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REWARD FROM PUBLIC OFFICE AND SELECTION OF POLITICIANS BY PARTIES

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WORKING PAPERS

2014/14

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T i t l e : REWARD FROM PUBLIC OFFICE AND SELECTION OF POLITICIANS BY PARTIES

Rewards from public office and selection of politicians by parties*

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This version: September 2015

Abstract

We investigate the relationship between quality of politicians, defined in terms of their competence (skills), and rewards from public office in a game between parties and citizens, in which parties play a crucial role in the selection of politicians. Citizens who wish to become politicians have to become party members first. Parties produce public information about the quality of potential candidates. An increase in the rewards from public offices leads to two opposing effects on the average quality of politicians. First, a selection effect, whereby more skilled citizens enter politics, leading to an increase in average quality. Second, a manipulation effect such that parties have incentive to manipulate information to increase the probability to be elected of unskilled party members, from whom they can extract higher rents. We find that, for a plausible range of parameters values, the information manipulation effect dominates the selection effect when: i. Parties' costs of manipulating information are sufficiently low; ii. Even in the absence of manipulation, the quality of information available to citizen about candidates is sufficiently poor; iii. Net gains from becoming a politicians for unskilled citizens is sufficiently larger than that for skilled citizens. These findings provide a rationale the ambiguous sign of the empirical relationship between quality and pay of politicians.

JEL Classification: D72, H70, J33.

Key words: Selection, Public office rewards, Political parties, Quality of politicians, Information manipulation.

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1   Introduction

The tradition view in political economy has been for a long time that good politics and good policy are the result of well-designed institutional incentives (see Besley, 2005 for a general discussion). More recently, in the literature there has been a growing attention to the notion that – aside from incentives – intrinsic quality of politicians such as honesty and competence could well matter for quality policies and quality government, which could have a significant impact on socio-economic outcomes[1].

The focus of the present paper is on the relationship between politicians' quality, defined in terms of competence, i.e. skills, and rewards from public office. In particular, in a model in which parties play a role in the selection of candidates, we ask whether raising the pay of politicians leads necessarily to politicians of higher quality. As figure 1 and 2 show, prima facie evidence about trends in members' of parliament (MPs) pay and education attainments – a measure of skills widely used in the empirical literature – for Italy and United States suggests that paying politicians more is not necessarily associated with higher quality.[2]
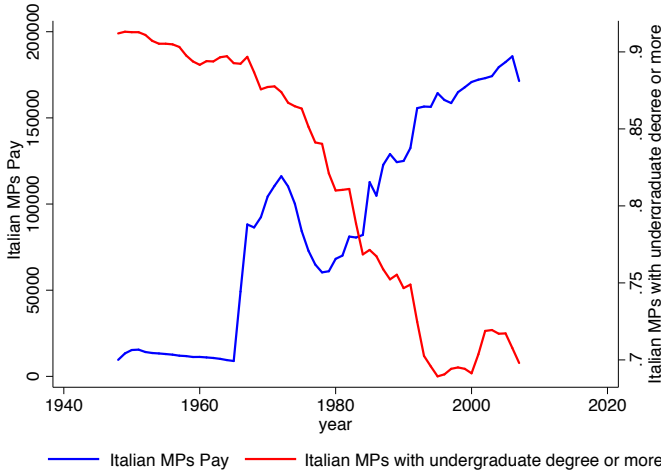

Figure 1: MPs reward in real terms (2005 dollars) and percentage of MPs with undergraduate degree in Italy 1948-2007. Source: Fondazione De Benedetti (FRDB), "Italian Members of the Parliament" dataset. Data originally collected by Merlo et al, 2008, with support of FRDB.
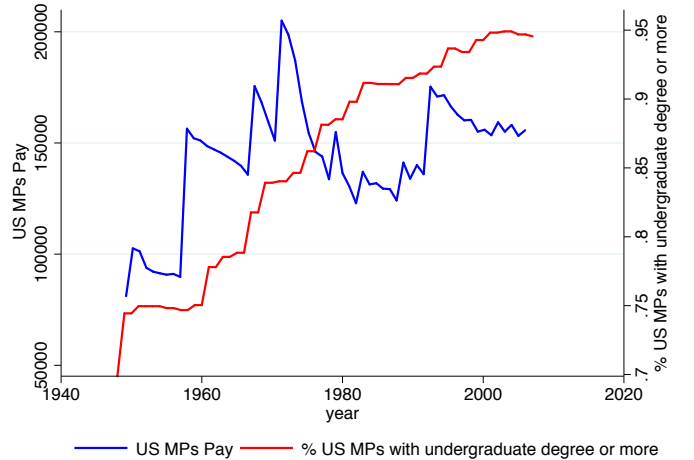
Figure 2: MPs reward in real terms (2005 dollars) and percentage of MPs with undergraduate degree in US 1948-2007. Source: Online bibliographical directory of the United States Congress.

While in the US the percentage of MPs with undergraduate education or more increases with pay, this is not the case in Italy, where the two phenomena are strongly negatively correlated.[3] A recent strand of empirical literature addresses the challenging task of identifying the causal effect that politicians' pay could have on quality of politicians. Using data from local Italian municipalities, Gagliarducci and Nannicini, 2013, show that a higher wage attracts more-educated candidates, and that better-paid politicians size down the government machinery by improving efficiency.[4] Similarly,

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[1]See Besley, 2005, Besley et al., 2013, and Besley et al., 2005.

[2]Education attainments are a commonly used proxy for competence/skills in the political economy literature. Notable examples include see Besley, 2004, Ferraz and Finan, 2009, Fisman et al., 2015, Gagliarducci and Nannicini, 2013.

[3]Correlation between MPs pay and education is around 31% in the US and −91% in Italy.

[4]According to their findings, most of this effect can be attributed to the selection of competent politicians.

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using municipalities data from Mexico, Dal Bo, Finan and Rossi, 2013, find that announcing a higher salary results in smarter applicants, with better personality traits, higher earnings and a better occupational profile. Finally, Ferraz and Finan, 2009, find that in the case of Brazilian municipalities, higher wages result in more educated candidates.

These findings support the case for positive causal relationship between pay of politicians and quality of politicians, at local level. However, things change considerably when national politics is considered. Using data on Members the European Parliament (MEPs), Fisman et al., 2015, find that "[..] high salaries reduce the quality of elected MEPs (as proxied by the quality of the colleges they attended) [..]" (page 3). Relatedly, Braendle, 2015, finds no significant impact of MEPs' pay on MEPs' quality as proxied by formal education, occupational background and political experience. Kotakorpi and Poutvaara, 2011, study the relationship between politicians' wage and quality in Finnish National Parliament. They report that the wage increase led to more educated female candidates but had no effect on the composition of male candidates. Finally, Hoffman and Lyons, 2013, find almost no correlation between salary and politician performance or quality of US governors and state legislators.

Our theory of the role of parties in the selection of candidates provides an explanation as to why the sign of the relationship between pay and quality of politicians is ambiguous as well as on why it is more likely to be positive at local level than at national level. We show that increasing politicians pay might actually worsen the average quality of politicians so long as, (i) Parties face low costs of manipulating information about quality of potential candidates, and/or (ii) even in the absence of manipulation citizens would be poorly informed (*unaware society*), and/or (iii) Net gains from becoming a politicians for unskilled citizens is sufficiently larger than that for skilled citizens. We model parties' role in determining quality of politicians by informing citizens about the quality of prospective candidates in a setup related to the theory of quality of elected officials put forward by Caselli and Morelli, 2004. In the model, citizens who wish to be elected politicians have to become party members, first. If elected, as politicians they contribute service duties to their party.[5] Citizens are of two qualities, skilled and unskilled. Unskilled politicians lead to a more costly scheme for the provision of the essential public good compared to skilled ones. Moreover, skilled individuals earn a higher salary than unskilled ones if working in the private sector. Individual quality is private information. However, parties observe the quality of each of their members at no cost, and can produce an informative public signal about prospective candidates' quality. More precisely, parties can either provide truthful information (signals) about candidates' skills at no cost, or manipulate information, which is costly and results in less precise, yet still informative, public signals about candidates' type.

The intuition behind our main result is as follows. Increasing politicians' pay might favor the entry of skilled citizens into politics, to the extent that they have a higher opportunity cost to enter politics compared to unskilled ones. Other things equal, this positive *selection effect* would increase quality of elected politicians. However, entry of skilled citizens into politics worsens election prospects for unskilled party members, who would be therefore less willing to contribute service duties to the party if elected. To counteract that effect, parties manipulate information more (*manipulation effect*), in order to improve unskilled members' chances to be elected, so to increase the service duties that they

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[5]These duties can be interpreted both as monetary transfers as well as transfers in kinds.

can extract from unskilled politicians. In other words, an increase in salary increases the measure of skilled citizens who run for office. Since the party doesn't want them to be elected it manipulates more. Such increase in information manipulation might undo the positive selection effect, thereby resulting in a negative relationship between pay and quality of politicians. More so the less costly is for parties to manipulate information, and/or the more the society is unaware or *ignorant*, in that, even in the absence of information manipulation, the informational disadvantage of citizens is significant. This could be due to the fact that citizens have little concern for politics, and/or to a poor quality of the media.

Clearly, in reality, parties do many important things other than just shaping citizen's information about perspective candidates, and they have other objectives aside from that of extracting rents from politicians. Yet, the possibility that parties might have incentives not to select the best politicians in order to enjoy higher rents, as well as the fact that in order to do so they might manipulate information are, according to the existing literature, definitely more than just intellectual curiosities.[6] Accordingly, our contribution is to highlight how such incentives could play a role in shaping the relationship between quality and pay of politicians, other things given.

According to our model, if quality of politicians and politicians' pay are negatively correlated in the case of Italy, and positively correlated in the case of the US – other things equal – we should expect the cost of manipulating information and/or the level of citizen awareness to be lower in Italy than in the US. Finding proper proxies for these variables is not an easy task. Having said that, if one accepts the idea that parties' manipulation technology is more effective, and citizens' awareness is lower in countries where, (i) press is not entirely free and independent, and (ii) citizens are less informed about political and social issues, respectively, then we could refer to some official measures of these two phenomena, and see how they compare in the two countries. Reporters without borders[7] and Freedom of the House[8] provide two indexes of freedom of press according to which they rank countries from 2002 up to 2015. According to both indexes, Italian press lags significantly behind

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[6]For instance, according to Besley, 2005, p.55: "Candidates are typically chosen by political parties. This fact raises the question of why a party would ever put a bad candidate up for election. One possibility is that if rents are earned by parties as well as successful candidates, and protection of those rents is dependent on selecting bad politicians with little public service motivation, then the party may have an interest in putting up bad candidates. The problem that parties face in making this choice arises from the risk that voters will choose the other party. A striking example of how the absence of competition reduced politician quality is the recent history of the US south, where the near monopoly on power of southern Democrats gave less incentive to select good candidates." and also "The selection procedures within parties may also influence the likelihood that a bad candidate is chosen. In many party structures, candidate selection is structured to maximize the power of party elites, with candidate selection being a highly secretive procedure where personal connections could play a large role. This process could allow bad candidates, intent on using political office for private ends, to use their influence."(*ibid.*)

[7]Reporters without borders (http://en.rsf.org/) describes itself as follows: "Reporters Without Borders was founded in Montpellier (France) in 1985 by four journalists [...]. This association, registered as a non-profit organisation in France since 1995, soon took on an international dimension." Their main sources of financing are merchandising and sale of publications, grants, and donations, including funding from foundations and sponsorships.

[8]Freedom House (freedomhouse.org) describe itself as "an independent watchdog organization dedicated to the expansion of freedom around the world.". Its main supporters and financiers are: Canadian International Development Agency, Dutch Ministry of Foreign Affairs, European Instrument for Democracy and Human Rights, John D. & Catherine T. MacArthur Foundation, Smith Richardson Foundation, U.S. Agency for International Development, U.S. Department of State but also Ford Foundation, Google, Leon Levy Foundation, The Lilly Endowment, Norwegian Ministry of Foreign Affairs, The Schloss Family Foundation (Edwin Schloss).

that of the US in terms of freedom. As for citizens' awareness, according to the *Index of Ignorance* elaborated by Ipsos MORI[9], which "[..] highlights how wrong the public across 14 countries are about the basic make-up of their populations and the scale of key social issues [..]" (taken from Ipsos-MORI website), Italy is the more ignorant country among the 14 being considered.[10] The behavior of these proxies of the cost of information manipulation across countries are entirely with the model. Freedom of press and society awareness are respectively higher and lower in US compared to Italy, as our theory would predict.

Finally, our model also offers an explanation of the fact that the relationship between quality and pay of politicians is generally positive only at local municipality level, might be due to the fact that informational asymmetries, and therefore citizens' awareness, are more of an issue at national level, where it is less likely that citizens have a direct knowledge of the candidates.

The rest of the paper is as follows. Section 2 locates our contribution within the related literature. Section 3 presents the model. Section 4 describes payoffs and actions. Section 5 contains the equilibrium analysis. Section 6 presents the main result about quality and pay of politicians. Section 7 concludes the paper.

2 Related Literature

Our paper is directly related to the literature on how citizens self-select, or are selected by parties, into politics. The theory put forward by Caselli and Morelli, 2004, predicts that increasing politicians' pay always increases politicians' quality due to a selection effect. We significantly depart from their setup by introducing parties and endogenizing the information that citizens have about candidates. Our results show that the selection effect dominates – so that a positive relationship between quality and pay of politicians emerges – if and only if parties' ability to manipulate information is low enough and/or in the absence of information manipulation, the society is sufficiently aware.

Using a different setup, Mattozzi and Merlo, 2008, show that increasing the pay for public service makes politics more attractive at all skill levels, which reduces quality, but also makes more attractive for skilled politicians to stay in politics longer. As a result the impact of pay for public office on quality is ambiguous. In our setup, a similar intuition applies that a higher pay makes politics a more attractive option for both unskilled and skilled agents. Yet, in our case, the ambiguous relationship between pay and quality of politicians is due to parties' incentives to manipulate information about candidates, rather than to opportunity cost considerations by skilled politicians on whether to stay in politics or leave. Messner and Polborn, 2004, also show that quality of politicians might go down following an increase in politicians' wage. Their result, though, stems from an intuition very different from ours. In their setup, citizen care about quality of politicians, and, crucially, each citizen knows

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[9]According to Wikipedia, Ipsos-Mori (www.ipsos-mori.com) is the second largest market research organisation in the United Kingdom, formed by a merger of Ipsos UK and MORI, two of Britain's leading survey companies in October 2005. Ipsos MORI conducts surveys for a wide range of organisations including other market research agencies. Ipsos MORI's Social Research Institute works extensively for the Government of the United Kingdom.

[10]The 14 countries are Australia, Belgium, Canada, France, Germany, Hungary, Italy, Japan, Poland, South Korea, Spain, Sweden, Great Britain and the United States of America.

he can affect the quality of politicians if entering politics. Hence, while other things equal an increase in salary makes it politics more attractive for a skilled citizen it also increases the incentive of each skilled citizen not to run for election and free ride on other skilled citizens instead, counting on the fact that some of them will run.

A strand of the literature on politicians' self-selection, including Bernheim and Kartik, 2014, Besley, 2004, and Caselli and Morelli, 2001, focuses on aspects of candidates' character other than competence, such as honesty or public spirit. In that respect, our model could be reinterpreted replacing skilled and unskilled citizens with honest and dishonest ones, with no change in the main result so long as dishonest citizens have more incentives to enter politics than honest ones. As suggested by Caselli and Morelli, 2001, such assumption seems realistic if the governance in public sector is worse than in the private sector, so that it is easier to expropriate cash flows from taxpayers than from private enterprises' stakeholders. Under this alternative setting, our theory would contribute to the above mentioned literature by highlighting the possible ambiguous relationship between honesty and pay of politicians, whereby the level of honesty in politics is positively (negatively) related to politicians' pay depending on whether the level of society awareness is high (low) and/or parties ability to manipulate information is low (high).

While all the above mentioned contributions abstract from parties, Poutvaara and Takalo, 2007, integrate political parties into a citizen-candidate model and show that the effects of pay for politicians on candidate quality may be non-monotonic. Their setup significantly differs from ours in several aspects: the number of political parties is fixed, parties have no role in manipulating information while candidate ability affects both outside options and the probability of sending a good signal in costly campaigning.

Finally, Mattozzi and Merlo, 2011 present a model in which two parties select politicians trading off costs and benefits of selecting good vs bad ones. They show that a party may deliberately choose to recruit only mediocre politicians, in spite of the fact that skilled politicians might enhance party's electoral prospects. Our model is similarly to theirs, in that they also assume party members to contribute services to their party. However, differently from what happens in their model, in our case parties might prefer mediocre politicians not because they can extract more rents form them, but rather because the presence of skilled politicians might discourage other party members from putting effort. Moreover, their model does not deal with the relationship between pay and quality of politicians.

3   The model

Building on Caselli and Morelli, 2004, we develop a game between parties and citizens, in which parties' role is to provide public information about candidates as fully explained later on in the discussion. The model setup is as follows.

3.1 Citizens, Party members, Candidates, Politicians and Parties

The economy is populated by a measure $1 + p$ of risk-neutral citizens and an endogenous measure N of political parties. Citizens are of two types: a fraction s is skilled (s) and a fraction $1 - s$ is unskilled (u). A citizen of type $i = s, u$, earns w_i in the private sector, with $w_s > w_u$ and, without loss of generality, $w_u = 1$.

Citizens consume an indispensable public good, whereby citizen's utility would equal zero if the good were not provided. The provision of the public good requires a measure p of citizens being elected to public office, where we call *politicians* the elected public officials. Politics is run by parties. A citizen can become politician only enrolling as *member* in a party, first. Becoming a *party member* entails a *participation cost* ϕ per unit of gross income, which measure citizens' willingness to engage in politics.[11] Furthermore, we assume that party members face an infinite cost of switching party. [12] Parties produce a public informative signal about their members. Once endowed with such signals, party members run for office, or in other words, become *candidates*, where a candidate is a party member running for office.

Politicians are elected among candidates by citizens who vote individually. Each politician is assigned to a public office and receives a monetary reward, $\pi > w_s$. Crucially, skilled politicians are assumed to be more productive than unskilled ones: the per-capita tax, $t(q)$, necessary to finance the provision of the public good, is decreasing in the quality of politicians, q, where q is defined as the fraction of politicians of type s.

Following Caselli and Morelli, 2004, in order to eliminate a trivial equilibrium were the entire population runs for office, we assume that there is a measure $v \in [p, 1]$ of citizens who foce an infinite (subjective) cost as party members, so that, $\mu \equiv 1 + p - v$ is the measure of citizens who can potentially become politicians.

3.2 The role of Parties

In the model, citizen can become candidates only if they are party members. Hence parties play a role as gatekeepers. Moreover, they produce a public informative signal about the quality of their members, who then become candidates. Parties operate thanks to the contributions of their politicians, whereby a politician of type i pays service duties e_i to the party she belongs to.

The information structure is the following. Citizen's type i is private information. However, parties learn the true type of their members, at no cost. Moreover, each party produces a public signal $j = s, u$ about the type of its members. Let $f(i|j)$ the probability that for a party member of true type j, the public signal generated by her party is i. The structure of the public signal generated by parties is as follows,

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[11]One could think that such cost could be associated to services to the party, or membership fee paid the party. Changing the model accordingly complicates it without significant changes in the main results.

[12]To be precise, in order for our results to go through we do not need the cost to be infinite, but just sufficiently high that switching party is never an option for party members.

Definition 1 (Signal's structure)**.** *For a party member of true type i the public signal generated by her party is correct (i = j) with probability $f(i|i) \equiv \sigma$ and incorrect (i $\neq$ j) with probability $f(i|j \neq i) \equiv 1 - \sigma$.*

Clearly, the signal is informative if and only if $\sigma \geq 0.5$. Each party k controls the informativeness of her signal by choosing, σ_k, for all its members at a fixed cost $c(\sigma_k)$. More specifically, we assume that a party k can produce at no cost, a signal i for each of its members that is correct with probability $\overline{\sigma} > 0.5$. Alternatively, the party can manipulate information thereby producing a signal i that is correct with probability $\sigma_k < \overline{\sigma}$ for each of its members, at an overall cost, $c(\sigma) > 0$. We assume $c(\sigma_k)$ to be decreasing in σ, i.e. $c'(\sigma_k) < 0$. We further assume that manipulating information is increasingly costly, i.e. $c''(\sigma_k) > 0$. All parties face the same cost $c(\sigma_k)$ of manipulating information. More specifically, for party k, the cost of manipulating information is as follows

$$ c = \begin{cases} c(\sigma_k) & \text{if } \sigma_k < \overline{\sigma} \\ 0 & \text{if } \sigma_k = \overline{\sigma} \end{cases} \tag{1} $$

$\overline{\sigma}$ measures the quality of the signal that parties can produce at no cost. Accordingly, we interpret $\overline{\sigma}$ as a measure of the quality of information in the society which – other things equal – can be associated with the quality of the media, for instance, or the degree of citizens' concern about politics. We define *aware* (*unaware*) a society is characterized by a relatively high (low) level of $\overline{\sigma}$.

In order to avoid trivial results, we assume that for either type and for any feasible set of σ_k, with $k \in N$, the measure of potential candidates with correct signal is greater than the measure of public offices to be filled.[13] From now on we refer to σ_k as the amount of information produced by a party.

3.3 Voting Rules

Voting rules are set in a standard way as follows. Citizen can vote at most one candidate, and votes to non-candidates are void. For a given measure of public offices x to be filled, the measure x of candidates who receive the most votes are elected to office. When necessary, ties are broken with a random draw.

3.4 Citizen-Parties game.

The timing of the game played by citizens and parties is as follows.

1. Nature decides individual types;

2. Parties enter;

3. Each party decides service duties to be contributed by its politicians;

4. Citizens decide whether to become party members and parties generate information about their party members, who then become candidates;

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[13]Restricting attention to $\sigma_k \geq 0.5$ for all $k \in N$, the necessary and sufficient parameter-restrictions for this to happens are $\mu s > 2p$ and $\mu(1 - s) > 2p$. The equilibrium analysis conducted in the paper takes such restrictions into account.

5. Citizens vote;

6. The outcome of the game is realized and payoffs are assigned.

4 Payoffs and actions

In this section, we analyze parties and citizens' payoffs and actions.

4.1 Citizens

Let $d_i = (0,1)$, the decision to become a party member by a citizen of type i where $d_i = 1$ in case a citizen decides to start a political career by becoming a party member, and $d_i = 0$ otherwise. A citizen of type i who becomes a party member incurs a cost, ϕ. Once that citizen is a party member, her party will produce a signal $j = s, u$ about her, and the citizen becomes a candidate. If elected, as a politician the citizen will receive a payment π and will contribute service duties to the party. Let α^j be the probability of a candidate to be elected – conditional on a signal $j = s, u$. Then, given the above and considering the probabilistic structure of the signal j provided by definition 1, for a citizen of type i, the expected payoff from choosing a political career in party k, where such party charges service duties $e_{s,k}$ to skilled politicians and $e_{u,k}$ to unskilled ones, is the following

$$
\begin{aligned}
v_i|_{d_i=1} \equiv & \left[\alpha^s f(s|i) + \alpha^u (1 - f(s|i))\right](\pi - e_{i,k}) + \\
& \left[(1 - \alpha^s)f(s|i) + (1 - \alpha^u)(1 - f(s|i))\right] w_i - \phi - t(q)
\end{aligned}
\tag{2}
$$

If not engaging in politics, the same citizen will have a payoff equal to

$$
v_i|_{d_i=0} \equiv w_i - t(q)
\tag{3}
$$

Given the measure C of candidates, each citizen of type i expresses a vote $b_i \in \mathbb{R}$, where the vote is void if $b_i \notin \mathcal{C}$, where $\mathcal{C}$ is the set of candidates, with measure C. An action for citizen of type i is a pair (d_i, b_i).

4.2 Parties

We define $A_{k,s}$, and $A_{k,u}$, with $A_{k,s}, A_{k,u} \in \mathbb{R}$, the measures of members of types s and u, respectively, recruited by party, k. Accordingly, $A_s \equiv \int_k A_{k,s}$, and $A_u \equiv \int_k A_{k,u}$, are the aggregate measures of party members of type s and u, respectively, while $A \equiv A_s + A_u$ is the aggregate measure of party members, independent of type. Note that the following inequalities must hold

$$
\begin{aligned}
A_s &\leq \mu s \tag{4} \\
A_u &\leq \mu(1 - s) \tag{5}
\end{aligned}
$$

as the measure of party members cannot be – conditional on type – larger then the measure of the citizens who can engage in politics.

Given the above, the expected payoff of party k can be written as

$$v_k = e_{s,k}(\alpha^s \sigma_k + \alpha^u (1 - \sigma_k)) A_{k,s} + e_{u,k}(\alpha^s (1 - \sigma_k) + \alpha^u \sigma_k) A_{k,u} - c(\sigma_k) \tag{6}$$

Each party k chooses whether to enter $r_k = 1$, not, $r_k = 0$, the level of information manipulation, $\sigma_k \in [0, \bar{\sigma}]$, and service duties $e_{u,k}, e_{s,k} \in \mathbb{R}$ to be paid its unskilled and skilled elected politicians. An action for the party k is a quadruple $(r_k, \sigma_k, e_{s,k}, e_{u,k})$.

5 Equilibrium analysis

A strategy for a citizen of type i is a probability function a_i that maps actions (d_i, b_i) on $[0, 1]$. A strategy for a party k is a probability function a_k that maps actions, $(r_k, \sigma_k, e_{u,k}, e_{s,k})$, to $[0, 1]$. Given these definitions,

Definition 2. *An equilibrium is a strategy profile for the citizens and the parties such that each agent's strategy is best reply at any given stage of the game.*

Let $C_{k,i}^j$ be the measure of candidates of type i and signal j belonging to party k, so that, (i) $C_i^j \equiv \int_k C_{k,i}^j$ is the aggregate measure of candidates of type i and signal j across parties; (ii) and $C^j \equiv C_s^j + C_u^j$ is the aggregate measure of candidates of signal j across candidate's types; (iii) $C \equiv C^s + C^u = C_u + C_s$ is the total measure of candidates. Note that, $\int_j C_{k,i}^j = C_{k,i} = A_{k,i}$ as well as $C = A$ as, for any $i = s, u$, and for every party k, since all party members become candidates once endowed with the informative signal j produced by their party. Rather than characterizing all possible equilibria, we restrict our attention to a subset of the possible equilibria that satisfy the following properties:

1. *Symmetry.* Members, candidates and politicians, are equally divided among parties. That is, for each $k \in N$,

$$A_{k,i} = \frac{A_i}{N} \tag{7}$$

$$C_{k,i}^j = \frac{C_i^j}{N} \tag{8}$$

   with $i, j = s, u$;

2. *Candidates who have a positive probability to be elected are perceived to be skilled, i.e. they have a high signal, $j = s$. Since voters prefer to vote high-signal candidates than low-signal ones, this condition is equivalent to imposing that there are enough candidates of high signal to cover all seats, i.e.,*

$$C^s > p \tag{9}$$

3. *Reluctancy of skilled citizens to enter politics. Of the μ citizen who can potentially enter politics,*

all unskilled ones become party member while only a fraction of skilled ones do so. That is[14]

$$(A_u = \mu(1 - s)) \wedge (A_s < \mu s) \tag{13}$$

Our focus on equilibria in which while all unskilled citizens run for office only some of the skilled ones do so, is motivated by the fact that it is the most conservative case to look at if one wants to prove that increasing the pay of politicians might reduce average quality of politicians. This follows from the fact that, starting from an equilibrium that satisfies properties 1-3 listed above, the selection effect induced by an increase in pay of politicians is unambiguously positive since only skilled citizens, if any, will be attracted, as the unskilled ones are already all engaged in politics. Furthermore, the composition of party members associated with this type of equilibria, delivers the same situation as the one analyzed by Caselli and Morelli, 2004, thereby allowing direct comparability between our results and theirs.

In the following discussion, we will fully characterize the equilibrium that satisfies properties 1-3 listed above. We will also provide the sufficient condition for such equilibrium to exist. Since we are assuming symmetry, we drop the k when referring to parties' actions.

5.1 Citizens's behavior and equilibrium values of the probability to be elected

We analyze first citizens' voting behavior (stage 5 of the citizen-parties game) and then their decision to become party members (stage 4 of the game).

Citizens vote based upon the set $\mathcal{C}$ of candidates, which coincides with the set of activists endowed with an individual informative signal j by their party, whom they observe. Given $\mathcal{C}$, the optimal voting strategy of a citizen is as follows. Following the literature, we adopt the notion of conditional sincerity and assume non-candidate citizen perform as if they were pivotal.[15] That given, since citizens prefer skilled politicians and they observe a signal for each candidate, whenever such signal is informative ($\sigma > 0.5$) each non-candidate citizen votes for a randomly chosen element of the set of candidates with high-signal, $\mathcal{C}^s$, so long as such set is non-empty. Only if $\mathcal{C}^s$ were empty, would non-candidate citizen vote for an randomly drawn element of the set of candidates with signal u, $\mathcal{C}^u$. As for candidates, the

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[14]Concerning the skill-composition of party members (point 3), in principle, possible equilibrium situations alternative to the one we focus on, would be

i. Skilled citizens all become members, while some of the unskilled ones do not

$$(A_u < \mu(1 - s)) \wedge (A_s = \mu s) \tag{10}$$

ii. All citizens, skilled and unskilled, become party members

$$(A_u = \mu(1 - s)) \wedge (A_s = \mu s) \tag{11}$$

iii. Some skilled and unskilled citizens become members and some (both skilled and unskilled) do not

$$(A_u < \mu(1 - s)) \wedge (A_s < \mu s) \tag{12}$$

[15]See Caselli and Morelli, 2004.

optimal sub game perfect equilibrium strategy is as follows. Each candidate who – given the optimal voting strategy of non-candidates – has a positive positive probability to be elected votes for himself. As for candidates who have zero chance to be elected even if they vote for themselves, they will vote as non-candidate citizen.

Citizens' optimal behavior as voters allows us to characterize the equilibrium probabilities to be elected for candidates with signals u and s, respectively. In particular, in any equilibrium in which condition (9) holds (property 2, page 11), so that there are enough candidates with a signal s to cover all public office seats, a candidate with a signal u will never be voted for public office, since citizens prefer skilled politicians. Accordingly, only candidates with signal s would ever be elected if there are enough of them to cover all seats.[16] Therefore, provided that such condition holds:

$$\alpha^s = \frac{p}{C^s} \tag{14}$$

$$\alpha^u = 0 \tag{15}$$

are the equilibrium probabilities for a candidate to be elected conditional on her signal.

Substituting in for the values of α^s and α^u in the citizen's payoff expressions (2) and (3), the equilibrium expected gains from becoming an party members, for citizens of type s and u are

$$v_s|_{d_s=1} - v_s|_{d_s=0} \equiv \underbrace{\frac{p}{C^s}\sigma(\pi - w_s)}_{\text{Expected benefit}} - \left(\underbrace{\frac{p}{C^s}\sigma e_s + \phi}_{\text{Expected cost}}\right) \tag{16}$$

and,

$$v_u|_{d_u=1} - v_u|_{d_u=0} \equiv \underbrace{\frac{p}{C^s}(1-\sigma)(\pi-1)}_{\text{Expected benefit}} - \left(\underbrace{\frac{p}{C^s}(1-\sigma)e_u + \phi}_{\text{Expected cost}}\right) \tag{17}$$

respectively.

The optimal decision about whether to become a party member ($d_i = 1$) or not ($d_i = 0$), for a citizen of type i is as follows,

$$d_i \equiv \begin{cases} 1 & \text{if } v_i|_{d_i=1} - v_i|_{d_i=0} > 0 \\ 0, 1 & \text{if } v_i|_{d_i=1} - v_i|_{d_i=0} = 0 \\ 0 & \text{if } v_i|_{d_i=1} - v_i|_{d_i=0} < 0 \end{cases} \tag{18}$$

Citizens net expected gain from becoming a party member is given by the difference between an expected benefit and an expected cost. The expected gain is, for both skilled and unskilled citizens, a positive function of the probability to be elected and of the difference between the reward as public officer and the salary in the private sector. The expected cost, for both skilled and unskilled citizens, is given by the sum of the expected costs of party membership and service duties. Since in the

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[16]Note that if there are enough candidates with signal $j = s$ to cover all seats ($C^s > p$, property 2), in general, in order to be elected a candidate needs more than one vote, so that even though each candidate with signal u votes for himself, this would be not enough for such candidates to be elected.

equilibria we look at, only party members with signal s have a positive probability to be elected, the net expected gains from entering politics are increasing (decreasing) in the informativeness, σ, of the signal for skilled (unskilled) citizens.

We note that, in the equilibrium we are interested in, the net expected gain from entering politics for skilled and unskilled citizen respectively should satisfy the following conditions. First, $v_u|_{d_u=1} - v_u|_{d_u=0} \geq 0$ must hold, because if all unskilled decide to become party members, this should be the preferred choice for this type of citizens. Second, $v_s|_{d_s=1} - v_s|_{d_s=0} = 0$ must hold, because skilled citizens must be indifferent between becoming party members or not, in order for only a fraction of skilled individuals to choose to become party members.[17]

Crucially, since only party members with signal s have a positive probability of being elected, the measure of candidates with a positive chance to be elected will be given by the sum of skilled party members with correct signal and of unskilled party members with incorrect signal. More precisely

$$C_s^s = \sigma A_s \tag{19}$$
$$C_u^s = (1-\sigma)A_u \tag{20}$$

In the class of equilibria we restrict attention to, where unskilled citizens all become party members, we also have

$$C_u^s = \mu(1-s)(1-\sigma) \tag{21}$$

And since $C^s = C_s^s + C_u^s$, in our equilibrium the probability of being elected reduces to

$$\alpha^s = \frac{p}{C_s^s + \mu(1-s)(1-\sigma)} \tag{22}$$

where the value of C_s^s will be pinned down endogenously from parties optimal behavior in the next subsection.

5.2 Parties' behavior

In this subsection we analyze parties' equilibrium choice of the service duties, e_i (stage 3 of the game citizen-party game) to be extracted from skilled and unskilled politicians, $i = s, u$, and of the optimal degree of information manipulation, σ, (stage 4 of the game) for a given measure of parties N. Then, the entry decision will be dealt with. We assume perfect enforceability of service duties, e_i.[18] As we shall see, the optimal value of e_i together with the conditions relative to citizens' optimal behavior, pins down the probabilities of being elected and the measure of candidates as well as its skill composition.

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[17]Since all skilled citizens share the same payoff function, if $v_s|_{d_s=1} - v_s|_{d_s=0} > 0$, then all skilled citizens would be willing to run while if $v_s|_{d_s=1} - v_s|_{d_s=0} < 0$ none of them will be willing to become party members.

[18]Otherwise, incentives for elected politicians to pay service duties to the party should be modeled explicitly. One could assume that parties can impose penalties on politicians who refuse to pay. In a repeated interaction framework the threat of excluding them from future elections could be such penalty. Otherwise we could assume that service duties have to be paid upfront when a party member becomes candidate, which would not change the results.

5.2.1 Equilibrium values of the service duties, e_s and e_u, and of the measure of candidates with positive chance to be elected, C^s

The following result holds,

Lemma 1. *Consider a symmetric equilibrium in which, (i) There are enough high-signal candidates to cover all seats (see property 1, page 11, $C^s > p$), and; (ii) All unskilled citizens and only a fraction of skilled ones are party members (property 3, page 11, $A_u = \mu(1-s) \wedge A_s < \mu s$). Then, for given N, and σ, the equilibrium values of e_u, e_s, and, C^S, the are as follows,*

$$e_s^* = 0 \tag{23}$$

$$e_u^* = (\pi - 1) - \frac{\sigma(\pi - w_s)}{(1-\sigma)} \geq 0 \tag{24}$$

$$C^{s*} = \frac{p\sigma(\pi - w_s)}{\phi} \tag{25}$$

Proof. First, we note that, in any equilibrium, parties are local monopolists since party members face an infinite cost of switching party. Therefore, given a citizen's decision to become member of party k, the best reply of party k is always to charge the maximum party duties, thereby extracting all surplus. In other words, $e_i^* : v_i|_{d_i=1} - v_i|_{d_i=0} = 0$. Second, it is immediate to verify that in any equilibrium, $e_s^* = 0$ must hold. By contradiction, let us consider a candidate equilibrium in which $e_s^* > 0$ and not all citizens of type s are party members. Then there are type s citizens who are willing to become party member if paying less than e_s^*. Then, there would be room for a new party to be formed, with service duties $e_s^* - \epsilon$, where $\epsilon \to 0^+$. Note that such party would surely make strictly positive profits by setting $\sigma = \bar{\sigma}$, which costs zero. Hence, in any equilibrium where not all citizens of type s are party members, $e_s = 0^*$ must hold. Using $e_s = 0^*$ in (16) and setting $v_s|_{d_s=1} - v_s|_{d_s=0} = 0$, we find $C^{s*} = \frac{p\sigma(\pi - w_s)}{\phi}$. Substituting for this value for C^{s*} into (17) and setting $v_u|_{d_u=1} - v_u|_{d_u=0} = 0$ we finally obtain $e_u^* = (\pi - 1) - \frac{\sigma(\pi - w_s)}{(1-\sigma)}$. $\square$

The above result tells us that in an equilibrium where unskilled citizens all become party members, while some skilled citizens do not, parties are able to extract positive service duties from unskilled members only.

5.2.2 Optimal information manipulation

First of all, since parties cannot make negative profits, in any equilibrium in which parties are extracting service duties only from unskilled politicians, the following result holds.

Lemma 2. *Consider a symmetric equilibrium in which, (i) There are enough high-signal candidates to cover all seats (see property 1, page 11, $C^s > p$), and; (ii) All unskilled citizens and only a fraction of skilled ones are party members (property 3, page 11, $A_u = \mu(1-s) \wedge A_s < \mu s$). Then, the equilibrium value of information generated by parties, as measured by σ^*, satisfies*

$$\sigma^* < \hat{\sigma} \equiv \frac{\pi - 1}{\pi - w_s + \pi - 1} \in \left(\frac{1}{2}, 1\right) \tag{26}$$

whenever $e_u^* > 0$.

Proof. Parties cannot make negative profits. Hence, with $e_s = 0$, they hire members if and only if they can extract rents from them. Hence, $e_u \geq 0$ must hold. The resultt then, comes directly from the fact that, given $e_u^* = (\pi - 1) - \frac{\sigma(\pi - w_s)}{(1 - \sigma)}$ (lemma 1), $e_u^* > 0$ if and only if $\sigma^* < \hat{\sigma}$. Also, we note that $e_u^* = 0$ if and only if $\sigma^* = \hat{\sigma}$, so that an equilibrium with $e_s^* = 0$ and $e_u^* = 0$ only exists in the special case in which $\sigma^* = \hat{\sigma}$ holds. $\qquad\square$

$\hat{\sigma}$ is the level of informativeness of the signal produced by parties above which skilled citizens are more willing to become party members than unskilled one. Clearly, an equilibrium where only some skilled citizens enter politics while all unskilled ones become party members cannot exist if the associated level of σ chosen by parties exceeds $\hat{\sigma}$. It is interesting to note that $\hat{\sigma}$ is always decreasing in π since

$$\frac{\partial \hat{\sigma}}{\partial \pi} / \hat{\sigma} = \frac{1 - w_s}{(\pi - 1 + \pi - w_s)(\pi - 1)} < 0 \tag{27}$$

The intuition for this outcome is straightforward. When the level of informativeness of the signal equals $\hat{\sigma}$ skilled and unskilled citizens are equally willing to enter politics. Whenever the signal is informative an increase in pay of politicians favors more skilled party members than unskilled ones, since the former have a higher chance to be elected than the latter. To compensate that effect, as the pay of politicians increases, the value of $\hat{\sigma}$ should go down, thereby increasing the chance of unskilled party members to be elected.

Combining (25) and (14) we obtain the probability of being elected as a function of only one endogenous variable, σ:

$$\alpha^s = \frac{\phi}{\sigma(\pi - w_s)} \tag{28}$$

Substituting in (6) for the equilibrium values of e_s, e_u, C^s, α^s and α^u as derived above, and considering that in a symmetric equilibrium each party is identical, the representative party solves

$$\max_{\sigma} \frac{\phi \mu (1 - s)}{N} \left(\frac{\pi - 1}{\pi - w_s} \frac{1 - \sigma}{\sigma} - 1 \right) - c(\sigma) \tag{29}$$

In the case of an interior solution, for given N, the optimal level of σ, which we call σ^*, solves the following first-order condition

$$-\frac{\phi \mu (1 - s)}{N} \frac{\pi - 1}{\pi - w_s} - \sigma^2 c'(\sigma) = 0 \tag{30}$$

A rise in σ has two opposing effects on the party's objective function: one positive and one negative. The positive effect stems from a lower cost of information manipulation (remember $c'(\sigma) < 0$ so that $-\sigma^2 c'(\sigma) > 0$). This effect is associated with the second term on the LHS of equation (30). The negative effect is given by the first term on the LHS of (30). A lower degree of information manipulation reduces the amount of service duties that a party can extract from politicians. That happens because of two main forces: 1) The equilibrium measure of unskilled politicians are reduced (both because more skilled citizens are becoming party members and because the probability of being elected for a low-type/high-signal party member is reduced); 2) The maximum level of service duties each unskilled party member is willing to provide is lower because the expected net gains from politics are reduced.

The optimal level of σ is the one such that these two effects are counterbalanced. Before introducing an explicit cost function in order to fully characterize the optimal value of σ^*, we first analyze how the equilibrium number of parties N^* is determined.

5.3 Number of parties and information manipulation

We assume free entry for parties (stage 2 of the game). Accordingly, the following result holds

Lemma 3. *Consider a symmetric equilibrium in which, (i) There are enough high-signal candidates to cover all seats (see property 2, page 11, $C^s > p$), and; (ii) All unskilled citizens and only a fraction of skilled ones are party members (property 3, page 11, $A_u = \mu(1-s) \wedge A_s < \mu s$). Then, for given σ, the equilibrium number of parties, N^*, satisfies,*

$$N^* = \frac{1}{c(\sigma)} \left(\phi\mu(1-s) \left(\frac{\pi-1}{\pi-w_s} \frac{1-\sigma}{\sigma} - 1 \right) \right). \tag{31}$$

Proof. For given σ, N^*, is found by: (i) substituting in equation (6) for the equilibrium values of e_s, e_u, α_s, α_u, $A_{k,u}$, and $A_{k,s}$, then; (ii) imposing free entry, which implies $v_k = 0$, and; (iii) solving for N. $\qquad\square$

The equilibrium number of parties, N^*, and the equilibrium value of information manipulation, σ^*, are found solving the simultaneous system of equations (30) and (31). By substituting for N^* in (30) using (31), we get

$$\sigma^* : \frac{\hat{\sigma}}{\hat{\sigma} - \sigma^*} = -\frac{\sigma^* c'(\sigma^*)}{c(\sigma^*)} \tag{32}$$

which defines implicitly the equilibrium value for σ, equal to σ^*, as a function of $\hat{\sigma}$ and therefore of π and w_s only (see equation (26)). Having characterized the equilibrium that satisfies properties 1-3, we now turn to the analysis of the relevant existence conditions.

5.4 Sufficient conditions for Equilibrium existence

For the value σ^* to yield a maximum, we require party's objective function (29) to be globally strictly convex in $\sigma \in (1/2, \bar{\sigma})$ which in turn requires

$$\frac{2}{\sigma^3} \frac{A_u}{N} \phi \frac{\pi-1}{\pi-w_s} - c''(\sigma) < 0, \forall \sigma \in \left(\frac{1}{2}, \bar{\sigma} \right) \tag{33}$$

Substituting in using (30) the above condition reduces to the following assumption

Assumption 1. $-\frac{\sigma c''(\sigma)}{c'(\sigma)} = \gamma(\sigma) > 2.$

Assumption 1 states that the elasticity of the marginal cost of manipulating information should be large enough for a unique optimal value $\sigma^* \in \left(\frac{1}{2}, \bar{\sigma} \right)$ to exist.[19]

Apart from Assumption 1, in order for σ^* to be consistent with properties 1-3 of the equilibrium, we need some other restrictions on parameters' values to be satisfied. First, property 2, page 11,

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[19]This follows from the fact that if 1 holds, then $\sigma^2 c'(\sigma)$ is strictly decreasing and so there is only one value of σ that satisfies the first-order condition (30)

implies that all candidates are perceived to be skilled or that $C^s > p$. Since the equilibrium value of C^s is given by (25), such condition implies $\sigma^* > \frac{\phi}{\pi - w_s}$ should hold. In turn, since $\sigma^* > \frac{1}{2}$ must hold, as we want the signal produced by parties to be informative, a sufficient condition for C^{s*} to be strictly larger than p is then,

$$\phi < \frac{\pi - w_s}{2}. \tag{34}$$

That is, in order to have enough candidates of high signal, the cost of becoming party member shouldn't be too large.

Second, property 3, page 11, requires that only a fraction of skilled citizens become party members, that is $A_s < \mu s$. Given that in the equilibrium we are analyzing, (i) the measure of candidates with high signal is equal to the sum of skilled party members with correct signal and unskilled party members with incorrect signal, and (ii) all unskilled citizens become party members,

$$C^s = \sigma A_s + (1 - \sigma)(1 - s)\mu \tag{35}$$

so that the measure of skilled party members can be written as

$$A_s = \frac{C^s - (1 - \sigma)(1 - s)\mu}{\sigma} \tag{36}$$

Substituting in for the equilibrium value of C^s as given by (25), we conclude that property 3 is satisfied when

$$\frac{\frac{\sigma^* p (\pi - w_s)}{\phi} - (1 - \sigma^*)(1 - s)\mu}{\sigma^*} < \mu s \tag{37}$$

which implicitly sets an upper bound for the equilibrium value of σ^*, i.e.

$$\sigma^* < \frac{(1 - s)\mu\phi}{p(\pi - w_s) + \mu\phi(1 - 2s)}, \tag{38}$$

Finally, since we need $\sigma^* \in \left(\frac{1}{2}, \hat{\sigma}\right)$, the above inequality is satisfied if

$$\hat{\sigma} < \frac{(1 - s)\mu\phi}{p(\pi - w_s) + \mu\phi(1 - 2s)} \tag{39}$$

or, given the value of $\hat{\sigma} = \frac{\pi - 1}{\pi - 1 + \pi - w_s}$, if,

$$\phi > \frac{p(\pi - w_s)(\pi - 1)}{\mu((\pi - w_s) + s(w_s - 1))} \tag{40}$$

The above condition sets an upper bound for ϕ. The cost of becoming party member cannot be too large in an equilibrium where only a fraction of skilled citizens become party members.

We can summarize the restrictions on value of ϕ necessary and sufficient for the existence of the equilibrium that satisfies properties 1-3, in the following assumption

Assumption 2. $\phi \in \left(\frac{p}{\mu} \frac{(\pi - w_s)(\pi - 1)}{(\pi - w_s) + s(w_s - 1)}, \frac{\pi - w_s}{2}\right)$.

It is important to notice that when p/μ (i.e. the ratio between the measure of political seats and the measure of citizens who can potentially become candidates) is small enough, then there is a wide range of values of ϕ such that assumption 2 is satisfied and the our equilibrium exists. Finally, the following further assumption is needed in order to ensure that $\sigma^* < \bar{\sigma}$,

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Assumption 3. $\bar{\sigma} \geq \frac{\pi - 1}{\pi - 1 + \pi - w_s}$.

It follows directly from the above discussion that, given the other parameters, if ϕ, γ, and $\bar{\sigma}$ satisfy assumptions 1, 2 and 3, the equilibrium we are interested in, which satisfies properties 1-3, exists and it is unique.

5.5 Equilibrium characterization with an explicit cost function

We now fully characterize the equilibrium by assuming the following explicit cost function

$$c(\sigma) = \left(\frac{\bar{\sigma} - \sigma}{\sigma} \right)^{\theta} \tag{41}$$

with $\theta, \bar{\sigma} > 0$, where we recall that $\bar{\sigma}$, which we assume to be not only greater than 0.5, but also greater than $\hat{\sigma}$, measures the quality of the signal that parties can produce at no cost.

Given (41), condition (32) that implicitly defines σ^*, reduces to,

$$\frac{\hat{\sigma}}{\hat{\sigma} - \sigma^*} = \theta \frac{\bar{\sigma} - \sigma^*}{\sigma^*} \tag{42}$$

Solving (42) for σ^* yields,

$$\sigma^* = \frac{\bar{\sigma}}{\theta \bar{\sigma} - \hat{\sigma}} \hat{\sigma}(\theta - 1) \tag{43}$$

Assumption 1 needs to be satisfied for σ^* to yield a maximum value for the objective function which, given (41), reduces to $\theta > 1$. It then follows, $\theta \bar{\sigma} > \bar{\sigma} > \hat{\sigma}$, which automatically implies $\sigma^* < \hat{\sigma}$, which ensures that σ^* is consistent with the existence of the type of equilibrium we analyzing. Moreover, for $\sigma^* > 0.5$ to hold, we need to impose the additional following restriction on θ

$$\theta > \frac{\hat{\sigma}(2\bar{\sigma} - 1)}{\bar{\sigma}(2\hat{\sigma} - 1)} > 1 \tag{44}$$

If this were not the case, then manipulating information would be so cheap that parties would always choose the minimum level of information manipulation of σ^*.[20] The associated value of N^* is found substituting for the value of σ in equation (31) using the above explicit solution for σ^*.

Having fully characterized the equilibrium, we can now turn to the analysis of how changes in the pay of politicians affect the quality of elected politicians.

6 Quality of politicians and politicians' pay

Given the model setup, the relevant measure of quality of politicians, q, is the fraction of politicians of type s, which affects the level of taxes necessary to finance the provision of the public good . In a symmetric equilibrium – by the law of large numbers – the fraction of politicians of type s is the same as the fraction of skilled candidates with a signal s. That is, $q = \frac{C_s^s}{C^s}$ holds. By using (25), and recalling that $C_s^s = C^s - \mu(1-s)(1-\sigma)$ we finally obtain the equilibrium value of q

$$q^* = 1 - \frac{\mu(1-s)(1-\sigma^*)}{C^{s*}} = 1 - \frac{\phi\mu(1-s)(1-\sigma^*)}{p\sigma^*(\pi - w_s)} \tag{45}$$

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[20]It is easy to note that σ^* is, quite intuitively, decreasing in θ.

as a function of the equilibrium value of information produced by parties, σ^*. In order to see how politicians' pay affects quality of politicians we differentiate q^* with respect to π, yielding

$$\frac{\partial q^*}{\partial \pi} = \frac{\phi\mu\left(1-s\right)}{p\sigma^*\left(\pi-w_s\right)}\left(\underbrace{\frac{1-\sigma^*}{\pi-w_s}}_{\text{Selection effect}} + \underbrace{\frac{\partial\sigma^*}{\partial\pi}\frac{1}{\sigma^*}}_{\text{Information manipulation effect}}\right) \tag{46}$$

Accordingly, the effect of pay on quality can be viewed as the sum of two different effects: (i) A *Selection* effect and; (ii) An *information manipulation* effect. The first effect – which is always positive – is the one put forward by Caselli and Morelli, 2004. An increase in π attracts skilled citizens into politics which, other things equal, improves the quality of party members, candidates and elected politicians. The second effect is novel and it says that increasing the pay of politicians affects their quality because parties try to manipulate information in order to increase the chance of election for their unskilled members, from whom they are able to extract higher service duties. Crucially, the following result holds regarding the sign of the trade off between these two opposing effects,

Lemma 4. *Consider a symmetric equilibrium in which, (i) There are enough high-signal candidates to cover all seats (see property 2, page 11, $C^s > p$), and; (ii) All unskilled citizens and only a fraction of skilled ones are party members (property 3, page 11, $A_u = \mu(1-s) \wedge A_s < \mu s$). Then, an increase in the pay of politicians induces parties to manipulate information more. That is,*

$$\frac{\partial\sigma^*}{\partial\pi}\frac{1}{\sigma^*} < 0 \tag{47}$$

Proof. Rewriting condition (32) as follows

$$c\left(\sigma^*\right)\hat{\sigma} \equiv -\left(\hat{\sigma}-\sigma^*\right)\sigma^*c'\left(\sigma^*\right)$$

Applying the implicit function theorem by differentiating both sides of the latter expression with respect to σ and π and solving for $\frac{\partial\sigma^*}{\partial\pi}$ yields

$$\frac{\partial\sigma^*}{\partial\pi} = \frac{c\left(\sigma^*\right)}{\left(\hat{\sigma}-\sigma^*\right)\left(\gamma\left(\sigma^*\right)-2\right)c'\left(\sigma^*\right)}\frac{\partial\hat{\sigma}}{\partial\pi}\left(\frac{\sigma^*c'\left(\sigma^*\right)}{c\left(\sigma^*\right)}+1\right)$$

where $\gamma(\sigma^*) = -\frac{\sigma^*c''(\sigma^*)}{c'(\sigma^*)}$ is the elasticity of the marginal cost of manipulating information evaluated at the equilibrium value of σ^*. Finally, substituting in using equation (32) we find

$$\frac{\partial\sigma^*}{\partial\pi}/\sigma^* = \frac{\sigma^*}{\hat{\sigma}-\sigma^*}\frac{1}{\gamma\left(\sigma^*\right)-2}\frac{\partial\hat{\sigma}}{\partial\pi}/\hat{\sigma}$$

which is clearly negative since: 1) by (27), $\frac{\partial\hat{\sigma}}{\partial\pi}/\hat{\sigma}$ is negative; 2) by the second-order condition, $\gamma(\sigma^*) > 2$; 3) in the interior solution $\hat{\sigma} > \sigma^*$.

$\square$

Why does an increase in politicians' reward always induce parties to manipulate information more? The intuition can be easily gained from figure 3 that shows the equilibrium expected benefits $B(\sigma;\pi)$ and costs $c(\sigma)$ of a representative party as a function of σ for $\sigma \in (0.5, \bar{\sigma})$ for two different values of politicians' pay equal to π_0 and π_1 respectively, with $\pi_0 < \pi_1$. Notice that while $c(\sigma)$ does not depend

on politicians' pay π, $B(\sigma; \pi)$ does depend on π because parties' benefits are affected by politicians' pay (and market wage w_s as well) both through the service duties that can be charged from each (unskilled) politician, e_u, as well as and from the measure of (unskilled) politicians belonging to the representative party.
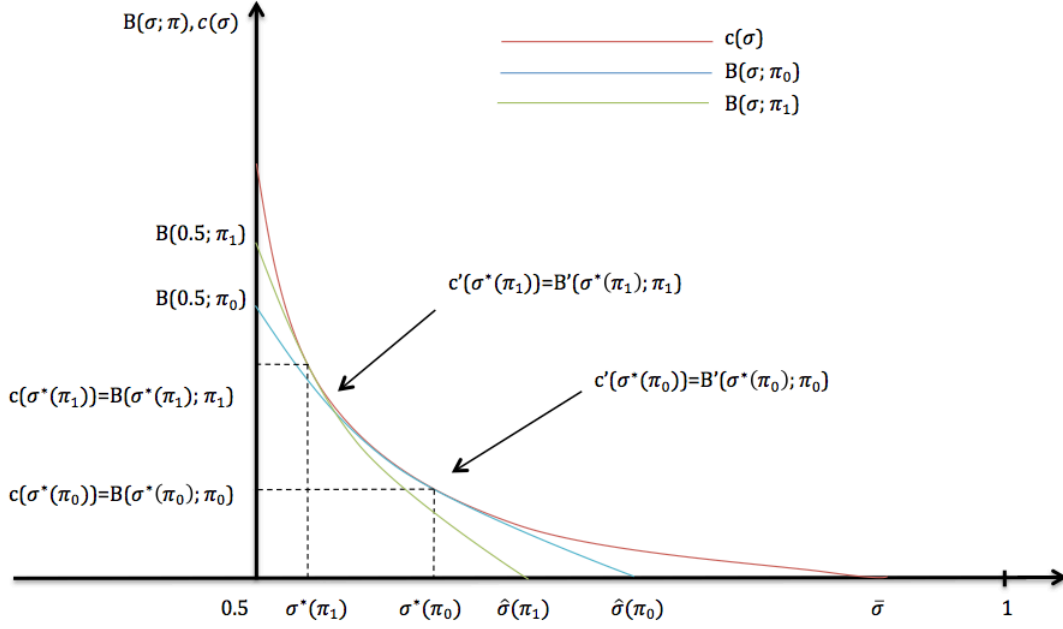

Figure 3: The information manipulation effect: change in the optimal solution of σ following an increase in π.

At the initial value of $\pi = \pi_0$, the optimal choice $\sigma^*(\pi_0)$ corresponds to a tangency point of the benefit curve $B(\sigma; \pi_0)$ and the cost curve $c(\sigma)$. Notice that at $\sigma^*(\pi_0)$ total costs equal total benefits, i.e. $B(\sigma^*(\pi_0); \pi_0) = c(\sigma^*(\pi_0))$, and marginal costs equal marginal benefits, i.e. $B'(\sigma^*(\pi_0); \pi_0) = c'(\sigma^*(\pi_0))$.[21] Note that the horizontal intercept for the costs curve is $\overline{\sigma}$, which is the amount of information that the representative party can produce at no cost ($c(\overline{\sigma}) = 0$). The horizontal intercept for the benefits curve is by contrast $\hat{\sigma}(\pi_0) = \frac{\pi_0 - 1}{\pi_0 - 1 + \pi_0 - w_s}$, which is the amount of information that, for a given $\pi = \pi_0$, equalizes the maximum service duties that can be charged from unskilled politicians to those that can be charged to skilled politicians. Since in this type of equilibrium $e_s = 0$, then $e_u(\hat{\sigma}(\pi_0)) = 0$ and therefore $B(\hat{\sigma}; \pi_0) = e_u(\hat{\sigma}(\pi_0))\alpha^s(\hat{\sigma}(\pi_0))(1 - \hat{\sigma}(\pi_0)) = 0$.

Now assume an exogenous increase in politicians' reward from π_0 to $\pi_1 > \pi_0$. The costs curve remains unaffected while the benefits curve becomes steeper and the horizontal intercept shifts to the left. The movement of the benefits curve can be explained as follows. First, party's marginal benefits of manipulating information are increased at any level of σ and, second, unskilled politicians are less willing to run for public office so that the threshold $\hat{\sigma}$ falls. As a result, the "old" equilibrium value $\sigma^*(\pi_0)$ is not optimal anymore, because, according to the new benefits curve $B(\sigma; \pi_1)$, at $\sigma^*(\pi_0)$, marginal benefits are larger than the marginal costs, i.e. $-B'(\sigma^*(\pi_0); \pi_1) > -c'(\sigma^*(\pi_0))$, and total benefits are smaller than total costs ($B(\sigma^*(\pi_0); \pi_1) < c(\sigma^*(\pi_0))$). The equality between marginal and

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[21] Also notice that, due to free entry, the representative party cannot make profit in equilibrium and this is why the costs curve always lies above the benefits curve except in correspondence with the optimal value.

absolute benefits and costs is restored by reducing the value of σ to $\sigma^*(\pi_1)$ which is associated to higher marginal and absolute costs (since $c''(\sigma) > 0$ and $c'(\sigma) < 0$) but even higher marginal and absolute benefits.

One may ask how to reconcile an increase in absolute and marginal benefits of manipulating information following an increase in politicians' rewards, with a smaller propensity of unskilled citizens to become party members, reflected in smaller service duties that can be charged to them. Here the role of free-entry in the parties market is crucial. An increase in politicians' pay, π, has two opposing effects. First, it reduces the service duties that can be extracted from an unskilled party member, and the probability that the latter can be elected, reducing both total and marginal benefits of manipulating information, for a given N^*. Second, by reducing absolute benefits while leaving absolute costs unchanged (for a given σ), it also reduces the equilibrium measure of parties $(N^*(\pi_1) < N^*(\pi_0))$, which in turns increases total and marginal benefits of manipulating information for incumbent parties.

To sum-up, the information manipulation effect can be explained as follows. An increase in politicians' pay, π, increases the measure of skilled citizens who become party members. Since parties don't want them to be elected, they are more willing to bear the cost of manipulating information even further. The overall effect of increasing the pay of politicians on quality of politicians is the result of the tradeoff between the selection effect and the information effect. Increasing politicians' pay always lead to more information manipulation by parties, according to lemma 4, which –other things equal– would increase the chance of election for unskilled party members, thereby reducing politicians' quality. Therefore, for an increase in politicians' pay to improve the quality of elected politicians, the selection effect should be strong enough, as we explore in the next subsection by resorting to the full characterization of the equilibrium under the cost function (41).

6.1 Pay and quality of politicians with a specific cost function

Given the cost function, (41), the expression for the information manipulation effect can be obtained by differentiating (43) with respect to π, which yields

$$\frac{\partial \sigma^*}{\partial \pi} \frac{1}{\sigma^*} = \frac{\theta \bar{\sigma}}{\theta \bar{\sigma} - \hat{\sigma}} \frac{\partial \hat{\sigma}}{\partial \pi} \frac{1}{\hat{\sigma}} \tag{48}$$

where $\frac{\partial \hat{\sigma}}{\partial \pi} \frac{1}{\hat{\sigma}}$ is defined by (27). The following results holds

Proposition 1 (Pay and quality of politicians). *Consider a symmetric equilibrium in which, (i) There are enough high-signal candidates to cover all seats (see property 2, page 11, $C^s > p$), and; (ii) All unskilled citizens and only a fraction of skilled ones are party members (property 3, page 11, $A_u = \mu(1-s) \wedge A_s < \mu s$). Assume the cost of manipulating information is given by equation (41). Then, increasing the pay of politicians reduces the quality of politicians whenever,*

$$\left(\frac{\pi - w_s}{\pi - 1}\right)^2 < \frac{1 - \bar{\sigma}}{\theta \bar{\sigma}} \tag{49}$$

and improves it otherwise.

Proof. Given (46) we know that equilibrium quality of politicians, q^*, is decreasing in π if the information manipulation effect is larger, in absolute value, then the information manipulation effect. That is

$$\frac{\partial q^*}{\partial \pi} < 0 \Leftrightarrow -\frac{\partial \sigma^*}{\partial \pi}\frac{1}{\sigma^*} > \frac{1 - \sigma^*}{\pi - w_s} \tag{50}$$

Using (48) and (43) we can substitute for the explicit value of $\frac{\partial \sigma^*}{\partial \pi}\frac{1}{\sigma^*}$ and σ^* to obtain

$$\frac{\partial q^*}{\partial \pi} < 0 \Leftrightarrow -\frac{\bar{\sigma}\theta}{\theta\bar{\sigma} - \hat{\sigma}}\frac{\partial \hat{\sigma}}{\partial \pi}\frac{1}{\hat{\sigma}} > \frac{\theta\bar{\sigma} - \hat{\sigma}\left(1 + \bar{\sigma}\left(\theta - 1\right)\right)}{\theta\bar{\sigma} - \hat{\sigma}}\frac{1}{\pi - w_s} \tag{51}$$

Substituting for for $\frac{\partial \hat{\sigma}}{\partial \pi}\frac{1}{\hat{\sigma}}$ and $\hat{\sigma}$, using (27) and (26), we get

$$\frac{\partial q^*}{\partial \pi} < 0 \Leftrightarrow \bar{\sigma}\theta\left(\frac{w_s - 1}{\pi - 1}\right) > \theta\bar{\sigma} - \frac{(\pi - 1)}{(\pi - w_s)}(1 - \bar{\sigma}) \tag{52}$$

Collecting, $\bar{\sigma}\theta$, multiplying both sides by $\pi - 1$ and $\pi - w_s$, and dividing both sides by $\theta\bar{\sigma}$ yields condition (49),

$$\frac{\partial q^*}{\partial \pi} < 0 \Leftrightarrow \left(\frac{\pi - w_s}{\pi - 1}\right)^2 < \frac{1 - \bar{\sigma}}{\bar{\sigma}\theta} \tag{53}$$

$\square$

Quite intuitively, according to Proposition 1, with the specific cost function (41), an increase in the pay of politicians' reduces the quality of politicians whenever, other things equal,

i. θ is relatively small. If parties' technology for information manipulation is efficient so that manipulation is cost-effective, the manipulation effect is comparatively stronger;

ii. $\bar{\sigma}$ is relatively small. The less informative is the public signal that citizen receive in the absence of information manipulation, i.e. the less aware a society is, then the information manipulation effect is larger, and the selection effect is comparatively smaller.

iii. $\frac{\pi - w_s}{\pi - 1}$ is relatively small. When politicians reward is small compared to the market wage of skilled citizens, the latter have less incentive to run for politics and the selection effect is comparatively smaller.

Notice that cases (i) and (ii) might well be self-reinforcing. In other words, θ and $\bar{\sigma}$ might be positively correlated. On the one hand, it looks more likely that manipulating information is cheaper in less aware societies, where the quality of media and the average level of citizens' concern and ability to process information correctly is low. On the other hand, when manipulating information is cheap we expect that parties take advantage of this by choosing a higher degree of information manipulation (σ^* is low when θ is low, see equation (43)), and one may expect that exposing citizens to a high degree of information manipulation for a significant amount of time can affect their "exogenous" level of concern and their ability to process informations correctly. We leave the analysis of such interaction for future research, and we simply observe that the alleged positive correlation between $\bar{\sigma}$ and θ would strengthen our argument.

6.2 Empirical implications

What are the empirical implications of our model? To what extent our results provide a rationale for the relationship between rewards for public office and quality of politicians in Italy and in USA described in the introduction? Assuming that the left-hand side of condition (49) is similar in US and Italy[22], our model predicts that if quality of politicians and politicians' pay are negatively correlated in the case of Italy, and positive correlated in the case of the US, then we should expect the cost of manipulating information θ and/or the level of citizen awareness $\bar{\sigma}$ to be lower in Italy than in the US. As already mentioned in the introduction, despite finding proper proxies for these quantities is not an easy task, we propose two indexes of press freedom as as a proxy for parties' ability to manipulate information, which depends on θ, and the so-called *Index of Ignorance* elaborated by IPSOS-MORI as a proxy for citizens' awareness, $\bar{\sigma}$. As shown in figure 4, According to the *Press Freedom Index* elaborated by Reporters Without Borders, since 2002, Italy's ranking ranges between 35th (out of 164 in 2007) and 73rd (out of 180 in 2015), while the US's ranking ranges between 17th (out of 134 in 2002) and 53rd (out of 161 in 2006). An even sharper picture emerges from the *Freedom of the Press index* elaborated by Freedom House according to which, among 186 countries and since 2002, Italy rank ranges from a maximum of 52nd (in 2002) to a minimum of 79th (out of 194 in 2006) while US rank ranges from a maximum of 15th (out of 193 in 2004) to a minimum of 31st (in 2015 out of 199) as shown in figure 5. Moreover, Freedom House defines Italian press as "partly free" in 10 of the last 14 years while US press is always defined "free". Indeed, these observations suggest that manipulating information is more difficult in the US than in Italy which, in our model, translates in a lower value of θ in Italy than in the US. As for the Ignorance index, Italy is the most ignorant country among the 14 considered, suggesting that citizens' awareness (and then the level of $\bar{\sigma}$) is lower in Italy than in the US. These empirical findings seem to support the model's predictions and suggest that the mechanism we propose might have a role in explaining the observed data.

Finally, for the subsample of 14 countries for which the information on both the above mentioned freedom of press and the ignorance indexes is available, we have computed the correlation between country's relative average rankings during 2002-2015 in the ignorance and freedom of press cross-country tables (see also figures 6,and 7). Such correlation is equal to -0.57 is we consider the Freedom of the Press index by Freedom House and to and -0.61 if we consider Press Freedom index elaborated by Reporters Without Borders, which confirms our priors on the interaction between these two variables.

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[22]Using OECD data (OECD, 2011) for earnings premiums from tertiary education, Barro-Lee dataset (Barro and Lee, 2010) for the percentage of population with a tertiary degree, Piketty (2014) estimates on labour share and public informations for politicians pay in US and Italy, we have calibrated the LHS of (49), $\left(\frac{\pi - w_s}{\pi - 1}\right)^2$, for the US and Italy from 1999 to 2009. The estimates for the two countries turn out to be very close. In US the estimated value of the LHS of condition (49) ranges from 0.74 to 0.77 while in Italy it ranges from 0.79 to 0.89.
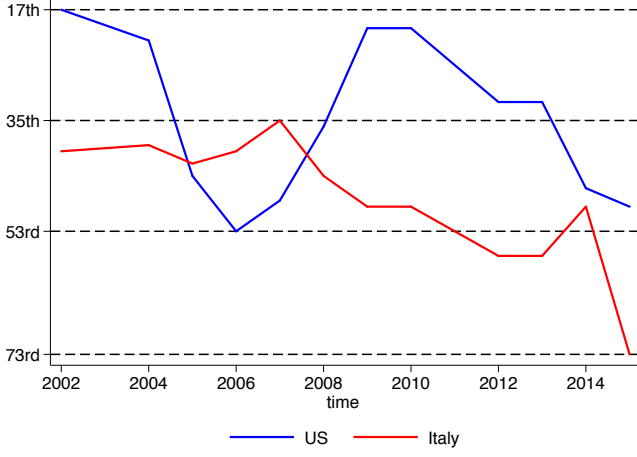
Figure 4: Trends of Italy's and US's ranking positions according to the Press Freedom index by Reporters Without Borders, 2002-15.
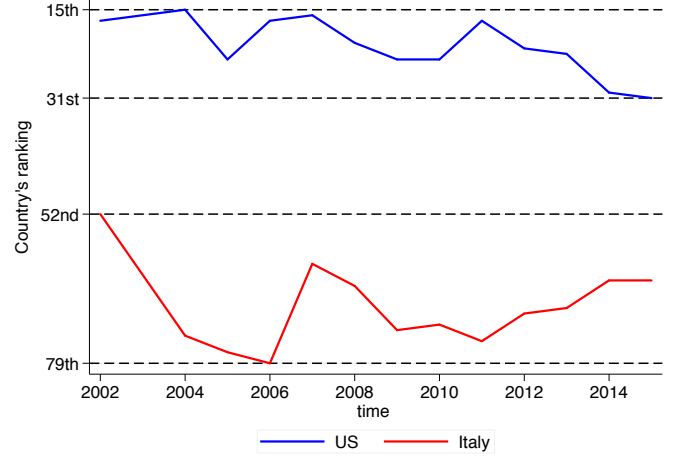

Figure 5: Trends of Italy's and US's ranking positions according to the Freedom of Press Index by Freedom House, 2002-15.
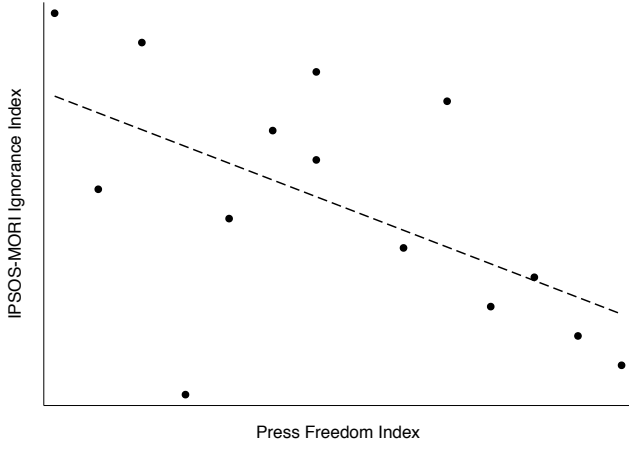

Figure 6: Cross-country linear relationship between IPSOS-MORI index and Press Freedom Index rankings. For the Press Freedom Index we consider the time-series average ranking over the available periods.
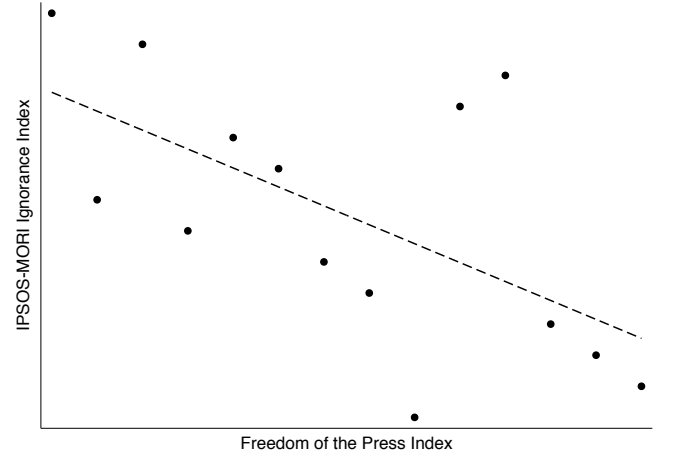

Figure 7: Cross-country linear relationship between IPSOS-MORI index and Freedom of the Press Index rankings. For the Freedom of Press Index we consider the time-series average ranking over the available periods.

7   Conclusions

We analyze how such relationship could be affected when party play a role in the selection of candidates, and show that the relationship between quality and pay of politicians is ambiguous. We show the existence of an equilibrium where increasing politicians' pay reduces the average quality of politicians. Such equilibrium is more likely to exist when the costs of manipulating information are not too large, and/or the society is less aware, i.e. the quality of information available about perspective politicians is relatively low, due for instance to the bad quality of the media or because citizens have little concern about politics. In such contexts, political parties may prefer to bear the additional cost of distorting information through aggressive political campaign in order to increase the probability of elections for unskilled candidates whom, in case of election, would be willing to provide

higher party duties relative to skilled politicians. The empirical literature on how remuneration of politicians affects their quality delivers convincing evidence that the sign of the relationship could be positive only at local level. At national level, the evidence is far more mixed, providing the case for an ambiguous relationship. This is consistent with our theoretical results, to the extent that the informational disadvantage of citizen as far as the quality of candidates is concerned, might be higher in the case of national elections than in that of local ones.

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