Games and Economic Behavior 114 (2019) 146–168

Contents lists available at ScienceDirect

Games and Economic Behavior

www.elsevier.com/locate/geb

Political rents and voter information in search equilibrium

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ARTICLE INFO

Article history:
Received 22 February 2017
Available online 30 January 2019

JEL classification:
D72
D83

Keywords:
Information search
Political equilibrium
Political rents
Voter turnout

ABSTRACT

Political parties committed to grab rents may run for election, and even win, if citizens are uninformed. But, how is the political equilibrium affected if citizens can mitigate this information problem through costly information search? We propose a political equilibrium theory with endogenous information search and turnout. We show that: (*i*) the political equilibrium generates political uncertainty characterized by a distribution of rent policies; (*ii*) the expectation of this rent distribution is inversely U-shaped in the information search cost; (*iii*) turnout is lower and rents are higher the more proportional is the electoral system.

1. Introduction

The concern that politicians may abuse office to extract rents is of first order importance – to ordinary citizens that depend on the political system for welfare and redistribution, and to scholars that strive to understand political mechanisms. This is not only a developing-country problem. Even in the U.S. – which ranks in the top decile on both income and transparency – government officials are frequently prosecuted and convicted for corruption, for example in cases of conflict of interest, fraud, campaign finance violations, and obstructions of justice. Clearly, citizens can only hold politicians and parties accountable for excessive rent extraction to the extent that they are informed about these practices. Existing evidence does indeed suggest that citizens' ability to hold candidates and parties accountable depends on the overall supply of information, via the media or other sources (as shown by, e.g., Ferraz and Finan, 2008, 2011, Snyder and Strömberg, 2010, and Strömberg, 2015).

The association between political rents and voter information as a political equilibrium phenomenon is, however, not very well understood. On the one hand, politicians appear to be less corrupt when citizens are better equipped to gather and process information, as suggested by the negative correlation between corruption convictions and educational attainment across U.S. states in Fig. 1.[1] On the other hand, there is a large amount of unexplained heterogeneity. For example, the scatter plot in Fig. 1 suggests that the variance of observed corruption is high, and higher the lower is the level of educational attainment. Moreover, existing evidence suggests that the level of political corruption may, perhaps surprisingly, be *positively* associated with citizens' level of political participation. For example, Karahan et al. (2006) document a positive

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[1] The scatterplot in Fig. 1 is based on data from U.S. states, averaged over the period 2001 to 2010. The negative slope of the regression line is statistically significant at the 10 percent level. As documented by Glaeser and Saks (2006), educational attainment is indeed one of the most robust correlates of political corruption in the U.S., which also holds when instrumenting for education with historical factors.

https://doi.org/10.1016/j.geb.2019.01.006

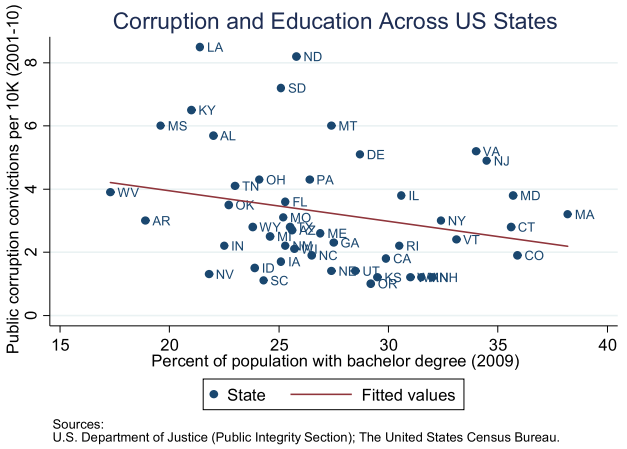

Fig. 1. Corruption and education across US states.

correlation between corruption and voter turnout across county elections in the State of Mississippi, and Escaleras et al. (2012) demonstrate the same pattern across U.S. states.[2]

We argue that considering citizens' level of informedness, their electoral participation patterns, and political parties' policies on corruption and rents as jointly determined equilibrium outcomes is key to gain a deeper understanding of the potential mechanisms behind patterns observed in the data. How much information a citizen gathers – by reading newspapers, listening to the radio, watching television, attending political meetings, and so on – is an endogenous choice variable that presumably depends on her information search costs and her expectation about parties' attitudes towards, and policies on, rent extraction. Additionally, citizens endogenously choose whether to participate or abstain from information acquisition and voting altogether, for example if they are discouraged by corruption, or if they find information search too costly. Finally, it seems reasonable to expect that parties take into account citizens' characteristics and voting behavior when competing for office. Hence, voters' informedness, their participation patterns, and parties' political rent policies may all be functions of citizens' information search costs. We know little about how information search costs affect political-equilibrium outcomes and we aim at filling this gap in the literature.

To this end, we develop a theory of equilibrium rents in large (e.g., regional or national) elections, characterized by different degrees of proportional representation. In our model, ex ante identical parties endogenously commit to different (or similar) political rent levels prior to the election, while citizens endogenously choose whether to search for information about the parties' rents, how much information they gather, whether to vote, and who to vote for. Our main theoretical result is that, in political equilibrium, higher information search costs lead to higher equilibrium rents, but that this relationship is reversed when the search cost increases beyond a threshold value. The intuition for the reversal is that, when information search costs become sufficiently high (above a threshold value), increasing it even further reduces the propensity of those citizens with the highest search cost to participate in the election. This endogenously increases the share of (relatively) informed citizens in the election, implying that equilibrium political rents is expected to be (weakly) lower when voter turnout is lower. In addition, we show that both turnout and rents depend on the political institutions, in our theory characterized by the level of proportionality in the translation of votes into political power. Specifically, we show that proportionality and turnout may be (weakly) negatively correlated if elections are ex ante competitive, consistent with the evidence in, for example, Herrera et al. (2013) and Cox et al. (2016). Moreover, we show that more proportionality is expected to lead to a higher level of rents, which is consistent with, for example, the micro evidence from Italian elections provided in Gagliarducci et al. (2011).

Going into the details of our model, our point of departure for modeling voter behavior is that, in the context of large elections, a voter's strategic margin tends to zero. A strategic voter would then only acquire information if the information search cost is zero (as discussed by, e.g., Feddersen and Pesendorfer, 1996, p. 418). Hence, in order to have positive information search in political equilibrium, we propose a model where the incentive to participate stems from an exogenous, non-instrumental consumption benefit of voting (Riker and Ordeshook, 1968, and Feddersen, 2004). The key variable for voter behavior in our model is the expected costs of voting. We assume that citizens perceive as costly that they may end

[2] The analysis in Karahan et al. (2006) has the flavor of a difference-in-difference approach, contrasting turnout at the 1987 county supervisor elections to turnout at the 1984 presidential elections, using the number of political corruption convictions (via FBI operations in the period 1984 to 1987) as the main explanatory variable. They interpret the positive estimate on their corruption variable as evidence of a demand-side story, where rent-seeking candidates mobilize voters in order to gain votes and consume rents. Escaleras et al. (2012) use a panel of gubernatorial elections across the fifty U.S. states between 1979 and 2005 to test the association between the number of public officials convicted of corruption and voter turnout, relying on state fixed effects to deal with time-invarying unobserved variables. Also this paper relies on a demand-side story to interpret their results, taking corruption levels as given. In contrast, our theory suggests that turnout and corruption should be considered as jointly determined political equilibrium outcomes.

up voting for a party with a high-rent policy. Moreover, as citizens cannot directly observe the parties' policies they must engage in costly search to get informed. When searching for information, citizens face different levels of information search costs (e.g., due to differences in education, cognitive skills, etc.). We define the *informed* as those citizens that face zero information search costs and the *uninformed* – the remaining share of citizens – as those that face positive information search costs.

Citizens face the following key trade-off: they must balance their cost of searching for information about one or more parties against their expected reduction in voting costs of potentially finding a party with low(er) rents. Moreover, as the uninformed face two types of voting costs – the information search cost and disutility of voting for a party with high(er) rents – some of these citizens may optimally choose to abstain in the election.

The political parties form rational expectations about the citizens' voting behavior when maximizing their respective expected payoffs from rents, giving rise to the following trade-off: a party can commit to low rents and expect to capture a larger share of the vote, or commit to a higher level of rents and rely to a larger extent on the votes from the uninformed. In this trade-off, the parties take into account that the larger is the share of the uninformed citizens that is expected to abstain in the election, the more fierce will the electoral competition for the votes of the informed be.

In the political equilibrium of our model, parties are expected to commit to different levels of political rents within the bounds of a political *equilibrium rent distribution*, providing a rationale for why the level of rents is expected to be dispersed at any level of information characteristic (e.g., educational attainment). The characteristics of this equilibrium rent distribution – its expectation and support – are determined by the information structure. The intuition why rents are not competed down to zero is that, in contrast to a pure Bertrand competition, parties operating in electoral systems characterized by some degree of proportionality expect to get a positive vote share and some political power even if they don't offer the best policy. Hence, there exist no symmetric pure strategy equilibria, and the equilibrium we study is one in symmetric mixed strategies.

Studying the equilibrium rent distribution, a first result (as mentioned above) is that there is an inverted U-shaped relationship between the uninformed citizens' search cost and the parties' expected rent policy. This non-linearity is due to two competing effects on the expected rent policy. On the one hand, a higher search cost weakens the uninformed citizens' incentive to acquire information. The parties then have a weaker incentive to commit to low political rents, pushing up the equilibrium level of expected rents. We refer to this as the *information effect* on political rents. On the other hand, a higher information search cost induces some of the uninformed to abstain in the election. When the share of the uninformed that are expected to participate is reduced, the effective share of fully informed voters in the election increases. This is the *participation effect*, which increases the competitive pressure on parties and pushes equilibrium rent policies down. As it turns out, in the part of the political equilibrium where the participation effect is relevant (i.e., when electoral turnout is sensitive to search costs), the participation effect dominates the information effect, implying that a decrease in the information search cost increases both the expected rent policies set by the parties and overall electoral turnout.

Further, at any given participation rate, the equilibrium distribution of political rents is wider when the information search cost is higher, as the parties may get votes for a broader range of rents when the uninformed voters are less inclined to search for information. This can be interpreted as the level of political uncertainty being higher when information search is costly, and suggests that political rents are expected to display a higher variance at, for example, a lower level of educational attainment (as in Fig. 1). Moreover, the expected level of political rents is weakly decreasing in the share of informed citizens, since a higher share of informed citizens increases the competitive pressure on the parties (again, consistent with Fig. 1).

Finally, the political equilibrium depends on the political institutions, and our main technical innovation is to model the interaction between information search and the political institutions via the aggregation of votes into expected payoff for the parties. As our citizens are homogeneous, except for their differences in search costs, the only role of the political institutions is to determine the expected payoff for a party as a function of its expected vote share. On the one hand, if the expected payoff of setting a given rent policy is proportional to the resulting vote share, this implies that even small parties – i.e., those that endogenously set rents high and, hence, expect to receive a relatively small share of the votes – can expect strictly positive payoffs after the election. One may think of this in terms of a proportional electoral system, where even small parties can expect to enjoy political power if, for example, included in a larger government coalition. On the other hand, the electoral system may favor the largest party, as in, for example, a majoritarian type of electoral system. In such a system, the largest party in terms of vote share enjoys a disproportionately large amount of political power, and the competition for the informed voters will hence be more fierce. Our comparative statics results on the political institutions are then as follows. First, the expected rent policy is (weakly) increasing in the level of proportionality as a more proportional system gives more political power to the small parties. More power to the smaller parties weakens the parties' incentive to capture the informed citizens and thus reduces the competitive pressure in the election. Second, turnout in the election is (weakly) decreasing in the level of proportionality. Again, this stems from that a more proportional system is less competitive and when the competitive pressure is reduced, expected rents and, hence, the expected costs of voting are higher, and citizens choose to a greater extent to abstain in the election due to higher expected costs of voting.

Our theory combines key elements from theories of voter behavior and industrial organization (IO) models of consumer search. As is well acknowledged in the literature on voter behavior in large elections, an individual citizen knowing that her vote cannot possibly change the election outcome may still choose to participate due to non-instrumental voting motives

(for example, to defend the values of democracy *per se*, as argued by, e.g., Cohen, 1973; Sen, 1999).[3] Further, that voters do not appreciate ending up voting for a party with a high rents is akin to the perceived cost of voting assumption in Matsusaka (1995) and Degan and Merlo (2011). Given these assumptions on voter behavior, the political market is similar to a consumer goods market, and we combine this behavior with insights and techniques from the IO consumer search literature (e.g., Diamond, 1971; Varian, 1980, and Burdett and Judd, 1983). In particular, the sequential structure of citizens' information acquisition relates closely to Stahl's (1989) consumer search setup. Moreover, our citizens' margin to participate in the election is similar to the margin for shopping in Janssen et al. (2005). However, there are major differences between a consumer goods market and a political market, both with respect to institutional features and agents' incentives. Technically, then, our main deviations from the IO literature is the institutional transformation of votes into parties' expected political power and the decision theoretic framework for voting behavior.

The remainder of the paper is structured as follows. In Section 2, we relate our contribution to the existing literature in more detail. Subsequently, we describe the model environment in Section 3 and characterize the political equilibrium in Section 4. Section 5 consists of a series of comparative statics exercises, mainly focusing on the effect of the level and the distribution of information search costs on the equilibrium level and distribution of rent policies set by the parties. In Section 6, we discuss potential extensions, as well as the robustness of our key assumptions. This includes a discussion of how our theory suggests a novel mechanism by which parties, or incumbent(s), have a joint incentive to manipulate information by changing the level of information costs rather than – as in the literature on media capture – the content of information. Finally, Section 7 sums up and concludes.

2. Related literature

While our way of modeling electoral competition and information problems is, to the best of our knowledge, new, our proposed theory relates to a number of previous contributions and existing literatures – within the field of political economy and beyond. Most importantly, our paper relates to the large literature on political competition and the political agency problem and, more specifically, to the 'pre-election politics' branch of this literature (see, e.g., Persson and Tabellini, 2000, and Besley, 2006, for thorough reviews). There is a large literature on probabilistic voting where exogenous popularity (taste) shocks form the foundation for parties' rent extraction in political equilibrium (Polo, 1998; Svensson, 1998).[4] Our framework is fundamentally different from that of probabilistic voting as electoral uncertainty in our model is an equilibrium outcome, stemming from the endogenous voting behavior of uninformed citizens that gives rise to a distribution of equilibrium policies.[5]

A different branch of the political agency literature focuses on 'post-election politics' and the agency problems arising from moral hazard and/or incomplete information (e.g., Ferejohn, 1986; Alesina, 1988; Austen-Smith and Banks, 1989; Banks, 1990).[6] These problems are absent in our model. First, we abstract away from moral hazard concerns by modeling full commitment to policies, as is common in the 'pre-election politics' literature. Second, rather than exogenous type draws of preferences or abilities, as is common in models of incomplete information, citizens in our model face homogeneous parties that differ in their political rent policies because they play a mixed strategy in political equilibrium.

Central to our model is the link between the level and distribution of political information in society and voter activity. The positive relationship in our model between information and turnout finds broad support in the empirical literature. Palfrey and Poole (1987) show that uninformed voters are more inclined to abstain from voting, and also display more variation in their voting behavior, and Lassen (2005) and Degan and Merlo (2011) provide evidence of a positive, causal effect of information on electoral participation. Existing theories that study the relationship between information and turnout in large elections include, e.g., Palfrey and Rosenthal (1985) and Feddersen and Sandroni (2006a). Degan and Merlo (2011), Feddersen and Sandroni (2006b), Larcinese (2007) and Hodler et al. (2015) are among the few papers that also analyze costly information acquisition in this context.[7] However, none of these papers study equilibrium political rents. Similarly, there is a growing literature on media and voter turnout which tends to find a positive effect of more media (see, e.g., Snyder and Strömberg, 2010; Gentzkow et al., 2011), although there may be effects pointing

[3] Instrumental voting motives lacks empirical support in the context of large elections. Extensive documentation is provided by, e.g., Aldrich (1993), Blais (2000), Dhillon and Peralta (2002), Feddersen (2004), Geys (2006), Merlo (2006), and Smets and van Ham (2013). Also notice that, in the absence of an instrumental motive, the 'swing voter's curse' (Feddersen and Pesendorfer, 1996) – i.e., strategic abstention by uninformed voters – does not apply.

[4] Several recent extensions of the probabilistic voting framework relate to our paper in different ways, by considering either endogenous turnout or differences in voting costs or voter information (Svaleryd and Vlachos, 2009; Lind and Rohner, 2011; Aldashev, 2015). For experimental evidence on the effect of electoral competition on political rents see Heggedal et al. (2018).

[5] The notion of informed and uninformed voters is part of this literature as well (e.g., Baron, 1994, and Grossman and Helpman, 1996), but focusing on the dimension of special interest politics without paying attention to endogenous information search and endogenous electoral participation.

[6] Persson and Tabellini (2000) and Besley (2006) also review this literature thoroughly.

[7] A related class of theories study voting, abstention, and costly information acquisition in small-scale elections, such as committees, where – in contrast to our large-election context – a voter may expect to be pivotal. That a voter expects to be pivotal may radically change the association between turnout and information, as in, e.g., Oliveros (2013), where some voters are shown to be more likely to abstain the more informed they are.

in the opposite direction (e.g., McMurray, 2013; Piolatto and Schuett, 2015).[8] There is also evidence that costs of information acquisition are heterogeneously distributed and that this distribution can be related to voter activity (Dee, 2004; Milligan et al., 2004). Finally, there is recent evidence that information about corruption is negative for turnout: Consistent with the behavior of the voters in our theory, Chong et al. (2015), in a field experiment from Mexico, document that citizens are less inclined to participate if they receive exogenous information that politicians are (more) corrupt (which would be a partial equilibrium outcome in our model when exogenously changing the expected level of rent policies).

Our paper also relates to the literature on rational inattention, in that individuals with rational expectations about equilibrium outcomes endogenously choose an information acquisition strategy (e.g., Sims, 2003). The main difference is that, while our citizens make choices about the amount of information to collect about ex ante identical parties, a rational inattentive citizen would focus attention on an identifiable subset of parties or policies. The only political economy paper we are aware of that explores rational inattention in political equilibrium is Matějka and Tabellini (2017), but they do not consider the issue of political rents.[9]

Finally, our theory relates to the literature on the economic effects of political institutions. While the formation of governments, coalitions and policies in proportional representation systems is contextual, parties that expect to be larger in terms of vote and seat shares can expect to have a stronger influence on the political equilibrium policy (as demonstrated by, e.g., Baron and Diermeier, 2001). Interestingly, our results corroborate the theoretical (as reviewed in Persson and Tabellini, 2000) and empirical (e.g., Persson and Tabellini, 2003; Persson et al., 2003; Kunicova and Rose-Ackerman, 2005) result that a more proportional aggregation of vote shares into political power leads to a higher expected level of rents in political equilibrium. Even though our model suggests a different causal mechanism, the underlying logic is somewhat similar: political competition is stiffer in majoritarian relative to proportional systems because competition will be more responsive with respect to the voting behavior of smaller groups of more homogeneous voters (e.g., Persson and Tabellini, 1999). In our setting, the small group of homogeneous voters is identified as the group of informed citizens whereas, in the existing literature, this group is the one with the least ideologically dispersed voters (i.e., with a larger mass of 'swing voters').[10]

3. The model environment

Population characteristics. Our model economy is populated by a unit mass of citizens with homogeneous preferences.[11] A small exogenous subset, $N \geq 2$, of citizens form parties $i = 1, ..., N$ which may be voted into government in popular elections.[12] As the population is assumed to be homogeneous, the exact mechanism by which citizens are selected, or self-select, into politics is inessential. Additionally, redistributional concerns do not apply and, finally, we disregard the role of ideology. The only remaining political tension, then, is the level of political rents, and the only source of heterogeneity, as will be explained below, comes from the information structure.

Commitment. As is common in the literature on pre-election politics, we assume that parties may commit to a policy on political rents. For example, a party may commit to low rents by committing to reforms aimed at increasing the checks-and-balances within and across government branches, or by selecting more or less honest or competent party candidates. The level of political rents that any given party i commits to (i.e., the party's rent policy), r_i, can thus be interpreted narrowly as the expected level of (excess) politician wages or corruption implied by the party's political platform and candidate selection, or more broadly as the implied level of any type of government waste. We discuss different interpretations of political rents further in Section 6.2.

Preferences. In line with most comprehensive theories in political economy, we assume that parties (or politicians) seeking political power prefer higher to lower rents while citizens prefer lower to higher rents.[13] We operationalize the latter by assuming that citizens incur a direct (psychological) disutility of voting for a party with political rents, and that this disutility is increasing in the party's level of rents. The exact preference structure will be defined in more detail below, when considering the citizens' objectives. In addition to their disutility of voting for a party with rents, we assume that citizens enjoy a non-instrumental utility (a "consumption benefit") of voting, D, which may be interpreted as the satisfaction of complying with a civic duty, or from affirming allegiance to the political system.[14] This D is the only positive benefit

[8] The evidence of the effect of Internet availability on electoral participation is, however, more mixed: Falck et al. (2014) find a negative effect, while Campante et al. (2013) find that the effect is positive after some time, and both argue that the negative effect may be due to a crowding out of other, more relevant sources of political information.

[9] Matějka and Tabellini (2017) propose a probabilistic voting framework with costly information acquisition, where voters optimally trade off the cost of reducing policy signal noise against a perceived (non-instrumental) "sincere attention" benefit of voting. In political equilibrium, the political candidates take voters' rational inattention into account and thereby maximize a modified social welfare function, in order to attract votes and win the election. However, the authors do not address the issue of political rents, and they also disregard the effect of search costs on political participation (by implicitly assuming full turnout).

[10] For a broad review of the literature on the economic and political determinants of political corruption, see, e.g., Treisman (2000).

[11] We refer to 'citizens' as the entire population entitled to vote in elections and 'voters' as those who, in political equilibrium, turn out to vote.

[12] The notion of parties may be interchanged with individually running candidates.

[13] As in, e.g., Persson and Tabellini (2000), Besley and Persson (2011) and Bueno de Mesquita et al. (2003).

[14] See, e.g., Riker and Ordeshook (1968) for a thorough discussion of the calculus of voting and of the importance of including a D-term. In addition to ethics and political allegiances, they list affirming a partisan preference, the satisfaction of deciding, and the satisfaction of affirming one's efficacy in the political system as key elements of D.

of voting and we assume a citizen only gets D if she is informed about the policy of the party she votes for. This rules out purely random voting.[15] Further, D is the same for all citizens and independent of the parties' polices. For notational brevity, we drop that D is conditional on that the citizen has information about the party she votes for.

Information search. Parties' rent policies or their strategic selection of "bad" politician types is typically behind-the-scenes, hence, citizens need to engage in costly search to be informed. In their process of acquiring information, citizens face different levels of information search costs. Denote by c^s the vector of search costs, with $c_I^s = 0$ for the informed citizens (indexed by "I") and $c_U^s > 0$ for the uninformed citizens (indexed by "U"). The distribution of search costs in the population is given by a share $\mu \in (0,1)$ that are informed while the remaining share $(1-\mu)$ are uninformed. Notice that no citizens are ex ante informed about any policies, so it is only the individual cost of obtaining information that varies across individuals.[16]

When searching for information, a citizen incurs the cost c^s and observes the rent policy r_i of a party i. Incurring the cost again gives another policy quote of another party, i.e., search is sequential, and c^s is the marginal search cost.[17] Each search gives an independent draw from the equilibrium policy distribution with cdf $F(\cdot)$ and support $[\underline{r}, \overline{r}]$. Both the distribution and the support are endogenous in our model and will be pinned down later when we characterize the equilibrium, but it is convenient to establish the notation for the distribution here. Importantly, we do not suppose anything about the shape of $F(\cdot)$, it could even be degenerate. Let $r \sim F(\cdot)$ denote the stochastic policy variable with $E[r]$ as the expected policy quote from each additional search action. Further, we assume that a citizen has recall over her observations from all previous searches and that she will choose the party with the lowest level of rent in her information set.

Turnout. A convenient way to endogenize the participation rates of the citizens in our model is to allow them to play mixed participation strategies. We denote τ_I and τ_U the mixed strategies of the informed and the uninformed, respectively, with $\tau = \{\tau_I, \tau_U\}$. The share of informed relative to uninformed citizens that participate in the election will vary according to the participation strategies. For later use, we define the effective share of informed voters in the election as $\hat{\mu}(\tau) \equiv \frac{\mu\tau_I}{\mu\tau_I + (1-\mu)\tau_U}$.

Political institutions. Once those citizens that participate in the election have cast their votes, the votes will be translated into political power for the different competing parties according to the specific political institutions of the economy. A higher level of political power implies a higher likelihood of getting to consume the level of rents that the party has committed to, and hence a higher payoff for the party.

Crucially, we assume that the political institutions imply some degree of proportionality in the translation of vote shares into political power. Specifically, we assume: i) any positive vote share, however small, will map into some positive degree of political power and ii) the higher the vote share a party wins in the election, the more political power it will enjoy.[18] A party expects with some probability to attract the informed and become the largest party, or else it will get only some share of the uninformed votes and become a small party.

The mapping of vote shares into the power of the large ("L") and the smaller ("S") parties is given by the functions $\gamma_L\left(\hat{\mu}(\tau)\right)$ and $\gamma_S\left(\hat{\mu}(\tau)\right)$, respectively, where $\gamma_L\left(\hat{\mu}(\tau)\right) > \gamma_S\left(\hat{\mu}(\tau)\right) > 0$ and we assume that both functions are monotonic and twice differentiable. It will be useful to define $g(\tau) \equiv \frac{\gamma_S(\hat{\mu}(\tau))}{\gamma_L(\hat{\mu}(\tau))} < 1$ as the relative political power of being a small versus a large party in terms of vote shares, where a higher value of $g(\tau)$ implies a higher degree of proportionality. Notice that for a larger effective share of informed voters, a higher vote share will go to the party that has the lowest rent policy. It follows that $\frac{\partial g}{\partial \hat{\mu}} < 0$, and we assume $\lim_{\hat{\mu}\to 1} g = 0$.

To build intuition for how our institutional setup works, consider the following example. First, note that the party with the lowest rent gets (by the law of large numbers, using that there is a continuum of citizens) a vote share of $\hat{\mu}(\tau) + (1-\hat{\mu}(\tau))/N$, while the other parties get vote shares equal to $(1-\hat{\mu}(\tau))/N$. Since $\gamma_L\left(\hat{\mu}(\tau)\right) > \gamma_S\left(\hat{\mu}(\tau)\right) > 0$, the largest party in terms of vote share holds more, but not all, political power. Then, in the case of full proportionality where political power directly follows from the parties' respective vote shares, we would have $\gamma_L\left(\hat{\mu}(\tau)\right) = \hat{\mu}(\tau) + (1-\hat{\mu}(\tau))/N$, $\gamma_S\left(\hat{\mu}(\tau)\right) = (1-\hat{\mu}(\tau))/N$ and $g(\tau) = \frac{(1-\hat{\mu}(\tau))/N}{\hat{\mu}(\tau)+(1-\hat{\mu}(\tau))/N}$. Alternatively, in a (close to) majoritarian system, $\gamma_L\left(\hat{\mu}(\tau)\right)$ would be close to one while $\gamma_S\left(\hat{\mu}(\tau)\right)$ would be close to zero and, hence, $g(\tau)$ would tend to zero.

[15] In our discussion in Section 6, we argue that our main results hold also in a model where voter behavior is exogenous and uninformed citizens vote randomly (see section 6.4). Moreover, rather than assuming that D is dichotomous (i.e., either positive or zero, depending on whether the citizen is informed or not), we could make it a continuous function of information search. In fact, in our setup, an increase in D or a reduction in the cost of voting (as described in more detail below) would lead to the same type of political equilibrium results.

[16] An alternative is to assume that all citizens have information about at least one party and, hence, that all citizens participate in the election to enjoy D. This would rule out abstention (the participation effect), but the remainder of the political equilibrium and the information effect would remain unchanged.

[17] Alternatively, we could have assumed 'noisy search', where a citizen may observe more than one rent policy quote for each search. In the discussion in Section 6.5, we argue that our main results do not hinge on our choice of search technology.

[18] The latter assumption is consistent with the translation of vote shares into seat shares as described by the "cube law" (e.g., Taagepera, 1986).

3.1. Citizens' and parties' objectives

We now turn to the parties' and the citizens' objectives. In this section we assume that the policy distribution $F(\cdot)$ with support $[\underline{r}, \overline{r}]$ exists, which will be shown to be the case in Section 4.3.

Citizens' objective. Let the parameter $c^v > 0$ be a measure of a citizen's disutility of voting for a party i with a rent policy r_i that is higher than her reference policy.[19] In our framework, citizens prefer low over high rents, and we define the reference policy as the lowest possible equilibrium rent. In political equilibrium, the lowest possible realization of the rent policy distribution $F(\cdot)$ is $\underline{r}$. The citizens form rational expectations of this lower bound, i.e., they calculate $\underline{r}$, and hold this as their reference point. We can then define the utility cost of voting for party i as $c^v\left(r_i - \underline{r}\right)$, which is increasing in both the parameter c^v and in the distance $\left(r_i - \underline{r}\right)$.[20]

The search strategy of a citizen is to decide on a reservation rent policy $\rho \in R^+$, and we write the number of searches as $S(\rho)$, which is a random variable. When a citizen observes a rent policy equal to or below the reservation rent, she stops searching and votes for the best policy in her information set. We denote the lowest observed rent $r_{\min}$. Total expected cost of voting for a citizen is then given by

$$E[C] \equiv E\left[S(\rho)\right]c^s + c^v\left(E[r_{\min}|S(\rho)] - \underline{r}\right). \tag{1}$$

A citizen's expected net benefit of voting is then $D - E[C]$.

We write the citizens' objective as

$$\max_{\{\tau,\rho\}} \tau\left(D - E[C]\right). \tag{2}$$

Since we will only analyze symmetric equilibria, the participation strategy τ and search strategy ρ will be identical across all citizens with identical search cost; however, the strategies will differ across the informed and the uninformed citizens.

Parties' objective. We assume that a political party i commits to a level of rents r_i and that it takes the participation decision of citizens as given. The party recognizes that the electoral outcome may be uncertain due to the partly stochastic voting by uninformed citizens. Also, the turnout decision, and thus the vote shares of the informed and uninformed citizens, influences the expected political power. Taking into account uncertainty and participation, we define $\Gamma(F(r_i), \tau)$ as the expected political power of a party i to extract and consume political rents. We can then define the expected payoff of a party i as

$$\Pi\left(r_i, F(r_i), \tau\right) \equiv r_i\Gamma(F(r_i), \tau), \tag{3}$$

which can be interpreted as the party's expectation of the rents it will be in a position to consume when committing to a platform with r_i (we elaborate on this interpretation in Section 4.2 below). Importantly, (3) implies that expected payoff is increasing in party i's rent policy for a given expected power and increasing in the expected power for a given level of rents, but that the expected power is a function of the party's rent policy. It is convenient to analyze the citizens participation and search strategies $\{\tau, \rho\}$ before defining $\Gamma(F(r_i), \tau)$, so we postpone this and further interpretations of the parties' expectations to Section 4.2. A party i's objective is to set r_i as to maximize (3) taking τ as given. We denote F_i the party's mixed rent strategy, that is, the probability distribution over $r_i \in R^+$.

3.2. The game structure

Now, turning to the game structure, consider the following political game between parties and citizens:

Timing. Two periods, $t = 1, 2$, where:

$t = 1$: Nature chooses a vector of parameters $\left\{D, N, c^s, c^v, \mu\right\}$ at the beginning of the period. Parties and citizens simultaneously decide on their rent strategies, F_i, and their participation and search strategies, $\{\tau, \rho\}$, respectively.

$t = 2$: The election takes place and payoffs are realized.

A party i commits to a rent policy r_i consistent with its rent strategy F_i, taking the other parties' strategies and the search and voting strategies of the citizens as given. Citizens decide whether to participate or abstain and, subject to participation, they search, get information about one or more parties' policies, r_i, and cast their votes, anticipating the equilibrium policy distribution that follows from the parties' strategies. After the election, in period $t = 2$, payoffs are realized. Since all the strategic behavior takes place in $t = 1$ we drop time subscripts throughout.

[19] Two alternative interpretations of c^v, which both are fully consistent with our setup, are, first, that this parameter measures a citizen's perceived cost of (or aversion toward) voting for a high-rent party, or, second, that it is a measure of how much a citizen cares about finding the right policy for her.

[20] Whether citizens evaluate a party's rent policy relative to their rational expectation of the lower bound of the rent policy support, $\underline{r}$, or to any other, arbitrary level lower than this bound (say, zero) is inessential for the key equilibrium characteristics and results. Note that, independent of the choice of reference point, our formulation implies that expecting to vote for a party with a policy farther away from the reference point is associated with a higher expected voting cost. This notion is consistent with the idea of incurring psychological costs from making voting errors (as in, e.g., Degan and Merlo, 2011).

4. The political equilibrium

We now continue by defining and characterizing the political equilibrium with information search. We solve the game between citizens and parties in the following way. First, we assume that a policy distribution with cdf $F(\cdot)$ and support $[\underline{r}, \overline{r}]$ exists in equilibrium. Then, we analyze the citizens' search and voting strategy, given $F(\cdot)$ and that the support of $F(\cdot)$ includes ρ. Next, we set up the details of the parties' payoffs, given $F(\cdot)$ and ρ. After that, we analyze the parties' strategies further, characterize $F(\cdot)$, and find ρ. Last, we show that $F(\cdot)$ indeed exists, that ρ indeed is in the support, and derive the sufficient parameter conditions for existence and uniqueness of the political equilibrium.

We only analyze symmetric equilibria. Then, in political equilibrium, the mixed strategies of the parties are given by the policy distribution $F_i = F(\cdot)\ \forall i$. We define the political equilibrium in our model as follows:

Definition 1. A political equilibrium is a policy distribution $F(\cdot)$, and participation and search strategies $\{\tau, \rho\}$ such that:
1. Parties have the same expected payoffs; $\Pi(r_i, F(r_i), \tau) = \overline{\Pi}$ for all r_i in the support of $F(\cdot)$;
2. Parties have no incentive to change their policies; $\overline{\Pi} \geq \Pi(r_i, F(r_i), \tau)$ for all r_i in the support of $F(\cdot)$, given ρ;
3. ρ is in the support of $F(\cdot)$;
4. $\{\tau, \rho\}$ solves the citizens' problem given by Equation (2).

4.1. Citizens' search and voting strategy

First, we analyze the citizens' search strategy, conditional on their participation. Recall that one search action gives an independent draw from the policy distribution. Then, using (1) and (2), the expected net benefit of taking only one search action can be written

$$d - \left(E[r] - \underline{r}\right) - c, \tag{4}$$

where we have used the linear transformations $d \equiv \frac{D}{c^v}$ and $c \equiv \frac{c^s}{c^v}$. Here, d and c have the interpretations of the relative importance of the direct benefit of voting and the search cost, respectively, to the parameter value of the disutility of voting for high rents.

Citizens search again if the rent policy from the first search is larger than their reservation rent. The reservation rent will vary with the citizens' search costs, and we denote ρ_I and ρ_U the reservation rent of the informed and uninformed citizens, respectively. The reservation rent for the uninformed is defined by the rent that makes the expected benefit of continued search equal to the search costs:

$$\int_{\underline{r}}^{\rho_U} (\rho_U - r_i) f(r_i) dr_i - c = 0. \tag{5}$$

The reservation rent implied by (5) constitutes an optimal stopping rule that is independent of the number of parties left to search. Importantly, no party will set its policy above this reservation rent, or else it would not get any votes. Hence, the upper bound of the equilibrium policy distribution is given by $\bar{r} = \rho_U$ and, consequently, the uninformed citizens do not search more than once in political equilibrium (see appendix A1 for a formal proof).[21] We then can use the facts that $\int_{\underline{r}}^{\rho_U} f(r_i) dr_i = 1$ and $\int_{\underline{r}}^{\rho_U} r_i f(r_i) dr_i = E[r]$ to rewrite (5) as

$$\rho_U - E[r] - c = 0. \tag{6}$$

Search is free for the informed citizens, implying that there is a possible gain from searching again as long as $r_{\min} > \underline{r}$. They thus set $\rho_I = \underline{r}$, and will search all parties, since $\Pr\{r_i = \underline{r}\} = 0$ in political equilibrium (that the equilibrium distribution is atomless will be shown in Section 4.3).

A citizen may abstain from voting in political equilibrium. Since the uninformed only search once, if they choose to participate, it follows from (4) that their participation constraint is

$$d - \left(E[r] - \underline{r}\right) - c \geq 0, \tag{7}$$

or, equivalently, $D - c^v \left(E[r] - \underline{r}\right) - c_U^s \geq 0$, where we assume $D > c_U^s$ to focus attention on equilibria with positive participation of the uninformed. Hence, (7) implies that uninformed citizens are more likely to abstain from participating in the election the higher the expected level of rents is relative to the lower bound of the support.

Recall that citizens decide on their participation and search strategy simultaneously. However, since they cannot condition their participation strategy on observation(s) from their search, the citizens in effect commit to participation (i.e., voting) before searching. Importantly, the timing between the decision to participate and the decision to search is not relevant for the citizens' choice of strategies. The reason is that, conditional on searching, the search cost is sunk and a citizen

[21] That uninformed agents do not search more than once is a standard result in sequential search models, see, e.g., Stahl (1989).

only gets D if she votes. Thus it will be optimal to vote for one of the sampled parties since the upper bound of the equilibrium policy distribution, given by ρ_U, ensures that the participation constraint (7) holds.

Notice that the expected net benefit of participating for the informed is strictly greater than for the uninformed, since $E[r_{\min}|S(\cdot)=N] < E[r_{\min}|S(\cdot)=1] = E[r]$ for any non-degenerate distribution of r. Thus, as long as some of the uninformed citizens participate in political equilibrium, all of the informed will participate. The following lemma establishes that $\tau_U > 0$ and, hence, $\tau_I = 1$.

Lemma 1. *In political equilibrium all of the informed citizens and at least some of the uninformed citizens participate in the election.*

Proof. See appendix A2. □

Lemma 1 implies that there are at least some uninformed citizens participating in the election and searching for information. The intuition for this can be explained by considering what would happen if only the informed citizens participate in the election. If so, the party offering the lowest rent would get all the votes. This gives a Bertrand-type competition that would drive rents down to zero. But then there would be no disutility of voting and the uninformed citizens would benefit from deviating by participating in the election since $D > c_U^s$. Hence, a political equilibrium where only the informed citizens participate does not exist.

Observe that Lemma 1 suggests two candidates for political equilibrium: either a *full participation* case with $\tau_I = \tau_U = 1$ or a *partial participation* case with $\tau_I = 1$ and $0 < \tau_U < 1$. This is analogous to the two cases for consumer participation of Janssen et al. (2005). When convenient, we will separate the analysis into these two cases.

4.2. Parties' payoffs

Having established the search strategies of the citizens, we can now set up the parties' payoffs in more detail. A party conditions its rent strategy on its expectations of the rent policies of the other parties and of the search and voting strategies of citizens. Again, assume that $F(\cdot)$ exists, so that a party perceives the other parties' rent policies as random draws from $F(\cdot)$.

We define the expected political power of a party as

$$\Gamma\left(F(r_i),\tau\right) \equiv \left[1-F\left(r_i\right)\right]^{N-1}\gamma_L\left(\hat{\mu}\left(\tau\right)\right) + \left(1-\left[1-F\left(r_i\right)\right]^{N-1}\right)\gamma_S\left(\hat{\mu}\left(\tau\right)\right), \tag{8}$$

where $\left[1-F\left(r_i\right)\right]^{N-1}$ is the probability that r_i is the lowest rent, conditional on the distribution $F(\cdot)$. Using (8), the expected payoff of a party is then

$$\Pi\left(r_i, F\left(r_i\right), \tau\right) = r_i\left[\left[1-F\left(r_i\right)\right]^{N-1}\gamma_L\left(\hat{\mu}\left(\tau\right)\right) + \left(1-\left[1-F\left(r_i\right)\right]^{N-1}\right)\gamma_S\left(\hat{\mu}\left(\tau\right)\right)\right]. \tag{9}$$

There are two alternative interpretations of rent policy implementation in this setup. First, that only the largest party's rent policy is implemented and all rents accrue to this party. In this case, $\Gamma\left(F(r_i),\tau\right)$ is a multiplicative factor for the expected power of being the only party whose policy is implemented. Second, that a combination of parties' rent policies is implemented, for example through the formation of a coalition government. In this case, each party receives, in expectation, a share of their own rent offer, where the share follows from the parties' political power. Although the policy outcome of those two interpretations may be different, the expected payoffs for the parties are invariant. Thus, the parties' trade-off is invariant. From (9) we see party i's trade-off when deciding on policy; a low level of r_i to attract the votes of the informed citizens versus a high level of r_i with a lower probability of getting the largest vote share but at the same time higher rents if the rent policy is implemented.

4.3. Characterizing the political equilibrium

Having analyzed the citizens' strategies and set up the details of the parties' payoffs, given $F(\cdot)$, we will now characterize $F(\cdot)$.

A major feature of our model is that there exist no symmetric pure strategy political equilibria. To see why this is the case, consider a rent policy $\hat{r}$ set by all the parties. If $\hat{r} = \rho_U > 0$, then any party will have an incentive to lower its rents marginally to attract the informed voters and, hence, get a discrete increase in its expected payoff. If $\hat{r} = 0$, then any party expects zero rents and has the incentive to increase its rent policy to exploit the leverage of the uninformed citizens, implying $\rho_U > 0$. If $\hat{r}$ is in the range $0 < \hat{r} < \rho_U$, both aforementioned mechanisms provide the parties with the incentive to deviate from $\hat{r}$. Thus, as is standard in IO-search models (see, e.g., Varian, 1980; Stahl, 1989; Janssen et al., 2005), the distribution $F(\cdot)$ is atomless in equilibrium.

We now turn to mixed strategies. Recall that the symmetry of our model implies that all parties must play the same mixed strategy in equilibrium and, thus, the mixed strategy is given by the policy distribution $F_i = F(\cdot)\ \forall i$. In what follows, we will derive such a mixed strategy and show that a political equilibrium exists.

In equilibrium a party must be indifferent between committing to any rent policy in the support of $F(\cdot)$. We use this indifference to solve for $F(\cdot)$. More specifically, we use the property that for any rent policy r_i in the support of $F(\cdot)$, the party i's expected payoff must be equal to offering the supremum $\bar{r}$. Hence, we set $\Pi\left(r_i, F\left(r_i\right), \tau\right) = \Pi\left(\bar{r}, F\left(\bar{r}\right), \tau\right)$. Then the policy distribution in political equilibrium is characterized by[22]

$$F\left(r_i\right) = 1 - \left[\frac{g(\tau)}{1-g(\tau)}\frac{\bar{r}-r_i}{r_i}\right]^{\frac{1}{N-1}} \; : \; \forall i. \tag{10}$$

The lower bound of the distribution is found by setting $F\left(\underline{r}\right) = 0$, which gives[23]

$$\underline{r} = g(\tau)\bar{r}. \tag{11}$$

Notice that, since $g(\tau) \in (0,1)$, it follows that $\underline{r} < \bar{r}$, where we have already established that the upper bound is given by $\bar{r} = \rho_U$.

Next we derive an expression for the expected rents set by the parties. To this end, we first solve (10) for r_i which, using $\bar{r} = \rho_U$, gives

$$r_i = \frac{\rho_U}{1 + \frac{1-g(\tau)}{g(\tau)}\left[1 - F\left(r_i\right)\right]^{N-1}} \; : \; \forall i. \tag{12}$$

Since (12) is valid for any r_i in the support, due to symmetry, we can change r_i with the stochastic r, and then take the expectation over r to get

$$\begin{aligned} E[r] &= E\left[\frac{\rho_U}{1 + \frac{1-g(\tau)}{g(\tau)}\left[1 - F\left(r\right)\right]^{N-1}}\right] \\ &= \int_0^1 \frac{\rho_U}{1 + \frac{1-g(\tau)}{g(\tau)}z^{N-1}}dz, \end{aligned} \tag{13}$$

where, in the lower line, we have changed variables and used the fact that $z \sim U[0,1]$.

Then, we find the reservation rent of the uninformed, ρ_U. The indifference between searching again or not is given by (6) which, by plugging in (13), can be written

$$\rho_U\left[1 - \int_0^1 \frac{dz}{1 + \frac{1-g(\tau)}{g(\tau)}z^{N-1}}\right] - c = 0. \tag{14}$$

Having established expressions for the expected rents and the reservation rent of the uninformed, we now turn to the existence of political equilibrium. From Lemma 1 we know that, for a political equilibrium to exist, at least some of the uninformed must participate, i.e., the participation constraint (7) must be satisfied for some $\tau_U \in (0,1]$. Using that the lower bound of the support relates to ρ_U according to (11) and that expectations are given by (13), we can rewrite the constraint (7) as

$$d - \rho_U\left[\int_0^1 \frac{dz}{1 + \frac{1-g(\tau)}{g(\tau)}z^{N-1}} - g(\tau)\right] - c \geq 0. \tag{15}$$

The indifference to search again given by (6) and the participation constraint (7) must hold at the same time in equilibrium, so it follows that

$$\left[1 - g(\tau)\right]\rho_U \leq d. \tag{16}$$

Then, using (16) to substitute out ρ_U from (15), we get the equilibrium condition

$$\frac{1}{1-g(\tau)}\left[1 - \int_0^1 \frac{dz}{1 + \frac{1-g(\tau)}{g(\tau)}z^{N-1}}\right] \geq \frac{c}{d} \equiv \frac{c_U^s}{D}, \tag{17}$$

which gives a set of parameters for which a political equilibrium exists.

In what follows, it will be useful to separate between a full participation and a partial participation case for the political equilibrium. We have the following proposition:

[22] See appendix A3 for the derivation of the expression for $F\left(r_i\right)$.
[23] See appendix A3 for the derivation of the expression for $\underline{r}$.

Proposition 1. *A political equilibrium exists and is unique when $D > c_U^s$. Further, there are two candidates for political equilibrium: either a full participation case with $\tau_I = \tau_U = 1$ or a partial participation case with $\tau_I = 1$ and $0 < \tau_U < 1$.*

Proof. See appendix A4. □

It is the participation *per se* of uninformed citizens in the election that provides the foundation for political parties to abuse their power and extract political rents. The intuition regarding why the information structure lays the foundation for rent extraction is that it generates electoral uncertainty which provides a party with the incentive to trade off rents against the probability of winning the election. This trade-off is, however, not as smooth as in a model with exogenous electoral uncertainty (e.g., the probabilistic voting model) because the leverage of the positive mass of informed voters generates discrete jumps in the parties' expected payoffs. Thus, the equilibrium is one in mixed strategies, implying a dispersion in the equilibrium rent policies.

The participation constraint for the uninformed citizens gives rise to the two cases for the political equilibrium. All citizens participate in the election if the expected net benefit of participating for the uninformed is strictly positive. At the participation threshold, however, the uninformed citizens are indifferent between voting and abstaining and, depending on the exact parameter configuration, this threshold may either constitute an equilibrium with full or partial participation.

Starting from an equilibrium at the participation threshold with full participation ($\tau_U = 1$), consider an increase in the cost of voting (e.g., via an increase in the search cost, c_U^s). This implies, ceteris paribus, that the uninformed citizens' net benefit of participating becomes negative, inducing some of these citizens to abstain in the election ($\tau_U < 1$). That some uninformed citizens abstain has an effect on equilibrium outcomes since it changes the effective share of informed voters in the election. When τ_U goes down political competition increases, since the party that has committed to the lowest level of rents now gets a larger vote share (i.e., $g(\tau)$ goes down). The increased political competition for the informed citizens' votes pushes down the expected rents set by the parties and, hence, the expected voting costs of the uninformed citizens decreases. In political equilibrium the uninformed citizens are, again, indifferent to participating. The exact mechanisms by which a change in participation affects other equilibrium outcomes will become clear when we do comparative statics in the following section.

5. Comparative statics

In this section we analyze the effects on the political equilibrium of changing the key voting cost parameters in the model. In particular, we analyze effects of changing the level, c_U^s, and the distribution, μ, of the search costs. We also consider the effect of institutional reform, that is, a change in the degree of proportionality in the translation of vote shares into political decision power, as given by the shape of $g(\tau)$.

Whether there is full or partial participation in political equilibrium depends crucially on the voting costs. In this section, we first analyze the cases with full and partial participation separately to highlight that the effects on equilibrium outcomes of changing costs depend on the (initial) level of participation. Then we join the two cases and show that there is an inversely U-shaped relationship between the parties' expected rent policy and the search cost.

5.1. Comparative statics with full participation

In the following, we analyze the effects of changing search cost parameters when the participation constraint (15) is not binding, that is, $\tau_U = 1$.

The effects of changing the information search cost are then summarized in the following proposition.

Proposition 2. ***The search cost:*** *In political equilibrium with $\tau_U = 1$, an increase (decrease) in the search cost c_U^s:*
(i) increases (decreases) the reservation rent of the uninformed ρ_U;
(ii) increases (decreases) the lower bound, $\underline{r}$, and widens (narrows) the support $[\underline{r}, \bar{r}]$ of $F(\cdot)$;
(iii) increases (decreases) the parties' expected rent policy $E[r]$.

Proof. See appendix A5. □

Intuitively, a voter has less to gain from acquiring more information when this is more costly. Hence, when the search cost c_U^s is higher, the uninformed voters accept a worse policy without continuing their search for other and potentially better parties, implying a higher reservation rent ρ_U. That the reservation rent is higher implies that parties can commit to higher political rents and expect to get the same vote shares as before. Thus, the expected level of political rents set by the parties increases. We refer to this positive effect of the search cost on the expected level of rent policies, through the incentives to search for information, as the *information effect*.

Increasing the search cost of the least informed voters, however, does not eliminate the competitive pressure on the parties to offer low rents due to the competitive "pull" of the fully informed voters. Hence, while the lower bound also shifts up, this shift is smaller than the shift of the upper bound when c_U^s increases, implying a wider equilibrium distribution of rents.

Then, in an election with full participation, and where obtaining information about parties is generally more costly (due to, e.g., a lack of freedom of the press or low internet coverage), the parties can offer, and get elected on, worse policy platforms from the citizens' point of view. This suggests that, if political parties could collaborate on the search cost, the information effect in isolation implies a joint incentive to keep this cost high, and we follow up on this point in the discussion in Section 6.1.

While the parameter c_U^s is a measure of the *level* of the search cost, the *distribution* of search costs in the population is pinned down by the share of the population with zero search costs, μ. Notice that, in the case of full participation, μ is identical to the *effective* distribution of information among the voters $\hat{\mu}$ (as opposed to the case of endogenous participation which we return to below), so $\frac{\partial g(\tau)}{\partial \hat{\mu}} = \frac{\partial g(\tau)}{\partial \mu} < 0$. The effects of changing the distribution of voting costs on the political rents are summarized in the following proposition.

Proposition 3. ***The distribution of search costs:*** *In political equilibrium with $\tau_U = 1$, an increase (decrease) in the share of informed (uninformed) citizens μ $(1-\mu)$:*

(i) decreases (increases) the reservation rent of the uninformed ρ_U;

(ii) decreases (increases) the parties' expected rent policy $E[r]$.

Proof. See appendix A6. □

When the share of informed citizens is larger, the parties' incentive to lower their rents strengthens since the party that offers the best policy from the voters' point of view will have, in expectation, more political power. Further, the uninformed citizens anticipate that the parties will compete harder for the votes of the informed citizens, expect to find a lower rent policy when searching, and thus have a lower reservation level of rents. Both these effects lead to a lower expected rent policy in political equilibrium. Hence, in an election with a larger share of citizens with low search costs (e.g., a large intellectual elite) the policies offered are better from the citizens' perspective. Notice that Proposition 3 is consistent with $F(\cdot)$ shifting up for all r_i in the support, and that the support shifts to the left, when the share of informed citizens increases.

In appendix A6, we also show that rents converge to zero if the share of informed citizens goes to 1. This result highlights the role of informed citizens in the model: More informed citizens increase the competitive pressure in the election, and – in the limit with only informed citizens – a Bertrand-type competition between the parties will drive rents down to zero.

Generally, the transformation of vote shares into political decision power depends on the characteristics of the political institutions. In the current framework, institutions affect the aggregation of votes through $g(\tau)$. We let this transformation function be conditioned on an institutional index Υ and reformulate this function as $g(\tau_u|\Upsilon)$ when we analyze the effect of institutional change on the political equilibrium. Υ represents an index for the level of proportionality in the translation of votes into political decision power. We assume that a higher value of Υ corresponds to a higher effective level of proportionality, in the sense that the decision power of small parties increases, for any given vote distribution.[24]

Assumption 1. *Institutional characteristics and proportionality:* For any $\tau_U \in [0,1]$, if $\Upsilon_0 < \Upsilon_1$ then $0 < g(\tau|\Upsilon_0) < g(\tau|\Upsilon_1) < 1$.

Assumption 1 implies that a reform moving decision power away from the largest party and towards the smaller parties (in terms of vote shares) – e.g., from a majoritarian to a proportional electoral system – shifts $g(\tau|\Upsilon)$ up (for any value of μ).

Corollary 1. ***Institutional reform:*** *In political equilibrium with $\tau_U = 1$, the parties' expected rent policy $E[r]$ increases in the effective level of proportionality of the political institutions Υ.*

Assumption 1 implies that the effect on $g(\tau|\Upsilon)$ of an increase in Υ is qualitatively similar to the effect of a decrease in μ. Then, since Υ and μ affect the political equilibrium exclusively via $g(\tau|\Upsilon)$, an increase in Υ must move expected rents in the opposite direction than an increase in μ (as described in Proposition 3).

Intuitively, when a party's political decision power is distributed proportionally to its vote share, as will be the case in a fully proportional system, there is relatively more to gain from setting high rents and gamble on getting some votes from the uninformed, compared to the case of, for instance, a plurality ('first-past-the-post') system where decision power is concentrated in the hands of the largest party. Hence, the 'pull from below' on the level of rents by the voting behavior of the informed citizens is stronger the less proportional the translation of votes into legislative decision power is. In fact, in a (close to) pure majoritarian system – where the largest party enjoys absolute power – expected rents approaches zero (see appendix A6).

[24] Generally, the translation of votes into political decision power depends on a combination of electoral rules and the form of government (see, e.g., Persson and Tabellini, 2000), hence, constitutional reforms may be considered as discrete shifts in Υ. The Υ index can further be interpreted in terms of observational proportionality indexes such as the (inverse of the) Gallagher (1991) index (assuming that decision power in the legislature is proportional to the respective parties' seat shares).

5.2. Comparative statics with partial participation

In this subsection we analyze effects of changes to the search cost parameters when some of the uninformed citizens choose to abstain, that is, when $0 < \tau_U < 1$. Notice that in this case the participation constraint (15) binds. Thus, the upper bound of the distribution is pinned down by that conditions (6) and (7) can be jointly satisfied only if

$$[1 - g(\tau)]\,\rho_U = d. \tag{18}$$

The effects of changing the cost of search for information are summarized in the following proposition.

Proposition 4. ***The search cost:*** *In political equilibrium with $\tau_U < 1$, an increase (decrease) in the search cost c_U^s:*

(i) decreases (increases) the participation of the uninformed citizens, τ_U, and, hence, decreases (increases) aggregate turnout and increases (decreases) the effective share of informed to uninformed voters in the election;

(ii) decreases (increases) the reservation rent of the uninformed ρ_U;

(iii) decreases (increases) the lower bound, $\underline{r}$, and keeps the width the support $[\underline{r}, \bar{r}]$ of $F(\cdot)$ constant;

(iv) decreases (increases) the parties' expected rent policy $E[r]$.

Proof. See appendix A7. □

The intuition regarding why expected rents go down when the cost of acquiring information increases is that there is more competitive pressure due to abstention by the uninformed citizens. Higher search costs increase the expected cost of voting and thus make the uninformed citizens more prone to abstain in the election. In turn, a higher expected abstention rate increases the expected effective share of informed to uninformed voters in the election. This again increases the competitive 'pull from below' by the most informed citizens on the parties' rent policies. We refer to this negative effect of search costs on the expected rents offered by the parties as the *participation effect*.

The information effect pulls expected rents in the opposite direction of the participation effect, as the uninformed, conditional on participation, have a weaker incentive to search for information when the search cost is higher. In total, though, the participation effect dominates. That rents are lower is anticipated by the uninformed and they decrease their reservation rent. Even though the expected disutility of voting is lower as expected rents are lower, this does not fully compensate the uninformed citizens for their higher search cost, so the expected cost of voting for these citizens increases. Hence, in political equilibrium, a higher cost of acquiring information implies lower expected rents set by the parties and lower aggregate turnout in the election.

When considering the effect of changing μ, notice that this parameter refers to a population characteristic, as opposed to the function for the effective share of informed citizens in the election, $\hat{\mu}(\tau)$, which is an outcome variable. The effects of changing the distribution of search costs on the political equilibrium are summarized in the following proposition.

Proposition 5. ***The distribution of search costs:*** *In political equilibrium with $\tau_U < 1$, an increase (decrease) in the share of informed (uninformed) citizens μ $(1-\mu)$:*

(i) increases (decreases) the uninformed citizens' propensity to participate in the election τ_U;

(ii) does not change the reservation rent of the uninformed ρ_U or the parties' expected rent policy $E[r]$.

Proof. See appendix A8. □

Notice that, even though the expected rent policy does not change when μ changes, the participation rate of the uninformed citizens, τ_U, will change. Intuitively, when there are more informed voters in the population there is increased competitive pressure on rent policies as parties, all else equal, have more to gain form offering the best policy. But then, if expected rent policies are lower, more of the uninformed citizens will participate (i.e., τ_U will fall), which countervails the first effect as parties can exploit that there are more uninformed voters that do not directly compare rent policies. Since the partial participation equilibrium is sustained by the participation indifference of the uninformed citizens, these two effects on the parties' rent strategies and the expected rent policy must exactly offset each other in political equilibrium. Moreover, if the share of informed citizens exceeds a threshold, the two effects cannot offset each other, all of the uninformed citizens will participate, and equilibrium characteristics are again given by Propositions 3 and 4.[25]

To analyze the effect of political institutions in the partial participation case, again consider Υ as a representation of the level of proportionality that may affect the political equilibrium through $g(\tau|\Upsilon)$. The following corollary states the effect of institutional reform in the range of the equilibrium where some uninformed citizens choose not to participate.

Corollary 2. ***Institutional reform:*** *In political equilibrium with $\tau_U < 1$, the uninformed citizens' propensity to participate in the election τ_U decreases in the effective level of proportionality of the political institutions Υ.*

[25] See appendix A8 for a proof.

Proof. See appendix A9. □

The effect on τ_U of an increase in Υ is qualitatively similar to the effect of a decrease in μ. Intuitively, an increase in Υ gives more decision power to the smaller parties and this lowers the competitive pressure in the election which, in isolation, pushes rent policies up. This effect, however, is again completely offset in political equilibrium by the abstention of uninformed voters in the election. Hence, although the expected rent policy remains invariant to the electoral reform, both the participation rate of the uninformed citizens and the composition of voters in the election will change.

5.3. Summing up the effect of search costs

The full and partial participation cases in combination suggest a political equilibrium with two segments. Specifically, holding all other parameters constant, increasing the search cost from a low level, the expected rents offered by the parties will increase until the participation constraint binds and then, as the search cost increases further, expected rents will start to decrease due to an increased abstention rate by the uninformed citizens. The following corollary summarizes this effect of search costs on rents.

Corollary 3. *In political equilibrium, the parties' expected rent policy $E[r]$ first increases and then decreases in the search cost c_U^s.*

Proof. See appendix A10. □

Let $\hat{c}_U^s$ denote the search cost threshold for full participation given by the equilibrium condition (17). Fig. 2 below illustrates, first, the relationship between the search cost and participation (Fig. 2a) and, second, between the search cost and the parties' expected rent policy (Fig. 2b) in equilibrium. The participation threshold, $\hat{c}_U^s$, is illustrated by the vertical line cutting through both diagrams.

From the illustration in Fig. 2, we see that for costs lower than $\hat{c}_u^s$ (i.e., to the left of the vertical line), only the information effect is at work. In Fig. 2b, as the search cost increases from a low level and toward the participation threshold, the uninformed continuously and monotonically increase their reservation rent for continued search, and the parties exploit this by increasing the level of political rents that they commit to (by shifting up their rent strategies). Notice however that, in the entire range to the left of the participation threshold, the expected cost of voting is sufficiently low to ensure full participation by all citizens at the election, as illustrated in Fig. 2a.

Increasing the search cost beyond the participation threshold (i.e., crossing the vertical line in Fig. 2), the participation effect kicks in immediately. At the participation threshold, the uninformed are just indifferent between participating and abstaining at full turnout, hence when increasing the search cost further, this indifference can only be sustained if the uninformed decreases their participation strategy τ_U: higher search costs increase the voting costs of the uninformed citizens and they become more inclined to abstain in the election. This increases the effective share of informed voters and the level of political competition intensifies. In political equilibrium, the participation effect dominates the information effect, hence both the parties' expected rent policy and the participation rate of the uninformed are decreasing in the cost of information

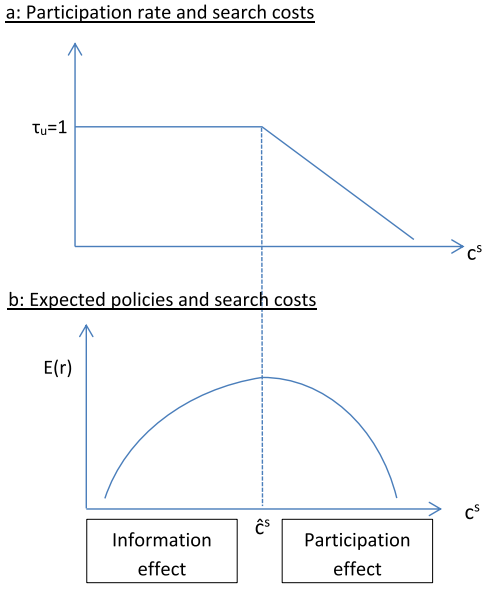

Fig. 2. (a) Participation rate and search costs. (b) Expected policies and search costs.

search. We give more intuition for this result in section 6.1 where we discuss the information manipulation incentive of political parties.

Readers that are familiar with the consumer search literature (e.g. Stahl, 1989) will probably find the relationship between political rents (the "price of politics") and the search cost in our model familiar. Moreover, the intuition why the equilibrium is characterized by a distribution of rents, rather than a deterministic level, is also paralleled in the consumer search literature, and can be explained by the fact that a party faces a similar trade-off as an owner of a store in the consumer market: a party can either commit to a low level of rents ("low price") and hope to attract the best informed voters ("customers"), or set rents higher and gamble that it might still capture some positive share of the uninformed voters. Furthermore, the margin to participate in the market for consumer goods in Janssen et al. (2005) is similar to our margin to abstain in the election: uninformed voters ("consumers") may choose not to participate in the election ("market") if they expect political rents ("prices") to be too high.

However, there are major differences between a consumer goods market and a political market. In particular, the level of proportionality of political institutions introduces a new mechanism compared to the IO literature that both influences the derivation of the familiar results discussed above and offers new results related to institutional changes. Nonetheless, the major contribution of our paper is to embed the effects of consumer search in a political economy setting with endogenous information acquisition, and to discuss how our framework may shed a new light on several empirical patterns in the political economy literature.

6. Discussion

6.1. The information manipulation incentive

The inverted U-shaped relationship between the parties' expected rent policy and the search cost provides the parties with the incentive to collude against the citizens, by manipulating the information search cost. Before we analyze this incentive, we establish the relationship between the expected payoff of a party and the search cost in the following lemma.

Lemma 2. *There is an inverted U-shaped relationship between the parties' expected payoff* $\Pi\left(r_i, F\left(r_i\right), \tau\right)$ *and search cost* c_U^s *with the peak at* $\hat{c}_U^s$ *– the same point as for the expected rent policy* $E[r]$.

Proof. See appendix A11. □

In our model, there is no mechanism by which the parties can act upon the incentive to increase the expected payoff. However, one simple way of introducing an information manipulation mechanism would be to extend the model into a simple two-period game, where an incumbent (any incumbent) is provided with an instrument to manipulate the search cost in the first period, and where all parties compete for votes, as before, to enjoy rents in the second period. Assume that the incurred cost for a party of changing the search cost from $c_{U,0}^s$ to $c_{U,1}^s$ is captured by the function $f_c\left(\left|c_{U,0}^s - c_{U,1}^s\right|\right)$, where $f_c\left(0\right) = 0$. Given a convex shape of $f_c\left(\cdot\right)$ – that is, if manipulating the information search cost is increasingly costly – it is straightforward to show that any incumbent will have the incentive to manipulate the search cost so as to maximize the expected payoff from entering into political competition. Exactly how much the search cost will change would generally depend on the exact convexity of the information manipulation cost function (and, potentially, how this cost is distributed among the partners in government in the case of a coalition), but the direction of change is: (i) unambiguously positive if the search cost is initially below the participation threshold $\hat{c}_U^s$; (ii) unambiguously negative if the search cost is initially above this threshold.

An immediate implication of the information manipulation incentive is, hence, that if the search cost is initially high, so that a positive share of citizens abstain from voting due to high costs of information acquisition, politicians have a joint interest in reducing citizens' information costs. In the model, doing so will increase parties' expected rents because it will incentivize more of the uninformed citizens to participate in the election without increasing their intensity of information search. In other words, rent-seeking parties have the incentive to mobilize the masses to exploit their lack of information. To see this, notice that, on the one hand, the uninformed citizens will have the incentive to search for more information since information acquisition has become relatively cheaper. However, on the other hand, the increased participation by uninformed citizens influences the parties' trade-off, making it less costly to propose higher rents as the competitive pressure is lower when the share of uninformed increases. In turn, when the parties' rent policies increase, this changes the uninformed citizens' expectations and makes them more prone to accept a party with higher rents without continuing the search for other parties (i.e., the uninformed citizens' reservation rent level goes up). This feeds back into the citizens' voting behavior by increasing their expected disutility of voting for a party with high rents. This second order effect on the citizens' expected costs of voting partly offsets the positive effect of reduced information search costs – however, the participation of uninformed citizens unambiguously goes up when the search cost decreases.

This information manipulation incentive relates to the literature on media capture in politics.[26] The point of departure for the existing theories on information manipulation is commonly a dichotomous environment where one type of politician, or voter group, has the power to strategically use the media to manipulate information in order to bias the election in their favor.[27] In contrast, we assume no heterogeneity across parties or citizens (apart from the search costs they face). This implies that the parties in our model have a *joint interest* in manipulating the information cost so as to increase the expected payoff for all parties. Hence, our theory suggests a new mechanism for the observed correlation between press freedom and corruption indices that has been documented (see, e.g., Brunetti and Weder, 2003). Moreover, our mechanisms and results are also consistent with the findings that a more informed and politically active population strengthens the incentive for politicians to be responsive to the preferences of citizens (as suggested in, e.g., Besley and Burgess, 2002).

6.2. Interpretations of political rents

As mentioned above, we interpret political rents broadly as some conflict of interest between politicians and citizens. Although an uninformed citizen may abstain from voting to escape her expected voting costs, abstention does by no means eliminate a citizen's economic cost of political rents. In our identical-agents framework, the economic cost of political rents is borne equally by *all* citizens, independent of their (endogenous) informedness or voting statuses. Hence, without making further assumptions about how the economic cost of political rents may be different across informed and uninformed citizens, including this cost in the citizens' objective functions neither affects the citizens' voting margins nor the political equilibrium.

Rents may also be implied by the overall level of taxation (as discussed by, e.g., Olken, 2007). In the following, assume that each individual party's policy platform must satisfy a government budget constraint given by

$$T_i Y = G_i + r_i,$$

where T_i is the average tax rate policy (net of transfers) of party i, Y is the (exogenous) aggregate income, G_i is the policy on public goods spending, and r_i is the (residual) political rents policy. Next, also assume that there exists an optimal public goods policy, G_i^*, that all citizens agree upon, which is consistent with our assumption of homogeneous preferences. Then, no party has the incentive to deviate from proposing G_i^*, and it follows that our model is isomorphic to political parties deciding on tax policies with political rents as a residual. This means that interpreting r_i as political rents, corruption, or government waste is, in the context of our model, theoretically equivalent. For instance, a party that spends more (costly) effort to lower the costs of financing the public sector through reform, might be able to provide the given G^* at a lower tax cost $T_i Y$. Then, it is natural to interpret r_i as the amount of government waste and the cost of effort as the utility loss for a party of lowering the amount of waste. Bandiera et al. (2009) discuss different forms of government waste, and our interpretation of r_i is consistent with their notion of *active waste*: the type of waste that "... entails utility for the public decision maker ..." (p. 1278). Yet another alternative interpretation of r_i consistent both with our main setup, the tax setup, and the notion of active waste, is that r_i reflects the wages and pecuniary benefits for the government's close friends and allies.

It could be interesting to analyze a model where taxes also have a redistributive dimension in addition to rent extraction. In such a setting, the trade-off of the parties will remain the same: high expected vote share against expected payoff from political rents. However, the perceived cost of rents (taxation) will be heterogeneous among citizens, which may influence equilibrium outcomes. To analyze heterogeneous agents in our framework is a venue for future research.

6.3. Ideology

As discussed in the previous section, we interpret rents broadly as some policy dimension where politicians' and voters' interests are not perfectly aligned. Thus, our paper also relates to the literature on electoral competition more generally. It is well known that in a Downsian (Downs, 1957) election framework, with single-peaked preferences over a one-dimensional policy space, commitment to policies, and full information, there is full convergence toward a single equilibrium policy. This is in contrast to our model, in which divergence across parties' policies arises even with only one policy dimension, due to the endogenous uncertainty generated by the information structure.

While we believe that our main mechanisms and main results also will be relevant in a multidimensional policy setting, adding additional dimensions might affect the equilibrium in different ways. In spatial models with multi-dimensional policy space there are typically no pure strategy equilibria. However, as in our model, mixed Nash equilibria may exist (see e.g. Kramer, 1978; McKelvey, 1986; Banks et al., 2002). In these models, there is a conflict of interest between voters with different preferences, and the support for the mixed Nash distribution of polices is centrally located with respect to the

[26] Prat and Strömberg (2011) offer a recent review of this literature.

[27] For example, in Besley and Prat (2006), a 'bad' incumbent has the incentive to bribe the media to suppress bad news about policy performance, in Corneo (2006) a monopolist media has the incentive to team up with a specific group of voters, and in Petrova (2008) the 'rich' elite bribe the media to suppress information about the social return to public projects. In all of these models the equilibrium level of information manipulation is a function of the nature of these dichotomies and the structure of the media market, where the latter is taken as given.

ideal points of the voters (Schofield, 2007). By contrast, our conflict of interest is between voters and politicians, and the support of the equilibrium policies is typically diverging from the ideal point of the voters. A similar tension to that in our paper is found in the recent literature on multidimensional valence-models of spatial competition (see, e.g. Ansolabehere and Snyder, 2000; Aragones and Palfrey, 2002). In these models, the electorate is uncertain about, for instance, how effective a party will be in governing, and the resulting equilibrium policies may diverge away from the electorate mean (Schofield, 2007). However, the valence of each party is exogenously distributed in these models, while in our model the effectiveness (interpreted as the inverse of rents) is an equilibrium outcome and voters may search to get more information about the parties' rent policies. Even more interesting results might emerge if politicians also have preferences over polices. In this case, the parties will face an additional trade off between their own ideological bliss point and vote share. We plan to explore these ideas in future research.

6.4. Random voting

In this subsection we first discuss an equilibrium where the citizens' behavior is exogenously given and uninformed citizens vote randomly. Let the informed citizens μ vote for the party with the lowest level of political rents, while the uniformed $1-\mu$ vote for a random party. Assume that all the informed citizens participate in the election, while the uninformed participate at an exogenous rate $\bar{\tau}_U$. Last, let there be a maximum rent level $r^{\max}$ that the parties can set. Otherwise, the parties' problem is as in the main model: they trade off a high rent with a low vote share against a low rent and a high vote share. We then define equilibrium as in the main model, though without citizens' decisions, and call this the random voting equilibrium.

It is straightforward to show that this random voting equilibrium is characterized by a distribution of policies. In fact, one can show that it is characterized by

$$F(r_i) = 1 - \left[\frac{g(\tau)}{1-g(\tau)}\frac{r^{\max}-r_i}{r_i}\right]^{\frac{1}{N-1}},$$

while the expected rent set by a party is

$$E[r] = \int_0^1 \frac{r^{\max}}{1+\frac{1-g(\tau)}{g(\tau)}z^{N-1}}dz,$$

similar to (10) and (13) in the main model, respectively. Hence, the properties of the random voting equilibrium is in several respects similar to those of the political equilibrium with search. In particular, one can show that an increase in the share of informed citizens decreases the parties' expected rent policy, and that the expected rents is increasing in the level of proportionality of the political institutions. Moreover, lowering $\bar{\tau}_U$, that is reducing the effective share of informed voters in the election, decreases the expected rent policies of the parties.

Next, we discuss an extension of the main model where voters may vote randomly after observing the rent policy of one party. That is, if a voter is dissatisfied with the sampled rent, she may choose to search again to see if she obtains a better policy quote *or* she may vote blindly for another party. Let $D^R \in [0, D)$ denote the non-instrumental utility of voting randomly, with the corresponding transformed parameter d^R. In addition to the reservation rent ρ_U given by equation (6), there will be another reservation rent ρ_R for the uninformed voters given by the indifference between voting for a party with policy ρ_R and casting a random vote:

$$\rho_R - E[r] - \Delta d = 0, \tag{19}$$

where $\Delta d \equiv d - d^R > 0$. Notice that no party will set its policy above either of the reservation rents, or else it would not get any votes. Thus, either (6) or (19) binds, and $\bar{r} = \min\{\rho_U, \rho_R\}$. Hence, the results of the main model are preserved.

6.5. Noisy search

Search is sequential in our model; one search action gives one policy observation. Instead, one could imagine that each search gives more than one policy observation (e.g., by reading a fair and balanced newspaper). We could capture this by a 'noisy search' technology where one search gives one observation for sure plus a probability that more than one rent policy is observed (Burdett and Judd, 1983). Using such noisy search, while keeping a share μ with zero search costs and the remaining $1-\mu$ with positive search cost, would mean that the expected gain of a search for the uninformed citizen is higher than, ceteris paribus, with sequential search. There would still be an optimal reservation rent, the trade-offs of both citizens and parties would remain, and there would be a distribution of rent policies in political equilibrium. However, some of the uninformed citizens, still only doing one search, would observe more than one rent policy and increase the competitive pressure in the election. Hence, we conjecture that the parties' expected rent policy would be lower with noisy than with sequential search, for given parameters.

Alternatively, one could assume that all citizens have the same search costs in a noisy search model. Then, the probability of more than one policy being observed from a search action again makes the parties trade off a high rent with a low

probability of winning against a low rent with high probability of winning. Thus, a distribution of rents may also exist in political equilibrium in this case, even though all citizens only search once.

6.6. Static information acquisition

In the main model, voters decide on a reservation policy before they search for information. In this subsection, we discuss how our main results would change if voters instead decide on the number searches at the outset, that is, voters commit to how many parties they will visit before casting their votes. As in the random voting model, presented in section 6.4 above, we assume that the uninformed citizens participate in the election at an exogenous rate, while all the informed citizens participate and vote for the party with lowest rents.

First, consider the case where the uninformed citizens' strategy is to search only once. Given this strategy, the parties' trade-offs are as in the random voting model, since a party gets a share of the uniformed votes regardless of its rent policy. Thus, the mechanisms from the main model are preserved. Again, let $r^{\max}$ denote the maximum rent policy. Then it can be shown that an equilibrium with one search exists (for low enough $r^{\max}$), although with higher expected rents than in the main model (as long as $r^{\max}$ is larger than the reservation rent ρ_U from the main model).

Consider next the case where the voters' strategy is to search *more* than once. Given this strategy, the parties' trade-off change dramatically since voters always compare at least two policies with each other before voting. This gives a Bertrand-type competition also for the uninformed citizens and pushes rent policies to zero. However, $r_i = 0$ cannot constitute an equilibrium, since in this case citizens would gain from deviating by deciding on a strategy to search once instead of twice or more. Thus, the only equilibrium that may exist in a model with static information acquisition is the one in which citizens search once.

To sum up the discussions in Sections 6.4, 6.5, and 6.6: the main mechanisms and results of our theory are robust to many alternative assumptions with respect to search technology and information search strategies.

7. Conclusion

We propose and analyze an equilibrium model of political rents with electoral competition of multiple parties, where citizens endogenously search for information about the parties' rent policies as well as optimally decide whether to participate or abstain in the election. The main contribution of the paper is to provide a framework for analyzing political-equilibrium implications of endogenous information search. In our model, the political equilibrium is characterized by a distribution of rent policies. Thus, we obtain political uncertainty as an equilibrium outcome, stemming from the voting behavior of uninformed citizens.

A key parameter in our model is the cost of searching for information about the parties' political rents, and we show that the parties' expected rent policies are inversely U-shaped in the citizens' costs of information search. The inverted U-shaped relationship between the information search cost and the expected level of rents is due to two competing effects: the information effect, by which a higher search cost makes citizens more inclined to vote for a party with high rents rather than searching for more information to potentially find another party with lower rents; the participation effect, which is only relevant at a sufficiently high level of information search costs, and which implies that even higher search costs make the least informed citizens more likely to abstain from voting. In the segment of the equilibrium where the participation effect is relevant (i.e., when the search cost is higher than the participation threshold), the participation effect dominates the information effect, explaining the downward sloping part of the inversely U-shaped relationship between the search cost and the parties' expected rent policies.

Our theory's predictions are consistent with the observation that political corruption is systematically correlated with measures of voter information such as educational attainment and media coverage. Moreover, our theory is consistent with the perhaps puzzling observation that the level of political corruption is positively correlated with voter turnout, as has been documented for the cases of both U.S. county and state elections. Finally, our results corroborate the empirical results that proportional aggregation of vote shares into political power leads to a higher expected level of rents in political equilibrium. We are not aware of any other equilibrium theories of political rents that can explain these patterns within a unified framework.

Although the interpretation of political rents in our theory is broad – ranging from active government waste to outright political corruption – there are several important issues that we do not explicitly address. In particular, there may be other political dimensions at work – like partisanship, ideology, or different types of policies, waste, and rents – that would affect the political equilibrium. We believe that the mechanisms presented in this paper will play an important role also in a more multifaceted political equilibrium, and we intend to pursue these issues in future research.

Appendix A

Note that, in the appendix we will, for convenience, simplify notation by using $g \equiv g(\tau)$.

A1. Proof: uninformed take only one search

Let ρ_I and ρ_U exist in equilibrium, satisfying $\rho_I \leq \rho_U$. If all parties set $r_i \leq \rho_U$, then the uninformed citizens, conditional on participating, will optimally stop searching after the first policy is observed. In equilibrium no party will set $r_i > \rho_U$. By contradiction consider a party j setting $r_j > \rho_U$. This party will not get any votes from the uninformed. For the informed citizens there are two cases to consider. First, if some other party $-j$ set $r_{-j} \leq \rho_U$, then party j will not get any of the informed votes either. In this case, party j is (strictly) worse off committing to r_j than any other policy in the range $[\underline{r}, \rho_U]$ (this result follows from $\overline{\Pi} > 0$, as will be shown to be the case in equilibrium). Second, if all other parties set $r_i > \rho_U$, then no party will get votes from the uninformed and the best response for each party is to undercut the others' rents to capture all the informed votes. In this case, a Bertrand-type competition implies that $r_i > \rho_U$ cannot be an equilibrium (rents would be competed down to at least ρ_U) and, thus, need not be considered.

A2. Proof of Lemma 1: at least some uninformed participate

By contradiction let $\tau_U = 0$ in an equilibrium where at least some of the informed citizens participate. First, it cannot be the case that $r_i > r_{-i} \geq 0$ for a party i, since the party will get zero votes and can raise Π by setting r_i between 0 and r_{-i}. Next, it neither can be the case that $r_{-i} > r_i \geq 0$ for a party i, since it can set r_i between r_i and r_{-i}, keeping its vote share, and increase Π. Last, nor can it be the case that $r_i = r_{-i} > 0$, since any party could rise Π by reducing their rent policy. The only possible equilibrium is then that all parties set rents equal to zero. However, when equilibrium rents are zero, we have $E[r] = \underline{r} = 0$, and from (7) it follows that $d - c = D - c_U^s > 0$. Hence, the uninformed citizens would benefit of deviating from $\tau_U = 0$, by searching for a party and participating in the election.

Note that we do not consider the trivial equilibrium with $\tau_U = 0$ and $\tau_I = 0$.

A3. Deriving $F(r_i)$ and $\underline{r}$

$F(r_i)$ is derived by setting $\Pi(r_i, F(r_i), \tau) = \Pi(\bar{r}, F(\bar{r}), \tau)$. First note that $F(\bar{r}) = 1$. Then, using (9), we have

$$r_i\left[[1-F(r_i)]^{N-1}\gamma_L\left(\hat{\mu}(\tau)\right) + \left(1-[1-F(r_i)]^{N-1}\right)\gamma_S\left(\hat{\mu}(\tau)\right)\right] = \bar{r}\gamma_S\left(\hat{\mu}(\tau)\right) \tag{20}$$

$$r_i\left[g + (1-g)[1-F(r_i)]^{N-1}\right] = \bar{r}g,$$

where $g \equiv \frac{\gamma_S(\hat{\mu}(\tau))}{\gamma_L(\hat{\mu}(\tau))}$. Next solving (20) for $F(r_i)$ gives $F(r_i) = 1 - \left[\frac{g}{1-g}\frac{(\bar{r}-r_i)}{r_i}\right]^{\frac{1}{N-1}}$.

The lower bound of the distribution $F(r_i)$ is defined by $F(\underline{r}) = 0$, which gives

$$\begin{aligned} 1 - \left[\frac{(\bar{r}-\underline{r})\,g}{\underline{r}\,(1-g)}\right]^{\frac{1}{N-1}} &= 0 \\ \Longrightarrow & \\ \underline{r} &= g\bar{r}. \end{aligned}$$

A4. Proof of Proposition 2: existence and uniqueness

We will show that the equilibrium condition (17) holds, given the parameter assumption $D > c_U^s$, and that the corresponding τ_U is unique.

First, note that g is a continuous and increasing function of τ_U (with $\frac{dg}{d\tau_U} = \frac{\partial g}{\partial \hat{\mu}}\frac{d\hat{\mu}}{d\tau_U} > 0$). Let $\bar{g}$ be the value of g for $\tau_U = 1$, i.e., the maximum value of g (for given institutions). g takes values on $(0, \bar{g}]$, where by assumption $\bar{g} < 1$.

Next, we construct the function $\xi(g) = \frac{1}{1-g}\left[1 - \int_0^1 \frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right]$ from the LHS of (17) and analyze its properties on the domain $g \in (0,1)$. Note that $\lim_{g\to 0^+}\left[1 - \int_0^1 \frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right] = 1$, while $\lim_{g\to 1^-}\left[1 - \int_0^1 \frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right] = 0$. It follows that $\lim_{g\to 0^+}\xi(g) = 1$, while $\lim_{g\to 1^-}\xi(g) \geq 0$. Moreover, the following lemma establishes that $\xi(g)$ is strictly decreasing:

Lemma 3. $\frac{d\xi(g)}{dg} = \frac{d\left(\frac{1}{1-g}\left[1-\int_0^1 \frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right]\right)}{dg} < 0$ *on* $g \in (0,1)$.

Proof. To show that $\frac{d\left(\frac{1}{1-g}\left[1-\int_0^1 \frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right]\right)}{dg} = \frac{1}{(1-g)^2}\left[1-\int_0^1 \frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right] - \frac{1}{1-g}\frac{1}{g^2}\int_0^1 \frac{z^{N-1}}{\left[1+\frac{1-g}{g}z^{N-1}\right]^2}dz$ is negative we need to show that $1-\int_0^1\left(\frac{\left[1+\frac{1-g}{g}z^{N-1}\right]g^2}{\left[1+\frac{1-g}{g}z^{N-1}\right]^2 g^2}+\frac{(1-g)}{g^2}\frac{z^{N-1}}{\left[1+\frac{1-g}{g}z^{N-1}\right]^2}\right)dz = 1-\int_0^1\left(\frac{g^2+(1-g^2)z^{N-1}}{\left[g+(1-g)z^{N-1}\right]^2}\right)dz$ is negative. To this end define the function $h(g)=\int_0^1\left(\frac{g^2+(1-g^2)z^{N-1}}{\left[g+(1-g)z^{N-1}\right]^2}\right)dz$. To establish $\frac{d\xi(g)}{dg}<0$, it is sufficient to show that $h(g)>1$ on $g\in(0,1)$. We show this in two steps. The first step is to evaluate $h(g)$ at the limits of the domain. At the lower limit we have $\lim_{g\to 0^+} h(g) = \int_0^1 \frac{1}{z^{N-1}}dz = \begin{cases} |_0^1 \frac{1}{2-N}z^{2-N} & \text{if } N>2 \\ |_0^1 \ln z & \text{if } N=2 \end{cases} > 1$. At the upper limit we have $\lim_{g\to 1^-} h(g) = \int_0^1 dz = 1$. Hence, $h(g)$ is always bigger than 1 if $h(g)$ is monotonically decreasing in g. The second step is then to show that $\frac{dh(g)}{dg}<0$. This derivative can be written:

$$\begin{aligned}\frac{dh(g)}{dg} &= \int_0^1\left(\frac{\left[2g-2gz^{N-1}\right]\left[g+(1-g)z^{N-1}\right]^2-\left[g^2+(1-g^2)z^{N-1}\right]2\left[g+(1-g)z^{N-1}\right](1-z^{N-1})}{\left[g+(1-g)z^{N-1}\right]^4}\right)dz \\ &= \int_0^1\left(\frac{2(1-z^{N-1})(g-1)z^{N-1}}{\left[g+(1-g)z^{N-1}\right]^3}\right)dz.\end{aligned}$$

Note that the numerator of the integral, $2(1-z^{N-1})(g-1)z^{N-1}$, is negative on the interval $z\in[0,1]$ for all $g\in(0,1)$, while the denominator is positive. It then follows that $\int_0^1\left(\frac{2(1-z^{N-1})(g-1)z^{N-1}}{\left[g+(1-g)z^{N-1}\right]^3}\right)dz<0$. □

Note that we have established that $\xi(g)>0$ on $g\in(0,1)$ (and thus $1-\int_0^1\frac{dz}{1+\frac{1-g}{g}z^{N-1}}>0$).

Last, we analyze the intersection of the RHS of (17) with the LHS given by $\xi(g)$. Note that by assumption $1>\frac{c_U^s}{D}$, thus the RHS is strictly below the LHS as g approaches zero. Then in the range $(0,\bar{g}]$ there is either a unique point to the left of (or at) $\bar{g}$ where $\xi(g)=\frac{c_U^s}{D}$, or $\xi(g)>\frac{c_U^s}{D}$ over the whole range. In the first case the g function maps into a unique $\tau_U\in(0,1]$, while in the second case g is given by to $\bar{g}$ and $\tau_U=1$.

A5. Proof of Proposition 2: comparative statics of c_U^s when $\tau_U=1$

We prove each part in turn. Note that g is not a function of c_U^s, so g is constant for a given τ_U. Part (i): For a given g, it follows from (14) that $\frac{d\rho_U}{dc}>0$, where $c\equiv\frac{c_U^s}{c^v}$.

Part (ii): The supremum increases in c_U^s since $\bar{r}=\rho_U$, and we have established $\frac{d\rho_U}{dc}>0$. From (11) it then follows that $\underline{r}$ increases, where $\underline{r}$ increases by less than $\bar{r}$ since $g<1$.

Part (iii): For a given g, it follows from (13) that $\frac{dE[r]}{d\rho_U}>0$. Then since we have established $\frac{d\rho_U}{dc}>0$ in Part (i), it follows that $E[r]$ is a continuous function increasing in c_U^s.

A6. Proof of Proposition 3: comparative statics of μ when $\tau_U=1$

To show Part (i), first note that $\frac{d\left[\int_0^1\frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right]}{d\mu} = \frac{1}{g^2}\frac{dg}{d\mu}\int_0^1\frac{z^{N-1}}{\left[1+\frac{1-g}{g}z^{N-1}\right]^2}dz<0$, where the sign follows from that the integral is positive while $\frac{dg}{d\mu}=\frac{\partial g}{\partial\hat{\mu}}<0$, for given τ_U. Then, using this, it follows from (14) that $\frac{d\mu}{d\rho_U}<0$.

Then, using (13), Part (ii) is shown by the differential

$$\frac{dE[r]}{d\mu} = \frac{d\rho_U}{d\mu}\int_0^1\frac{dz}{1+\frac{1-g}{g}z^{N-1}} + \rho_U\frac{d\left[\int_0^1\frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right]}{d\mu}<0,$$

where the sign follows from that the integral is positive while both $\frac{d\mu}{d\rho_U}$ and $\frac{d\left[\int_0^1\frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right]}{d\mu}$ are shown to be negative.

Last we show that $\lim_{\mu\to 1}E[r]=0$. First note that by assumptions we have that $\lim_{\hat{\mu}\to 1^-}g=0$ and that $\hat{\mu}\to 1$ when $\mu\to 1$. Next note that $\lim_{g\to 0^+}[\int_0^1\frac{dz}{1+\frac{1-g}{g}z^{N-1}}]=0$ and that ρ_U and $E[r]$ are continuous on the domain $g\in(0,1)$. It then follows from (14) that $\lim_{g\to 0^+}\rho_U=c$, and thus from (13) that $\lim_{g\to 0^+}E[r]=0$.

A7. Proof of Proposition 4: comparative statics of c_u^s when $\tau_u < 1$

We prove each part in turn. Part (i): From Lemma 3 we know that the LHS of (17) is decreasing in g, and thus in τ_U since $\frac{dg}{d\tau_U} > 0$. Hence, when c_U^s/D shifts up, τ_U must go down for (17) to hold.

Part (ii): The reservation rent of the uninformed decreases in c_U^s, since $\rho_U = \frac{d}{1-g}$ is increasing in g together with that we have established $\frac{dc_U^s}{dg} < 0$ in Part (i).

Part (iii): The infimum is given by $\underline{r} = g\bar{r} = g\rho_U$. From the results in Part (ii) together with $\frac{dc_U^s}{dg} < 0$, it then follows that the infimum also decreases. However, the width of the support is invariant as $\bar{r} - \underline{r} = d$.

Part (iv): Combining (18) with (13), expected rents can be written

$$E[r] = \frac{d}{1-g}\int_0^1 \frac{1}{1+\frac{1-g}{g}z^{N-1}}dz. \tag{21}$$

Next, note that (21) implies that $E[r]$ is a continuous function that is monotonically increasing in g (and thus in τ_u), since $\frac{dE[r]}{dg} = \frac{d}{(1-g)g^2}\int_0^1 \frac{z^{N-1}}{\left[1+\frac{1-g}{g}z^{N-1}\right]^2}dz + \frac{d}{(1-g)^2}\int_0^1 \frac{1}{1+\frac{1-g}{g}z^{N-1}}dz > 0$. Having established that $\frac{dc_U^s}{dg} < 0$ in Part (i), the result then follows.

A8. Proof of Proposition 5: comparative statics of μ when $\tau_u < 1$

To show that $\frac{d\tau_U}{d\mu} > 0$, first recall that Proposition 1 gives a unique g for a given set of parameters, and that g is pinned down by (17). Since μ only appears in (17) through g, we then know that g cannot change in equilibrium, i.e. $\frac{dg}{d\mu} = 0$. It then follows that $\frac{d\hat{\mu}}{d\mu} = 0$, since g is a function of $\hat{\mu}(\tau_U)$ with $\frac{\partial g}{\partial \hat{\mu}} \neq 0$ on its domain. Next, the total derivative of $\hat{\mu}(\tau_U) = \frac{\mu}{\mu+(1-\mu)\tau_U}$ is $\frac{d\hat{\mu}}{d\mu} = \frac{[\mu+(1-\mu)\tau_U]+\mu\tau_U}{[\mu+(1-\mu)\tau_U]^2} - \frac{\mu(1-\mu)}{[\mu+(1-\mu)\tau_U]^2}\frac{d\tau_U}{d\mu}$. Last, setting $\frac{d\hat{\mu}}{d\mu} = 0$ in the total derivative we get the result as $\frac{d\tau_U}{d\mu} = \frac{\mu+\tau_U}{\mu(1-\mu)} > 0$.

Part (ii) follows directly from that μ only appears in (18) and (21) through g, together with that we have established $\frac{dg}{d\mu} = 0$.

Last we show that for any fixed $\hat{\mu}$ there exists a threshold $\bar{\mu}$ such that $\tau_U = 1$ for $\mu \geq \bar{\mu}$. To this end note that for any $\hat{\mu} = k$, with $k \in (0,1)$, τ_U is continuous and given by $\tau_U = \frac{\mu(1-k)}{(1-\mu)}$. Then the fact that $\lim_{\mu\to 1^-}\frac{\mu(1-k)}{(1-\mu)} \geq 1$ concludes the proof.

A9. Proof of Corollary 2: institutional reform when $\tau_u < 1$

To show that $\frac{d\tau_U}{d\Upsilon} < 0$, we follow the steps of the proof to Proposition 5. First note that g is pinned down by (17). Since Υ only appears in (17) through g, we then know that g cannot change in equilibrium, i.e. $\frac{dg}{d\Upsilon} = 0$. Then, keeping μ fixed, the total derivative of g wrt Υ is $\frac{dg}{d\Upsilon} = \frac{\partial g}{\partial \Upsilon} + \frac{\partial g}{\partial \tau_U}\frac{d\tau_U}{d\Upsilon}$. Then, noting that $\frac{\partial g}{\partial \Upsilon} > 0$ by Assumption 1 and that $\frac{\partial g}{\partial \tau_U} = \frac{\partial g}{\partial \hat{\mu}}\frac{\partial \hat{\mu}}{\partial \tau_U} > 0$, the result follows.

A10. Proof of Corollary 3: the inverse U-shape of expected rent policy

Let $\hat{c}_U^s$ denote the search cost threshold for full participation given by condition (17), $\hat{c}_U^s = \frac{1}{1-g}\left[1 - \int_0^1 \frac{dz}{1+\frac{1-g}{g}z^{N-1}}\right]D$, where $c_U^s \leq \hat{c}_U^s$ implies $\tau_U = 1$ and $c_U^s > \hat{c}_U^s$ implies $\tau_U < 1$. We need to show that $E[r]$ is continuous at $\hat{c}_U^s$. First note that in the proof of Proposition 2 we established that $E[r]$ is continuous and increasing in c_U^s when $\tau_U = 1$. At the threshold $\hat{c}_U^s$ the participation constraint (7) holds with equality, and since (6) also must hold, it follows that the reservation policy is ρ_U is given by (18). Then $E[r]$ at the threshold $\hat{c}_U^s$ (with $\tau_U = 1$) is given by combining (18) and (13):

$$E[r] = \frac{d}{1-g}\int_0^1 \frac{1}{1+\frac{1-g}{g}z^{N-1}}dz,$$

which is the same expression for expected rents as when $\tau_U < 1$. The result then follows, as we in the proof of Proposition 4 established that $\frac{d\tau_U}{dc_U^s} < 0$ and that $E[r]$ is continuous and decreasing in c_U^s.

A11. Proof of Lemma 2: the inverse U-shape of expected payoff

Note that, in equilibrium, $\Pi(r_i, F(r_i), \tau) = \bar{\Pi}\ \forall\ r_i$. To analyze the properties of Π in equilibrium it is then sufficient to analyze the properties of $\Pi(\bar{r}, F(\bar{r}), \tau) = \bar{r}\gamma_S\left(\hat{\mu}(\tau)\right)$. Taking the derivative wrt, c_U^s gives $\frac{d(\bar{r}\gamma_S(\hat{\mu}(\tau)))}{dc_U^s} = \gamma_S\left(\hat{\mu}(\tau)\right)\frac{d\bar{r}}{dc_U^s} +$

$\bar{r}\frac{\partial\gamma_S(\hat{\mu}(\tau))}{\partial\hat{\mu}}\frac{\partial\hat{\mu}(\tau)}{\partial\tau_U}\frac{d\tau_U}{dc_U^s}$. We analyze Π below and above the search cost threshold for full participation $\hat{c}_U^s$ separately. First, in the range $c_U^s < \hat{c}_U^s$, we have $\frac{d\tau_U}{dc_U^s} = 0$ and $\frac{d\bar{r}}{dc_U^s} > 0$ by Proposition 2, and thus $\frac{d(\bar{r}\gamma_S(\hat{\mu}(\tau)))}{dc_U^s} > 0$. Second, note that $\frac{\partial\gamma_S(\hat{\mu}(\tau))}{\partial\hat{\mu}} < 0$ by our proportionality assumption and that $\frac{\partial\hat{\mu}(\tau)}{\partial\tau_U} < 0$. Then, in the range $c_U^s > \hat{c}_U^s$, the result follows from that we have $\frac{d\bar{r}}{dc_U^s} < 0$ and $\frac{d\tau_U}{dc_U^s} < 0$ from Proposition 4.

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