reason may be to solve a commitment problem of the incumbent policymaker due to the time-inconsistency problem where rules help policymakers to influence the private sector's expectations (Kydland and Prescott 1977). A third reason for installing rules can be that a policymaker wants to constrain the policy space of future policymakers who may pursue different objectives (Alesina and Tabellini 1990). Ultimately, the decision of policymakers to introduce rules and how to design them will likely be driven by their consideration of what suits them best. What policy regime is preferred by a policymaker is certainly related to her policy position, and the increase in political polarization that can be observed in many countries (Carothers and O'Donohue 2019, Mueller and Schnabl 2021) is thus likely to influence the choice of policy regimes and their future design.

In this paper, we develop a model that analyzes the incentives for policymakers to adopt binding rules compared to contingent or no rules. While the issue of what rules can achieve has been addressed extensively, we add two aspects usually neglected in the discussion about binding rules versus full discretion (see Dellas and Tavlas (2022) for a recent survey). Typically, the discussion evolves around a trade-off between the ability to stabilize shocks and the use of rules to influence the private sector's expectations. In this setup, higher policy goals increase the private sector's policy expectations and neutralize part of the policy, as only unexpected policies are effective. A policy rule can reduce this expectation but has the cost that shocks can no longer be stabilized.

To this standard approach, we first explicitly introduce the possibility of contingent rules and show an unambiguous ranking of preferred regimes that moves from no rule to a contingent rule to a binding rule as the policy expectations of the private sector increase. The optimal choice is not between discretion or binding rules, as most of the literature argues, but also comprises a contingent rule that dominates both polar cases for an intermediate range of policy targets of policymakers. The optimality of a contingent rule as a function of a policymaker's policy target over binding rules and no rules is a novel result in this context.

We secondly introduce a political economy dimension to the regime choice. We add political polarization between policymakers concerning their policy goals, and we allow for electoral uncertainty so that policymakers are uncertain about who will set policy in future periods. We show that increasing polarization between policymakers shifts policymakers' preferences towards more binding regimes. While policymakers lose the ability to stabilize shocks in a more binding regime, they gain at two margins. More binding rules help them to control the costs of the private sector's expectation bias that arises from ambitious policy goals. Moreover, , it can constrain the opponent's possibilities to pursue her policy objectives. Political polarization thus has two dimensions that influence the choice of rules: As policymakers become more extreme in their positions, moving from the center to the fringes of the political spectrum, expectations increase with the election probability of more extreme types, prompting policymakers of all types to use policy rules to control the expectation bias. Moreover, the partisan motive to bind the hands of other policy types by establishing rules increases as polarization increases under certain conditions. If policymakers' aims are close there is less incentive to tie the hands of one's opponent.

Based on this logic, we thirdly determine the optimal threshold for shocks above which policymakers can suspend the rule in a contingent regime. This threshold is, again, becoming stricter under the condition that the election probability of the policymaker with a higher policy target is sufficiently high as polarization increases. More political polarization should thus lead to rules that can only be suspended in case of more significant shocks. Again, more binding or stricter rules lower the private sector's expectations, which is in the interest of all types of policymakers, and it serves the partisan motive of binding the hand of one's opponent.

Our argument is related to the extensive rules versus discretion debate (see Barro and Gordon 1983; Calvo 1978; Calvo and Obstfeld 1988; Kydland and Prescott 1977, and the survey by Dellas and Tavlas 2022). While this literature usually compares full discretion with binding rules, there is also a small but inconclusive literature on the benefits of contingent rules that aim to improve the trade-off between constraining the policy space of policymakers and solving the time-consistency problem on the one hand and the need for active policy in more or less well defined circumstances on the other hand (Borio 1986; Buiter 1981; Flood and Isard 1989; Minford 1995). Similarly, escape clause models (Halac and Yared 2022, Lohmann 1992, Obstfeld 1996, Persson and Tabellini 1990) allow policymakers to renege on the rule, usually associated with a cost. We also relate to analyses that show how rules can constrain the policy space of future incumbents (Alesina and Tabellini 1990; Glazer 1989; Milesi-Ferretti 1995; Tabellini and Alesina 1990). Our contribution concerning these analyses is that we incorporate the problem of policy expectations, the incentive to tie the hands of future policymakers, and the different types of rules in a single framework, which has not been done before to the best of our knowledge. This enables us to connect regime choice with increasing political polarization and its likely consequence on future choice and design of policy rules. This question has so far received little attention in the literature. [1]

While there exists a considerable body of literature evaluating rule-based policies, including contingent rules, versus discretionary policies concerning various outcome variables such as growth (Afonso and Jalles 2013; Castro 2011; Gründler and Potrafke 2020), exchange rates (Bordo and Schwartz 1994), fiscal performance (Eyraud et al. 2018; Heinemann et al. 2018; Potrafke et al. 2016; Vinturis 2023), the political budget cycle (Azzimonti et al. 2016, Gootjes et al. 2021), inflation (Combes et al. 2018; Gonçalves and Carvalho 2009; Walsh 2009), or when coordinated among economies (Arawatari and Ono, 2023), little is known about how political variables affect the regime choice. Some attempts have been made by Debrun et al. (2008) to link the adoption of fiscal rules to political determinants. Empirically, they find that rules are more likely adopted in election years and when there is more political instability.

In the following section, we introduce our model. Section 3 derives the losses accruing to the policymakers under different policy regimes, and Section 4 determines and discusses the regime choice and optimal strictness of rules in a contingent rule regime. The last section concludes.

2 The Model

There are two policymakers, indexed $i = R, L$, where the incumbent policymaker sets policy x_i, $x_i \in \mathbb{R}$, when in office. Policymakers interact with a private sector that forms rational expectations about the incumbent's policy $E(x_i)$. Furthermore, a stochastic shock u may affect policy output y. We assume that the shock u is distributed uniformly on $[-\mu, \mu]$ with expected value $E(u) = 0$, and variance $Var(u) = \sigma_u^2 = \frac{\mu^2}{3}$. Under rational expectations and no shock to the economy, the policy output y_i is normalized to zero. Therefore, it follows as

$$y_i = x_i - E(x_i) - u. \tag{1}$$

The policy instrument can be thought of as monetary or fiscal policy whose effectiveness depends on the private sector's expectations. In the case of monetary policy, this may be interpreted as a reduced form of an economy where a policymaker can raise output by surprising the private sector through an unexpected increase in inflation (Barro and Gordon 1983) or an unexpected devaluation (Obstfeld 1996). In the case of fiscal policy, y_i could be interpreted as fiscal expenditures and x_i as a fiscal policy where an expected increase in taxation, public debt, or expropriation leads to tax evasion, capital flight, or under-investment (Drazen 2000,

[1] In recent work, Piguillem and Riboni (2021) model policymakers who can negotiate the suspension of a fiscal rule and are less likely to reach an agreement if political polarization increases. Thus, rules are contingent in the sense that their suspension can be negotiated. The paper does not look at the optimality of contingent rules in comparison to binding rules or no rules.

Hefeker and Kessing 2017), thus affecting fiscal expenditures. The stochastic shock u may be considered a supply or a spending shock, depending on the interpretation of y_i.

An incumbent policymaker of type i will set policy to minimize a loss function

$$L_i = (y_i - \theta_i)^2 + bx_i^2, \tag{2}$$

where the type of policymaker is associated with a policy target θ_i to reflect an output or spending target in our examples sketched above. Policymakers have quadratic losses in the deviation of the policy output from the policy target, which gives rise to a bias that induces the incumbent policymaker to pursue an increase in policy x_i to close the gap between given policy output and the policy target even if no shocks occur. Moreover, there are costs of applying a policy x_i to narrow the deviation of a given policy from the policy target. Setting policy x_i affects the policymaker's losses with $b > 0$.

Without loss of generality, we assume $\theta_L > \theta_R \geq 0$ in what follows, so that policymaker L has a more ambitious policy target than policymaker R (Drazen 2000). To capture political polarization, we specify $\theta_L = \theta + \varepsilon$ and $\theta_R = \theta - \varepsilon$ with $\theta \geq \varepsilon \geq 0$ so that $2\theta \geq \theta_L \geq \theta_R \geq 0$. Thus, 2ε captures the distance between policy targets or degree of political polarization between policymakers L and R.

The incumbent faces a private sector aware of the policymaker's policy target and forms rational expectations about realized policy. Given that only the non-expected part of the policy effectively closes the gap between the policy output and the policy target, the policymaker would like to "surprise" the private sector, which is impossible given rational expectations. Lowering policy expectations is only possible if the policy is subject to a policy rule that either rules out active policy completely, also forgoing the possibility of stabilizing shocks, or a contingent rule that only allows active policy in well-specified circumstances.

We consider three types of rules, based on existing rules. The empirical literature on policy rules (Budina et al. 2012; Davoodi et al. 2022a,b) shows that some countries do not have rules at all, other countries install binding rules, or rules that are combined with circumstances under which a policymaker can break them. Often these contingencies are linked to significant reductions in growth or formulated rather vaguely as "fundamental disequilibrium", "exceptional and temporary", or as "distortion of the business cycle".[2] Thus, the incumbent policymaker decides on a policy regime that sets the framework for how policies can be set in the future. The choice is between a fully discretionary no-rule (NR) policy, in which the policymaker may choose any policy x_i, a binding rule (BR) that fixes policy at $\bar{x} = 0$, and a contingent rule (CR), in which the policymaker is bound to policy $\bar{x} = 0$ for shocks below a critical size of $\bar{u}$.

[2] The references pertain to the adjustment of par values in the original Articles of Agreement of the International Monetary Fund (Art. 5), the permissible suspension of the deficit rules in Art. 104 of the Maastricht Treaty of the European Union, and the suspension of the debt brake in the German constitution (Art. 109).

We make three additional simplifying assumptions. First, we assume that the contingent rule is asymmetric in the sense that it can be suspended only for negative shocks ($u > 0$). This is inspired by fiscal rules which allow a suspension, that is, an increase of debts and deficits, in case of negative shocks, whereas there is no requirement to restrict fiscal surpluses. Second, we assume the rule to be credible and verifiable so that the event $\bar{u}$ triggering the discretionary policy is clearly defined and observable to policymakers and the private sector. Measuring disturbances is a difficult issue, which implies that, from the perspective of the policymakers and the private sector, a contingent clause may not be as clearly defined as we assume. While one may think about modeling the trigger surrounded by some uncertainty, the main driving force in the decision for a specific regime is that a contingent rule should provide a better trade-off between lowering the private sector's policy expectations and stabilizing large shocks. These main drivers would mostly be unaffected by uncertainty around a threshold, and we thus exclude this additional complication. Third, we assume that a policy regime, once established, will stay in place. This assumption can be justified by the observation that fiscal rules are, at least in some countries like France, Germany, Poland, Spain, or Switzerland codified in the constitution, which would make it difficult for a successor with different policy goals to change or abolish the rule (Budina et al. 2012). Moreover, rules are often part of an international treaty that is difficult to change. In the case of fiscal policies, an example of such a treaty is the European Fiscal Compact; in the case of monetary policies, one may think of an exchange rate regime like Bretton Woods or the European Exchange Rate Mechanism. Admittedly, this does not apply to all rules, and our model should thus be seen as a contribution that tries to clarify the link between political polarization and regime choice without problems related to commitment and enforceability of rules.

Given this irreversibility of regimes, we add electoral uncertainty to the choice problem of the incumbent policymakers. Given irreversibility, policymakers must consider that the rule will also apply in future periods when the incumbent may no longer be in office. Choosing to implement a policy rule is thus not only a way for the incumbent to tie her own hands but also the hands of her potential successor. With probability π policymaker L will be (re)elected into office and with probability $1 - \pi$ policymaker R will be the next incumbent. In defining exogenous election probabilities, we follow the existing literature (Alesina 1987; Alesina and Gatti 1995) and abstract from possible effects that the choice of a particular regime might have on the reelection probability of the incumbent. Assuming that the regime's choice does not affect the reelection probability of the incumbent policymaker may also be justified because policymakers compete for voters on a multi-dimensional policy space, and technical issues like policy rules are presumably less decisive for voting decisions than other issues.

We summarize the time structure as (i) the incumbent policymaker $i = R, L$ chooses the type of policy rule, (ii) elections take place, (iii) private agents form expectations based on the election outcome, (iv) observable and verifiable shocks occur, (v) the incumbent policymaker sets policy, depending on the policy rule in place, (vi) policy outcome realizes. Thus, policymakers and private agents are uncertain about shocks, but only policymakers face electoral uncertainty. When setting policy and forming expectations, policymaker and private sector take the behavior of each other as given. The model is solved by backward induction.

3 Policy Choices and Expected Losses

We begin by deriving equilibrium policies for the three policy rules and their associated payoffs for the incumbent. The following section will compare the three different policy rules in their ex-ante desirability for the policymaker.

3.1 Binding rule

In case a binding policy rule is in place, policy is fixed at $\bar{x} = 0$, from which neither policymaker $i = L, R$ can deviate. Using (1) and (2), the expected losses of the binding policy rule (BR) for policymaker i are

$$EL_i^{BR} = \sigma_u^2 + \theta_i^2. \tag{3}$$

The incumbent's expected losses are convex in her policy target and linear in the variance of the shock. The latter effect arises because the policymaker wants to stabilize output so that a higher variance of the output shocks to which she cannot react increases losses. Expected losses from this regime are higher for policymaker L because of her higher policy target.

3.2 No rule

A policymaker who has full discretion over policy will choose $x_i = \frac{\theta_i + u + E(x_i)}{1+b}$ to minimize losses (2) subject to (1). Rational expectations about the incumbent's policy choice imply $E(x_i) = \frac{1}{b}\theta_i$, leading to equilibrium policy

$$x_i = \frac{\theta_i}{b} + \frac{u}{1+b}. \tag{4}$$

Thus, policymaker L will run a systematically more expansive policy than policymaker R due to the higher policy target, but both will stabilize shocks to the same extent.

When deciding to adopt this regime, incumbent i does not know who is going to win the election and set policy in the future. Therefore, expected losses from this regime are weighted with π for the case that policymaker L wins and implements her preferred policy x_L, and with $1 - \pi$ for the case that policymaker R is able to implement policy x_R. With probability $1 - \pi$ policymaker L will suffer from being ruled by R, whereas R will be ruled by her opponent with probability π. Expected losses for policymaker i in the no rule (NR) regime, hence, are given as

$$EL_i^{NR} = \pi EL_i(x_L, E(x_L)) + (1-\pi)EL_i(x_R, E(x_R)), \tag{5}$$

where the losses depend on the policymaker's type (L, R) and the private sector's policy expectations $E(x_i)$.

Inserting (4) and expectations over policies into (5), and taking expectations over the output shock yields

$$EL_i^{NR} = \frac{b}{1+b}\sigma_u^2 + \theta_i^2 + \frac{1}{b}(\pi\theta_L^2 + (1-\pi)\theta_R^2). \tag{6}$$

Losses of both policymakers are a function of the variance of the shocks due to their preference for stabilizing output, and, again, policymaker L suffers more than R because of a higher policy target θ_L that cannot be fully realized. The third term, $\pi\theta_L^2+(1-\pi)\theta_R^2$, captures the existence of electoral uncertainty and the risk of being governed by a policymaker with a different policy target.

3.3 Contingent rule

Finally, we describe the expected losses of policymakers who are bound by a contingent rule (CR). In this regime, expected losses for incumbent i are

$$\begin{aligned} EL_i^{CR} = {} & Prob(u > \bar{u})[\pi EL_i(x_L, E(x_L)) + (1-\pi)EL_i(x_R, E(x_R))] \\ & + (1 - Prob(u > \bar{u}))[\pi EL_i(\bar{x}, E(x_L)) + (1-\pi)EL_i(\bar{x}, E(x_R))]. \end{aligned} \tag{7}$$

The expression captures expected losses in the case of a shock larger than $\bar{u}$ weighted with the probability $Prob(u > \bar{u})$ that this case arises. In this regime, policymakers will be allowed to respond to shocks by adjusting their policies. Given that the regime's choice is made before elections, the incumbent does not know whether she will be in power. The second line relates to the case of a shock below $\bar{u}$, for which both policymakers will have to implement policy $\bar{x} = 0$.

When forming policy expectations, elections have already taken place, and the private sector knows which policymaker is in office. The private sector, however, needs to learn about the future realization of the shock at this stage, which means it cannot distinguish ex-ante between a shock beyond the critical level or below. The expected policy for the private sector, therefore, is

$$E(x_i) = Prob(u > \bar{u})\frac{\theta_i + E(x_i) + E(u_{u>\bar{u}})}{1+b} + (1 - Prob(u > \bar{u}))\bar{x},$$

where $E(u_{u>\bar{u}}) = \frac{\mu+\bar{u}}{2}$ denotes the conditional expectation of shock u, given that it is above the critical level $\bar{u}$. The first term relates to the discretionary policy chosen by the policymaker after a sufficiently large shock, which would allow her to deviate from $\bar{x} = 0$, given expectations $E(x_i)$. The second term relates to the part of the contingent rule where the policymaker is not allowed to set policy freely. Inserting probabilities for shocks above and below the threshold $\bar{u}$ of the contingent rule, and the conditional expectation of the shock, gives

$$E(x_i) = \frac{(\mu - \bar{u})(\theta_i + E(u_{u>\bar{u}}))}{2\mu(1+b) - (\mu - \bar{u})}. \tag{8}$$

Inserting rational expectations policies (8) in (7) and taking expectations over the shock results in expected losses for policymaker i from this regime of

$$EL_i^{CR} = \frac{b}{1+b}\sigma_u^2 + \theta_i^2 + \frac{(\mu - \bar{u})(\pi\theta_L^2 + (1-\pi)\theta_R^2)}{2\mu(1+b) - (\mu - \bar{u})} + \kappa(\bar{u}) \tag{9}$$

with $\kappa(\bar{u}) = \frac{1}{1+b}Prob(u \leq \bar{u})\sigma^2_{u\leq\bar{u}} + \frac{b}{1+b}(E(u_{u\leq\bar{u}}))^2\frac{(\mu+\bar{u})}{2\mu b+\mu+\bar{u}} > 0$, where we use $\sigma^2_{u\leq\bar{u}} = \frac{(\mu+\bar{u})^2}{12}$ to denote the conditional variance of u, given that is is below the critical level $\bar{u}$, and $E(u_{u\leq\bar{u}}) = -\frac{\mu-\bar{u}}{2}$ as the conditional expectation of $u \leq \bar{u}$. The term $\kappa(\bar{u})$ captures the losses under the contingent regime that arise from policymakers not being able to react to shocks that are below the critical level and depend crucially on the critical shock level $\bar{u}$. Losses increase in the probability that such a shock arises, its conditional expectation, and its conditional variance. Moreover, $\kappa(\bar{u})$ is increasing in the threshold $\bar{u}$ of the contingent policy rule as the requirements for suspending the rule are increased. The overall influence of $\bar{u}$ on (9), however, is unclear as the impact of different policy targets and electoral uncertainty on policy expectations is declining in $\bar{u}$. The larger the critical level for suspending the rule, the less able policymakers are to implement their preferred policies, and the less influential political factors become.

4 Regime Choice

Having derived equilibrium policies and expected losses for each regime, we now compare and rank them and derive properties of the rules concerning electoral uncertainty and political polarization. We also provide a numerical example at the end of this section to illustrate the ranking of regimes depending on parameter values.

4.1 Comparing policy regimes

We begin by comparing the binding rule with the case of no rule by comparing (3) and (6). The no rule regime is preferred if $EL_i^{BR} > EL_i^{NR}$ or

$$\frac{1}{1+b}\sigma_u^2 > \frac{1}{b}(\pi\theta_L^2 + (1-\pi)\theta_R^2). \tag{10}$$

This replicates the standard result in the literature that if policy targets dominate shocks, binding rules are better and vice versa (Barro and Gordon 1983). For a given (unconditional) variance of shocks, the no rule regime becomes less attractive for ambitious policy targets, resulting in higher policy expectations, and a high probability of policymaker L winning the election. In this case, policymaker L benefits from tying her own hands and R also wishes to constrain L's policy space.

Likewise, the binding rule (3) is dominated by the contingent rule (9), if $EL_i^{BR} > EL_i^{CR}$ or

$$\frac{1}{1+b}\sigma_u^2 > \frac{(\mu-\bar{u})(\pi\theta_L^2 + (1-\pi)\theta_R^2)}{(2\mu(1+b)-(\mu-\bar{u}))} + \kappa(\bar{u}). \tag{11}$$

Lastly, comparing the contingent rule (9) with full discretion (6), the contingent rule is preferred if $EL_i^{NR} > EL_i^{CR}$, or

$$\frac{(\mu+\bar{u})(\pi\theta_L^2 + (1-\pi)\theta_R^2)}{(2\mu(1+b)-(\mu-\bar{u}))} > \frac{b}{1+b}\kappa(\bar{u}). \tag{12}$$

Hence the contingent rule is preferred if policy expectations are large and if $\kappa(\bar{u})$ is small.

We find that both policymakers will choose the same regime in all cases and that regime shifts are independent of the policymaker's type. The logic is that both face the same electoral uncertainty and that the marginal response to shocks is identical.

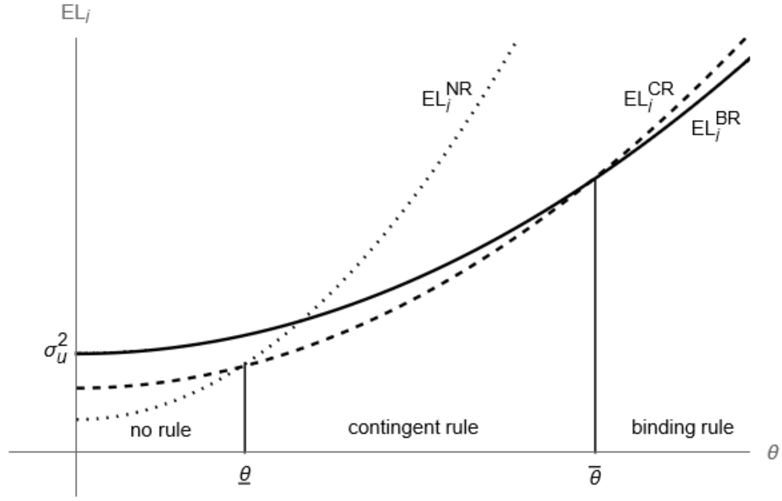
4.2 Ranking of policy rules

We first establish that contingent policy rules dominate the binding and no rule policy regime for specific values of policy targets. This optimality of contingent policy rules exists for all types of policymakers and is independent of political polarization. How the interval of policy targets in which contingent rules are preferred over the binding or no rule regimes depends on political polarization will be the focus of the following subsection.

Our first result thus assumes no polarization which implies $\pi\theta_L^2+(1-\pi)\theta_R^2 = \theta$ in equations (10), (11) and (12). Then, the result of pairwise comparisons of policy rules can be summarized in the following proposition.

Proposition 1. *As the policy target increases, policymakers will switch from a no-rule regime to a contingent rule regime and finally to a binding rule regime.*

Figure 1: Policy targets and regime choice



Notes: Figure 1 shows the expected losses EL for a policymaker from the three regimes (NR, CR, and BR) as a function of policy target θ. For $0 \leq \theta < \underline{\theta}$ the policymaker prefers the no rule regime, for $\underline{\theta} < \theta < \overline{\theta}$, the policymaker prefers the contingent rule regime, and for $\overline{\theta} < \theta$, the policymaker prefers the binding rule regime.

Proof: see Appendix.

As illustrated in Figure 1, policymakers prefer the no rule regime for low policy targets because lowering the private sector's policy expectations is not an issue. In this case, the ability to stabilize shocks is relatively more important for policymakers. As policy targets increase, however, the costs of the policy expectations increase as well. The optimal regime, then, is a contingent one that helps lower the private sector's expectations but allows policymakers to stabilize at least large shocks. At even higher policy targets, a binding regime is preferred because the costs of high policy expectations outweigh the costs of not being able to stabilize shocks at all.

4.3 The influence of political polarization and electoral uncertainty on regime choice

Having established that more ambitious policy targets, when there is no political polarization, change preferences for regimes from less binding to more binding ones, we now ask how regime choices are affected by political polarization and election probabilities. As introduced earlier, we model political polarization as an increase in ε, which shifts the policy targets of policymakers L and R apart to $\theta_L = \theta + \varepsilon$ and $\theta_R = \theta - \varepsilon$. This leads to

Proposition 2. *An increase in political polarization leads policymakers to switch from a no-rule regime to contingent and binding rules at lower policy targets if the election probability of* *the more ambitious policymaker is above a critical level $\bar{\pi}$.*

Proof: see Appendix.

Intuitively, we get this result because polarization makes the private sector's policy expectations and associated costs for policymakers more important. Under the condition that the likelihood of policymaker L winning the elections is sufficiently high, it becomes more likely that policymaker R will face a policymaker in office that follows a more ambitious policy target. Thus, policymaker R seeks a mechanism to bind her opponent's policy by implementing more binding rules. As the private sector's expectations go up, policymaker L prefers more binding regimes because they contain the costs by lowering private sector expectations. While policymaker R aims to tie her opponent's hands, policymaker L wishes to tie her own hands.

4.4 The optimal strictness of a contingent rule

In a situation where policymakers agree on the desirability of a contingent regime, they may also be able to choose the strictness of the rule. Often, individual policymakers will not be able to determine the critical level of shocks that allow the suspension of the rule because these are part of international arrangements or national constitutions. However, at other times, they may be able to define those critical values themselves. The following proposition addresses the optimal strictness of a rule in a contingent rule regime.

Proposition 3. *There is a loss minimizing critical level of shock ($0 < \bar{u}^* < \mu$) for policymakers at which the contingent rule should be suspended. This optimal threshold is increasing in the probability π and also increasing in political polarization if π is above a critical level $\bar{\pi}$.*

Proof: see Appendix.

Given that the contingent rule is preferred, both policymakers opt for a more binding contingent rule if polarization increases and if the election probability of the more ambitious policymaker is sufficiently high. This occurs for the same reasons as a shift in the choice of policy regime. Policymaker R wants to bind policymaker L who will likely to be in office in the future, and policymaker L prefers a more binding contingent regime to lower private policy expectations.

4.5 Numerical illustration

To illustrate the results of our analysis, we plot in Figure 2 the preferred policy regimes of policymakers over various combinations of the parameters of our model. We make the following assumptions for parameter values. Policy outcome is normalized to zero, and we interpret policies x_i and policy targets θ_i with $i = R, L$ as deviations from the normalization.

We set $\theta = 0.05$, with $\theta_L = \theta + \varepsilon$ and $\theta_R = \theta - \varepsilon$. Polarization is linked to larger values of ε, where $\varepsilon = 0$ implies no polarization between policymakers. Shocks can be between plus and minus 10% ($\mu = 0.1$) in relation to the policy outcome. The cost parameter is set to $b = 0.5$. This implies that a policy x_i that increases policy outcome by one percentage point has costs of approximately one percentage point, measured in terms of the policy outcome. In the plots, regimes are separated by solid lines.

In the upper panel, the regime choice is shown as a function of polarization (ε) and the election probability (π) of policymaker L. When polarization is low, both policymakers prefer a contingent regime independent of the election probability. For higher levels of polarization, the no rule regime is preferred when the election probability of policymaker L is low. As π increases, the contingent rule becomes the preferable regime. As π becomes even larger, the preferred regime switches from contingent to binding. When polarization is high and π is low, both policymakers prefer a no-rule regime because the costs arising from policy expectations are low, and policymaker R does not see the necessity to tie the hands of a future policymaker with a high policy target because policymaker L has a low election probability. That is, in the extreme case, where policymaker L can be sure not to be elected, and knowing that the opponent has policy preferences close or equal to the normalized policy output of zero, the incentive to stabilize output dominates the regime choice of both policymakers. Consequently, the no rule regime is preferred. On the other extreme, when it is almost certain that policymaker L gets elected, committing to rules is more important than to be able to stabilize policies, and, furthermore, policymaker R wants to tie the hands of the successor. Thus, the binding rule is preferred by both policymakers.

In the middle panel of Figure 2, we show the regime choice as a function of ε and the threshold $\bar{u}$ of the contingent rule. The election probability of policymaker L is now set to $\pi = 0.5$. The upper left area shows combinations of the two parameters for which policymakers prefer a binding regime to the contingent regime (lower right area). The line separating the regimes is increasing in the threshold of the contingent rule. This implies that polarization and strictness of the contingent rule are complementary. Again, the trade-off between lowering the private sector's expectations and stabilizing policy outcomes explains the observation. If a policymaker is indifferent between the binding regime and the contingent regime, this policymaker would still be indifferent when a higher threshold $\bar{u}$ helps her to control the costs of the policy expectations or tie a successor's hands as polarization increases (at high electoral uncertainty, $\pi = 0.5$).

Finally, in the lower panel of Figure 2, we fix polarization at $\varepsilon = 0.05$ and plot the policy regimes as a function of π and $\bar{u}$. The lower area in the panel reflects parameter constellations for which policymakers prefer the no rule regime, the middle area reflects parameter constellations where the contingent rule is preferred, and the upper left area reflects parameter constellations where the binding rule is preferred. As the functions separating the regimes are upward-sloping, the probability of policymaker L winning the elections and the strictness of the contingent rule are complements again. A higher probability of policymaker L winning the elections can be compensated by a stricter contingent rule, which binds the incumbent policymaker in the future and reduces expectations. At low election probabilities for policymaker L, both policymakers, when choosing the regime, are less concerned about the costs arising from policy expectations, and policymaker R does not fear a change in office. Consequently, a no rule regime is preferred. Given the strictness of the contingent rule, preferences for the policy regime switch from the no rule regime to the contingent regime, and to the binding rule. A contingent rule is preferred even for relatively high election probabilities of policymaker L as long as the contingent rule is sufficiently strict. At the same time, for both policymakers, costs from being unable to react to large shocks can be avoided.

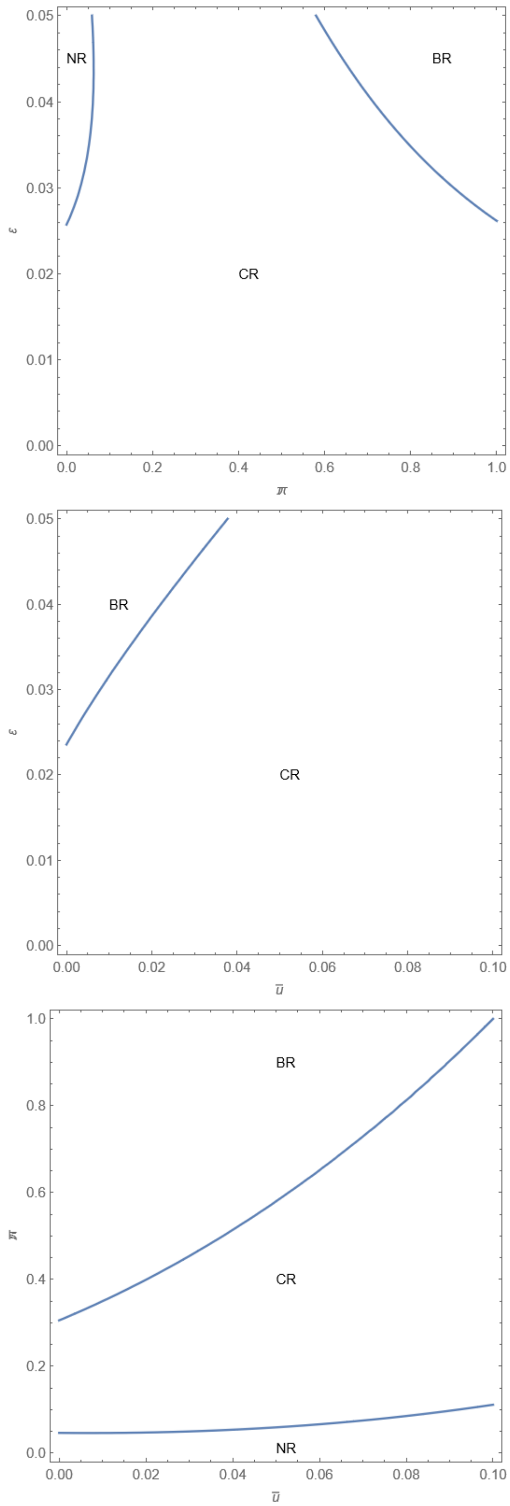
5 Conclusion

In this paper, we ask how the choice of policy rules will likely change in a politically more polarized world. To address this question, we develop a political economy model with two competing policymakers who choose between a no rule regime, a binding rule regime, and a contingent rule regime.

We derive three insights: First, we show that independent of the type of policymakers, both will move from a no-rule regime to a contingent rule regime and, finally, to a binding rule regime as policy targets increase. Contingent rules become more attractive for policymakers with more ambitious policy goals, and, eventually, they will prefer a binding rule under which stabilization of shocks is completely ruled out. More binding rules are attractive for two reasons. They tie the hands of a successor with a different policy target, and they influence the private sector's expectations, reducing the costs of policy expectations. Second, we show that polarization in the policy targets of the policymakers affects the choice of regime. Whenever the more ambitious policymaker has a sufficiently high election probability, policy rules become more attractive as polarization increases. This occurs because the right policymaker aims to tie the hands of a likely successor with a higher policy target, and a left policymaker wants to contain the costs of private sector expectations by tying her own hand. Third, political polarization affects the design of a contingent regime. With the more ambitious policymaker's sufficiently high election probability, the critical shock level at which the contingent rule can be suspended becomes larger. Contingent rules should thus be more strict.

In addition to our predictions on the consequences of political polarization for policy rules, we see implications of our analysis concerning future economic volatility. On the one hand, since policy regimes become more binding because of political polarization, less stabilization of economic shocks will occur. On the other hand, more binding policy rules will reduce economic volatility because a change of policymakers in office has less impact on outcomes. Thus, the

Figure 2: Regime choices for policymakers L and R



Notes: Figure 2 shows policy regimes for policymakers ($i = R, L$) as a function of (π, ε) in upper panel, as a function of $(\bar{u}, \varepsilon)$ in middle panel, and as a function of $(\bar{u}, \pi)$ in lower panel. Parameters are $\mu = 0.1$, $b = 0.5$, $\theta = 0.05$, and when not varied $\varepsilon = 0.05$, $\bar{u} = 0.05$, and $\pi = 0.5$.

overall effect of political polarization on economic volatility would be ambiguous.

We see at least two ways to extend the analysis in future work. It could be desirable to account for the possibility that contingent rules are poorly defined and non-verifiable since this can lead to mulitple equilibria and thus influence the optimality of contingent rules. Another gap in the literature that should be addressed is more empirical analyses concerning the influence of political variables, particularly political polarization and electoral uncertainty, on the choice of policy rules and their strictness.

Appendix

Proof of Proposition 1 Proposition 1 establishes the general ranking of policy rules and thus focuses on the case of no polarization ($\varepsilon = 0$) which implies $\theta = \theta_L = \theta_R$. Political polarization ($\varepsilon > 0$) will be introduced in Proposition 2.

The proof consists of three parts: First, we show that expected losses can be ranked as $EL_i^{BR} > EL_i^{CR} > EL_i^{NR}$ at $\theta = 0$. Second, we show that $\partial EL_i^{NR}/\partial\theta > \partial EL_i^{CR}/\partial\theta > \partial EL_i^{BR}/\partial\theta$. Third, we show that the policy target $\theta^{NR} = \theta^{CR}$ at which expected losses for the NR regime are equal to expected losses of the CR regime is to the left of the policy target $\theta^{CR} = \theta^{BR}$ at which expected losses of the BR regime are equal to the expected losses of the CR regime. This establishes that policymakers move from the no-rule to the contingent rule and then to the binding rule regime.

1. Ranking of intercepts: At $\theta = 0$, the intercepts are $EL_i^{BR} = \sigma_u^2$, $EL_i^{NR} = \frac{b}{1+b}\sigma_u^2$ and $EL_i^{CR} = \frac{b}{1+b}\sigma_u^2 + \kappa(\bar{u})$. It is clear that $\sigma_u^2 > \frac{b}{1+b}\sigma_u^2$ and thus $EL_i^{BR} > EL_i^{NR}$. To locate EL_i^{CR}, we consider $\kappa(\bar{u})$. The maximum value $\kappa(\bar{u})$ is at $\bar{u} = \mu$ and thus $\frac{b}{1+b}\sigma_u^2 + \frac{2\mu}{2\mu(1+b)}(\frac{1}{3}(\frac{2\mu}{2})^2) = \frac{b}{1+b}\sigma_u^2 + \frac{1}{(1+b)}(\frac{1}{3}(\mu)^2) = \sigma_u^2$ so that $EL_i^{BR} = EL_i^{CR}$. The minimum value of $\kappa(\bar{u})$ is at $\bar{u} = -\mu$ and thus $\kappa(\bar{u}) = \frac{b}{1+b}\sigma_u^2$ so that $EL_i^{CR} = EL_i^{NR}$. Thus, $EL_i^{BR} > EL_i^{CR} > EL_i^{NR}$ for $-\mu < \bar{u} < \mu$.

2. Ranking of slopes: Expected losses are given by $EL_i^{BR} = \sigma_u^2 + \theta^2$, $EL_i^{NR} = \frac{b}{1+b}\sigma_u^2 + \theta^2 + \frac{1}{b}\theta^2$ and $EL_i^{CR} = \frac{b}{1+b}\sigma_u^2 + \theta^2 + \frac{(\mu-\bar{u})\theta^2}{2\mu(1+b)-(\mu-\bar{u})} + \kappa(\bar{u})$. Taking partial derivatives yields $\partial EL_i^{BR}/\partial\theta = 2\theta$, $\partial EL_i^{CR}/\partial\theta = 2\theta + 2\theta\frac{(\mu-\bar{u})}{(2\mu(1+b)-(\mu-\bar{u}))}$, and $\partial EL_i^{NR}/\partial\theta = 2\theta(1+\frac{1}{b})$. Because $\frac{1}{b} > \frac{(\mu-\bar{u})}{2\mu(1+b)-(\mu-\bar{u})}$ we establish $\partial EL_i^{NR}/\partial\theta > \partial EL_i^{CR}/\partial\theta > \partial EL_i^{BR}/\partial\theta$ for $\bar{u} \leq \mu$.

3. Switching points between regimes: Our results on the ranking of intercepts and slopes imply that there must be two critical values of θ at which the policymakers switch from choosing the NR regime to the CR regime and where they switch from the CR regime to the BR regime. We denote the lower level as $\underline{\theta}$ and the upper one as $\bar{\theta}$.

The intersection of the expected loss functions for regimes NR and CR, irrespective of the type of policymaker, is determined by

$$\frac{b}{1+b}\sigma_u^2 + \theta^2 + \frac{(\mu-\bar{u})\theta^2}{2\mu(1+b)-(\mu-\bar{u})} + \kappa(\bar{u}) = \frac{b}{1+b}\sigma_u^2 + \theta^2 + \frac{1}{b}\theta^2,$$

which is equivalent to $\theta^2 = \frac{b}{1+b}\frac{(2\mu(1+b)-(\mu-\bar{u}))}{\mu+\bar{u}}\kappa(\bar{u})$, and solves for $\underline{\theta} = \theta^{NR} = \theta^{CR}$. For later use, we define $\underline{\theta}_{\varepsilon=0} = \theta^{NR}_{\varepsilon=0} = \theta^{CR}_{\varepsilon=0}$.

The intersection of the expected loss functions for CR and BR in turn is determined by

$$\frac{b}{1+b}\sigma_u^2 + \theta^2 + \frac{(\mu-\bar{u})\theta^2}{2\mu(1+b)-(\mu-\bar{u})} + \kappa(\bar{u}) = \sigma_u^2 + \theta^2,$$

which is equivalent to $\theta^2 = \frac{2\mu(1+b)-(\mu-\bar{u})}{(\mu-\bar{u})}(\frac{1}{1+b}\sigma_u^2 - \kappa(\bar{u}))$ and solves for for $\bar{\theta} = \theta^{CR} = \theta^{BR}$.

We define $\bar{\theta}_{\varepsilon=0} = \theta^{CR}_{\varepsilon=0} = \theta^{BR}_{\varepsilon=0}$.

It remains to show that indeed $\bar{\theta}^2_{\varepsilon=0} > \underline{\theta}^2_{\varepsilon=0}$, which requires $\frac{2\mu(1+b)-(\mu-\bar{u})}{(\mu-\bar{u})}(\frac{1}{1+b}\sigma^2_u - \kappa(\bar{u})) > \frac{b}{1+b}\frac{(2\mu(1+b)-(\mu-\bar{u}))}{\mu+\bar{u}}\kappa(\bar{u})$ or $(\mu+\bar{u})\sigma^2_u > \kappa(\bar{u})(b(\mu-\bar{u})+(1+b)(\mu+\bar{u}))$. Since $\kappa(\bar{u})$ is increasing in $\bar{u}$, its maximum value is at $\bar{u}=\mu$. Evaluating the right hand side of the inequality at $\bar{u}=\mu$ implies that $\bar{\theta}^2_{\varepsilon=0} > \underline{\theta}^2_{\varepsilon=0}$ holds for all $\mu > \bar{u}$.

The results derived give rise to Figure 1 in the main text.

Proof of Proposition 2 We show that, as polarization increases, the levels of θ at which policymakers move from one regime to the other become smaller if $\pi > \bar{\pi}$.

Introducing ε_i with $\varepsilon_L = \varepsilon$ and $\varepsilon_R = -\varepsilon$, the expected losses in each regime become $EL^{BR}_i = \sigma^2_u + (\theta+\varepsilon_i)^2$, $EL^{NR}_i = \frac{b}{1+b}\sigma^2_u + (\theta+\varepsilon_i)^2 + \frac{1}{b}(\pi(\theta+\varepsilon)^2 + (1-\pi)(\theta-\varepsilon)^2)$, and $EL^{CR}_i = \frac{b}{1+b}\sigma^2_u + (\theta+\varepsilon_i)^2 + \frac{(\mu-\bar{u})(\pi(\theta+\varepsilon)^2+(1-\pi)(\theta-\varepsilon)^2)}{2\mu(1+b)-(\mu-\bar{u})} + \kappa(\bar{u})$.

The intersection of the expected loss functions for regimes NR and CR is now determined by

$$\pi(\theta+\varepsilon)^2 + (1-\pi)(\theta-\varepsilon)^2 = \frac{b}{1+b}\frac{(2\mu(1+b)-(\mu-\bar{u}))}{\mu+\bar{u}}\kappa(\bar{u}),$$

which solves for $\underline{\theta}^2_{\varepsilon>0}$. Note that the right-hand side of the equation corresponds to $\underline{\theta}^2_{\varepsilon=0}$. The left hand side increases in ε for $\pi > \overline{\pi} \equiv \frac{1}{2} - \frac{\varepsilon}{2\theta}$ from which follows that $\underline{\theta}^2_{\varepsilon>0} < \underline{\theta}^2_{\varepsilon=0}$.

The intersection of the expected loss functions for CR and BR in turn is determined by

$$\pi(\theta+\varepsilon)^2 + (1-\pi)(\theta-\varepsilon)^2 = \frac{2\mu(1+b)-(\mu-\bar{u})}{(\mu-\bar{u})}(\frac{1}{1+b}\sigma^2_u - \kappa(\bar{u}))$$

and solves for for $\bar{\theta}^2_{\varepsilon>0}$. Again, the right side corresponds to $\bar{\theta}^2_{\varepsilon=0}$ and thus $\bar{\theta}^2_{\varepsilon>0} < \bar{\theta}^2_{\varepsilon=0}$ at $\pi > \overline{\pi}$.

Thus, for all $\pi > \overline{\pi}$ increasing polarization implies that the regime switching points move to the left and regime switches take place at lower levels of θ.

Proof of Proposition 3 The optimal $\bar{u}$ in the CR regime follows from the first order condition of (9) as

$$\frac{\partial}{\partial\bar{u}}\Theta + \frac{\partial}{\partial\bar{u}}\kappa(\bar{u}) = 0,$$

with $\Theta \equiv \frac{(\mu-\bar{u})(\pi\theta^2_L+(1-\pi)\theta^2_R)}{2\mu(1+b)-(\mu-\bar{u})}$. Using Θ and $\kappa(\bar{u})$ the first order condition becomes

$$(\mu+\bar{u})^4 + 8\mu\bar{u}b[\mu^2+\bar{u}^2+2\mu\bar{u}(1+b)] = 16\mu^2(1+b)^2(\pi\theta^2_L + (1-\pi)\theta^2_R).$$

There are four solutions for $\bar{u}$, which write as

$$\bar{u}_{1,2} = -(1+2b)\mu - 2\sqrt{b\mu^2(1+b) \pm \sqrt{(1+b)^2\mu^2(\pi\theta_L^2 + (1-\pi)\theta_R^2)}},$$

$$\bar{u}_{3,4} = -(1+2b)\mu + 2\sqrt{b\mu^2(1+b) \pm \sqrt{(1+b)^2\mu^2(\pi\theta_L^2 + (1-\pi)\theta_R^2)}}.$$

The solutions $\bar{u}_1$ and $\bar{u}_2$ can be excluded because they are below the lower bound of shocks $-\mu$. Moreover, we assume throughout the paper that the threshold for the contingent rule has to be positive, which rules out solution $\bar{u}_3$. This leaves us with a unique solution $\bar{u}_4 = \bar{u}^*$.

First, we show that a unique loss minimizing $0 < \bar{u}^* < \mu$ exists when the contingent regime is preferred over the binding regime and the no-rule regime. Next, we show that the second order condition for $\bar{u}^*$ to be a local minimum is fulfilled.

For $0 < \bar{u}^* < \mu$ it must hold that

$$0 < -(1+2b)\mu + 2\sqrt{b\mu^2 + b^2\mu^2 + \sqrt{(1+b)^2\mu^2(\pi\theta_L^2 + (1-\pi)\theta_R^2)}} < \mu$$

which simplifies to $3\sigma_u^2 > \pi\theta_L^2 + (1-\pi)\theta_R^2 > \frac{3\sigma_u^2}{16(1+b)^2}$ as the parameter space for which $0 < \bar{u}^* < \mu$ holds. Moreover, we know from (11) and (12) that the feasible parameter space for CR to dominate the alternative regimes requires

$$(\frac{1}{1+b}\sigma_u^2 - \kappa(\bar{u}))\frac{(2\mu(1+b) - (\mu - \bar{u}))}{(\mu - \bar{u})} > (\pi\theta_L^2 + (1-\pi)\theta_R^2) > \frac{b}{1+b}\kappa(\bar{u})\frac{(2\mu(1+b) - (\mu - \bar{u}))}{(\mu + \bar{u})}$$

To establish our result, we proceed with the help of Figure 3. As long as there is an overlap in the feasible parameter ranges for the contingent regime CR and the solution $\bar{u}^*$ for the threshold, a solution exists.

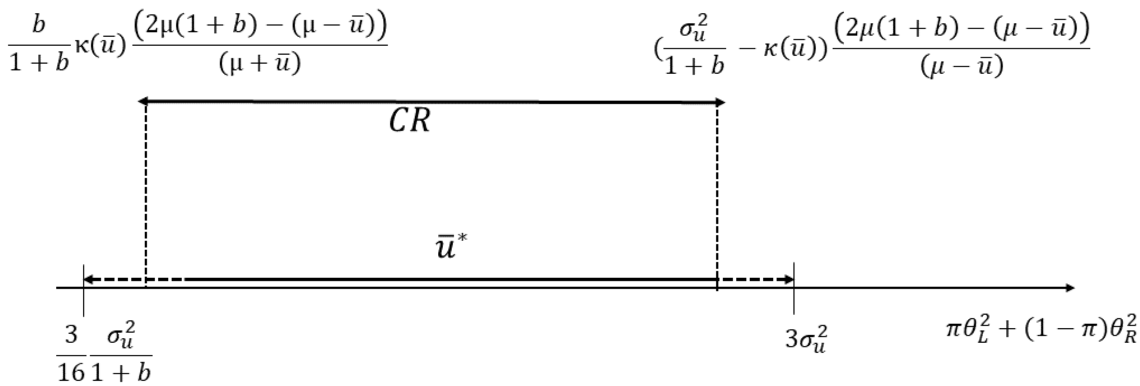
We already know from Proposition 1 that

$$(\frac{\sigma_u^2}{1+b} - \kappa(\bar{u}))\frac{(2\mu(1+b) - (\mu - \bar{u}))}{(\mu - \bar{u})} > \frac{b}{1+b}\kappa(\bar{u})\frac{(2\mu(1+b) - (\mu - \bar{u}))}{(\mu + \bar{u})}$$

always holds. We denote this area with CR; all parameter constellations outside of this interval imply that either BR or NR are preferred to the contingent rule regime and are thus not relevant for $\bar{u}^*$.

At the upper limit for the range of $\bar{u}^*$, we have $\pi\theta_L^2 + (1-\pi)\theta_R^2 = 3\sigma_u^2$, and for CR we have $\pi\theta_L^2 + (1-\pi)\theta_R^2 = (\frac{1}{1+b}\sigma_u^2 - \kappa(\bar{u}))\frac{(2\mu(1+b)-(\mu-\bar{u}))}{(\mu-\bar{u})}$, which becomes $\pi\theta_L^2 + (1-\pi)\theta_R^2 = 3\sigma_u^2$ at $\bar{u} = \mu$. Thus the upper limits for CR and $\bar{u}^*$ coincide for $\bar{u} = \mu$. For the lower limits, we have $\frac{b}{1+b}\kappa(\bar{u})\frac{(2\mu(1+b)-(\mu-\bar{u}))}{(\mu+\bar{u})} > \frac{3\sigma_u^2}{16(1+b)^2}$ unless b becomes very small. Evaluating

Figure 3: Parameter space for optimal $\bar{u}^*$



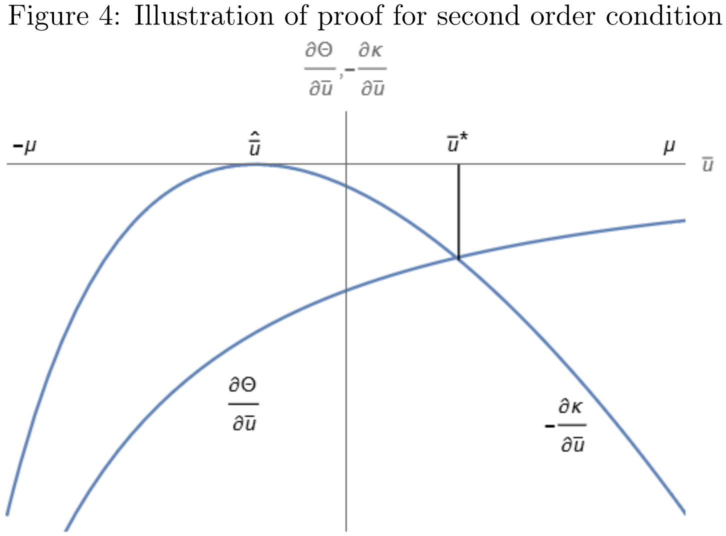
$\frac{b}{1+b}\kappa(\bar{u})\frac{(2\mu(1+b)-(\mu-\bar{u}))}{(\mu+\bar{u})}$ at $\bar{u}=0$ shows that the inequality will hold for all $b>\frac{3}{8}$ and the lower limit of CR will be within the interval that describes $\bar{u}^*$. Thus, we have a feasible parameter range in which CR is the preferred regime and a unique $0<\bar{u}^*<\mu$ exists.

Next, we show that our solution is indeed a minimum of (9). The second order condition for $\bar{u}^*$ to constitute a minimum in losses writes

$$\frac{\partial^2}{\partial^2\bar{u}}\Theta+\frac{\partial^2}{\partial^2\bar{u}}\kappa(\bar{u})>0.$$

Figure 4 illustrates our argument. We can show that $\bar{u}^*$, the intersection of $\frac{\partial}{\partial\bar{u}}\Theta$ and $-\frac{\partial}{\partial\bar{u}}\kappa(\bar{u})$,

Figure 4: Illustration of proof for second order condition



is where $\frac{\partial^2}{\partial^2 \bar{u}}\kappa(\bar{u})|_{\bar{u}=\bar{u}^*} > 0$. Within the bounds of $[-\mu, \mu]$, $-\frac{\partial}{\partial \bar{u}}\kappa(\bar{u})$ has an inverted u-shape, which follows from the properties of $\frac{\partial \kappa(\mu,\bar{u})}{\partial \bar{u}}$ that $\frac{\partial \kappa(\mu,\bar{u})}{\partial \bar{u}}|_{\bar{u}=-\mu} = \frac{\partial \kappa(\mu,\bar{u})}{\partial \bar{u}}|_{\bar{u}=\mu} = \frac{\mu}{2(b+1)}$. Furthermore, $\frac{\partial^2 \kappa(\mu,\bar{u})}{\partial^2 \bar{u}} = 0$ at $\hat{\bar{u}} = -\mu(1+2b) + 2\sqrt{b(1+b)\mu^2}$ which implies $\mu^2 > 0$. Moreover,as $\hat{\bar{u}} < 0$, $\bar{u}^*$ has to be on the downward sloping part of $-\frac{\partial}{\partial \bar{u}}\kappa(\bar{u})$. Finally, because $\frac{\partial^2 \Theta}{\partial^2 \bar{u}} > 0$, the second order condition for a minimum in losses is fulfilled.

To see the influence of political polarization on $\bar{u}^*$, we replace θ_L and θ_R with $\theta + \varepsilon$ and $\theta - \varepsilon$ respectively in $\bar{u}^*$:

$$\bar{u}^* = -(1+2b)\mu + 2\sqrt{b(1+b)\mu^2 + (1+b)\mu\sqrt{(\pi(\theta+\varepsilon)^2 + (1-\pi)(\theta-\varepsilon)^2)}}.$$

It follows that $\bar{u}^*$ is increasing in π and in ε if $\pi \geq \overline{\pi}$.

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