Corruption in Romania - A game theory model

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Abstract

Corruption has become a very severe issue in many countries in past years, especially in Romania. This paper aims to shed more light on causes and solutions to this problem, within the context of prior literature. To this aim, a game theoretical model is presented, in which corruption is an equilibrium strategy, taking into account the specifications of the Romanian political system. Subsequently, the factors contributing to the equilibrium are individually analysed and their effects on deterring corruption are elaborated on, ceteris paribus. Furthermore, a set of extensions provides ways to extend the model to other situations, such that, for instance, it can apply to other political frameworks. The results suggest that corruption could be minimised by increasing the distribution of voters on the spectrum of political preferences, by decreasing expected future incomes by either increasing uncertainty or decreasing expected rents, by increasing voter valuation of public goods, or by increasing the costs associated with corruption, as perceived by the politicians.

1 Introduction

For many years, the Eastern European country of Romania has been plagued by a vast array of cases of corruption. Some include institutional issues, such as trying to influence criminal investigations, others company issues, such as embezzlement of firm funds. But the most drastic cases arise when it comes to politics. One of the most recent and highly discussed cases concern the previous president of the country, Traian Basescu. On July 6th 2012, the Constitutional Court of Romania had decided to suspend him from his function. To follow was a referendum, where the voters could decide whether or not to remove the president from office permanently. This occurred on grounds of overstepping his authority and interfering in legal and governmental affairs. The referendum, which took place later that month, was ruled invalid, due to the insufficient number of voters, as 50% of the population was required to attend. The 46% of the registered voters who attended had overwhelmingly voted to impeach Basescu, with 87.5% being in favour of releasing him from his position. The low turnout seems to have been caused by the very high summer temperatures, but also by the request of the suspended president, who asked his supporters to boycott the referendum by not going to the polls (in order to keep the turnout rate under 50%). Traian Basescu had been holding office since 2004 when this occurred. In the same referrendum, "regional development minister Liviu Dragnea was convicted of masterminding a campaign to use bribes and forged ballot papers to swing an impeachment vote against then president Traian Basescu" (Ilie, 2015)[1]. Dragnea was a member of the Social Democrats, Basescu's arch rivals.

Throughout his presidency, Basescu had been involved in various political scandals, the most notable one involving his younger brother, accused in 2011 (and finally convicted in 2016) of being bribed in order to speed up the release from prison of a prominent Roma leader, who himself was convicted for attempted murder.

But this was not the first instance of Basescu getting in trouble. In 2007, the president was close to being subject to another impeachment referendum, prior to his re-election in 2009.

In light of this and many other such examples, it would be interesting to analyse why and how situations like these arise, in particular in the example country, Romania. Understanding how such activities come to take place is the first step in understanding how to stop them. Thusly, the research question to be answered by this paper is: What drives political corruption in Romania and how can it be contained?

There is a wide range of literature on the economics of corruption, in which Rose-Ackerman is a very well-known voice. In 1997, she wrote about various types of political corruption, including but not limited to bribing with the aim of avoiding payments, for high-up positions, or for official favours. She also discusses incidence of corruption and some consequences, such as inefficiencies and negative effects on a macroeconomic level. Further, she mentions some solutions for various of these issues, such as increasing the risk and cost of being caught, reducing the incentives and payoffs of bribing, or involving independent parties in order to enforce commitment to honesty. Such institutions could be, for instance, third-party auditing companies. Besides her own writings, she has also compiled a series of books containing the most recent and prevalent articles about (political) corruption, some of which I will summarise below.

Firstly, Lambsdorff (2006) summarises a wide array of empirical papers, which tackle corrup-

[1] Ilie, L. (2015, 05 15). Romanian minister found guilty of vote-rigging in referendum. Retrieved from reuters.com: https://www.reuters.com/article/us-romania-corruption/romanian-minister-found-guilty-of-vote-rigging-in-referendum-idUSKBN0O00J820150515

tion with cross-sectional data from diverse countries. This piece is particularly useful in gaining some insight as to why corruption is a problem in need of solving. In particular, he names a variety of causes and consequences of corruption, which also seem to sometimes overlap, creating a self-enforcing mechanism. Some causes he presents include a too large public sector or too much government power, where redistributive policies, in particular, are very predisposed to corruption. Other causes of corruption range from poor, too complicated, or vague regulations, which allow for loopholes in administration, inappropriate market structures (e.g. competition), as well as the government, democracy and voting structure themselves, to culture and gender, arguing that corruption may be lowered by improving women's rights in the country. Although democracy is generally believed to impede corruption by increasing political competition, the existence of a strong parliament may still lead to "self-seeking behaviour" (Lambsdorff, 2006). In return, the author names some consequences of corruption, such as inequality, decreased productivity, GDP, investment in capital and, once again, a larger public sector.

Similar research has been performed by Schleifer and Vishny (1993), but more theoretically, reaching comparable conclusions. Later, in 2010, Rose-Ackerman herself wrote a chapter in her book, "The institutional Economics of Corruption", further elaborating on these causes and consequences of (political) corruption, as well as discussing some empirical results supporting her theoretical framework.

The "International Handbook on the Economics of Corruption" (2006) also contains articles about institutional structures and how they relate to corruption. For instance, Kunicová (2006) looked at the previously mentioned effect of democratic institutions on corruption, by reviewing not only theoretical concepts, but also empirical evidence. She also elaborates on various types of corruption, such as 'vote buying', and mentions some recent theoretical developments concerning office seeking. Some of this literature refers to campaign fund seeking, but quite some scholars have researched vote buying, mostly agreeing that electoral systems encouraging personal voting[2] - such as Romania - are more prone to corruption (Kunichová, 2006).

In a further chapter, Rousso and Steves (2006) empirically investigate anti-corruption programs and their effectiveness, in post-communist transition countries. Romania, having been under Soviet control for a period of time after the Second World War, naturally belongs to this research. Although their sample size is fairly small and therefore inappropriate for any causal inference, as well as the fact that there is a high probability of omitted variables in this research. the research does highlight some trends regarding the results of anti-corruption programs and legislation. The general trend seems to be that anti-corruption measures have a significant downward effect on bribes, at least in the long run.

Further literature includes Ades & Di Tella (1999), Macrae (1982) and Rose-Ackerman (1975), who have created models of corruption. However, despite providing deeper insight into how such issues can be modeled, they mainly refer to firm-level corruption and rent seeking, rather than political corruption. Beenstock (1979) also develops a model of corruption as a decision under uncertainty. However, this method falls short in comparison to more advanced theory nowadays.

A new point of view on the matter is addressed by Teorell (2007). He is concerned that the previous literature on the economics of corruption is too one-dimensional and tackles the issue by considering corruption as an institution itself, rather than a set of actions undertaken by

[2]Personal voting in this context refers to a direct voting system, where the electoral votes all have the same weight in the outcome. In contrast, the American voting system, for instance, in not personal, as the votes are weighted by state.

individuals. Although he does not present a solution or model himself, he does hint toward a methodology, both theoretical and empirical. Previous literature viewed corruption as merely a principal-agent problem, where one party (e.g. the one receiving a bribe) is passive, while the other is the only one undertaking actions. Teorell argues that the interaction is rather a mutual exchange, where both parties play an active role (e.g. the bribe is received in return for some service). He also argues that this industry would generate increasing returns, as those in power gain more of it by continuing their endeavors, which is also something observed in the real world. Finally, he aims to improve existing principal-agent models by incorporating these factors as additional means of conflict in the exchange.

Besides that, Bardhan (2006) discusses various causes for countries to end up on different equilibrium levels of corruption and on different points in the spectrum of consequences, despite similar *ex ante* characteristics. He argues for the differentiation between corruption at a level of enactment versus enforcement of laws, implying their different results for the concerned countries. That is, he looks at what laws countries choose to adopt in order to tackle corruption (enactment) and at how exactly these laws are implemented and enforced, further analysing the differences between the countries.

That being said, game theoretical models of political corruption are rare, possibly due to the vast display of factors affecting corruption decisions, and this paper aims to fill some of those gaps. Some literature that still belongs to this category includes, among others, Brollo et al. (2013). The authors base political corruption on a political agency model and test their findings, about how corruption and the quality of candidates are influenced by government revenues, on Brazilian data. They find that higher revenues do indeed lead to more corruption, as it is easier to seek rents without too much voter backlash. Similarly, they find that a higher amount of revenues deteriorates the average quality of politicians, as it makes it more attractive for those individuals with few or bad outside options to run for office. The empirical analysis performed also supports their findings. They call these results a "political resource curse" (Brollo et al., 2013) as increased political resources, i.e. government revenues, have a detrimental effect on the above-mentioned factors. This article, although related to this thesis, tackles a different range of political corruption issues. While the authors' research focuses on the politicians' behaviour while in office, I will target pre-election promises and politician behaviour.

Groenendijk (1997) also addresses a principal-agent model of corruption, in particular showing alternative uses of this model rather than bureaucracy, and analysing trade-off costs of being corrupt.

Furthermore, as Di Tella et al. (2015) noticed, perceptions about the corruption and altruism of others also have an effect on the individual. If people believe that others are likely to take or pay bribes, they themselves will as well, hence even more urgency to disrupt the cycle.

To sum up all the aforementioned literature, corruption is and has been for a long time a widespread social issue which needs to be kept under control for the benefit of the society. Moreover, not enough literature has tackled game theoretical models referring to political corruption. Hence, the rest of this paper will develop a microeconomic, game-theoretical model for political corruption, following the Romanian political system. The model is derived from a political agency model. As in the classic case, the players are two politicians (and their respective political parties) and the voters. At one point in the game, parties may choose to bribe some or all of the electorate in order to gain their votes. At this point, a variation of the electoral model of Persson and Tabellini (1999) is very useful to analyse the behaviour of the corrupt party. A result will be presented showing that corruption indeed takes place in the equilibrium. From

this, we may gain insights on how corruption could be deterred and minimised in the real world, within the constraints of the model.

Persson and Tabellini (1999) engage in an analysis of government spending and redistribution for varying types of political systems. More specifically, they look into proportional elections, where the parliament is populated by politicians according to their respective parties' proportion of votes. They then move on to majoritarian elections, where the sole aim of the parties is to gain more than 50% of the polls. The rest of their research deals with post-election regimes, as well as econometric evidence for their claims. The model I will inspire this paper on is the proportional representation one, as it corresponds to the Romanian political system. However, despite a similar approach, namely a fairly standard probabilistic voting model, many more factors play a role in this thesis. Furthermore, the aim and implications of their research is hugely different from the corruption issues presented here.

The assumption of two main parties is also backed by the Romanian election results in recent years, in which two parties were clearly preferred over all others, as well as by campaign finance laws, which are "often designed to exclude the entrance of new parties" (Roper, 2002), notably in Eastern Europe.

The layout of the subsequent sections is as follows. Section 2 presents a very short description of the Romanian political system, which is the basis of this model, as well as the model in question, while Section 3 elaborates on the equilibrium solution and discusses it, whilst also mentioning some resulting methods of deterring corruption. Thereafter, Section 4 includes a number of extensions of this model, which allow it to also be representative of other cases and for other countries. Section 5 concludes.

2 Model

2.1 Romanian political system

Romania, the main example this thesis is based on, is a parliamentary republic. Many parties have the right to exist, but only the most prominent ones receive seats in the parliament. These seats are assigned based on proportional representation: the percentage of votes received in national elections translate to the same (or a slightly higher) percentage of seats in the Parliament. Each party must receive over 5% of the votes in order to qualify for parliamentary representation. The votes cast for the parties who did not pass are proportionally shared among the most popular parties, which may lead to a slightly higher representation for some, as opposed to the number of votes they received. These elections take place every four years.

The political agency model to be presented in Section 2.2 also models the Romanian term limit of the politician in power - he is not allowed to preside more than twice.

2.2 The corruption model

To set up this corruption problem I will use a variation of a political agency model. The classical model consists of two time periods, $t \in \{1, 2\}$, in which we have two types of players: politicians (agents) and voters (principal).

Before the start of each period, nature decides the state of the world $s_t \in \{\underline{s}, \bar{s}\}$. The state is only observable by the incumbent politician, but it affects the payoff of the voters. The utility of the voters is affected by the action $a_t \in \{\underline{a}, \bar{a}\}$ of the incumbent:

$$U_i(a_t) = -(a_t - s_t)^2,$$

where i denotes the individual. This implies that the voter prefers the action of the politician to exactly correspond to the state of the world, i.e. if the state of the world is $\bar{s}$, the voters desire $a_t = \bar{a}$, otherwise $\underline{a}$. If the chosen action does not match, the voter will lose the equivalent of $(a_t - s_t)^2$ in utility.

Each individual in the economy discounts future utility at a common factor $\beta < 1$ (politicians and the electorate alike).

At the beginning of the first period, the government gathers taxes amounting to T from each individual. These taxes may be used in the second period for redistribution purposes, or for contribution towards a public good x. Redistribution and public good spending promises occur right before the second election, thus right before the start of the second period, and after the voters observe the realisation of $U_i(a_t)$.

Politicians and parties

Politicians belong to either one of two parties $J \in \{A, B\}$, and can choose an action $a_t \in \{\underline{a}, \bar{a}\}$.

Before the beginning of the first period, both parties make the same promises with regards to policies and have an even distribution of votes, making the median voter indifferent and thus leaving the election result to chance. Therefore, party preferences of voters are negligible in the first round of elections.

Politicians can be congruent (c), with a probability p, or dissonant (d) in the rest of the cases $(1-p)$. A congruent politician is purely altruistic, thus always choosing $a_t = s_t$. His incentive to run in the election is ensuring the population against the utility loss from $a_t \neq s_t$. A dissonant politician seeks office in order to ensure a certain preferred policy, for example $a_t = \underline{a}$. This policy ($\underline{a}$) gives him a private benefit r, drawn from a distribution $F(r)$ with support $(0, R]$ and mean μ. Denote by r_t the realisation of r in period t, which the politician observes at the same time as s_t, and thus before choosing a_t. Further denote by m the probability that $s_t = \underline{s}$.

Assumption: Some politicians are so dissonant (i.e. perceive the cost of $\bar{a}$ to be so high, or $F(r)$ to be so low) that they would never choose $a_t = \bar{a}$, no matter the expected future payoff μ. Denote this proportion by $1 - q$. This implies that a proportion q of dissonant politicians may choose $a_t = s_t$, if they perceive the payoff of doing so to be higher than that of a dissonant policy. These differences account for the existence of a multitude of politicians, as it is in the real world. Denote the *ex ante* probability that a 'bad' politician will choose a congruent policy by $\lambda = Pr(a_t = s_t | j = d)$, where $j \in \{c, d\}$ is the politician type.

Denote $a(s, j)$, with $s \in \{\underline{s}, \bar{s}\}$ as the action of the incumbent.

The game only lasts for two periods, meaning that, since there is no chance of re-election, any politician will choose their preferred policy in the second period. Therefore, $a_2(s, c) = s_2$ and $a_2(s, d) = \underline{a}$.

ASSUMPTION: Furthermore, assume that both parties have the same distribution of congruent and dissonant politicians as the entire economy (and so $P(politician = c) = p$). This ensures comparable voter expectations for future politicians.

Voters

In both periods, each voter has a payoff of $U_i(a_t) = -(a_t - s_t)^2$.

Moreover, we can suppose that the status quo is such that, as long as $a_t = s_t$, the median voter will always vote for the incumbent, which is meant merely as a tie-breaker. This can signify that good behaviour improves a politician's reputation, and holds as long as no politicians are corrupt. On the other hand, observing $a_1 \neq s_1$ causes voters to never re-elect an incumbent.

The setup for the rest of this model will follow in some measure that of Persson and Tabellini (1999). Voters belong to 3 groups g, $g \in \{1, 2, 3\}$, each of size 1, which are unidentifiable to politicians. The utility of each member of group g is represented by the function

$$u_g^J(c_g, x, a_t) = c_g^J + H(x^J) + U_i(a_t) = 1 - T + b_g^J + H(x^J) - (a_t - s_t)^2 \tag{1}$$

where c_g^J stands for the consumption of the members of group g made possible by party J, b_g^J represents the redistributive transfer from party J to each member of group g, and $H(x^J)$ is the utility that each individual receives from consuming an amount x of the public good.

ASSUMPTION: $H(x^J)$ is concave and monotonically increasing. This is not only in line with the usual economic assumption of diminishing marginal returns, but also ensures that a unique equilibrium exists.

Denote by ξ a uniformly distributed global popularity shock with $\xi \sim U[-\frac{1}{2\alpha}, \frac{1}{2\alpha}]$ and η_g a group specific shock, where $\eta_g \sim U[-\frac{1}{2\Xi_g} + \bar{\eta_g}, \frac{1}{2\Xi_g} + \bar{\eta_g}]$. These shocks represent the net effect on the popularity of both parties. Thus ξ will shift the entire electorate toward the ideology of a certain party, while η_g will shift each group individually, possibly in different directions. An interpretation of these could be, for instance, a political scandal involving a party (ξ) or exogenous, group specific preference changes (η_g).

Ξ_g represents the group density. Since the groups are all of unit mass, a higher density implies a lower spread over the political spectrum. The following two assumptions are in line with the paper by Persson and Tabellini (1999).

ASSUMPTION: $\Xi_2 > \Xi_1, \Xi_3$. The density of the middle group is the highest, implying that most voters are relatively central on the political spectrum, which is an accurate representation of the reality.

$\bar{\eta_g}$ is the position of the group on the political spectrum.

ASSUMPTION: $\bar{\eta_1} << 0$, $\bar{\eta_3} >> 0$, $\bar{\eta_2} = 0$ and $\Xi_1\bar{\eta}_1 + \Xi_3\bar{\eta}_3 = 0$. This ensures that the three groups are far enough apart on the spectrum (one close to party A, one B, and one central) to still account for the existence of extreme preferences. Furthermore, the fact that $\Xi_1\bar{\eta}_1 + \Xi_3\bar{\eta}_3 = 0$ ensures an *ex ante* balance of the parties' popularity, implying that the shocks and policy promises are the only factors influencing the election results *ceteris paribus*. This further enforces the previous assumption that, on average, the result of the first period election is random, and that the one of the second is affected by the observed utility $U_i(a_t)$.

An approximate graphical representation of these distributions can be found in *Figure* 1.

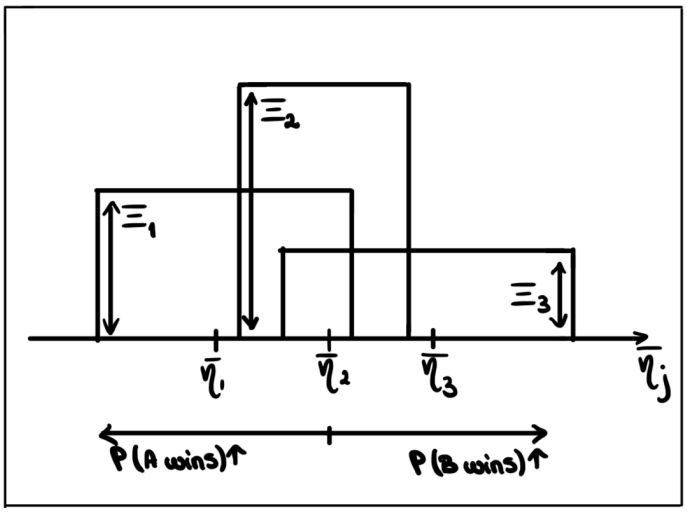

Figure 1: Ideological preferences distribution, following Persson and Tabellini (1999)

Bribing decision

Before the second round of elections and before s_2 and r_2 are drawn, there is an option for politicians to bribe the electorate. This will take the form of targeted redistribution, which is a realistic step in the model, as Lambsdorff's findings suggest (Lambsdorff, 2006).

A dissonant politician who chose $\underline{a}$ whilst the state of the world was $\overline{s}$ may try to bribe part of the electorate to vote for him in return for favourable redistribution. An incumbent politician who has chosen a congruent policy in period 1 has no incentive to attempt to influence the voters since he would be re-elected regardless. Similarly, the opposing party may try to 'convince' the electorate to vote for their party in the next election. Further assume that the incumbent party owns a majority of the parliament and will keep doing so unless their opponent takes over.

The budget constraint of the government is, keeping in mind the voter groups' size,

$$3T = \sum_g b_g + x, \tag{2}$$

and the bribing party will try to maximise their probability of winning the election.

Assumption: I will further assume that the status quo dictates all taxes be spent on the public good x, and thus the non-corrupt party will adhere to this policy. However, in certain rare economic situations, redistribution may still occur if the government sees it fit to do so. Therefore, simply observing redistribution does not necessarily imply that a certain party is corrupt. This is simply so that redistribution is not an immediate sign of corruption. However, the cases in which redistribution would occur are seldom enough to be insignificant in the optimisation problem of the players. Furthermore, modeling redistribution in this framework would make it impossible (realistically) to tell redistribution for policy reasons apart from bribing.

Assumption: Another required assumption of this model is commitment. If the parties cannot commit to their promises (the party actually providing the bribe and the electorate the votes), the situation becomes much more complicated. However, commitment to the own

promises is a realistic assumption in regard to the real world. Despite the fact that the model only permits two periods and players would not be punished for deviating, in real interactions people have the incentive of reputation to uphold. If they do not keep their promises, no future party will attempt to negotiate with them. The repeated interactions in the real-world imply that we can safely assume commitment in this model.

For clarity, a short overview is provided in the *Overview* Appendix. It provides a summary of the players, what they know, and their choices at each point in time.

3 Equilibrium and discussion

The bribing decision process takes the form of a sequential game. After the end of the first period and the realisation of $U_i(a_t)$, the corrupt party chooses its redistribution policy and supply of the public good x, followed by the second election. For this, I will proceed using backward induction.

3.1 Voters' choice

Voters, upon deciding whether to re-elect the incumbent or not, know the promises of the two parties and their expected utility from voting for either party, which is

$$Eu_g^J(c_g, x, W) = 1 - T + b_g^J + H(x^J) - \Pi^J(a_t - s_t)^2,$$

where Π^J is their estimate for the probability of a dissonant incumbent.

The previously mentioned assumption, that a congruent incumbent will be re-elected, can be modeled by introducing Bayesian updating: voters update their beliefs according to Bayes' rule: $\Pi = \frac{p}{p+(1-p)\lambda} > p$ if they observe $U_i(a_t) = 0$.

Estimated probability of a congruent incumbent

A congruent politician will always choose $a_t = s_t$. A dissonant politician prefers $\underline{a}$ but may choose $\overline{a}$.

$1 - q$ of dissonant politicians will only ever choose $\underline{a}$, for a short term payoff of r_1. The rest of them, q, will choose their a_1 based on the same r_1, the state of the world s_1, and their expected future payoff, $\beta\mu$. Note that, at this point in the game, the politicians have no reason to suspect corruption. Hence, the expected future payoff of $\beta\mu$ is considered certain if they decide to implement a congruent policy.

If the state of the world is $\underline{s}$, it matches with the politician's preferred action and thus there is no trade-off between the current gain (r_1) and the future returns. This occurs with a probability of m. In $1 - m$ of cases, the incumbent will choose $\overline{a}$ iff $r_1 \leq \beta\mu$. In other words, he will satisfy the needs of the voters in the first period, if and only if he expects a higher payoff in the future from doing so.

The state of the world is unobservable to voters. Nevertheless, they can compute λ based on their prediction of a politician's response to the possibility of re-election and on their knowledge of $F(r)$. This yields

$$\lambda = m + (1 - m)qPr(r_1 < \beta\mu) = m + (1 - m)qF(\beta\mu)$$

and so, if they observe $U_i(a_t) = 0$, they will expect the politician to be congruent with a probability of $\Pi = \frac{p}{p+(1-p)[m+(1-m)qF(\beta\mu)]} > p$.

Voting

On average, each member of a group will vote for party A iff

$$b_g^A + H(x^A) + \Pi^A U_i(a_t) > b_g^B + H(x^B) + \Pi^B U_i(a_t) + \overline{\eta}_g.$$

Lemma 1. *The corrupt party, J, will win the election if their overall voter utility surplus, $b_g^J + H(x^J) - H(T)$, is higher than the expected utility loss of voters, $\Delta^J U_i(a_t)$:*

$$b_g^J + H(x^J) - H(T) > \Delta^J U_i(a_t),$$

where $\Delta^J \equiv \Pi^{\neg J} - \Pi^J$ is the difference in estimated probabilities between the two parties.

The proof of *Lemma* 1 can be found in *Appendix B*. This *Lemma* leads to some interesting conclusions and insights about potential methods of combatting corruption, which will be presented in the following section.

3.2 Bribing promise

Knowing the voting pattern of the voters, the parties face the bribing decision. Suppose, for the following, that party A has an incentive to bribe the electorate. The party will aim to maximize the probability that the share of votes from the overall electorate is higher than 50%. Given the previously presented preferences, voter i of group g will vote for party A iff $u^A > u^B + \xi + \eta_g$.[3]

Suppose also that the group specific shock η_g is realised before ξ. Knowing this, the proportion of voters from group g who will choose party A is given by

$$\frac{1}{2} + \Xi_g(u^A - u^B - \xi - \overline{\eta}_g).$$

This implies that, over all three groups, party A will maximise its expected utility by maximising the following function:

$$[\frac{\alpha}{\Xi}\frac{1}{3}\sum_{g=1}^{3}\Xi_g(u^A - u^B) + \frac{1}{2}]\beta\mu \tag{3}$$

with respect to x^A and b_g^A (keeping in mind that $u_g^J = 1 - T + b_g^J + H(x^J) - (a_t - s_t)^2$), where $\Xi \equiv \frac{1}{3}\sum_{g=1}^{3}\Xi_g$.

Maximising Eq. (3) subject to the budget constraint (2) and taking into consideration Eq. (1) we obtain the party's redistributive pattern. This is in line with the one presented by Persson and Tabellini (1999). Due to the fact that groups 1 and 3 are, by assumption, fairly unresponsive to redistribution, in equilibrium, the party will only transfer income to group 2. Thus $b_2^A > 0$ and $b_1^A = b_2^A = 0$. This effect is enforced by the density of the groups. Group 2 is the most central on the ideology spectrum and it has the highest density of voters, and therefore it has the highest amount of swing voters. Consequently, the party will maximise the responsiveness of voters to its redistribution policy by choosing this group.

[3]The main computations for this part can be found in *Appendix A*.

The public good x will be provided following a trade-off between the concave utility $H(x)$ and the constant utility of consumption of the private income b_2. More specifically, $H'(x^A) = \frac{\Xi_2}{\sum_g \Xi_g}$. Note that the choice of a_t and the policies x^J and b_g^J are independent, as they are provided at different times in the game, and also in different contexts. a_t depends on the type of politician $j \in \{c, d\}$, while the policy promises are provided by the party, which aggregates multiple types of politicians.

Proposition 1. *The equilibrium amount of the public good negatively depends on the relative density of swing voters*[4] *to the total population.*

An increase in the density Ξ_2 decreases the equilibrium spending for the public good, which makes sense given the budget constraint and the fact that a larger amount of redistribution b_2^A is required[5].

Furthermore, rewriting the previous equation yields $\sum_g \Xi_g * H'(x^A) = \Xi_2$, which makes it easier to observe that, in order to increase redistribution to group 2, the party will have to give up part of the supply of the public good x. Thus a gain of Ξ_2 votes from this group will proportionally cost party A an amount of $\sum_g \Xi_g * H'(x^A)$ votes from each group.

Note that the Π^J factor plays no direct role in the choice of policy of the corrupt party. This is due to the fact that these probabilities only affect the voters and they have been decided before the policy promises. Therefore the party can no longer influence them.

Possible ways to deter corruption

From *Proposition* 1 we can see that a lower density of group 2 implies a higher provision of the public good and thus less redistribution. Therefore, if the density can be lowered (and hence the spread increased) artificially, this may lead to lower amounts of corruption. This could be achieved by passing a law, stating that the government must subsidise political journals and other medias. In particular, the media should be encouraged to spread as many views and opinions as possible, as voters would not be able to see all, and may end up shifting in a different direction on the spectrum than their peers.

Some other ways to deter corruption arise from Eqs. (6) and (7).

Proposition 2. *A decrease in the mean personal gain of the dissonant politician leads to lower corruption.*

This effect indirectly occurs through the probability Π^J. Decreasing the expected average future gain of the politicians (μ) leads the voters to expect that a lower amount of dissonant politicians will choose congruent policies in the first period, thus making it more likely for a politician to be congruent if the voter observed a payoff of $U_i(a_t) = 0$ in period 1. This mean payoff could be decreased by, for example, legally binding politicians to pay a sum of money in period 2 if they choose $\underline{a}$. This could be done by e.g. passing a law, as long as the sum of money to pay is lower than R and lower than the congruent politician's equivalent of the intrinsic motivation. Additionally, the law could be enforced by a supreme court or some independent third-party, such as an audit company, which was also recommended by Rose-Ackerman (1997). This result is also analogous to that of Bernheim and Kartik (2014). They reach the conclusion

[4] Here proxied by the density of group 2

[5] An increase in Ξ_2 leads to an increase in $H'(x^A)$, which, due to the concavity of $H(x^A)$, implies a lower x^A.

that politician compensation as a policy instrument is an effective means of indirectly controlling corruption. In their paper, lower remuneration (although only subtly) 'cleanses' the government of the wrong type of politicians, through self-selection, thus leaving only those who are less corrupt still willing to run for office. Although the self-selection effect is not possible in this model, it is worth noting that, also through other channels, the result is aligned with the one resulting from this model.

A similar reasoning occurs for the discount factor, β.

Proposition 3. *A decrease in the discount factor leads to lower corruption.*

This, of course, is a realistic result, since the politicians are made more impatient by these changes. In reality, the discount factor (β) could be decreased by, for example, making politicians more unsure about the future. This could imply institutional changes at the level of (central) banks, as they are the ones setting the interest rates and (if desired) exchange rates. However, the exact mechanism is very difficult to deduce given the scope of this paper and may differ on a case by case, country basis.

The previous two *Propositions* are proven mathematically in *Appendix D*.

Proposition 4. *Increasing public valuation of the supplied good leads to lower corruption.*

An additional way to reduce corruption in this setting would be to increase $H(T)$. That is, to increase the voter's valuation of higher amounts of the public good. This could be done through public campaigns aimed at convincing the voters that more spending on x is desirable and thus making $H(x^J)$ steeper. Mathematically, this change makes it more difficult for the parties to achieve a high enough utility surplus from redistribution to compensate for the different expected return of $U_i(a_t)$.

4 Extensions

4.1 Majoritarian election system

In the main model I have assumed a proportional, parliamentary election. Instead, it might be the case that the elections are purely majoritarian. This could be simplified by assuming that the party will aim to gain the majority votes in two of the three groups. An example of this case in the real world would be the US elections, where the president is elected on the basis of gaining the majority of votes in a majority of groups and not over the entire population. Persson and Tabellini (1999) elaborate on this situation and show that the only difference, as opposed to the parliamentary election, is that the amount of public good will be lower. However, the redistribution will still be focused towards group 2. Lindbeck and Weibull (1987) also analyse a model of political elections with majoritarian elections, whereby the result is consistent with that of proportional representation, and therefore with that of the pervious section of this paper.

4.2 Costly bribing

Suppose that, in addition to the previous model, if a politician tries to bribe the electorate, there is an additional cost of doing so. This will take the aggregate form $\sum_g c(b_g^J)$, where $c(b_g^J)$ is monotonically increasing for any $b_g > 0$. This cost will be drawn from the budget previously set up.

This cost may simply be an administrative cost of sorts, such as for transferring the money to the voters. However, the existence of this cost allows for the introduction of screening mechanisms. If the government decides to start screening for corruption, and punishing this sort of behaviour, parties will take measures to avoid being caught. These measures will be costly, as otherwise the screening mechanism would be redundant, and so the costs of avoiding the punishment would also be paid from the tax revenues. Neither one of these options would change the computation, assuming that the probability of being caught is already accounted for in the cost function.

This would imply that the budget constraint of party A becomes

$$3T = x^A + \sum_g [b_g^A + c(b_g^A)].$$

Solving the expected utility maximisation problem of the party with this new budget constraint yields, in equilibrium,

$$H'(x^A) = \frac{\Xi_g}{\sum_g \Xi_g [1 + c'(b_g^A)]}.$$

Proposition 5. *: Increasing the costs of redistribution leads to less corruption.*

Note that $1 + c'(b_g^A) > 1$, since the cost function is increasing. This implies that, due to the additional cost incurred by the party, for any party density Ξ_g, the public spending on x will be higher. Intuitively, this should hold in the real world since danger or increased costs negatively influence the incentives of individuals to deviate from the 'acceptable' behaviour.

This finding therefore results in one more method of impeding corruption, namely increasing the costs associated with redistribution. In order to do so, in the case of administrative costs, an option would be to make bureaucracy more tedious. Such methods include extensive paperwork, long waiting times etc. Alternatively, a law could be implemented to introduce more or better monitoring and oversight forces, which would further increase the probability (and thus cost) of being caught, as also suggested by Rose-Ackerman (1997).

5 Conclusion

This paper has analysed a political agency model of corruption and found that corruption can indeed be an equilibrium strategy. By analysing the main factors leading to this equilibrium, we can identify a series of factors which could be manipulated in order to diminish the amount of bribing in political campaigns. These are the expected political rents from being in office, the patience of the players and the number of swing voters in the economy, which have a positive relationship to the amount of redistribution. On the contrary, appreciation of public good provision and administrative costs reduce corruption.

As previously noted, these solutions have been already mentioned by Rose-Ackerman (1997), thus enforcing the belief that the results are both accurate and (externally) valid. Very recently, Basu (2018) also published an article discussing corruption, arguing that credible threats and commitments, claiming that the payoff of the politician will be decreased in the future, can be effective in discouraging corruption, which could be done by banks.

Some other options to control corruption have been suggested by scholars, such as Roper (2001), as well as Colazingari and Rose-Ackerman (1998). Both articles tackle campaign laws and the role of (free) media, as well as the need for "greater prosecutorial and judicial independence" (Roper, 2002). These findings are in agreement with the effects observed in this thesis.

Therefore, to answer the research question of this thesis, in the specific case of Romania, not only have some causes of corruption been identified, but most of these solutions could be implemented. If, for whatever reason, politicians do not match the population's distrust in the financial stability of the country, banks may launch campaigns specifically targeting politicians' future incomes, in order to make them less secure in their future payoff. Once again, the exact mechanism is very tricky to estimate, especially in Romania, where corruption extends across many industries and institutions. However, the claim that the laws or campaigns would work is enforced by Basu's (2018) findings. Additionally, since the media is free, it could ensure more diversity in party opinions, while the legislative forces could ensure more severe punishments and stricter surveillance, as well as lower future payoffs. These procedures may have stopped even Dragnea from bribing voters, despite his strong aversion and desire to impeach Basescu. The only issues would occur if the legislative and executive forces are also easily corrupted, thus allowing politicians to 'slip between the cracks' and avoid punishment, but that is beyond the scope of this paper.

One additional element worth noting is that, despite the fact that this model was molded around the Romanian political system, it is valid in most other countries, due to the lack of any specific cultural or social elements. Specifically, any country with parliamentary and presidential elections is represented. Furthermore, the variation of a majoritarian election system allows it to be used even more widely.

Due to the time and content constraints with which I was faced, this model, as it is, does not cover all available options or incentives. However, due to the layout and setting, it leaves room for additions. For instance, further research could tackle an option where the politicians and/or voters cannot commit to their promise. This may also imply elaborating on artificial means to ensure or encourage commitment between the parties, which were simply assumed here. Furthermore, the model could be extended to also include punishments for the voters. In this model, the voters are passive in the sense that they simply follow expected utility maximisation. However, future research could look into interactions where both parties are punishable. Similarly, voters could simply have strong moral beliefs and may decline the bribe, simply due to the fact that they dislike corruption. This may also expand insofar that the electorate may take into account the opinions and predisposition of the others to take a bribe (in the sense of 'If I do not take the bribe, someone else will').

Another option would be to expand the model by introducing multiple (so more than two) states of the world, thus allowing the politicians to not only choose an exact match to the situation, but to choose actions on a set spectrum. This option would create a stronger trade-off between the politician preference and the 'appropriate' action, while also allowing them a multitude of options from the array of choices. Furthermore, this would further complicate the computation of λ and make it more difficult for the voters to discern which politicians had their

interest in mind.

Ultimately, this paper aimed to contribute to the vast literature of the economics of corruption, by introducing a game theoretical approach to political corruption, based on a country that is not often talked about in an international context, but which is nonetheless representative of many others.

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Appendix: Overview

This appendix provides a short overview of the players, what they know, and their choices at each point in time.

At the start of the game: t=0

Before the start of the game, the state of the world is decided.

VOTERS: The voters choose a random politician. They do not know the state of the world. They can only observe, at the end of the period, $U_i(a_t)$.

POLITICIAN: The incumbent politician can observe s_1 and choose his preferred a_1.

Additionally, the government collects taxes during this period.

End of the first period: t=1

Before the start of the next period, the bribing decision may take place.

VOTERS: The voters have observed $U_i(a_t)$ and update their beliefs about the type of the politician.

PARTIES: The corrupt party chooses its optimal bribing scheme and makes its policy promise. The other party promises to invest all tax revenues in the public good.

Second election: t=2

The state of the world is decided for the second period (s_2).

VOTERS: The voters observe the policy promises and choose the politician that will maximise their utility.

POLITICIAN: The elected politician observes s_2 and chooses a_2.

PARTY: The winning party implements the promised policy.

The game ends.

Appendix A: Equilibrium

Voter i of group g will vote for party A iff $u^A > u^B + \xi + \eta_g$. This implies that the probability that this voter will vote for party A is given by

$$Pr(u^A - u^B - \xi > \eta_g) = \frac{u^A - u^B - \xi + \frac{1}{2\Xi_g} - \overline{\eta}_g}{\frac{1}{2\Xi_g} + \overline{\eta}_g + \frac{1}{2\Xi_g} - \overline{\eta}_g}$$

which solves for

$$\frac{1}{2} + \Xi_g(u^A - u^B - \xi - \overline{\eta}_g).$$

Denote the previous proportion by $\pi_g^A \equiv \frac{1}{2} + \Xi_g(u_A - u_B - \xi - \overline{\eta}_g)$, which, due to the law of large numbers, is also the proportion of voters from group g who will vote for party A.

Now that the group specific votes have been established, the party will aim to maximise the probability that they can get more than half of the aggregate votes, i.e. the $Pr(\frac{\sum_{g=1}^3 \pi_g^A}{3} > \frac{1}{2})$

$$= P(\frac{1}{3}\sum_{g=1}^{3}\frac{1}{2} + \Xi_g(u^A - u^B - \xi - \overline{\eta}_g) > \frac{1}{2})$$

$$= P(\frac{1}{3}\sum_{g=1}^{3}\Xi_g(u^A - u^B - \xi) - \frac{1}{3}\sum_{g=1}^{3}\Xi_g\overline{\eta}_g > \frac{1}{3}\sum_{g=1}^{3}\Xi_g\xi).$$

This expression can be simplified, since $\sum_{g=1}^3 \Xi_g\overline{\eta}_g = 0$[6]. Also, we can denote $\Xi \equiv \frac{1}{3}\sum_{g=1}^3 \Xi_g$. This implies $P(\frac{1}{\Xi}\frac{1}{3}\sum_{g=1}^3 \Xi_g(u^A - u^B - \xi) > \xi)$, which solves for

$$\frac{\alpha}{\Xi}\frac{1}{3}\sum_{g=1}^{3}\Xi_g(u^A - u^B) + \frac{1}{2},$$

meaning that the corrupt party will maximise

$$[\frac{\alpha}{\Xi}\frac{1}{3}\sum_{g=1}^{3}\Xi_g(u^A - u^B) + \frac{1}{2}]\beta\mu.$$

We now go back to the voter's utility. Their utility will depend on the party promises and the probability of losing $U_i(a_t)$: $u_g^A = 1 - T + b_g^A + H(x^A) + \Pi^A U_i(a_t)$ and respectively $u_g^B = 1 - T + b_g^B + H(x^B) + \Pi^B U_i(a_t)$, implying that the expected utility of the party is given by

$$EU^A = [\frac{\alpha}{\Xi}\frac{1}{3}\sum_{g=1}^{3}\Xi_g(b_g^A + H(x^A) + \Pi^A U_i(a_t) - b_g^B - H(x^B) - \Pi^B U_i(a_t)) + \frac{1}{2}]\beta\mu.$$

Note that, for the party competing with the incumbent, it simply holds that $\Pi^J = 1 - p$, since the voters have not yet observed any behaviour from the elected politician. On the other

[6]Due to the previously mentioned assumptions: $\Xi_1\overline{\eta}_1 + \Xi_3\overline{\eta}_3 = 0$ and $\overline{\eta}_2 = 0$

hand, the incumbent party is faced with an *ex post*, updated probability, which is based on the actions of the politician in period 1.

Taking into consideration the budget constraint from Eq. (2), party A is maximising the following Lagrange function:

$$L = [\frac{\alpha}{\Xi}\frac{1}{3}\sum_{g=1}^{3}\Xi_g(b_g^A + H(x^A) + \Pi^A U_i(a_t) - b_g^B - H(x^B) - \Pi^B U_i(a_t)) + \frac{1}{2}]\beta\mu - \delta(\sum_g b_g^A + x^A - 3T)$$

$$= \{\frac{1}{2} + \frac{\alpha}{\Xi}[\frac{1}{3}\sum_{g=1}^{3}\Xi_g b_g^A + \Xi H(x^A) + \frac{1}{3}\sum_{g=1}^{3}\Xi_g(\Pi^A U_i(a_t) - b_g^B - H(x^B) - \Pi^B U_i(a_t))]\}\beta\mu$$

$$-\delta(\textstyle\sum_g b_g^A + x^A - 3T),$$

where δ is the Lagrangian multiplier.

The first order conditions of this function are:

$$\frac{\partial L}{\partial x^A} = \beta\mu\alpha H'(x^A) - \delta = 0 \tag{4}$$

and

$$\frac{\partial L}{\partial b_g^A} = \beta\mu\frac{\alpha}{\Xi} * \frac{1}{3}\Xi_g - \delta = 0 \tag{5}$$

where $H'(x^A) = \frac{\partial H(x^A)}{\partial x^A}$, while

$$\sum_g b_g^A + x^A = 3T.$$

From Eqs. (4) and (5) we obtain

$$H'(x^A) = \frac{\Xi_g}{\sum_g \Xi_g}.$$

Appendix B: Proof of Lemma 1

For the following I will take party A as the incumbent party and B as the competition. Assume for simplicity that groups 1 and 3 are so strongly biased that they will always vote for party A and B respectively, which is in line with the aforementioned assumption that $\bar{\eta_1} << 0$ and $\bar{\eta_3} >> 0$. Therefore the only group that will make a difference is group 2, with $\bar{\eta_2} = 0$. The following two sub-sections analyse the cases in which parties find it worthwhile to be corrupt. If the resulting conditions are not met, there will be no corruption and voters will act according to a regular political agency model: re-elect the incumbent if they observe $U_i(a_t) = 0$ and choose a different one otherwise.

Denote by Δ^J the difference in probabilities between the party that behaves 'legally' and the corrupt party.

Incumbent was congruent

In the case in which the incumbent politician of party A was congruent, the party will have no incentive to deviate from the status quo. However, the opposition will attempt to bribe the electorate according to the equilibrium above:

$$H(T) + (1 - \frac{p}{p + (1-p)[m + (1-m)qF(\beta\mu)]})U_i(a_t) > b_g^B + H(x^B) + (1-p)U_i(a_t) + \overline{\eta}_g.$$

Voters of the critical group will elect party B (the corrupt one) if

$$b_2^B + H(x^B) - H(T) > -(\frac{p}{p + (1-p)[m + (1-m)qF(\beta\mu)]} - p)U_i(a_t). \tag{6}$$

From this, we can see that $\Delta^J = -(\frac{p}{p+(1-p)[m+(1-m)qF(\beta\mu)]} - p)$. Note that $H(T) > H(x^B)$ but $H'(T) < H'(x^B)$. Therefore, since any taxes not spent on x^B are spent on b_2^B, $b_2^B + H(x^B) - H(T) > 0$ and $\frac{p}{p+(1-p)[m+(1-m)qF(\beta\mu)]} > p$ as explained previously.

Incumbent was dissonant

If the incumbent was dissonant, the party will have to bribe the electorate to choose them regardless. In this case, the party adhering to the status quo is B. This leads to a similar condition to the one above:

$$b_g^A + H(x^A) + U_i(a_t) > H(T) + (1-p)U_i(a_t) + \overline{\eta}_g.$$

Here, party A will win if

$$b_g^A + H(x^A) - H(T) > -pU_i(a_t). \tag{7}$$

In this case, $\Delta^J = -p$.

Appendix C: Extensions

Costly bribing

Solving in the same way as *Appendix A*, but with the new budget constraint, $3T = \sum_g [b_g^A + c(b_g^A)] + x^A$, party A is maximising the following Lagrange function:

$$L = [\frac{\alpha}{\Xi}\frac{1}{3}\sum_{g=1}^{3}\Xi_g(u^A - u^B) + \frac{1}{2}]\beta\mu - \delta(\sum_g [b_g^A + c(b_g^A)] + x^A - 3T)$$

where δ is, once more, the Lagrangian multiplier.

The first order conditions of this function are:

$$\frac{\partial L}{\partial x^A} = \beta\mu\alpha H'(x^A) - \delta = 0 \tag{8}$$

and

$$\frac{\partial L}{\partial b_g^A} = \beta\mu\frac{\alpha}{\Xi} * \frac{1}{3}\Xi_g - \delta[1 + c'(b_g^A)] = 0 \tag{9}$$

where $H'(x^A) = \frac{\partial H(x^A)}{\partial x^A}$ and $c'(b_g^A) = \frac{\partial c(b_g^A)}{\partial b_g^A}$.

From Eqs. (8) and (9) we obtain

$$H'(x^A) = \frac{\Xi_g}{\sum_g \Xi_g[1 + c'(b_g^A)]}.$$

Appendix D: Comparative Statics

These computations follow from the results presented in *Appendix B*, in particular the updated probability $1 - \frac{p}{p+(1-p)[m+(1-m)qF(\beta\mu)]}$.

For simplicity, I will start by performing a logarithmic transformation to the ratio, which yields $-(lnp - ln\{p + (1-p)[m + (1-m)qF(\beta\mu)]\})$. In order to find the overall change in Π^J caused by changes in β or μ, I will now differentiate them:

$$\frac{\partial - (lnp - ln\{p + (1-p)[m + (1-m)qF(\beta\mu)]\})}{\partial\beta} = \frac{(1-p)(1-m)qf(\beta\mu) * \beta}{p + (1-p)[m + (1-m)qF(\beta\mu)]}$$

and similarly

$$\frac{\partial - (lnp - ln\{p + (1-p)[m + (1-m)qF(\beta\mu)]\})}{\partial\mu} = \frac{(1-p)(1-m)qf(\beta\mu) * \mu}{p + (1-p)[m + (1-m)qF(\beta\mu)]},$$

which are both positive for any increase in β or μ, implying that, for higher values of β and μ, voters expect more dissonant politicians to be in office, given their observation of $U_i(a_t) = 0$.