Preventive policies in parliament

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Abstract

We study the legislation process of preventive policies, such as bailouts, which took eventful histories in the recent crises. Key to our analysis is that preventive policies impede the verification of their necessities if targeted against an uncertain threat: there is no observable difference between successful prevention of an existing threat and wasteful intervention in case of a non-existing threat. In our model, this information structure induces some politicians to seek to lose the vote in parliament, generating narrow vote results. Others may coordinate to implement policies that they perceive as unnecessary. Especially when election day is close, politicians pander to public opinion, ignoring socially valuable information.

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1 Introduction

In recent years, Western democracies have witnessed several policies aimed at preventing severe damage from the economy. Prominent examples include the Wall Street bank bailout (TARP), increases of the

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federal debt limit, and appropriation bills in the US. Europeans have seen austerity measures as well as loans and credit guarantees for troubled Euro countries in the European Stability Mechanism (ESM). A substantial rationale behind these measures were the severe negative consequences of not conducting them but took eventful legislative histories. For example, before the vote over TARP, Ben Bernanke said that the sky would collapse if the banks weren't rescued. But the bill first failed in the House, causing a major drop in stock prices, before being enacted rather narrowly.[1]

In this paper, we analyze the incentives which members of parliament face when voting over preventive policies. We consider a model of a potential threat – e.g., a financial market meltdown or a collapse of the Euro – which can be prevented by a costly policy measure – e.g., a bank bailout or subsidized loans to Greece. A key ingredient of our analysis is that preventive policies impede the verification of their own necessities. There is no observable difference between successful prevention of an existing threat and wasteful intervention in case of a non-existing threat. In Bernanke's terms, since banks were rescued, we will never know for sure whether the sky would really have collapsed if they weren't. By contrast, if banks were not rescued, everyone would have been able to observe whether the sky really collapsed.

In our model, voters and politicians have, prior to the vote in parliament, uncertain and potentially different beliefs about whether the threat is real. This uncertainty is not fully resolved if the preventive policy is conducted, see above. This information structure gives rise to a number of interesting phenomena which help to understand the eventful legislative histories of preventive policies in the recent crises.[2]

[1]Similarly, failure to increase the debt limit or to enact an appropriation bill was said to cause a global economic crisis. But, before Congress appropriated funds for fiscal year 2014, a blockade by House Republicans led to a 16 days long government shutdown. In Europe, German chancellor Angela Merkel repeatedly argued that, if the Euro should fail, Europe as a whole would fail. But, ratifications of the ESM as well as national austerity measures passed parliaments very narrowly and cost several administrations their offices.

[2]Generally, this information structure and the resulting phenomena apply to policies where the arrival of information about the right choice depends on the choice taken. In this class, considering policies aimed to fight crises is particularly suitable: often crises are more or less unprecedented incidents with little experience about a potentially imminent risk and acute need of action.

First, individual politicians can seek to loose the vote in parliament. This happens if politicians perceive the threat as real but their voters disagree ex ante and reward prevention only if they ex post observe the damage occurring. Only then voters are fully convinced of the policy's necessity. If the preventive policy is conducted, uncertainty about the threat and thus the policy's necessity is not fully resolved and voters reward politicians for having pandered to voters' policy-opposing opinion. In turn, if the policy fails and damage does materialize, voters observe this and reward politicians for having supported the policy in parliament. In both cases, politicians are best off having voted against the majority.

These winners' curses can help to understand why many preventive policies passed parliaments so narrowly. For example, having expected that a federal budget will eventually be appropriated for fiscal year 2014, right-wing Republicans might have risklessly opposed it to please their voters. Even afterwards they could continue to deny severe consequences of a US government insolvency as it was prevented. In this respect, we can understand the events around the shutdown as a game of chicken among Republican congressmen. Possibly, they perceived the appropriation of a budget to be necessary but no one wanted to vote in its favor and rather hoped that others would do so.

A second interesting result is that individual politicians can seek to win the vote in parliament independent of its result. They do so if they perceive the threat to be rather not real but their voters disagree ex ante and reward voting against prevention only if they ex post observe that no damage occurs even without prevention. Only this convinces them that the policy is, in fact, a waste of money. If the preventive policy is enacted, uncertainty remains and voters who strongly supported prevention initially will reward voting in favor of the bill. In turn, when it is not enacted and voters will observe that the damage holds of, they will eventually be happy to have saved the costs of prevention. Either way, these voters will - ex post - reward their politicians for having voted for the chosen policy action.

If such politicians can affect the vote result, they play a coordination game among each other. They either pander to voters' opinion, making the bill pass, or they follow their belief and jointly vote against the policy, making it fail. In the latter equilibrium, politicians stand the risk of not being rewarded if, against expectation, damage occurs. By

contrast, pandering to voters' opinion by enacting the policy implies that its necessity can never be falsified. This equilibrium is thus Pareto dominant from the viewpoint of the decisive group of politicians but generates a social choice which these politicians themselves consider as suboptimal for their voters.

In terms of the Wall Street bailout, a possible interpretation is that some congressmen perceived the sky collapsing as unlikely but rather rescued banks than accepting the risk of their own beliefs being falsified. In this line of argument, TARP's first fail in the House can be seen as a coordination failure.[3]

As a final interesting result, information only possessed by politicians can be irrelevant for the vote result in parliament. This happens if a decisive group of politicians face voters whose reward behavior in case of prevention does only depend on voters' prior but not on additional information arriving until election day. These politicians will vote in accordance with voters' prior and have no incentive to (also) consider their own prior. This is likely to happen when politicians' prior is relatively imprecise or when election day is close, as was the case with TARP, such that little information is received until then. Since a social planner would clearly use all available information, decision making over preventive policies in representative democracies is then subject to inefficient information aggregation.

The remainder of this paper is organized as follows. Section 2 provides an overview of the related literature. Section 3 presents the model set-up. Section 4 analyzes individual behavior of voters and politicians. Section 5 analyzes the interaction of politicians in parliament and discusses the resulting equilibria. Section 6 concludes.

2 Relation to the literature

Our model contains standard building blocks of political agency models, as summarized in Ashworth (2012): politicians follow electoral and non-electoral interests and differ by type, voters try to solve the moral-hazard problem and to sort out 'better' types of politicians. Further, our model contains an information structure similar to the one in Dewan and

[3]According to Pew Research Center, 57% of Americans supported TARP before the Congress votes (www.people-press.org/2012/02/23/auto-bailout-now-backed-stimulus-divisive).

Hortala-Vallve (2012) where agents are uninformed but learn from policy outcomes. Other than what is common, our model considers the parliament as a group of politicians with individual and potentially different interests. By contrast, previous papers consider a single policy maker (potentially facing an incumbent in the future, e.g., Ashworth 2012), the interaction between government and opposition (e.g., the seminal contribution of Downs 1957), between parties in parliament (e.g., Diermeier and Merlo 2000), or between the parliament as a whole and other bodies of legislation (e.g., Matthews 1989). Recent examples for models with a set of legislators (i.e., a parliament) are Groseclose and Milyo (2010) and Dahm, Dur, and Glazer (2014). Our modeling of the parliamentary process resembles theirs.

Our paper is further related to the discussion of pandering and populism. Generally, incentives for pandering occur when policy-makers and electorate disagree on the appropriate course of action and policy makers' short-run interests incentivize them to follow public opinion rather than their own convictions (e.g., Canes-Wrone, Herron, and Shotts 2001; Maskin and Tirole 2004). Similarly, asymmetric information between politicians and voters can lead to inefficient social decision making as politicians have incentives to behave populistically and confirm voters' prior belief (e.g., Heidhues and Lagerlöf 2003; Felgenhauer 2012). Both argumentations are similar to ours but, in these models, whether the true state of the world becomes observable is determined exogenously while, in our model, whether this happens depends on actual policy choices. Most closely to our paper in this respect is Ashworth and Shotts (2010) where the media rationally decide whether to communicate some information to voters which mitigates the information asymmetry between politicians and voters. However, whether this happens does not depend on the specific policy choice as in our model.

Finally, our paper contributes to the discussion of the legislation process of preventive policies. In this regard, the vote on the bank bailout in 2008 has received particular attention. Dorsch (2013) documents that voting in favor of the bailout was electorally costly to Representatives with relatively low financial-sector employment in their home districts. To rationalize their pro-bailout voting behavior, Dorsch provides evidence that votes in favor of the bailout are partly explained by campaign donations from the financial sector, in line with Mian, Sufi, and Trebbi (2010). While this explanation is consistent with our model, our analysis

provides room for the possibility that also politicians who only seek to please voters take decisions that turn out to be electorally costly in the end. This happens when politicians' expectations prove wrong ex post or when the strategic situation does not allow that every politician acts in a way which is appreciated by voters, as explained in the introduction.

Congleton (2012) analyzes the policy responses to the 2008 financial crisis, mainly the TARP program and the 2009 stimulus (ARRA). His main focus is on the interpretation of these responses as crisis insurance programs. While Congleton mainly argues why, in times of crisis, the government can provide insurance that private insurers can not offer, he also discusses some of the political economy behind these policies, stressing that the necessity of these policies was not known for sure. Other than we do, he discusses the strategic dissemination of information through lobby groups while we focus on the strategic situation that politicians are put in by this imperfect information.

Candel-Sánchez and Perote-Peña (2013) analyze the political economy of market intervention under voter uncertainty but consider long-run regulation rather than responses to acute crises. Hugh-Jones (2014) analyzes information problems in the implementation of austerity policies but focuses on asymmetric information between different government agencies and not between voters and politicians.

3 Model Set-up

Our model is populated by politicians and voters. The electoral system is characterized by single-member districts. We denote district i's median voter as voter i and its representative in parliament as politician i.

We consider a situation where there is a potential threat to the economy which can be prevented by a costly policy action. Formally, there are two possible states of the economy ($s = 0, 1$) and two policy options ($p = 0, 1$). Policy passivity is denoted by $p = 0$ while $p = 1$ denotes running the preventive policy. The good state where the threat is absent is denoted by $s = 0$. In this good state, damage does not occur even without prevention. In turn, if the state of the economy is bad ($s = 1$), a damage would arise if not prevented by conducting the preventive policy, i.e., if $s = 1$ and $p = 0$. Irrespective of the state of the economy s, the policy itself is costly. Costs of the policy and potential damage can differ across districts and are denoted by c_i and $d_i > 0$, re-

Table 1: Voter's utility u_i in the state-policy space.

	$p=0$	$p=1$
$s=0$	0	$-c_i$
$s=1$	$-d_i$	$-c_i$

spectively. Prevention costs and damage affect voters' utilities as shown in Table 1. The key element of the utility structure is that only under one choice ($p = 0$), the payoff does depend on the state of the world. Thus, the arrival of information about the right choice depends on the choice taken.[4]

While the state s is drawn by nature, the public choice p is decided in parliament by simple majority voting.[5] The number of politicians in parliament is $N > 1$ with N odd. Individual politicians' votes are denoted by p_i. Each politician takes part in the vote. Some time after the vote in parliament, a general election takes place where our considered politicians are incumbents and voters decide about their re-election.

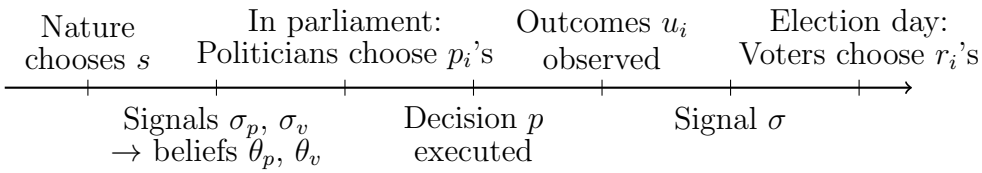
At election day, each incumbent receives some benefit, $B_i > 0$ if she is re-elected. Further, the incumbent i receives a benefit for voting p_i, $b_i(p_i)$, which is not associated with re-election (but with, e.g., ideology or serving special interest groups). For every vote in parliament, voters give or give not a reward to their politicians which is an increase in the re-election probability (if our considered vote was the only one in the legislative period, the reward would be sure re-election). We denote such reward as $r_i = 1$ while $r_i = 0$ denotes giving no reward. An incumbent's target function at the considered vote in parliament is

$$B_i \cdot E\left(r_i(p_i, p, c_i, d_i, s)|\Theta_p\right)/\alpha + b_i\left(p_i\right), \tag{1}$$

[4]Through monotone transformations of the utility matrix, other interpretations become visible. E.g., adding c_i we can understand $p = 0$ as a reform with certain benefit c_i and an uncertain cost d_i that only occurs in state $s = 1$ and $p = 1$ as a riskfree and costless status quo.

[5]We assume that a decision against the preventive policy is final, abstracting from alternative rescue measures and repeated voting. Naturally, it may well be that politicians vote against the bill because they support an alternative preventive policy. Proposing formal alternatives with only minor amendments, it is also possible that the parliament repeatedly votes over an array of similar polices until one is finally made law. We briefly discuss such effectively repeated voting below.

Figure 1: The timing of events.



where α is a scaling factor inversely related to the importance of our considered vote and Θ_p is the politician's information set at the time of the vote in parliament. A politician maximizes this target function by choosing a voting behavior p_i.[6]

There are two different types of politicians. First, there are politicians who care primarily about the non-electoral benefits, $|b_i| \gg 0$. For simplicity, we assume $B_i \to 0$ for these politicians. For this bad type of politician, we assume that voters have no information about the distribution of the b_i's.[7] Second, there are politicians who care primarily about re-election. For them, it holds that $B_i \gg 0$ and $b_i \to 0$ and they are called office-oriented. Politicians' types cannot be observed directly by voters.

Voters face a political agency problem. At election day, they use their vote to sort out the office-oriented from the other politicians, raising only the re-election chances of politicians who are associated with a better expected policy in the future. Further, they use their vote to incentivize office-oriented politicians optimally for their current term in office. Finally, voters have a small but positive preference for expressive voting (Tullock 1971; for empirical evidence see e.g., Sobel and Wagner 2004), i.e., they prefer to reward their politician for a behavior that they perceive to be good at election day. We use the motive to vote expressively only as a tie-breaker to discriminate between different voter behaviors that else lead to the same expected utility.

The timing of events is summarized in Figure 1. Before the vote in parliament, politicians draw a signal σ_p - either indicating "$s = 1$" or

[6]Thus, politicians do not care about others such as party mates. In Section 5, we discuss the implications of party lines on our results.

[7]This follows Frisell (2009). If the voter knew for sure that bad politicians only vote in one or the other way, selecting on types would be trivial, see Morris (2001).

"$s = 0$" - that is true with probability $\pi_p \geq 1/2$ and voters draw a signal σ_v with precision $\pi_v \geq 1/2$. $\theta_p \in \{1 - \pi_p, \pi_p\}$ and $\theta_v \in \{1 - \pi_v, \pi_v\}$ denote the prior probabilities assigned to the bad state by politicians and voters, respectively. After the vote in parliament, utilities u_i can be observed by voters and politicians. Before election day, agents receive a further discrete signal σ about s with precision $\pi \geq 1/2$. π can be seen as a measure of the time until election day. If election day is close, relatively little information arrives until then such that π is close to $1/2$ and vice versa. Note that σ is redundant if the vote outcome was $p = 0$, see Table 1, but else carries valuable information about s. Everything is common knowledge except for politicians' benefits and signal, b_i, B_i, σ_p - which are only known to politicians - and the state of the economy s - which is not known perfectly to anybody.[8]

4 Individual Behavior

4.1 Voters

Due to the information structure explained above, there are four constellations k with respect to voters' information at election day:

1. The policy is not implemented but the state of the economy turns out to be bad ($p = 0 \wedge s = 1$), such that voters are certain that $s = 1$, i.e., that the threat is certain. This constellation is labelled $k = 1$.

2. The policy is implemented and the signal after the vote indicates a bad state ($p = 1 \wedge \sigma = 1$), such that voters assign a higher probability to $s = 1$ than ex ante, i.e., the threat is rather likely ($k = 2$).

[8]Note that common knowledge includes voters' characteristics c_i and d_i as well as their signals σ_v. This is not a necessary but solely a simplifying assumption. The reason is that a voter would always have an incentive to reveal her characteristics and beliefs and could credibly do so, see below. Reversely, this is not true for politicians. Given a voting behavior p_i, both types of politicians would equally communicate to their voters that their behavior was in line with their information at that time. Since voters cannot observe politicians' types, this rules out that politicians can communicate their information to voters through cheap talk. As a short cut, the information in voters' signal is included in politicians' signal but not vice versa.

3. The policy is implemented and the signal after the vote indicates a good state ($p = 1 \wedge \sigma = 0$), such that voters assign a lower probability to $s = 1$ than ex ante, i.e., the threat is rather unlikely ($k = 3$).

4. The policy is not implemented and the state of the economy turns out to be good ($p = 0 \wedge s = 0$), such that voters are certain that $s = 0$, i.e., that the threat is certainly absent ($k = 4$).

In each of these four constellations, the voter can either reward her politician for voting $p_i = 1$ or for voting $p_i = 0$. The choice in which constellations to reward the politician can be seen as a voting rule which serves as an implicit contract of re-election probabilities, similar to classical principal-agent theory. In general, there are $2^4 = 16$ possible rules.

Before the vote in parliament, a voter seeks to incentivize her politician optimally for this vote (such as to solve the moral hazard problem). At election day, the considered policy choice p and current-term utility are sunk and the voter seeks only to elect an office-oriented politician (who can be incentivized and is thus associated with higher expected future utility) for the next term. A voting rule allows to select on types if, in each state, following the incentives therein makes the politician more likely to be good from the voter's perspective. With such a rule, it is rational for voters to stick to it at election day, such that it is credible and can be used for the imminent moral hazard problem.

To incentivize a good politician for the current term, voters rationally consider the situation where their politicians are pivotal in parliament. To discriminate between credible rules inducing a given behavior of the politician, voters' preferences for expressive voting can be used which leaves five rules that are potentially used. We delegate the formal derivation of possible voter rules to the Appendix since our focus is on how politicians cope with these rules. We discuss the decisive issues behind these choice of rules in the following. Possible rules are summarized in Table 2. Intuitively, rules in which a voter's support for the preventive policy is non-decreasing in the perceived probability of the threat are possible. In what follows, we distinguish between voter types defined by their chosen voting rules.

Which rule (type) a voter chooses, depends on her characteristics c_i and d_i and on aggregate variables such as π_p and θ_v. Formally, a voter chooses to reward her politician for supporting the preventive policy

- in none of the constellations above if $c_i < 0$ (a certain opposer of the policy, referred to as type A)
- only when the threat is certain ($k = 1$) if $0 < c_i < d_i$ and (($\pi > \pi_v$ and $-c_i = \max(-\theta_v d_i, X_{C,i}, -c_i)$) or ($\pi < \pi_v$ and $-c_i > -\theta_v \cdot d_i$)) (an ex-ante opposer, type B)
- only when the threat is certain or likely ($k = 1, 2$) if $0 < c_i < d_i$ and $\pi > \pi_v$ and $X_{C,i} = \max(-\theta_v d_i, X_{C,i}, -c_i)$ (an ex-ante uncertain voter, type C)
- in all constellation except when the threat is certainly absent ($k = 1, 2, 3$) if $0 < c_i < d_i$ and (($\pi > \pi_v$ and $-\theta_v \cdot d_i = \max(-\theta_v d_i, X_{C,i}, -c_i)$) or ($\pi < \pi_v$ and $-c_i < -\theta_v \cdot d_i$)) (an ex-ante supporter, type D)
- in all of the constellations above if $c_i > d_i$ (a certain supporter, type E),

where $X_{C,i} = (\theta_v \pi_p + (1 - \theta_v)(1 - \pi_p)) \cdot (-c_i) + \theta_v (1 - \pi_p) \cdot (-d_i)$, see Appendix A.2. Through observing c_i, d_i, and θ_v, a politician can determine her voter's rule. Alternatively, the voter could simply reveal her characteristics - or her voting rule - to the politician, which is credible since the voter actually wants the politicians to follow and thus to know the incentives embedded in the voting rule.

From type A to E, prevention costs c_i decrease compared to potential damage d_i. Naturally, with a higher c_i compared to d_i, the damage threat (i.e., the probability that $s = 1$) has to be larger to make the voter prefer and thus reward support for the preventive policy. Also intuitively, the higher is θ_v, the higher is voters' assigned probability to $s = 1$ and the more voters will choose rules that reward politicians for $p_i = 1$ rather often.

Note that the information about the state s provided by the vote outcome p and the signal σ is not used by all voters in a symmetric fashion. First, voters of type A and E do not at all base their reward on information they receive after the vote in parliament. Second, voters of type B and D base their rewarded behavior only on the utility outcome u_i but not on the signal σ. Loosely speaking, they only change their mind if they are a 100% sure that they erred before. These voters effectively incentivize their politicians to follow voters' prior when their politicians are decisive. Finally, type C voters fully take the provided

information into account. They effectively incentivize their politicians to follow politicians' prior.

Rule C is attractive for voters when politicians' signal σ_p is particularly precise. Then, this information, which is used by a pivotal politician only under this rule, is particularly valuable. Formally, rule C incentivizes an office-oriented politician best from the viewpoint of voter i if $\pi_p > \max(\theta_v(d_i - c_i)/(\theta_v(d_i - c_i) + (1 - \theta_v) \cdot c_i), (1 - \theta_v) \cdot c_i/(\theta_v(d_i - c_i) + (1 - \theta_v) \cdot c_i))$. However, even if π_p is sufficiently high such that a voter would want to incentivize her politician to follow σ_p, she is not able to do so if the precision of the information arriving after the vote in parliament is low, $\pi < \pi_v$. As, under rule C, office-oriented politicians base their vote on their signal, $p_i = \sigma_p$ voters consider their subjective probability that σ_p indeed equaled the observed p_i to determine the probability of facing a good politician. In case the vote outcome was $p = 1$, this calculation is made under uncertainty about s, based on the signal σ. If this signal is not precise enough to outweigh voters' prior ($\pi < \pi_v$), the voter will ex post stick to her ex-ante belief that $s = \sigma_v$ is rather likely and perceive $\sigma_p = \sigma_v$ as rather likely in $k = 2$ and $k = 3$. Thus, in *both* constellations, the politician is perceived to be rather of good type if and only if she voted $p_i = \sigma_v$. This makes it rational for the voter to reward $p_i = \sigma_v$ in both constellations - hence to deviate from the rule. This, in turn, creates a commitment problem which, foreseen by the politician, makes the use of the rule impossible. Consequently, rule C can be ruled out if election day is close - as was the case with TARP (32 days from October 3, 2008 to November 4, 2008) - such that not much new information arrives until then. If this is the case, no voter effectively incentivizes her politician to take into account θ_p.

4.2 Politicians

Politicians who maximize non-electoral benefits. Since these politicians do not primarily care about re-election, they vote in the way that gives them the higher non-electoral benefit. Such type of politician i votes $p_i = 1$ if $b_i(1) > b_i(0)$ and $p_i = 0$ otherwise.

Office-oriented politicians. An individual politician i who seeks to maximize re-election chances, chooses p_i to maximize the probability of being rewarded by voter i. The politician takes into consideration her voter's type and her (imperfect) expectation about s and σ. Since

Table 2: Rewarded behavior of politician by the different types of voters.

	threat is			
	certain ($k = 1$)	likely ($k = 2$)	unlikely ($k = 3$)	absent ($k = 4$)
type A: certain opposer	0	0	0	0
type B: ex-ante opposer	1	0	0	0
type C: ex-ante uncertain	1	1	0	0
type D: ex-ante supporter	1	1	1	0
type E: certain supporter	1	1	1	1

the revelation of s depends on the public choice p, politicians are in a situation of strategic interaction. Table 3 summarizes the politician's expected reward as a function of p_i and p for each type of voter faced.

Starting with politicians facing voters of types A and E, the analysis of their expected rewards is trivial as they are rewarded for opposing (type A) or supporting (type E) the policy independent of policy choices or signals, see Tables 3A and 3E. For all other politicians, expected rewards depend on own voting behavior, p_i and the political choice p.

When the public choice is $p = 0$ (rightmost columns of Tables 3B-3D), the voter will learn the state of the economy s. Voters of types B-D then reward their politicians for voting for $p_i = s$, see Table 2. The politician expects $s = 1$ with probability θ_p. Given the public choice is $p = 0$, the expected reward of a politician facing a voter of types B-D thus is θ_p when voting $p_i = 1$ and it is $1 - \theta_p$ when voting $p_i = 0$.

When the public choice is $p = 1$ (middle column of Tables 3B-3D), the voter will not learn the state of the economy through the observation of u_i but is left with the signal σ. Then, for the politician, it is decisive whether she faces a voter of type B, C, or D, see Table 2. First, if she faces an ex-ante opposer of the policy (type B), she will, given $p = 1$, be rewarded for voting against the policy, $p_i = 0$, no matter the signal σ. Second, the reward of a politician who faces an ex-ante uncertain voter of type C depends, given $p = 1$, on the realization of the signal σ. If $p = 1$, voters of type C ex post reward politicians who behaved as indicated by the signal, $p_i = \sigma$. The politician's expected reward is

Table 3: Politician i's expected reward in the vote-policy space for different voter types faced

A) facing type A

	$p=1$	$p=0$
$p_i=1$	0	0
$p_i=0$	1	1

B) facing type B

	$p=1$	$p=0$
$p_i=1$	0	θ_p
$p_i=0$	1	$1-\theta_p$

C) facing type C

	$p=1$	$p=0$
$p_i=1$	$\theta_p \cdot \pi + (1-\theta_p)\cdot(1-\pi)$	θ_p
$p_i=0$	$\theta_p \cdot (1-\pi) + (1-\theta_p)\cdot\pi$	$1-\theta_p$

D) facing type D

	$p=1$	$p=0$
$p_i=1$	1	θ_p
$p_i=0$	0	$1-\theta_p$

E) facing type E

	$p=1$	$p=0$
$p_i=1$	1	1
$p_i=0$	0	0

the probability she assigns to $\sigma = p_i$.[9] Third, a politician who faces an ex-ante supporter of the policy (voter of type D), is rewarded for voting in favor of the policy, $p_i = 1$, irrespective of σ.

We now analyze the strategic situation of a politician. Politicians who face voters of types A or E have strictly dominant strategies independent of their own beliefs. For the other three groups, the strategic situation depends on politicians' belief θ_p. When $\theta_p < \frac{1}{2}$, it is strictly dominant for the politician to vote $p_i = 0$ if facing a voter of type B or type C. However, if facing a voter of type D, the politician has no dominant strategy and seeks to win the vote in parliament. No matter the majority vote p, the politician's expected reward is highest when she also votes in this way, $p_i = p$, see Table 3D with $\theta_p > 1/2$.

When $\theta_p > \frac{1}{2}$, voting $p_i = 1$ is strictly dominant if facing voters of types C or D. Here, there is no dominant strategy for politicians

[9]The signal is $\sigma = 1$ if $\sigma = s$ and $s = 1$ or if $\sigma \neq s$ and $s = 0$. The sum of the politician's subjective probabilities of these events equals $\theta_p \cdot \pi + (1-\theta_p)\cdot(1-\pi)$ which is her expected reward when she votes $p_i = 1$. Analogously, her expected reward for voting $p_i = 0$ is the probability she assigns to $\sigma = 0$, $\theta_p \cdot (1-\pi) + (1-\theta_p)\cdot\pi$.

who face a voter of type B. A winner's curse arises: the politician's expected reward is highest when she looses the vote in parliament. If the politician perceives the threat rather likely, but faces an ex-ante opposer of the policy, she would only vote in accordance with her belief ($p_i = 1$) if she was able to convince the voter, i.e., if $p = 0$, see Table 3B. The politician would then seek to lose the vote in parliament.

Notice that this winner's curse does not only occur with voters disagreeing with their politicians about the threat to be likely.[10] The possibility of a winner's curse even with identical beliefs results from an asymmetry between the preferences of voters and the incentives for politicians in presence of risk. The voter prefers the policy that maximizes her expected utility. By contrast, the politician prefers the policy which is more likely to be rewarded by the voter.[11]

As an implication, winner's curses lead to narrow vote margins. Such type of politicians highly benefit from bills passing at comfortable vote margins. In seeking reward, pandering to voters' opposition generates a riskless way to achieve this goal. In light of this argument, one may interpret Republican opposition to raising the debt limit as pandering rather than as the pursuit of own convictions. In the same way, one may interpret the considerable number of votes against ratifications of the ESM in European parliaments.

5 Interaction in parliament

We collect office-oriented politicians facing voters of types A, ..., E in groups A, ..., E. Since politicians who aim to maximize non-electoral benefits behave like office-oriented politicians in groups A or E, we add them to these groups. We denote by N_A, ..., N_E, the numbers of politicians in the respective groups. For different values of θ_p and for different

[10] Assume voters and politicians agree about the likelihood of the threat, i.e. $\theta_v = \theta_p = \theta$. For the winner's curse to arise with $p = 0$, θ has to be larger than $1/2$. Further, if $\pi < \pi_v$, $0 < c_i/d_i < \theta$ must hold true for voters to choose voting rule B, while in case of $\pi > \pi_v$, voters choose rule B if $0 < \pi_p c_i/((2\pi_p - 1)c_i + (1 - \pi_p)d_i) < \theta$ and $c_i > 0$.

[11] Although the exact mechanisms differ, an individual politician might face a dilemma if being pivotal as voters do in Feddersen and Pesendorfer (1996) famous "swing voters' curse". Facing the winner's curse, a politician is best off loosing the vote but a pivotal politician can not achieve this goal. Other than voters in Feddersen and Pesendorfer (1996), politicians can not circumvent this curse through abstention as, in parliament, abstentions are de facto votes for the status quo.

Table 4: Voting behavior in parliament and equilibrium outcomes.

		group A	group B	group C	group D	group E	equilibrium vote result
1	$\theta_p > \frac{1}{2}$, $N_A > \frac{N}{2}$	0	1	1	1	1	$p = 0$
2	$\theta_p > \frac{1}{2}$, $N_A < \frac{N}{2}$, $N_A + N_B > \frac{N}{2}$	0	El Farol	1	1	1	$p = 0$ (one-vote margin) or $prob\,(p = 0) = 1/(2\theta_p)$
3	$\theta_p > \frac{1}{2}$, $N_A + N_B < \frac{N}{2}$	0	0	1	1	1	$p = 1$
4	$\theta_p < \frac{1}{2}$, $N_D + N_E < \frac{N}{2}$	0	0	0	0	1	$p = 0$
5	$\theta_p < \frac{1}{2}$, $N_E < \frac{N}{2}$, $N_D + N_E > \frac{N}{2}$	0	0	0	coord. game	1	$p = 0$ or $p = 1$ or $prob\,(p = 0) = 1/(2(1 - \theta_p))$
6	$\theta_p < \frac{1}{2}$, $N_E > \frac{N}{2}$	0	0	0	1	1	$p = 1$

majority structures in parliament, Table 4 describes voting behavior of the different groups of politicians and the equilibrium vote result. As we will see, particularly interesting constellations occur when the median politician falls in groups B or D. Obviously, this is rather likely when group C is small or does not exist, i.e., when π_p is low - such that politicians are rather uncertain themselves - or when $\pi < \pi_v$ - i.e., when election day is close.

5.1 Pessimistic politicians

When politicians perceive the threat to be rather real, i.e., $\theta_p > 1/2$, it is strictly dominant for politicians in groups C, D, and E to vote in favor of the policy. That is, there are $N_C + N_D + N_E$ certain votes in favor of the policy. Further, there are N_A certain votes against it from group A. Voting behavior of group B, who faces the winner's curse when $\theta_p > 1/2$, depends on whether the policy choice is already determined by the other groups' voting behavior, see Table 3B. If $N_A > N/2$ (line 1 of the table), the outcome is surely $p = 0$ and politicians in group B vote in favor of the policy. If $N_C + N_D + N_E > N/2 \Leftrightarrow N_A + N_B < N/2$ (line 3 of the table), the public choice is surely $p = 1$ and politicians in group

B vote against the policy. In both cases, they loose the parliamentary vote, and are rewarded.

Most interestingly, if $N_A < N/2$ and $N_A + N_B > N/2$ (line 2 of the table), the voting behavior of politicians in group B is decisive for the outcome of the vote in parliament. In this situation, median politicians perceive prevention as rather necessary but voting accordingly will surely lead to disagreement by voters and thus to no reward. The only chance of being rewarded is to forego prevention and hoping for the threat not to proof real. Hence, in the considered constellation, not all politicians in group B can be rewarded and they are in a strategic situation called the El Farol bar problem (Arthur 1994): a certain behavior only pays when not too many other players choose the same behavior. Those who vote $p_i = 1$ expect a higher reward if less than $\frac{N-1}{2} - N_C - N_D - N_E$ of their group mates also do so and the policy fails in parliament. Similarly, those who vote $p_i = 0$ expect a higher reward when less than $\frac{N-1}{2} - N_A$ also choose this option and the policy passes parliament.

The El Farol problem is known to have a finite number of Nash equilibria in pure strategies and a symmetric equilibrium in mixed strategies (Cheng 1997; Whitehead 2008). In all pure-strategy Nash equilibria, the "capacity level" is reached. In our context, $\frac{N+1}{2} - N_A$ politicians from group B vote $p_i = 0$ such that the outcome is $p = 0$ with a one-vote margin. Intuitively, the vote margin can not be two or greater. Then, group-B politicians in the winning majority would gain from moving to the loosing fraction. If $p = 1$ won with a one-vote margin, deviation from $p_i = 1$ to $p_i = 0$ would pay for an individual politician in expectation since this would change the vote outcome. Although the deviator still remains a winner of the vote in parliament, her expected reward increases from 0 to $1-\theta_p$, see Table 3B.[12] The preventive policy is thus impeded in

[12]Here, party lines as proposed by Zudenkova (2011) could alter the vote outcome. If we understand politicians in group B as a party and the weight on other party members' rewards in own utility, λ, is strong enough (specifically if $\lambda \cdot (N - 2N_A - N_B) > (1 - \theta_p)/\theta_p$), the vote result would change to $p = 1$ with a one-vote margin. There is anecdotic evidence for such behavior of parties. For example, the Green party in Germany managed that exactly eight of their members in the German national parliament voted in favor of the German participation in the Afghanistan war in 2001. This allowed that participation was enacted but a maximum number of Green politicians could vote against it. Since a politician can affect the rewards of other politicians only when she is pivotal, party lines can, in other situations, only matter if one-vote margins occur by coincidence of group sizes (see

parliament by sufficiently many politicians from group B voting against it despite perceiving it rather necessary. In the mixed-strategy equilibrium, expected payoffs of the two options equalize. This implies that $prob\,(p=0) = (2\theta_p)^{-1}$ which exceeds $prob\,(p=1) = 1 - prob\,(p=0)$ since $\theta_p < 1$. Thus, with pessimistic beliefs and group-B politicians being decisive in parliament, the policy rather fails in parliament despite politicians perceiving it rather necessary.[13]

The interpretation as an El Farol game can help to understand the considerable ado that was regularly made before preventive policies passed parliaments. When it is possible to vote repeatedly over an array of similar polices until one is finally made law (e.g., through adding formal alternatives with only minor amendments) or when votes can be postponed until a majority seems likely, the situation described above becomes a game of chicken. Then, politicians may refuse to support the policy, waiting for others to yield first. A potential application of this argument is the weeks lasting refusal of right-wing Republicans to vote for an appropriation bill for fiscal year 2014.

5.2 Optimistic politicians

When politicians believe the threat to be rather not real, i.e., $\theta_p < 1/2$, politicians in groups A, B, and C have the strictly dominant strategy to oppose the policy. Politicians in group E surely vote in its favor. Politicians in group D now seek to win the vote parliament, see Table 3D. If the outcome of the vote certainly is $p = 0$ (i.e., when $N_A + N_B + N_C > N/2 \Leftrightarrow N_D + N_E < N/2$, line 4 of the table), politicians in group D all vote against the policy. The vote then results in a fail of the policy, $p = 0$, with only group E voting in its favor. If, by contrast, the vote result is certainly $p = 1$ (i.e., when $N_E > N/2$, line 6 of the table), group D aligns with group E and unanimously votes in its favor. It then passes with $N_A + N_B + N_C$ dissenting votes. In both cases, politicians in group D win the vote in parliament and are rewarded.

Most interestingly, group D is decisive for the outcome of the vote if $N_E < N/2$ and $N_D + N_E > N/2$ (line 5 of the table). In this situation, median politicians perceive prevention as rather unnecessary but voting

Table 4). Details are available upon request.

[13] It is plausible to argue that politicians are in a long-term strategic interaction. Whitehead (2008) shows that, in a repeated El Farol problem, long-run behavior converges to a Nash equilibrium of the one-shot El Farol problem.

accordingly will surely lead to disagreement by voters and thus to no reward if the parliament as a whole decides pro prevention. Hence, in the considered situation, politicians in group D face a coordination problem: Opposing the policy is expected to pay when at least $\frac{N-1}{2}-N_A-N_B-N_C$ other politicians in group D do so and the policy fails while supporting the policy certainly pays if at least $\frac{N-1}{2}-N_E$ others do so and the policy passes. This coordination problem has two symmetric equilibria in pure strategies. Either all politicians in group D vote against the policy or all vote in favor of it. In the former equilibrium, the vote in parliament ends in a fail of the policy with N_E dissenting votes.[14] In the latter equilibrium, the policy passes with $N_A+N_B+N_C$ dissenting votes. There is also a mixed-strategy equilibrium with $prob\,(p=0)=(2(1-\theta_p))^{-1}$. The equilibrium that leads to $p=1$ is Pareto dominant to both other equilibria for group-D politicians. In this equilibrium, group-D politicians rather pander to their voters' opinion to be rewarded with certainty than following their own beliefs, thereby taking the risk of not being rewarded if their beliefs are falsified. They ensure the policy passes despite perceiving it rather unnecessary.

As noted above, during the recent crises in the US and Europe, it was a recurrent pattern that preventive policies finally passed parliament. Following our model's logic, politicians may nevertheless have perceived potential damage as unlikely. Assuming this for a moment, the passing of costly policy prevention would have been the result of politicians pandering to some voters' support for the bill, contrary to their own conviction of what is socially, or for their voters, optimal. One may argue that politicians of that kind would have deliberately wasted taxpayers' money in order to risklessly gain their support.

5.3 The role of politicians' beliefs

Depending on the precision of the different signals, it can occur that the information carried in the signal to politicians is not reflected in the political decision. As we have seen, the choice p does only depend on politicians' signal σ_p if the median politician falls in group C ($N_A+N_B<N/2$ and $N_D+N_E<N/2$). Obviously, this is rather unlikely if group C is small (which it is if π_p is small) and even impossible if this group does not exist (which is the case if $\pi<\pi_v$). Thus, when the precision of

[14] The equilibrium with $p=0$ disappears if by coincidence $N_E=(N-1)/2$.

politicians' information is small and not much new information arrives until election day, the public choice does only reflect voters' prior but not politicians' private information. By contrast, a social planner would clearly use all available information in the choice whether to run a preventive policy. In this way, decision making over preventive policies in representative democracies is subject to inefficient information aggregation. As argued above, this is particularly likely in situations where politicians do not know much about the 'right' policy choice or when election day is close.

To illustrate this result, suppose congressmen had better information about the consequences of massive bank crashes in 2008 than voters. Obviously, society would optimally have used this information to decide on whether to bailout banks. In contrast to this optimal social choice, our model implies that possibly the TARP decision in Congress (only 32 days before the next general election) did not incorporate private information of congressmen. This would mean that inefficiently little information was used in a decision about spending billions of tax dollars.

6 Conclusion

This paper has analyzed the legislation process of preventive policies in a model of imperfect information about the necessity of policy intervention. It lies in the nature of preventive policies that they impede the verification of their necessity. When damage is successfully fought off, it remains in the dark whether the threat was in fact real.

Our analysis revealed that this peculiar information structure induces a number of striking results which can help to understand better the legislative histories of bailouts and other preventive policies in the recent crises. Some politicians might seek to lose the vote in parliament thereby generating narrow vote results as observed in parliamentary decisions over, e.g., the Wall Street bailout or the European Stability Mechanism. Others may coordinate to implement policies that they themselves believe to be unnecessary to reduce their own re-election risks. Finally, especially when election day is close, public choices over preventive policies can use socially inefficient amounts of information.

References

Arthur, W. B. (1994). Inductive reasoning and bounded rationality. *American Economic Review 84*(2), 406–411.

Ashworth, S. (2012). Electoral accountability: recent theoretical and empirical work. *Annual Review of Political Science 15*, 183–201.

Ashworth, S. and K. W. Shotts (2010). Does informative media commentary reduce politicians' incentives to pander? *Journal of Public Economics 94*.

Candel-Sánchez, F. and J. Perote-Peña (2013). A political economy model of market intervention. *Public Choice 157*(1-2), 169–181.

Canes-Wrone, B., M. C. Herron, and K. W. Shotts (2001). Leadership and pandering: A theory of executive policymaking. *American Journal of Political Science 35*(3), 532–550.

Cheng, J. (1997). The mixed strategy equilibria and adaptive dynamics in the bar problem. Santa Fe Working Paper 96-08-063.

Congleton, R. D. (2012). On the political economy and limits of crisis insurance: The case of the 2008-11 bailouts. *Public Choice 150*, 399–423.

Dahm, M., R. Dur, and A. Glazer (2014). How a firm can induce legislators to adopt a bad policy. *Public Choice 159*(1-2), 63–82.

Dewan, T. and R. Hortala-Vallve (2012). Policy learning and elections. Political science and political economy working paper no. 1/2012, London School of Economics.

Diermeier, D. and A. Merlo (2000). Government turnover in parliamentary democracies. *Journal of Economic Theory 94*(1), 46–79.

Dorsch, M. (2013). Bailout for sale? The vote to save Wall Street. *Public Choice 155*, 211–228.

Downs, A. (1957). *An Economic Theory of Democracy*. New York: Harper.

Feddersen, T. J. and W. Pesendorfer (1996). The swing voter's curse. *American Economic Review*, 408–424.

Felgenhauer, M. (2012). Revealing information in electoral competition. *Public Choice 153*(1-2), 55–68.

Frisell, L. (2009). A theory of self-fulfilling political expectations. *Journal of Public Economics 93*.

Groseclose, T. and J. Milyo (2010). Sincere versus sophisticated voting in congress: theory and evidence. *Journal of Politics 72*(1), 60–73.

Heidhues, P. and J. Lagerlöf (2003). Hiding information in electoral competition. *Games and Economic Behavior 42*(1), 48–74.

Hugh-Jones, D. (2014). Why do crises go to waste? fiscal austerity and public service reform. *Public Choice 158*(1-2), 209–220.

Maskin, E. and J. Tirole (2004). The politician and the judge: Accountability in government. *American Economic Review 94*, 1034–1054.

Matthews, S. A. (1989). Veto threats: Rhetoric in a bargaining game. *The Quarterly Journal of Economics 104*(2), 347–369.

Mian, A., A. Sufi, and F. Trebbi (2010). The political economy of the US mortgage default crisis. *American Economic Review 100*(5), 1967–98.

Morris, S. (2001). Political correctness. *Journal of Political Economy 109*.

Sobel, R. S. and G. A. Wagner (2004). Expressive voting and government redistribution: Testing Tullock's 'Charity of the uncharitable'. *Public Choice 119*(1-2), 143–159.

Tullock, G. (1971). The charity of the uncharitable. *Western Economic Journal 9*(4), 379–392.

Whitehead, D. (2008). The El Farol bar problem revisited: Reinforcement learning in a potential game. *ESE Discussion Papers 186*.

Zudenkova, G. (2011). A model of party discipline in a congress. MPRA Paper 29890.

A Derivation of voters' behavior

There are $2^4 = 16$ possible voting rules which are listed in Table 5. Specific voting rules are chosen to select on politicians' types, to incentivize politicians optimally for the current term and - if this leaves more than one possible rule - to vote expressively.

A.1 Selection on types

Having observed p_i, voter i can, using Bayes' rule, calculate the probability that her politician is of the good type as

$$prob\,(good|p_i) = \frac{prob\,(p_i|good) \cdot \pi_g}{prob\,(p_i|good) \cdot \pi_g + prob\,(p_i|bad) \cdot (1 - \pi_g)}, \qquad (2)$$

where $prob\,(p_i|bad)$ is the probability which the voter assigns to a bad politician (who primarily seeks to maximize non-electoral benefits) voting p_i. Since the voter does not know the distribution of non-electoral benefits, $prob\,(p_i|bad) = 1/2$ for $p_i \in \{0, 1\}$. π_g denotes the unconditional probability of facing an office-oriented - i.e., a good - politician. At election day, the current representative competes against a challenger for the seat in parliament. As the challenger's behavior could not yet be observed, the voter assigns probability π_g to the challenger being good. She thus prefers the incumbent over the challenger when $prob(good|pi) > \pi_g$. Rearranging terms in equation (2), we see that this is the case exactly when $prob(p_i|good) > 1/2$, which is checked below.

Here, a non-pivotal politician i of good type is to be considered as, in case of pivotality, moral hazard considerations have to be taken into account, see below. The induced behavior is summarized in columns 5-6 of Table 5 and the information the voter can draw from this behavior in columns 8-11. A non-pivotal politician can consider the vote result as given. Consider first the case $p = 0$. Here, all voter rules that reward the politician for $p_i = 1$ in $k = 1$ and $k = 4$ (rules α, δ, ϵ, π) induce the non-pivotal politician to vote $p_i = 1$ independent of σ_p (behavior i) if $p = 0$. It follows that $prob(p_i = 1|good) = 1$ in $k = 1$ and $k = 4$ under these rules. Similarly, rules that reward the politician for $p_i = 1$ neither in $k = 1$, nor in $k = 4$ (rules η, ι, κ, o) induce $p_i = 1$ for no σ_p (ii) if $p = 0$, hence $prob(p_i = 1|good) = 0$ in $k = 1$ and $k = 4$ under these rules. Further, rules that reward the politician for $p_i = 1$ in $k = 1$, but not in $k = 4$ (rules β, ζ, λ, μ) induce $p_i = 1$ only when $\sigma_p = 1$

$\Leftrightarrow \theta_p > 1/2$ (iii) if $p = 0$, hence $prob(p_i = 1|good) = \pi_p$ in $k = 1$ and $prob(p_i = 1|good) = 1-\pi_p$ in $k = 4$ under these rules. Finally, rules that do not reward the politician for $p_i = 1$ in $k = 1$, but do so in $k = 4$ (rules γ, θ, ν, ξ) induce $p_i = 1$ only when $\sigma_p = 0 \Leftrightarrow \theta_p < 1/2$ (iv) if $p = 0$, i.e., $prob(p_i = 1|good) = 1 - \pi_p$ in $k = 1$ and $prob(p_i = 1|good) = \pi_p$ in $k = 4$ under these rules.

Now consider the case $p = 1$. Here, all voter rules that reward the politician for $p_i = 1$ in $k = 2$ and $k = 3$ (rules α, β, γ, o) induce the politician to vote $p_i = 1$ in any case (i) if $p = 1$, i.e., $prob(p_i = 1|good) = 1$ in $k = 2$ and $k = 3$ under these rules. Analogously, rules that reward the politician for $p_i = 1$ neither in $k = 2$, nor in $k = 3$ (rules ζ, η, θ, π) induce $p_i = 1$ for no σ_p (ii) if $p = 1$, i.e., $prob(p_i = 1|good) = 0$ in $k = 2$ and $k = 3$ under these rules. Further, rules that reward the politician for $p_i = 1$ in $k = 2$, but not in $k = 3$ (rules δ, ι, λ, ν) induce $p_i = 1$ only when $\sigma_p = 1 \Leftrightarrow \theta_p > 1/2$ (iii) if $p = 1$, i.e., $prob(p_i = 1|good) = prob(\sigma_p = 1|\sigma = 1, \theta_p) = \pi_p \cdot \frac{\pi \cdot \theta_p}{\pi \cdot \theta_p + (1-\pi) \cdot (1-\theta_p)} + (1-\pi_p) \cdot \frac{(1-\pi) \cdot (1-\theta_p)}{\pi \cdot \theta_p + (1-\pi) \cdot (1-\theta_p)} =: \Pi^2_{iii}$ in $k = 2$ and $prob(p_i = 1|good) = prob(\sigma_p = 1|\sigma = 0, \theta_p) = \pi_p \cdot \frac{(1-\pi) \cdot \theta_p}{\pi \cdot (1-\theta_p) + (1-\pi) \cdot \theta_p} + (1 - \pi_p) \cdot \frac{\pi \cdot (1-\theta_p)}{\pi \cdot (1-\theta_p) + (1-\pi) \cdot \theta_p} =: \Pi^3_{iii}$ $k = 3$ under these rules. Finally, rules that do not reward the politician for $p_i = 1$ in $k = 2$, but do so in $k = 3$ (rules ϵ, κ, μ, ξ) induce $p_i = 1$ only when $\sigma_p = 0 \Leftrightarrow \theta_p < 1/2$ (iv) if $p = 1$, i.e., $prob(p_i = 1|good) = prob(\sigma_p = 0|\sigma = 1, \theta_p) = 1 - \Pi^2_{iii} =: \Pi^2_{iv}$ in $k = 2$ and $prob(p_i = 1|good) = prob(\sigma_p = 0, \sigma = 0, \theta_p) = 1 - \Pi^3_{iii} =: \Pi^3_{iv}$ $k = 3$ under these rules.

To check the consistency of a voting rule with the aim to select on politician's types, we consider whether the politician is rewarded for $p_i = 1$ if and only if $prob(p_i = 1|good) > 1/2$. Comparing columns [1]-[4] with columns [8]-[11] of the table, this is clearly the case under the eight rules α, β, γ, ζ, η, θ, o, and π. Concerning the other eight rules, the consistency condition is fulfilled if and only if $\Pi^2_{iii} > 1/2$ and $\Pi^3_{iii} < 1/2$ (which is equivalent to $\Pi^2_{iv} = 1 - \Pi^2_{iii} < 1/2$ and $\Pi^3_{iv} = 1 - \Pi^3_{iii} > 1/2$). Considering the expressions for Π^2_{iii} and Π^3_{iii} above, this is the case if and only if $\pi > \pi_v$. Thus, rules α, β, γ, ζ, η, θ, o, and π always (and the other rules under the condition $\pi > \pi_v$) allow to select on politicians' types and voters have no incentive to deviate from their voting rule at election day.

A.2 Moral hazard

We here consider the moral hazard dimension and determine which rule incentives a voter's politician best. Of course, this aim is relevant only if one's politician is pivotal in parliament, i.e., $p_i = p$.

We first determine which voting behavior of a pivotal politician is induced by the specific rule at the vote in parliament. Rules α-ϵ induce a pivotal politician to always vote for $p_i = 1$ (behavior i). To see this, consider her reward probability. With voter rules α-γ it is one if $p_i = p = 1$ but it is less than one if $p_i = p = 0$. With voter rules δ-ϵ, it is zero if $p_i = p = 0$ but positive if $p_i = p = 1$.

Rules ζ-κ induce a pivotal politician to vote $p_i = 1$ (ii) for no σ_p. To explain, with voter rules ζ-θ the reward probability is zero if $p_i = p = 1$ but positive if $p_i = p = 0$ and with voter rules ι-κ it is one if $p_i = p = 0$ but less than one if $p_i = p = 1$.

Rules λ and μ induce a pivotal politician to vote $p_i = 1$ only if $\sigma_p = 1 \Leftrightarrow \theta_p > 1/2$ (iii). First, with both rules, the reward probability is $prob(s = 0) = 1 - \theta_p$ if $p_i = p = 0$. Next, if $p_i = p = 1$, the reward probability is $prob(\sigma = 1|\theta_p) = \theta_p\pi + (1 - \theta_p)(1 - \pi)$ with voter rule λ, while it is $prob(\sigma = 0|\theta_p) = \theta_p(1 - \pi) + (1 - \theta_p)\pi$ with voter rule μ. Hence, with both rules, the reward probability of voting $p_i = p = 1$ exceeds the one of voting $p_i = p = 0$ exactly if $\theta_p > 1/2$.

Rules ν and ξ induce a pivotal politician to vote $p_i = 1$ only if $\sigma_p = 0 \Leftrightarrow \theta_p < 1/2$ (iv). First, with both rules, the reward probability is $prob(s = 1) = \theta_p$ if $p_i = p = 0$. Next, if $p_i = p = 1$, the reward probability with rule ν (ξ) equals the one with rule λ (μ), outlined above. Hence, with both rules ν and ξ, the reward probability of voting $p_i = p = 1$ exceeds the one of voting $p_i = p = 0$ exactly if $\theta_p < 1/2$.

Finally, rules o-π induce a pivotal politician to be indifferent between the two policy options in terms of re-election chances (v). Rule o promises reward no matter the pivotal politician's choice, while rule π certainly promises no reward. Such politician would then follow her (else negligible) non-electoral benefits about which the voter does not have any information. Thus, from the viewpoint of the voter, $prob(p_i = p = 1) = prob(p_i = p = 0) = 1/2$ under pivotality.

Given the five different induced behaviors of politicians, we now want to determine which voter optimally aims to induce which behavior. First, there is no voter who optimally incentivizes her politician to choose

behavior (iv) or (v). Voters with $c_i < 0$ prefer $p = 1$ over $p = 0$ even if $s = 0$ is certain and thus aim to induce behavior (i). Voters with $c_i > d_i$ prefer $p = 0$ over $p = 1$ even if $s = 1$ is certain and thus aim to induce behavior (ii). Considering voters with $0 < c_i < d_i$, who thus prefer $p = 0$ if $s = 0$ but $p = 1$ if $s = 1$, behavior (iii) strictly dominates behavior (v), which in turn strictly dominates behavior (iv). First, if $s = 0$, behavior (iii) brings about the preferred $p = 0$ with probability $prob(\sigma_p = 0) > 1/2$ and thus more likely than behaviors (v) (1/2) and (iv) ($prob(\sigma_p = 1) < 1/2$). Second, if $s = 1$, behavior (iii) brings about the preferred $p = 1$ with probability $prob(\sigma_p = 1) > 1/2$ and again more likely than behaviors (v) (1/2) and (iv) ($prob(\sigma_p = 0) < 1/2$). For any voter with $c_i \neq \theta_v \cdot d_i$, it is easy to see that behavior (i) or behavior (ii) give higher expected utility to the voter than behavior (v). Only voters with $c_i = \theta_v \cdot d_i$ obtain the same expected utility under behaviors (i), (ii), and (v) - for them, we can rule out behavior (v) using the expressive voting motive, see below.

Having ruled out behaviors (iv) and (v), it now remains to show which of the voters with $0 < c_i < d_i$ favors inducing which of the behaviors (i), (ii) and (iii). For this purpose, we compare voters' ex-ante expected utilities conditional on one's politician's pivotality under the three possible behaviors, $E_i\left(u_i|\text{piv., (i)}\right)$ - $E_i\left(u_i|\text{piv., (iii)}\right)$:

$$E_i\left(u_i|\text{piv., j}\right) = \begin{cases} -c_i, & \text{if } j = (i) \\ -\theta_v d_i, & \text{if } j = (ii) \\ X_{C,i}, & \text{if } j = (iii) \end{cases}, \tag{3}$$

with $X_{C,i}$ defined in the main text. From a set J of credibly inducible behaviors ($J = \{(i), (ii), (iii)\}$ or $J = \{(i), (ii)\}$), voters aim to induce behavior $j^* = \arg\max_{j \in J} E_i(u_i|\text{piv.,j})$.

A.3 Expressive Voting

Having assigned the different types of voters to the behavior of politicians they aim to induce, we can use the expressive voting motive to reduce the pool of possible voting rules to only five rules. First, within the set of rules α-ϵ leading to behavior (i), the expressive voting motive rules out any rule that sometimes rewards $p_i = 0$ for voters with $c_i < 0$. This leaves only rule α for these voters. Similarly, the motive rules out any rule that rewards $p_i = 1$ if $s = 0$ is certain ($k = 4$) or $p_i = 0$ if $s = 1$ is

certain ($k = 1$) for voters with $0 < c_i < d_i$. This leaves only rule β in this block for them.

Second, within the set of rules ζ-κ, the tie-breaking wish to vote expressively rules out any rule that sometimes rewards $p_i = 1$ for voters with $c_i > d$. This leaves only rule η for these voters. Further and for the same reason as above, this motive rules out any rule that rewards $p_i = 1$ if $k = 4$ or $p_i = 0$ if $k = 1$ for voters with $0 < c_i < d_i$. This leaves only rule ζ in this block for them.

Third, among rules λ and μ, expressive voting rules out the latter for voters with $0 < c_i < d_i$. This is because rewarding $p_i = 1$ in $k = 3$ but not in $k = 2$ is not consistent with the voter's aim to induce $p_i = p = 1$ whenever the likelihood of s increases.

Finally, voters with $c_i = \theta_v \cdot d_i$ obtain the same expected utility under rules β, ζ, o and π. In terms of expressive voting, β is preferred to o and ζ to π.

A.4 Summary

Combining the insights of Appendices A.1-A.3, five rules are potentially chosen by voters. A voter chooses

- rule α (in the main text called A) if $c_i < 0$
- rule β (B) if $0 < c_i < d_i$ and $((\pi > \pi_v$ and $-c_i = \max(-\theta_v d_i, X_{C,i}, -c_i))$ or $(\pi < \pi_v$ and $-c_i > -\theta_v \cdot d_i))$
- rule λ (C) if $0 < c_i < d_i$ and $\pi > \pi_v$ and $X_{C,i} = \max(-\theta_v d_i, X_{C,i}, -c_i)$
- rule ζ (D) if $0 < c_i < d_i$ and $((\pi > \pi_v$ and $-\theta_v \cdot d_i = \max(-\theta_v d_i, X_{C,i}, -c_i))$ or $(\pi < \pi_v$ and $-c_i < -\theta_v \cdot d_i))$
- rule η (E) if $c_i > d_i$.

Table 5: Possible voting rules, incentive effects, and expressive voting.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
	reward for $p_i = 1$				induced behavior pivotal		non-	$prob(p_i = 1 \mid good)$ in $k =$				opt. incent. if $\max(-\theta_v d_i,$	expressive voting	rule
	$k=1$	$k=2$	$k=3$	$k=4$	$p=0$	$p=1$	piv.	$k=1$	$k=2$	$k=3$	$k=4$	$X_{C,i}, -c_i)$		
α	1	1	1	1	(i)	(i)	(i)	1	1	1	1	$-c_i$	if $c_i < 0$	A
β	1	1	1	0	(iii)	(i)	(i)	π_p	1	1	$1-\pi_p$	$-c_i$	if $0 < c_i < d_i$	B
γ	0	1	1	1	(iv)	(i)	(i)	$1-\pi_p$	1	1	π_p	$-c_i$	no	—
δ	1	1	0	1	(i)	(iii)	(i)	1	Π^2_{iii}	Π^3_{iii}	1	$-c_i$	no	—
ϵ	1	0	1	1	(i)	(iv)	(i)	1	Π^2_{iv}	Π^3_{iv}	1	$-c_i$	no	—
ζ	1	0	0	0	(iii)	(ii)	(ii)	π_p	0	0	$1-\pi_p$	$-\theta_v d_i$	if $0 < c_i < d_i$	D
η	0	0	0	0	(ii)	(ii)	(ii)	0	0	0	0	$-\theta_v d_i$	if $c_i > d_i$	E
θ	0	0	0	1	(iv)	(ii)	(ii)	$1-\pi_p$	0	0	π_p	$-\theta_v d_i$	no	—
ι	0	1	0	0	(ii)	(iii)	(ii)	0	Π^2_{iii}	Π^3_{iii}	0	$-\theta_v d_i$	no	—
κ	0	0	1	0	(ii)	(iv)	(ii)	0	Π^2_{iv}	Π^3_{iv}	0	$-\theta_v d_i$	no	—
λ	1	1	0	0	(iii)	(iii)	(iii)	π_p	Π^2_{iii}	Π^3_{iii}	$1-\pi_p$	$X_{C,i}$	if $0 < c_i < d_i$	C
μ	1	0	1	0	(iii)	(iv)	(iii)	π_p	Π^2_{iv}	Π^3_{iv}	$1-\pi_p$	$X_{C,i}$	no	—
ν	0	1	0	1	(iv)	(iii)	(iv)	$1-\pi_p$	Π^2_{iii}	Π^3_{iii}	π_p	never optimal	—	—
ξ	0	0	1	1	(iv)	(iv)	(iv)	$1-\pi_p$	Π^2_{iv}	Π^3_{iv}	π_p	never optimal	—	—
o	0	1	1	0	(ii)	(i)	(v)	0	1	1	0	never optimal	—	—
π	1	0	0	1	(i)	(ii)	(v)	1	0	0	1	never optimal	—	—

Notes: Induced behavior: politician votes for the preventive policy (i) for all σ_p, (ii) for no σ_p, (iii) only if $\sigma_p = 1 \Leftrightarrow \theta_p > 1/2$, (iv) only if $\sigma_p = 0 \Leftrightarrow \theta_p < 1/2$, or (v) if indicated by non-electoral benefits (unknown to voter).