

CAN IMPARTIALITY BE ENFORCED WHEN CORRUPTION IS SYSTEMIC?

THE IMPACT OF THE NATIONAL ANTICORRUPTION DIRECTORATE (DNA) ON FAVOURITISM IN LOCAL PUBLIC PROCUREMENT

By

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Abstract

Can increased judicial and electoral accountability in the form of strong anti-corruption agencies (ACAs) have a profound effect on corruption when it is systemic? Empirical evidence is mixed. Where success is absent, it remains unclear whether this is due to an insufficient implementation of ACAs and the legal framework they operate in or, as other scholars suggest, a misconceptualisation of systemic corruption. The present work addresses this controversy by bringing the deterrence effect and the political selection effect that the predominant principal-agent-theory based literature suggests to an empirical test in the critical case of Romania. This is done by assessing the impact of National Anticorruption Directorate (DNA) prosecution in two forms – the announcement of investigations and the announcement of the final sentence – on favouritism in local public procurement. Based on 1.4 million public procurement contracts, Propensity Score Matching is employed to estimate the Average Treatment Effects on the Treated (ATTs) and the Conditional Average Treatment Effects on the Treated (CATTs) for Romanian localities affected by DNA prosecution concerning a composite risk score based on three red flags in the tendering process and a market domination indicator. The data reveals that the theoretical predictions cannot be confirmed. These findings may suggest that systemic corruption requires a more comprehensive approach which goes beyond currently predominant policies.

Keywords : corruption, favouritism, public procurement, Romania

Table of Contents

Copyright declaration.....	i
Acknowledgements.....	ii
Abstract.....	iii
List of Tables	vi
List of Figures	vi
Introduction.....	1
1. Review of literature on anti-corruption policies.....	7
2. Case selection and level of analysis	15
3. The National Anticorruption Directorate (DNA)	18
3.1. The structure and competences of the DNA.....	19
4. The concept of corruption.....	26
5. Theory.....	31
5.1. Criminal deterrence	31
5.2. Public accountability	36
6. Data and operationalisation	39
6.1. Corruption.....	39
6.2. Prosecution	43
6.3. Additional context knowledge.....	44

7. Identification strategy	46
7.1. Estimating effects with the ATT	46
7.2. Identifying confounding variables	52
7.2.1. Mayor characteristics	54
7.2.2. Population characteristics.....	55
7.2.3. Locality characteristics.....	55
7.2.4. Structural characteristics	57
7.2.5. Priority setting of the DNA	58
8. Results	60
8.1. Descriptive statistics	60
8.2. Matching.....	63
8.3. Causal effects.....	66
8.3.1. Deterrence effect	67
8.3.2. Political selection effect	68
9. Discussion and conclusion.....	70
Appendix A: Keywords for contract filtering.....	75
Appendix B: Detailed matching results	75
Appendix C: Bootstrapped standard errors.....	78
References.....	79

List of Tables

Table 1: List of interviewees	p. 45
Table 2: Descriptive statistics per whether units was treated with investigation start announcement	p. 60
Table 3: Descriptive statistics per whether units was treated with investigation start announcement	p. 62
Table 4: Balancing results for publication of investigation start and corruption risk scores	p. 64
Table 5: Overview of matching results	p. 65
Table 6: Results of Monte Carlo permutation tests with the respective ATT as test statistics	p. 67
Table 7: Results of an OLS regression on the respective ATT with the conditioning variables of interest	p. 68

List of Figures

Figure 1: Accountability as described by Bovens (2007)	p. 8
Figure 2: Location of the National Anticorruption Directorate in the Public Ministry	p. 20
Figure 3: Organigram of the National Anticorruption Directorate	p. 22
Figure 4: The deterrence effect of prosecution on corruption	p. 35
Figure 5: The political selection effect of prosecution on corruption	p. 38
Figure 6: DAG on the impact of DNA prosecution on corruption in Romanian localities	p. 53

Introduction

The adverse consequences of corruption in all fields of society have long been recognised. Economically, corruption can cause, among others, higher income inequality and poverty (Gupta, Davoodi, and Alonso-Terme 2002) and lower economic growth (Glaeser and Saks 2006; Mauro 1995; Mo 2001). Politically, it can, for example, reduce political and civil rights (Kaufmann 2006) as well as democratic regime legitimacy (Anderson and Tverdova 2003; Seligson 2002).

Given this high relevance, the fight against corruption has been given large room both in the scholarly debate and in policy-making. The principal-agent-theory based mainstream in the literature formulates anti-corruption policies that aim for the improvement of institutional structures (for an overview see (Rose-Ackerman and Palifka 2016a; Rose-Ackerman and Truex 2012). One strand focuses on increased costs of corrupt behaviour, that is increased monitoring and punishments linked to increased accountability for example, (Avis, Ferraz, and Finan 2018; Djankov et al. 2010; Ferraz and Finan 2008).

Following this line of reasoning and concentrating on increased judicial accountability, one could observe a sharp increase in the establishment and/or institutional modification of anti-corruption agencies (ACA) in recent decades (Heilbrunn 2004; Meagher 2005). This trend also holds true for the European Union, where several member states by now have such a specialised agency (European Commission 2014). However, it remains unclear to what extent legal enforcement through ACAs is an effective anti-corruption tool in an environment of systemic corruption. The overall empirical record of ACAs in their impact on corruption levels is mixed and, with the exception of Hong Kong and Singapore, tends to be poor in environments of

systemic corruption (Doig, Watt, and Williams 2005; Meagher 2005). A similar picture of varying success can be observed in the European Union and it is argued that this is mainly a matter of deficient implementation (European Commission 2014). Other scholars, however, go further with their critique and state that this kind of anti-corruption approach is misplaced as it follows from a misspecification of the nature of corruption wherever it is endemic (Mungiu-Pippidi 2006; 2013; Persson, Rothstein, and Teorell 2013). In these cases, they argue, corruption must be seen as the rule rather than the exception and therefore constitutes first and foremost a collective action problem which increased judicial accountability cannot sufficiently grasp.

As a critical case to the principal-agent based theory and its related anti-corruption policy recommendations (Rose-Ackerman and Palifka 2016a; Rose-Ackerman and Truex 2012), the Romanian case may shed more light on this controversy. It constitutes a case of endemic corruption as Romania has consistently ranked among the countries with the highest corruption level within the European Union (Kaufmann, Kraay, and Mastruzzi 2011; Transparency International 2017). At the same time, its anti-corruption efforts have been – at least until 2017 – praised as exemplary by the European Commission, with the National Anticorruption Directorate's (DNA) work on high-level corruption being positively highlighted for its extraordinary prosecution record (European Commission 2015). Hence, if one does not find clear evidence of a decrease of corruption here, strong law enforcement with a focus on anti-corruption agencies is unlikely to be a successful strategy in other Eastern European cases with similar levels of corruption. Yet, to date and my knowledge, a systematic assessment of the DNA's impact on corruption in Romania has not been done.

Focussing on public procurement which provides the opportunity to objectively assess corruption risks based on so-called red flags, this work addressees this gap by assessing the

effect of Romania's DNA on corruption in the contract allocation of Romanian localities. Corruption is conceptualised as partiality in the exercise of public authority (Mungiu-Pippidi 2006; Rothstein and Teorell 2008), expressing itself in the given context as favouritism in the allocation of procurement contracts. Concentrating on Romanian localities has three major advantages. First, the local governmental structures are such that they provide large potential for corrupt activities. The mayor possesses considerable discretionary power over her respective locality's budget and the occurrence of widespread corruption at the local level has also been empirically shown and problematised (Coman et al. 2001; Klačnja 2015). Second, although Romania is a centralised state with a vertical chain of accountability across governmental levels, the effect of DNA action taken in a specific locality can be isolated because the discretionary power of the local budget provides enough room for corruption independent of the county or national level. This is relevant especially for favouritism in public procurement (European Commission 2014). Third, Romania localities are numerous enough to extensively account for baseline differences in corruption which makes causal identification more plausible.

Since this is a test of the predominant anti-corruption literature and practice (Rose-Ackerman and Palifka 2016a; Rose-Ackerman and Truex 2012), this work's argumentation follows the same theoretical lines and checks for two effects: a criminal deterrence effect and a political selection effect. Regarding the former, it is argued that the DNA increases judicial accountability. As a consequence, potentially corrupt public officials within a municipality targeted by the DNA are deterred from being corrupt because the perceived risk of punishment has increased (Apel 2013; Becker 1968; Becker and Stigler 1974; Paternoster and Piquero 1995). The latter effect concerns the increase of electoral accountability: If voters get informed about corruption taking place in their municipality and who is (allegedly) responsible for that,

they can react by voting into office a less corrupt politician (Besley 2007; Ferraz and Finan 2008). Both lines of argumentation ultimately predict a decrease of corruption as a result of DNA prosecution.

Data comes from five sources. For the measurement of corruption, two indicators based on public procurement contracts are used (Open Tender 2019). One is a composite score of three so-called red flags and indicates an elevated risk of corruption in the procurement process of a given contract (Fazekas and Kocsis 2017; Fazekas, Tóth, and King 2016). This is complimented by a second indicator of open market competition which captures the aggregated outcome of corrupted procurement processes. Information about the DNA prosecution is provided by a dataset compiled by the Romanian Academic Society (SAR 2015). Electoral data has been collected from Romania's Central Electoral Bureau (Central Electoral Bureau 2019), information about the localities' characteristics stems from the Romanian National Institute of Statistics (National Institute of Statistics 2019). Additionally, eight expert interviews were conducted to gain qualitative in-depth knowledge of the context for an improved identification strategy.

To assess the DNA's impact, matching on observables via propensity scores is employed and the Average Treatment Effect on the Treated (ATT) of DNA prosecution is calculated to check for the deterrence effect. More specifically, localities are matched on a range of confounding variables as well as the previous corruption level to account for baseline differences. The estimated effect consists of the difference in corruption level between treated and untreated localities in the year following the intervention. The political selection effect is tested by estimating the Conditional Average Treatment Effect on the Treated (CATT) through conditioning the ATT on pre-election year and incumbent's replacement in a regression setting. The data does not show evidence for any of the two effects.

By addressing the impact of the DNA on corruption, this work contributes to the literature primarily in four ways. First, it examines another instrument, rigorous enforcement, in the incomplete understanding of which measures in the toolkit of anti-corruption measures are more effective than others (Johnsøn, Taxell, and Zaum 2012; Mungiu-Pippidi and Dadašov 2017). Second, it provides indications for whether the institutional structure of the DNA can be a role model for other anti-corruption agencies in environments of systemic corruption. The establishment of anti-corruption agencies has found widespread application worldwide but their empirical impact record on lowering corruption is mixed (Davis, Machado, and Guillermo 2014; Doig, Watt, and Williams 2005; Quah 2015). Third, it addresses the debate about what the main source of motivation for compliance with the law is: legal enforcement or cultural norms (Besley, Jensen, and Persson 2015; Fisman and Miguel 2007). Given that the creation of the DNA was established in a very short time, the results help to indicate the impact of strong enforcement in an environment of systematic corruption and otherwise mainly unchanged norms. Fourth, it adds understanding to the effectiveness of the EU's conditions for membership as well as the impact of membership itself on state development in member states (Mendelski 2016; Vachudova 2015). This controversy gains particular importance in light of ongoing negotiations with Macedonia, Albania, Serbia, and Montenegro which face to some extent similar problems of public integrity as Romania.

The structure of the paper is as follows: Chapter 1 is a review of anticorruption policies is given to locate the DNA in this field and identify where an assessment of the DNA can contribute. Then, based on this review, the case selection and the particular focus on Romanian municipalities is explained in Chapter 2. Chapter 3 continues with an overview of the structure and competences of the DNA to assess the suitability of the DNA to encounter corruption and further justify the case selection. Afterwards, the concept of corruption and its application to

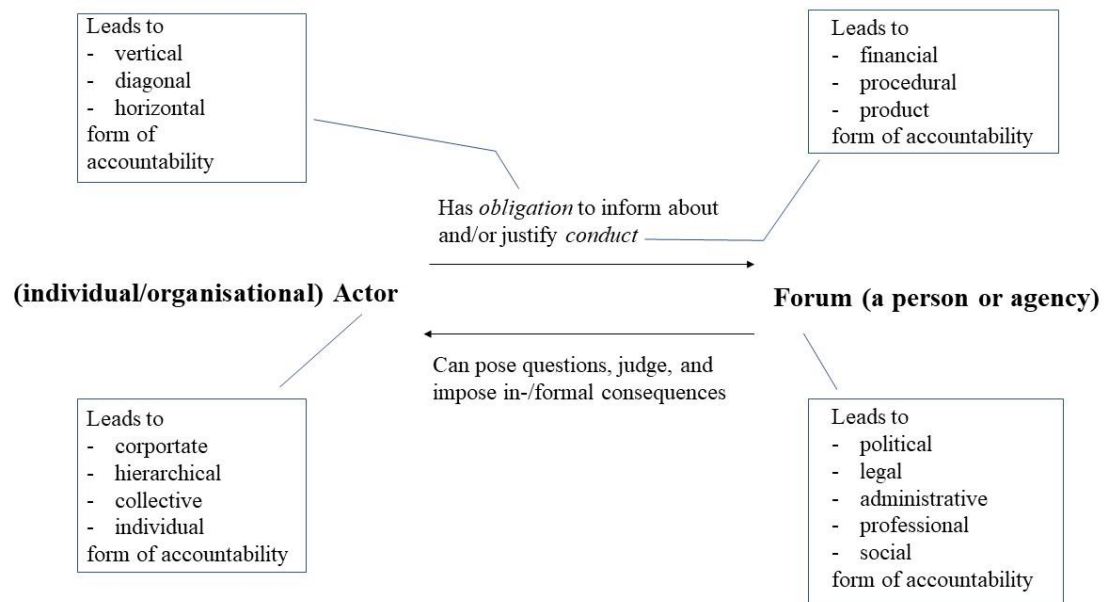
the field of public procurement is introduced in Chapter 4. Following the conceptualisation, the theoretical mechanisms and predictions are established in Chapter 5. The empirical part begins in Chapter 6 with an overview of the data and its sources. Subsequently, the identification strategy is discussed in Chapter 7, before turning to the results in Chapter 8. This work concludes in Chapter 9 by discussing the results and pointing out future research endeavours.

1. Review of literature on anti-corruption policies

Given the detrimental effects of corruption, the fight against it has been given large room both in the scholarly debate and in policy-making. While the detrimental consequences of corruption have been recognised, it is not clear how to fight corruption best and large gaps in assessing the effectiveness of anti-corruption measures remain (see for example (Johnsøn, Taxell, and Zaum 2012; Mungiu-Pippidi and Dadašov 2017)).

The principle of *accountability* is both essential as the theoretical backbone of anti-corruption policies and contested as a concept (Bovens 2010; Lindberg 2013). The most widely accepted conceptualisation of accountability as a social mechanism describes it as “a relationship between an actor and a forum, in which the actor has an obligation to explain and to justify his or her conduct, the forum can pose questions and pass judgement, and the actor may face consequences” (Bovens 2007) : 450. Each accountability relation can be classified separately among the nature of, respectively, the actor, the forum, the obligation, and the conduct (see Figure 1). Hence, there exist multiple dimensions of accountability and accordingly multiple theoretical ways to grasp the problem of corruption through increased accountability.

Figure 1: Accountability as described by Bovens (2007), including accountability dimensions
(own illustration)



The mainstream in the scholarly debate (for example, Bellver and Kaufmann 2005; Kaufmann 2006; Kaufmann and Siegelbaum 1997; Rose-Ackerman and Palifka 2016a; Rose-Ackerman and Truex 2012) identifies corruption in the framework of a principal-agent problem and typically aims at either avoiding a principal-agent relationship and its related problems, or increasing legal and political accountability of the agent through a more sophisticated monitoring and sanctioning regime. In the case of legal, sometimes also called judicial accountability, the actor is individually accountable to a court following the indictment through a governmental judicial body. The court will impose formal sanctions according to criminal or civil law based on the judgement of the judges. Political accountability, on the other hand, describes the obligation of the politician to explain her actions in office to the electorate, in some cases the parliament or parliamentary committees as representatives of the electorate, which responds with positive or negative consequences. These consequences can be formal, as

in the case of (non) re-election, but can also be informal as, for example, expressed through changes in popularity. In the following, the main approaches based on principal-agent theory are discussed. This review focuses on this strand because it dominates the scholarly debate, the recommendations following from that literature are the most widely implemented, and the Romanian anti-corruption agency can be located as one tool within that literature.

In the anti-corruption literature based on principal-agent theory, corruption is considered to be an exceptional, or at least unusual, phenomenon that occurs when the institutional framework provides strong enough incentives for individuals to act in a corrupt manner based on some form of discretionary power (Rose-Ackerman and Palifka 2016a; Rose-Ackerman and Truex 2012). Individuals are in these cases either elected officials or public servants and their discretionary power arises from the fact that, practically, the public official needs to have some degree of decision-making authority and, therefore, the rules guiding her decisions do not fully determine those decisions beforehand. Sources of discretionary power for the public officials can be, among others, the need of subjective case evaluation, private information leading to informational asymmetries, inconsistent rules, a lack of or an insufficient degree of accountability, rules that allow for delays in the decision-making process or simply the absence of rules (Rose-Ackerman and Truex 2012). Because of imperfect oversight and sanction mechanisms, the public official then may, via her discretionary power, extract private gains to the loss of the public benefit.

Accordingly, anti-corruption policy recommendations and their implementation mainly surround the improvement of institutional structures regarding the limitation of discretionary power or its enhanced exercise through improved accountability relations. The major approaches can be summed up in two strands: First, depending on the case at hand, to either complement or to remove regulation. One widespread way of complementing legislation is to

tighten transparency laws which disclose the actions of public officials and thereby reduce informational asymmetries (Bellver and Kaufmann 2005; Djankov et al. 2010). In Europe, EU standards often complement the national legislation to reduce discretionary power of national public officials. Within the realm of public procurement, the EU directives 2014/24/EC and 2014/25/EC regulate the transparency of public procurement data and introduce certain thresholds by which nationally solicited tenders need to be made publicly available in the Official Journal of the European Union. Despite being a theoretically important contribution to lowering corruption and this theory is also supported by experimental evidence (Azfar and Nelson 2007), the positive effects of increased transparency seem to be highly conditional on a number of other societal factors (Kolstad and Wiig 2009), such as education of the citizenry and media circulation (Lindstedt and Naurin 2010). In practice, one cannot see a strong correlation between legislation and corruption. Some of the countries with very comprehensive regulation to improve public integrity, such as strict transparency laws, nonetheless rank as relatively corrupt while others with less regulation score much better. For example, Serbia, Bulgaria and Croatia have extensive legislation as regards to political financing, financial disclosure, conflict of interest, freedom of information and public procurement, while these laws are very loose or non-existent in Scandinavian countries (EuroPAM 2019). This does of course not mean that legislation does not have any effect. But it shows that strict and comprehensive regulation alone does not seem to be enough to encounter corruption.

In other cases, regulation is removed in favour of the private market (Rose-Ackerman and Truex 2012). The reasoning behind is that the higher the governmental resources and the more intermediaries in the distribution of these resources exist, the larger the scope for corrupt practices and the more likely that one of these intermediaries will be corrupt (Alesina and Angeletos 2005). In its most extreme form, this approach would entail taking public officials

completely out of the game by dissolving a complete administrative structure. However, early research indicates that larger governments, e.g. those in Scandinavia, are associated with lower levels of corruption (La Porta 1999) which puts doubt on the assumption that size of state bureaucracy and its resources per se is the decisive factor for corruption. Empirical evidence is inconclusive. Some research on African and post-Soviet countries where deregulation and privatisation is accompanied by an increase in corruption under changed conditions seems to confirm the sceptical view that giving more room to the private sector does not necessarily reduce corruption (Celarier 1997; Szeftel 1998). Other work contradicts these findings by stressing the dependence of these reforms' success on the circumstances of privatisation, and arguing that these countries are still better off in regards to corruption when privatised compared to if they were not (Kaufmann and Siegelbaum 1997; Koyuncu, Ozturkler, and Yilmaz 2010).

The second broader approach to reduce corruption consists of organisational changes that supposedly provide favourable incentives to the public official. In this case, the task of the administration would remain the same, but its working mode is changed. Instead of adding regulatory requirements or stripping them off their tasks, public officials are being influenced to comply with non-corrupt behaviour. This can be done either through positive incentives, such as higher wages (Azfar and Nelson 2007; Besley 2004; Van Rijckeghem and Weder 2001) or a more meritocratic bureaucracy in general (Charron et al. 2016; Dahlström, Lapuente, and Teorell 2012). Of course, also negative incentives, i.e. sanctions, play an important role in guiding public official's behaviour. Increased monitoring and higher punishments (Garoupa and Klerman 2004; Lambsdorff 2007) are therefore one integral part of anti-corruption policies.

The concrete manifestation of improved judicial and electoral accountability through monitoring and punishment varies from context to context and its impact on systemic

corruption is mixed. One rather positive example may be Brazil, a country plagued with widespread corruption, where increased governmental oversight reduced corruption on the local level and attracted a rich body of research (Avis, Ferraz, and Finan 2018; Brollo 2008; Ferraz and Finan 2008; 2011; Ferraz, Finan, and Moreira 2012). In 2003, the Mexican government started an audit program that increased monitoring over the expenditures of local governments. Until 2017, 1949 municipalities were randomly selected and audited, many of them multiple times. This random assignment of the treatment ‘monitoring’ allows for strong methodological rigour, which differentiates corruption research on Brazil from other cases. Broadly, the data shows that the audit program has a substantial and statistically significant effect on corruption: Corruption is approximately eight percent lower among audited municipalities compared to non-audited ones. Assessing various channels of judicial and electoral accountability through which this program could potentially lower corruption levels in the local government, the authors conclude that the risk of legal punishment is the essential driver of non-corrupt behaviour. The increase in these non-electoral costs can account for 94 percent of the reduction in corruption. Correspondingly, a five percent increase in these non-electoral corruption costs would decrease corruption by approximately 20 percent (Avis, Ferraz, and Finan 2018). Hence, the main conclusion for the Brazilian case is that increased judicial accountability in the form of law enforcement is most effective in fighting corruption.

How do Anti-corruption Agencies (ACAs) in the framework of increased monitoring and punishment contribute to encountering corruption? One could observe a massive increase of anticorruption agencies within the last few decades which are specialised on combating institutionalised corruption (Heilbrunn 2004; Meagher 2005). Their specific institutional arrangement and competencies as well as their prosecution performance varies greatly from country to country (Meagher 2005; Sousa 2010). Within the European Union, agencies

specialised in combating corruption have also become more common, partly in countries where corruption is very wide-spread. Considering the prosecution records, the more successful ones are the Slovenian Commission for Prevention of Corruption (CPC), The Latvian Bureau for Prevention and Combating of Corruption (KNAB) or The Croatian Bureau for Combating Corruption and Organized Crime attached to the State Attorney General's Office (USKOK) (European Commission 2014). The anti-corruption agency which yields most attention is the Romanian one. Under high public pressure and incentivised to fulfil the conditions for EU membership, the Romanian government substantially empowered the National Anticorruption Directorate (DNA) during a small window of opportunity after the general elections of 2004. During following years, it has developed to become the main tool against mid- to high-level corruption in Romania and had an outstanding record of prosecution over recent years (European Commission 2015; National Anticorruption Directorate 2015).

Yet, the contribution of all these agencies in effectively lowering corruption is unclear since, despite impressive records, corruption levels in these countries have on average not substantially lowered (Transparency International 2017). While acknowledging that setting up anti-corruption agencies is not a sufficient means to combat corruption when standing alone, the European Commission claims that varying success among EU countries with an ACA is due to an insufficient implementation of good practices in regards to their ACA, namely:

guarantees of independence and absence of political interference, merit-based selection and promotion of staff, multidisciplinary collaboration among operational teams and with other institutions, swift access to databases and intelligence, and provision of necessary resources. (European Commission 2014: 13)

Parts of the scholarly literature is more critical. A broad conclusion one can draw is that, with the exception of Singapore and Hong Kong (Quah 2015; Quah 2016), the ACA's contribution is rather negligible in cases where corruption is systemic (Doig, Watt, and Williams 2005; Meagher 2005). Based on case studies of several ACAs across different countries, Meagher (2005) concludes that ACAs add value if the governance of the respective state is already following relatively high standards. If not, they would be ineffective since

ACAs are largely incapable of addressing the larger forces driving systemic corruption. [...] Most obviously, there is no way that ACAs can be effective in a situation where essentially every important institution is compromised. Even if this were not the case, an ACA is essentially a response to *symptoms*. (Meagher 2005: 101)

Other scholars express more fundamental criticism and state that this kind of anti-corruption approach is misplaced as it follows from a misspecification of the nature of corruption in systems where corruption is endemic (Mungiu-Pippidi 2006; 2013; Persson, Rothstein, and Teorell 2013). In these cases, they argue, corruption must be seen as the rule rather than the exception and therefore constitutes first and foremost a collective action problem, which an attempt to increase judicial or electoral accountability cannot sufficiently grasp. If the rules of the game are based on corruption, perceiving it as an agency problem and empowering the principal would be insufficient because the principal is likely to be corrupted as well. According to this view, there needs to be a more comprehensive approach that includes building up normative constraints in civil society and media besides increased judicial and electoral accountability.

2. Case selection and level of analysis

Do Anticorruption Agencies (ACAs) generally fail to show a substantial effect because they are not implemented properly or because they are an inappropriate tool in the context of systemic corruption? As a critical case, the assessment of the Romanian case can shed light on the effectiveness of ACAs on corruption in environments where corruption is systemic: Romania is a case with systemic corruption with the country's ACA being equipped with far-reaching competencies. In Mungiu-Pippidi's classification (2006), Romania would qualify as *competitive particularism*. These regimes are marked by an uneven power distribution, contested "ownership" of the state and an unfair and unpredictable distribution of public goods. Further, the social acceptability of corruption is low and the distinction between public and private rather poor. According to the most widely applied corruption indices, Romania is suffering from severe corruption problems: In the World Bank's Control of Corruption indicator, Romania scores -0.03 within the range from -2.5 to +2.5 in 2017 (Kaufmann, Kraay, and Mastruzzi 2011). In the same year, Romania reaches 48 out of 100 while Brazil 37 points in Transparency International's Corruption Perception Index (Transparency International 2017). At the same time, the Romanian National Anticorruption Directorate (DNA) is close to exemplary in how an ACA should be set up and institutionally embedded in the judicial system to work efficiently, as will become clearer in section 4 on the DNA below. For now, it suffices to say that the European Commission in the framework of the Verification and Cooperation Mechanism repeatedly positively highlights the DNA's work until 2016 for its extraordinary prosecution records among high-profile state officials (for example, European Commission 2007; 2014; 2015).

Of course, also the DNA is not without deficits. Some argue that the DNA would be unduly intertwined with the Romanian Information Service (SRI). This would undermine the integrity of the DNA itself and lead to not only an inefficient handling of corruption but also increased political instability (Mungiu-Pippidi 2018). Indeed, the number of wiretappings is remarkably high. However, they appear less surprising with more background that was provided in one of the interviews (Bulancea 2019). First, corruption has been declared a matter of national security. In other countries, usual police forces would investigate corruption. Having been declared a matter of national security made corruption being within the mandate of the SRI. Second, any form of wiretapping has until 2016 been exclusive to the SRI. The DNA, like any other law enforcement agency, is dependent on the SRI to execute wiretapping as a kind of service provider based on a court warrant. Only since the constitutional court ruling in 2016, DNA personnel is being trained to conduct wiretapping themselves.

As will become clearer in the following section, the Romanian government has – at least until recently – in many respects exemplarily followed the recommendations of the European Commission and the DNA is a strong enforcement agency. If these measures influence corruption, they should be quantifiable in Romania. Concentrating on Romanian localities has three mayor advantages. First, the local governmental structures are such that they provide large potential for corrupt activities. The mayor possesses large authority over the budget as she approves and executes the budget and also presides over the provision of many local public goods. The abuse of this authority has been empirically shown (Coman et al. 2001; Klačnja 2015). Hence, especially infrastructure projects are prone to corruption, such as the construction of water and sewage systems (Dimulescu, Pop, and Dorofte 2013).

Second, although Romania is a centralised state in which there is a vertical chain of accountability across governmental levels, the effect of DNA action taken in a specific locality

can be isolated because the discretionary power over the local budget provides enough room for corruption independent of the county or national level. This is relevant especially for favouritism in public procurement (Doroftei and Dimulescu 2015; European Commission 2014). Because of these powers that involve relatively large sums of money and its widespread abuse, corruption at the municipal level is within the scope of DNA investigations. Mayors are explicitly named as important officials who can be subject to investigations regardless of the severity of the offense (see below for the exact scope of DNA investigations). Between 2007 and 2015, there have been DNA investigations against more than 300 public officials at the local level.

Third, Romanian localities provide fertile ground to construct suitable counterfactuals. Romanian municipalities are to some extent similar since they are all in the same country. Therefore, factors that complicate identifying effects from cross-country comparisons, such as legal frameworks and cultural differences, should be negligible. At the same time, they are numerous enough to extensively account for baseline differences in corruption as will be explained in more detail in the section on the identification strategy.

3. The National Anticorruption Directorate (DNA)

As a pre-condition for EU membership in 2007, Romania signed and ratified all five major good governance conventions in a short period of three years (2001-2004). Until today, Romania is still subject to the EU's Cooperation and Verification Mechanism, together with Bulgaria, which consists of annual reports issued by the Commission regarding Romania's progress in administrative and judicial reforms. Among other measures, Romania established an anti-corruption agency in 2003, the National Anticorruption Directorate (DNA) to enforce anti-corruption legislation (Mendelski 2017). This agency is modelled after several other European ACAs, namely Spain, Norway, Belgium and Croatia and aims to combat high and medium level corruption. Its legal framework is given in Government Emergency Ordinance 63/2013 for amending Government Emergency Ordinance no. 43/2002 regarding the National Anticorruption Directorate (Government of Romania 2013), Law No. 78/2000 on preventing, discovering and sanctioning of corruption acts (Parliament of Romania 2000), and the Government Emergency Ordinance No. 43/2002 regarding the National Anticorruption Directorate (Government of Romania 2002).

The competences and efficiency of the DNA were first drastically increased under the 2005-2007 National Anticorruption Strategy (European Commission 2007; Romanian Intelligence Service 2005). Since then, Romania has had several National Anticorruption Strategies that each had a time horizon of two to three years (Government of Romania 2008; Romanian Ministry of Justice 2012). All these strategies do not only include the strengthening of the DNA but of the judicial system overall. To mention the most important institutions, this includes reforms in the Ministry of Justice, the Ministry of Internal Affairs and Public Administration,

the National Integrity Agency, and the High Court of Cassation and Justice. For example, these reforms also concern the Superior Council of the Magistracy, which has a veto right in the recruitment of DNA prosecutors and whose task it is to protect the independence of the judiciary. Members of this Council were given a lifetime office while being required to report annually about their actions, which enhanced their political independence while increasing their public accountability. At first glance, this alignment of domestic legislation and enforcement to European standards seems to have had a profound effect. In 2015 alone, thus far the ‘record year’ of prosecution, the DNA indicted over 1250 public officials for corrupt actions, among them former Prime Minister Victor Ponta and five other ministers, and seized almost half a billion euro (National Anticorruption Directorate 2015).

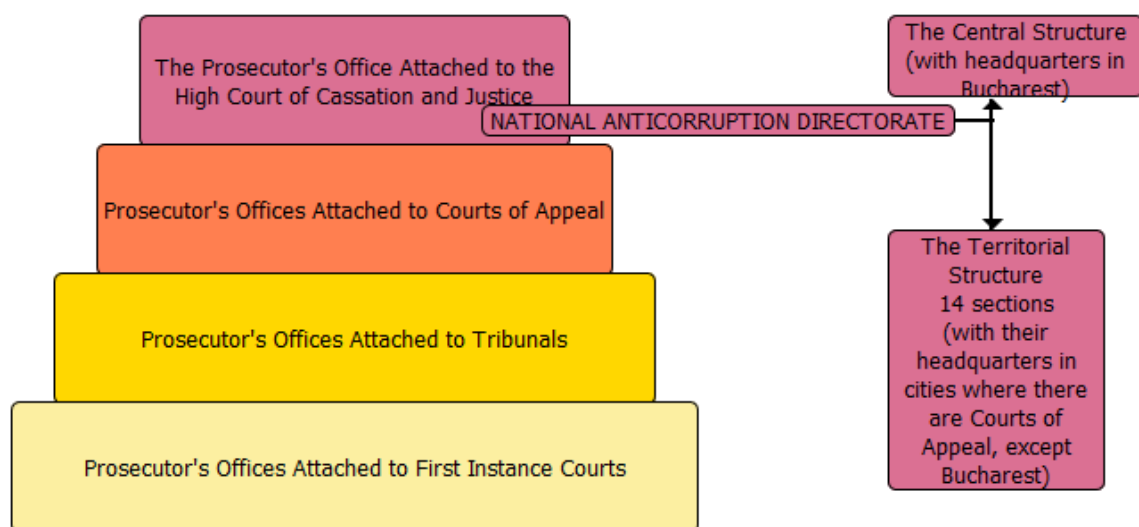
The following section gives an overview of the DNA’s competencies and its relation in the judicial framework to illustrate the agency’s capabilities and its suitability for a critical case study. It is important to note that Romania’s judicial framework, including the DNA, is not settled given the current political turmoils in Romania. I concentrate on the institutional composition before the current government came into office in 2016, that is before it was subject to strong political interference, and for which I was able to obtain data on DNA activity. Given the lack of scholarly literature, the following overview is mainly based on the DNA’s website (National Anticorruption Directorate 2019a) and an interview with the Chief Prosecutor in the Division for Crimes Assimilated to Corruption, Marius Bulancea (Bulancea 2019).

3.1. The structure and competences of the DNA

The DNA is directly attached to the Prosecutor’s Office Attached to the High Court of Cassation and Justice. The High Court of Cassation and Justice is Romania’s supreme court

and the court of last resort, similar to France's Cour de cassation. Structurally, the Agency divides into its central structure with its headquarters in Bucharest and the territorial structure with 14 sections in cities with Courts of Appeal, the second highest courts in the country (see Figure 2).

Figure 2: Location of the National Anticorruption Directorate in the Public Ministry



Source: (National Anticorruption Directorate 2019c)

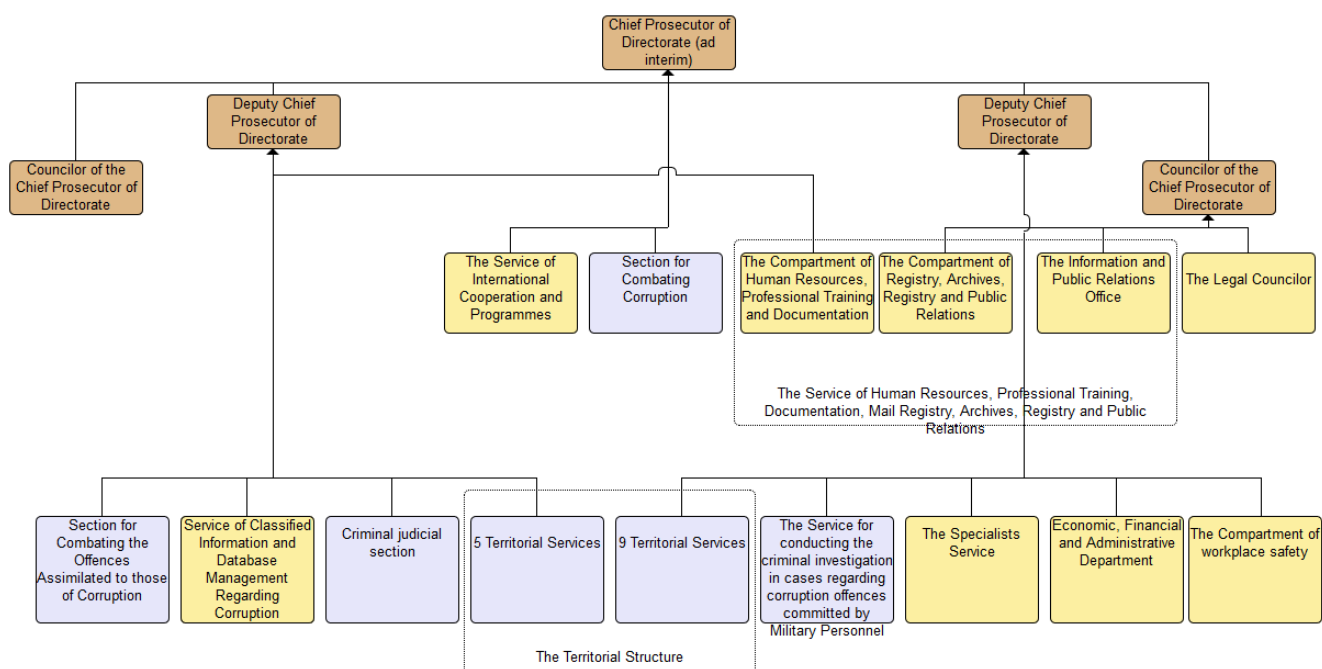
Because the DNA is attached to the High Court of Cassation and Justice and the territorial branches established where the second highest courts of the countries are, the co-operation with these courts is simplified and direct. This co-operation with courts is essential for the DNA because its activity may require court approval at several stages of the investigation, the most important ones being the request to gather intelligence in collaboration with the Romanian Intelligence Service (RSI), to obtain search warrants or to arrest suspects (Bulancea 2019). The territorial structure is supposed to ensure that the whole country can be equally covered through prosecution, i.e. that there are no blind spots for criminal activity. Although the branch where each case is handled typically depends for pragmatic reasons on where the alleged crime was

committed and evidence needs to be secured, each DNA office in the country can in principle investigate in the whole country (Bulancea 2019). This makes the agency flexible in prosecuting cases of corruption independent of geographical attributes of the corruption crime in question and is especially helpful when suspects are spread out throughout the country.

The structure of staff within the agency is relatively complex. On top, there is the Chief Prosecutor of the Directorate and two Deputy Chief Prosecutors. Following these top officials, there are ordinary Prosecutors who form the main body of the organisation. Their qualification for this job is secured through a rigorous selection process (National Anticorruption Directorate 2019a): To be eligible, they have to show, besides expertise and flawless moral behaviour, at least six years of experience as prosecutors or judges and pass an interview with a commission that consists of other prosecutors and human resources or psychology specialists. Based on an order of the Chief Prosecutor, they are eventually appointed with the approval of the Superior Council of the Magistracy. Once in office, the Prosecutors are highly autonomous in their work and only accountable to courts (Bulancea 2019). This way, political interference is avoided while maintaining procedural accountability of the prosecutor. These Prosecutors are supported by Judicial Police Agents which have the mandate to arrest suspects under condition of a corresponding court order and officers as well as Specialists from a diverse set of fields, such as banking or IT which provide additional sector specific expertise to investigate also complex cases. All these positions – Prosecutor, Judicial Police or Specialist – are exclusive, i.e. it is not

allowed to occupy any other public or private function beside this position, which aims at avoiding potential conflicts of interests (National Anticorruption Directorate 2019a).¹

Figure 3: Organigram of the National Anticorruption Directorate



Source: (National Anticorruption Directorate 2019a)

The scope of the DNA investigations is primarily medium and high-level corruption as qualified by either the undue advantage, the loss caused, or the office involved. More specifically, the DNA is in the position to investigate if at least one of the following criteria is met: The value of the undue advantage exceeds 10 000 EUR, the loss caused by the corrupt act exceeds 200 000 EUR or the case involves a person with an important function, such as Deputies, Senators, or Government members (for a complete list, see art. 8.1 of the Law no. 78/2000). Which offences qualify for the mandate of the DNA is very broad as it concerns clear

¹ One exception is teaching in higher education.

corruption offences, such as giving and taking a bribe, offences in direct connection with corruption, e.g. granting credits or subsidies by infringing the law or the crediting regulations, and offences assimilated to corruption, e.g. fraudulent bankruptcy. Additionally, the DNA is responsible for all offences that contravene the financial interests of the European Communities, regardless of the damage caused, and certain categories of serious offences of economical-financial criminality.

The initial source of information for the start of further investigations by the prosecutors can be threefold (National Anticorruption Directorate 2019a). First, citizens and legal persons can notify the agency through a complaint, a denunciation or a self-denunciation. Second, authorities and public institutions, such as the Financial Guard or the police, can equally notify the DNA. Third, prosecutors themselves may find hints that require further investigation based on their daily work or what they find relevant in the media. Every formally correct notification that falls into the mandate of the DNA needs to be turned into an investigation (Bulancea 2019). During a first phase, the prosecutor looks into the case and tries to evaluate based on easily obtainable information whether this case is likely to indeed involve a crime. If these checks show that it is unlikely that an indictment will follow at some point, she will stop the investigation and close the case. If not, the DNA will start the second phase of investigation. During that phase, the subject is informed about the investigation and has certain extended procedural rights while the prosecutor is enabled to secure more far-reaching evidence (Bulancea 2019).

Essentially, these three sources of notification cover all possible sources of information and allow the DNA to become active regardless of where the information comes from. This has positive and negative aspects: On the one hand, the DNA may be overloaded by cases since every formally correct notification needs to be turned into an investigation, which binds

resources also to cases which turn out to not involve corruption. On the other hand, the chance to miss any high-level corruption case due to constraints in sources is low. As became clear through an interview with one leading DNA official (Bulancea 2019), the amount of cases is indeed very high but does not seem to be a major problem which may in parts be attributable to the fact that the financial resources allocated to the DNA are relatively high and have increased with the case load. The main source of financing comes from the state budget. The share of state resources allocated annually to the DNA has increased from 58 820 000 RON in 2005 to 176 275 000 RON (ca. 37.2 million EUR) in 2018, which is equivalent to a more than threefold increase over 13 years (National Anticorruption Directorate 2019b). The main problem the DNA faces from an internal perspective is the unpredictability of court rulings (Bulancea 2019). In parts, this is due to emerging cases for which there is no precedence. On the other hand, there is a perceived inconsistency in court rulings. Additionally, Romanian legislation is often produced in Emergency Ordinates which can amend existing or establish new laws overnight. All these factors decrease the stability of judicial decisions and make it harder to anticipate which cases will be likely to hold in court. As a result, there is uncertainty for the DNA as to which methods are acceptable and which evidence is sufficient which can ultimately lead to frustration due to a waste of resources and acquittals for formal reasons.

In summary, the National Anticorruption Directorate as the main anti-corruption tool in Romania and its embeddedness into the broader judicial framework is – at least until 2016 - in many ways exemplary and the Romanian case therefore suitable as a critical case. The DNA's staff is well qualified and supported by experts, the work is largely shielded from political interference, the human and financial resources are sufficient and used throughout the country, the sources for corruption notifications are exhaustive, and the legal mandate enables to prosecute a wide range of high- to mid-level corruption cases. Further, the mandate goes

beyond an improvement of monitoring as it combines investigation and prosecution. This gains particular relevance as institutional multiplicity - the overlap of enforcement functions among governmental entities – has been shown to be essential for the effectiveness of judicial accountability systems in enforcing existing anti-corruption legislation (Prado and Carson 2016). The basic reasoning behind is that if strong interdependencies exist between government institutions regarding functions in the chain of law enforcement, i.e. monitoring, investigation and punishment, then one weak link in this chain can be enough to undermine the whole enforcement process (Prado and Carson 2016; Sousa 2010). While the DNA combines the first two steps, a potential weakness seems to be its dependence on volatile court rulings and governmental legislative actions in the last step.

4. The concept of corruption

The next chapter conceptually defines the main subject of interest: corruption. It starts with a general approach of what context-independent corruption is before narrowing it down to corruption in public procurement.

What corruption is and what it is not has been one central point of confusion in the scholarly debate. In fact, one can find multiple and sometimes even contradicting conceptualisations even in the same editorial volume (Heywood 2015; Rose-Ackerman 1999a; Rose-Ackerman and Palifka 2016a). One reason for this confusion is that ‘corruption’ is an evasive concept (Kurer 2015). It can occur in very different contexts, such as in the physical decay of objects or the nature of political systems. But it also may occur in all kind of social organisations, such as the church or even a chess club. Finally, corruption may be a part of business practices in the private sector. All these forms of corruption are certainly beyond the scope of this work. Instead, corruption is limited here to individual actions within the public sector, also called political corruption.

The standard definition of political corruption as “abuse of public office for private gains” (Rose-Ackerman 1999c: 91) has been widely applied in the literature (Treisman 2000; Vargas and Schlutz 2016). But this leaves many aspects undefined. Most crucially, what constitutes an “abuse” of public office? In this definition, the lines between unethical, or even illegal, inducements and acceptable practices are context-specific (for an extensive critique of this concept, see (Kurer 2015).

Following the extensive conceptual scrutinization by Rothstein and Varraich (2014; 2017), political corruption is here understood as an umbrella concept that links multiple other overlapping concepts to a common core, that is justice. More specifically, if political equality and equality before the law are established as the guiding principles within a society, the state through its representatives ought to treat all of its citizens impartially in the exercise of its power. Partiality in the exercise of public authority by a state official is one specific kind of the opposite of justice and is here called corruption (Kurer 2005; Rothstein and Teorell 2008). This is the case if the public official benefits or intends to benefit from how her authority based on anything other than the very content of those laws or policies, such as personal relationships or preferences. From this perspective, impartiality is a purely procedural norm that does not affect the content of the laws or policies that are being exercised but only the very act of exercising them.

This concept of corruption is analogue to corruption as a form of particularism as opposed to universalism (Mungiu-Pippidi 2006). Particularism entrenched as a norm in society describes “a mode of *social* organization characterized by the regular distribution of public goods on a nonuniversalistic basis that mirrors the vicious distribution of power” (Mungiu-Pippidi 2006: 87). While the terms used in these two conceptualisations differ, both particularism and partiality essentially refer to breaching the norm of the state not exercising its authority in a non-discriminatory way for the sake of the public official’s private gain.

The advantage of this corruption conceptualisation lies in its parsimony and in its comprehensive and inclusive character as well as in its wide range of applicability. It captures both formally legal and illegal ways of corruption since it aims at the underlying norms and is independent of further, potentially problematic definitions such as ‘abuse’. Further, it is a definition that is understood cross-culturally as it refers to a basic principle of human

interaction. Lastly, given its focus on procedure, it can be employed across many forms of corruption as a core definition, such as cronyism, patronage, nepotism or policy capture (Rothstein and Teorell 2008). Its main weakness, however, is its limited usefulness when standing alone: To make it useful in the researcher's conceptual toolkit, it needs further elaboration to distinguish different forms of corruption. In the context of public procurement: What kind of partiality in the exercise of public authority is the subject of investigation?

Public procurement concerns the purchase of goods and services through administrations from private firms. Accordingly, corruption in public procurement is corruption in a *triadic relationship* as it concerns the interaction between public officials and private companies to the detriment of the public. Political corruption in public procurement can best be described as *capture* which results in *favouritism*. Capture describes a corrupt act in which the public official and the company collaborate, and the public official breaks the rules by going beyond of what she is supposed to do. For example, a company may pay a bribe to a bureaucrat to retrieve insider information about when a tender is published to have a comparative time advantage to the company's competitors. Extortion, on the other hand, exists when company and public official have an antagonistic relationship: The public official refuses to work on the tasks he is ought to, unless she is paid off (Auriol and Lassebie 2013; Khalil, Lawarrée, and Yun 2010).

While extortion may also be present, the observed empirical praxis of corruption in public procurement points to capture (Fazekas and Kocsis 2017; Fazekas, Tóth, and King 2016; Rose-Ackerman and Palifka 2016b), sometimes systematically (Fazekas and Tóth 2016). Typically, corruption in public procurement means that competition in the bidding process is limited in one way or the other to make the favoured bidder win the contract (World Bank 2014). Thereby, monopoly rents are produced and transferred to the corrupting firm. From these unduly high profits, the corrupted official receives a part as her financial pay off. This act of corrupt

behaviour goes beyond outright bribery in the sense that the final contract award decision can be influenced at multiple stages of the bidding process, including but not limited to the direct selection of the winning firm (Fazekas and Tóth 2016). *Capture* is present as predominant form of corruption as public officials are paid off to limit the number of competitors in the list of prequalified bidders, to acquire relevant insider information, to tailor bidding specifications to the paying firm's characteristics, or to enable the firm to increase prices or undergo quality standards after having been awarded (Fazekas, Tóth, and King 2016). Because the ultimate goal is to make the favoured company win the contract, one can speak of *favouritism* as the result of the preceding corrupt practices.

A last distinction of corruption that appears in the literature is the one between petty and grand or high-level corruption with corruption in public procurement often to be argued to reflect a subcategory of 'grand corruption' (Rose-Ackerman 1999b; Rose-Ackerman and Palifka 2016b). Petty corruption typically concerns small bribes such as a small amount of money being paid to the police officer to get away for speeding whereas grand corruption refers to illicit strategies involving high-level state officials and large businesses. Conceptually, this categorisation can be considered as arbitrary. First, it remains unclear what sums of money or persons of which influence need to be involved in order to qualify a corrupt act as 'high-level'. Second, while consequences in corruption cases involving large-volume tenders have the potential to lead to a higher public loss, the procurement process can be illegally influenced on every level of governmental administration, also on the lowest one. In other words, the above described mechanism of capture leading to favouritism on the procurement market can be independent of the size of the bribe, the contract volume, the business involved or the relative status of the involved public official. Nonetheless, there is a predetermined scope on what the Romanian legislator defined as high-level corruption and therefore in the mandate of the

National Anticorruption Directorate (DNA) (Government of Romania 2002; 2013; Parliament of Romania 2000). Accordingly, this study will stick to that definition and have the same scope.

In short, corruption in public procurement can be described as influencing the allocation and performance of contracts through undermining those rules and principles of good public procurement which protect open competition with the goal to benefit a closed network of public officials and companies to the detriment of the public. In the context of this study, high-level corruption in public procurement is considered as defined by the mandate of the DNA.

5. Theory

5.1. Criminal deterrence

Now, the theoretical expectations on the impact of prosecutions through the National Anticorruption Directorate (DNA) are formulated. These expectations are based on those classical strands of the literature which conceptualise corruption as a principal agent problem. Partly, they are complemented through insights from interviews with local politicians. Through the investigations of the DNA, state officials were charged and often convicted by courts. The work of the DNA therefore mainly concerns legal accountability in which the forum that holds the public official accountable is the court. Laws are the yardstick against which officials have to justify their conduct. As such, DNA prosecutions, like any criminal-justice policy, can have an effect on corruption through deterrence.

Drawing on 18th century scholars, namely Beccaria and Bentham, theory concerning the deterring effect of legal accountability has first been formalised by Becker (Becker 1968; Becker and Stigler 1974). In the centre of the model stands the rationally behaving individual, i.e. self-interested and with ordered preferences, who is placed in a situation of strategic choice. The individual tries to maximise her utility according to her preferences by deciding between either corrupt or non-corrupt behaviour given a certain time and resource budget. Her set of choices consists of either acting criminally and therefore reap its benefit but be exposed to a risk of detection and punishment. Alternatively, she can decide to not be corrupt. This means to have no corruption benefits and to accordingly not be exposed to the associated risk of sanctions. Potential outcome scenarios are three-fold, and each have different levels of utility.

When conducting the criminal offense, the individual can either (1) be punished and experience “disutility” or (2) not be punished and experience utility from the corrupt behaviour. When abstaining from the criminal act, the individual (3) enjoys the utility from non-criminal behaviour. Which decision is taken depends on the relation between the *expected utilities* of the two options, that is the assigned utility of each outcome scenario in interaction with its assigned probability. Ultimately, the individual will act consistently by choosing the alternative which provides the highest expected utility - crime is chosen if its expected utility is higher than the expected utility of non-criminal behaviour. The implication of this model is that crime can be decreased in three ways: by increasing the certainty of being punished, by increasing the severity of being punished, or by increasing the opportunity costs of criminal behaviour.

Prosecution of the DNA affects the certainty of being punished because officials are more likely to be brought in front of court as a result of the DNA’s investigations. Hence, in a very basic model, the expected utility of engaging in corrupt behaviour is lowered and corruption should be less likely to occur. However, since Becker’s introduction of criminal deterrence theory, further important advancements have been made which aim to model human crime behaviour more realistically. This will help to refine the predictions. One strand of the literature is concerned with the fact that the objective costs of criminal behaviour, i.e. certainty and severity of punishment, are often only weakly, if at all, related to the subjective evaluation of individuals (Kleck and Barnes 2008; Lochner 2007). Therefore, *perceptual deterrence* tries to shed more light on the link between crime punishment and individual behaviour by incorporating how individuals perceive risks of punishment.

One approach in this respect is given by Apel (2013) who conceptualises criminal behaviour not as a direct function of prescribed punishment by law but as conditional on risk perception. Risk perception refers to

an individual's estimate of the likelihood of being detected, arrested, convicted, and incarcerated upon committing an offense (perceived sanction certainty), as well as the length of the custodial sentence or the strictness or the supervisory conditions imposed upon conviction (perceived sanction severity) (Apel 2013: 72).

Risk perception in turn is dependent on *threat communication* which describes how and to what extent citizens are informed about the apprehension risk and the current state of the punishment statutes. Threat communication comprises three dimensions: sanction publicity, police visibility, and sanction enforcement. Sanction publicity describes the publicly available information by mass media on the creation or modification of penalties, police visibility the physical presence of police forces, and sanction enforcement the extent to which established laws are put into practice as indicated by investigation and sentences.

The DNA's role in influencing risk perceptions is predominantly played within the latter. By prosecuting corruption cases, the DNA signals to the prosecuted individuals that established laws are put into practice. It does so in two ways: whether corruption is investigated and followed by a sentence influences the perceived certainty of punishment. The specific sentences issued inform about the type of punishment to be expected when investigations are successful and therefore affect perceived sanction severity. Scholars have demonstrated that perceived certainty is substantively more important in deterring from criminal behaviour than perceived severity of punishment (Apel and Nagin 2011; Pratt et al. 2008). Independent of the effect strength, the expected direction of the effect is clear: The prosecuted individuals' probability to engage in corrupt behaviour should be lower.

However, research has also demonstrated that this kind of threat communication not only works on the affected individual herself but also among proximate individuals. *Proximity of*

prosecution may be understood spatially and socially, although these dimensions often coincide. Whether law enforcement measures are spatially close is an important predictor because individuals tend to be aware that resources of the investigating authority are limited and, as a result, prosecution cannot be conducted simultaneously everywhere in the country. Hence, the individual perceives that the spatially closer law enforcement activities to the individual, the higher the certainty to be detected (Apel 2013).

Social proximity relates to the closeness of investigations to the individual in her social network. Research has indicated that individuals base their risk perceptions not only on their own experiences in committing crime but also based on their peers' experiences in their social networks -- so-called "vicarious experiences" (Paternoster and Piquero 1995; Stafford and Warr 1993). In the context of corporate crime, Paternoster and Simpson (Paternoster and Simpson 1996) show that the perceived risk of formal sanctions against the company is a strong predictor of the individual perceived risk to be formally sanctioned.

Transferred to the context of Romanian localities, these findings imply that DNA investigations are likely to have an impact on the whole locality where DNA investigations took place. Because average Romanian localities tend to be relatively small, the chance to witness the prosecution process is high. Thus, albeit not personally affected, prosecution of employees within the same locality increases perceived risks of punishment for corruption.

At the same time, public officials who work in localities unaffected by investigations should not update their punishment risk perception. The extent to which there are spill-overs should depend on the proximity of public officials across localities. Assuming that proximity across municipalities is sufficiently small, the effects should in general be concentrated in directly affected municipalities and not their neighbours.

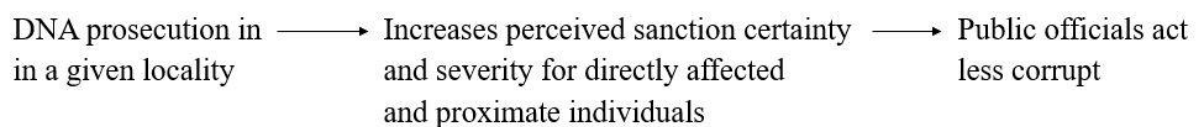
So far, it has been argued that corruption is the aggregated result of individuals' cost-benefit analysis. However, this cost-benefit analysis is subjective, i.e. perceptions of certainty play a crucial role in the decision-making of whether to be corrupt. DNA prosecutions signal that established laws are put into practice. Thereby, they increase the subjective certainty and severity of punishment and ultimately the costs of corruption. Furthermore, this subjective analysis is influenced by experiences of proximate individuals. The first hypothesis is therefore:

H1: DNA prosecutions lowers corruption in localities where DNA prosecution takes place because public officials' perceived certainty and severity of being punished increases in the respective locality (deterrence effect).

Transferred to the Romanian context, is this mechanism plausible? Qualitative evidence from interviews with former or current politicians suggests this (Calistru 2019; Gant 2019; Hellwig 2019; Macedonschi 2019; Sucaciu 2019). DNA prosecution is described as “a raised finger for those in office that they cannot simply do as they please” (Hellwig 2019). Fear has repeatedly been named as the motivation behind the current government's actions against the DNA's former Chief Prosecutor Laura Kösevi (Macedonschi 2019; Sucaciu 2019).

Figure 4 provides an overview of the expected effect of prosecution on corruption in Romanian localities under the theoretical framework of increased judicial accountability when conceptualising corruption as a principal agent problem.

Figure 4: The deterrence effect of prosecution on corruption



5.2. Public accountability

Alternatively, the investigations of the National Anticorruption Directorate (DNA) can increase public or political accountability – these terms will be used synonymously – as DNA investigations release information about an official's misconduct or the administration she oversees. Political accountability has been formalised in political agency models, which are principal agent models applied to representative democracies (Besley 2007). In these models, citizens (principal) and government officials (agent) are assumed to behave rational and seeking the maximisation of self-interest. The citizens delegate authority to the government to complete a task on their behalf. This can be the efficient provision of public goods, i.e. excluding corruption. While the result is visible, the action that leads to the result is not. The major problem in this relationship is informational asymmetry: The government possesses more information than the principal about how the authority is exercised and thus has incentives to deviate in its behaviour. Whether the incumbent behaves opportunistically, depends on the relative pay-off between the two options of efficient versus inefficient provision of public goods. Therefore, the citizens have to have mechanisms to both select the most complying agents, as well as to monitor and sanction opportunistic behaviour. This function can be fulfilled by elections which give the opportunity to punish badly performing politicians while rewarding well performing ones.

From a democratic perspective, public accountability achieved through elections is the major way to control public officials in their exercise of power because elected politicians are the first agents in a chain of principal-agent relationships (Bovens 2007). In most representative democracies, voters delegate authority to representatives who in turn delegate authority to a

government which in turn delegates policy-specific tasks to ministries and so on. While each of the principals tries to hold the respective agent to account, citizens are the ultimate authority to pass judgement through voting.

In Romanian localities, executive power is concentrated in the office of the mayor as she possesses large autonomy over the approval and execution of the local budget. Klačnja (2015) shows that corruption is an important policy issue for voters in Romanian localities as higher corruption increases the incumbency disadvantage of Romanian mayors. Accordingly, the question is, which conditions ensure that voters can monitor and evaluate the performance of politicians and induce them to act in line with their preferences for low corruption. A central point is the dissemination of information to encounter the information asymmetry.² Voters need to know about corruption to vote based on that information. Information provided about corruption in the voters' electoral district has shown to have a negative impact on the incumbents' electoral performance (Avis, Ferraz, and Finan 2018; Breitenstein 2019; Ferraz and Finan 2008). The prosecutions through the DNA are publicly available on the agency's website and can thereby serve as tool of information for which mayor is more likely to engage in or at least tolerate corruption. However, this effect is dependent on the timing of information publication and the credibility of the source. If the revelation is shortly before an election, it is more likely to influence voters' decision, as research on the publication of government audits demonstrates (Bobonis, Cámara Fuertes, and Schwabe 2016). Further, information is more

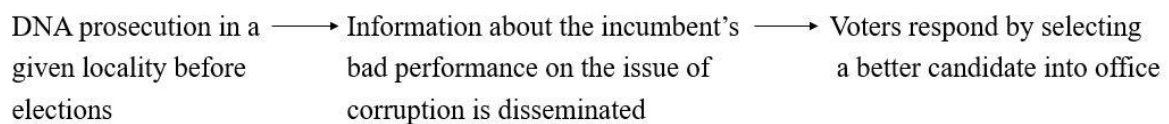
² There are also studies which examine the effect of political institutions on corruption voting such as electoral rules (Persson, Tabellini, and Trebbi (2003); Rudolph and Däubler (2016)), clarity of responsibility (Tavits Margit (2007); Schwindt-Bayer and Tavits (2016)), term limits (Ferraz and Finan (2011)) or a variety of other institutional settings (Lederman, Loayza, and Soares (2005)). However, these factors do not vary in the local Romanian context and are therefore not relevant here.

likely to be used for candidate evaluation if it comes from a credible source (Larreguy, Marshall, and Snyder 2014). As polls suggest, Romanians have high trust in the DNA: In 2016, almost 60 percent stated that they would trust the DNA “much” or “very much”. This is remarkable given that it is substantially higher than the share of population which makes the same statement regarding the press (36.6 percent) or the parliament (12.6 percent) (INSCOP 2016). Hence, if timed before the elections, DNA information on prosecution can help the voter in evaluating the incumbent’s performance. A political selection effect is likely: Incumbents which show a tendency for illicit strategies, indicated by prosecution of the DNA against officials in their administration, should be less likely to be re-elected. The second hypothesis therefore is:

H2: DNA prosecution shortly before elections lowers corruption because voters are enabled to choose a mayor who lowers corruption (political selection effect).

Figure 5 gives an overview of the political selection effect.

Figure 5: The political selection effect of prosecution on corruption.



6. Data and operationalisation

This chapter gives insights into the data and operationalisation of the two main variables of interest, corruption and prosecution, as well as on the expert interviews. The remaining variables used in the study are justified through the identification strategy and will be discussed thereafter.

6.1. Corruption

Corruption in public procurement is measured by components of the Corruption Risk Index (CRI). This is a proxy measurement which uses several so-called red-flags within each procurement contract to indicate elevated risks of corruption (Fazekas and Kocsis 2017; Fazekas, Tóth, and King 2016). The rationale behind the CRI's measurement is related to common practices of corruption in public procurement. Instead of simply 'selling out' contracts to the highest bidder, corrupt actors typically create conditions to make the favoured bidder win by limiting competition in the bidding process and/or allowing for inflated prices after the contract has been awarded. These conditions can include, for example, a very short solicitation period which makes it impossible for outside companies to gather all necessary documents and hand in their offer. The red-flags used here are therefore indications of deviation from standard competitive procedures in public procurement which increase the chance that the contract was awarded to the company favoured by the corrupted public official. As such, they are not a direct measurement of corruption but are instead indications of conditions in which corruption is more likely because discretionary power can more easily be abused.

The basis for analysis is a data set comprising roughly 3.2 million procurement contracts on the lot level – the sublevel of an award – between 2007 and 2018. The vast majority of these contracts is already publicly available on a designated website (Open Tender 2019), the rest is expected to be published on the same website in the near future. The data was collected and processed by researchers of the Government Transparency Institute, Budapest, in 2018 and comes from two sources. On the one hand, EU law requires public procurement contracts which surpass certain volume thresholds to be published in *Tenders Electronic Daily*, the EU public procurement journal. These are tenders above a volume of 865 000 EUR regarding public works and above 134 000 EUR for both services and supplies and can be accessed through the EU's Open Data Portal (EU Open Data Portal 2019). The major part, however, comes from the Romanian national government's website and includes governmental contracts between 2007 and 2016 (Romanian Agency for Digital Agenda 2017)

Two steps of data pre-processing were needed: identifying contracts relevant on the local level, and identifying the locality the respective contract refers to. Contracts are identified as issued on the local level through string matching with key words in the buyer name. A negative filtering approach was conducted: All buyer name strings that contained key words were excluded. The key words comprise variations of the words “national”, “regional” and “county” as well as words that concern governmental services which are typically provided at the national level such as border protection or military. For a complete list of words that were used for the string matching, please consult Appendix A. This results in a set of roughly 2 million contracts.

After having identified relevant contracts, one runs into the problem that approximately four fifth of the contracts does not contain any information on the geographical location of the buyer. To prevent discharging these contracts, another operation of string matching is performed. This

time, the string vector containing the buyer name is matched with a list of locality names, all exact matches extracted, and the missing buyer locality replaced with those matches. All contracts that contain more than one match, i.e. where more than one locality name appears in the buyer name and therefore ambiguity exists, were discharged. One exception is the case when the second match is the name of the county capital, which is often equivalent to the county name. In those cases, qualitative analysis has shown that the county name was often just an addition to the locality name, e.g. “Town Hall Agnita County Sibiu”. Contracts with this kind of ambiguity were not excluded. Ultimately, a set of 1.47 million contracts is suitable for analysis.

The Romanian procurement data makes it possible to retrieve information for three out of the seven CRI indicators. These concern characteristics in the tendering process itself. Explicitly, the data indicates on a binary measure whether:

- there was no call for tender announcement published,
- the advertisement period length is risky,
- the procedure type is non-open or has a higher probability of single bidding

These three indicators are combined to an additive index of corruption risk for each contract, taking four possible values between 0 and 1, with 0 if none of them is present and 1 if all of them are present. This contract level data is aggregated per year and locality to measure the level of corruption risk in a respective locality, resulting in 7 709 observations which cover roughly half of the 3 181 Romanian localities.

Additionally, I constructed an indicator of market competition to include a measurement of the outcome of risky tendering processes. Anecdotal evidence from the interviews suggests that predominantly politically well-connected firms win contracts at local level (Calistru 2019;

Macedonschi 2019). If those companies which, for example, are run by a family member of the mayor, systematically win more contracts because of risky tendering processes, this should be visible on an aggregate level through a lower number of companies being awarded with contracts. The market domination indicator MD_{ly} denotes the difference between the actual outcome AO and the theoretically possible most competitive outcome CO in the yearly market of a locality – every contract is won by a different company – both as measured by the Herfindahl-Hirschman Index (HHI):

$$MD_{ly} = AO_{ly} - CO_{ly}$$

$$\rightarrow MD_{ly} = \left[\sum_{i=1}^n \left(\frac{c_i}{c_{ly}} \right)^2 \right] - \frac{1}{c_{ly}}$$

With l as index for the locality, y as index for year, c_i being the number of contracts that company i wins and c_{ly} the total number of contracts. A high value of MD shows a heavy concentration of contracts on one or few companies in a large market.

A big advantage of concentrating on public procurement processes lies in the possibility to objectively assess corruption using big data. Commonly used indicators such as the Corruption Perception Index by Transparency International or the World Bank's Control of Corruption (Kaufmann, Kraay, and Mastruzzi 2011) are based on surveys and face several shortcomings in addition to those applicable to every survey based assessment, namely representativeness bias and reflexivity bias (for an extensive discussion and review see (Fazekas, Tóth, and King 2016).

Using a proxy measurement of corruption that focuses on public procurement may induce measurement error because public procurement is only one potential field of corrupt activity which potentially differs from others. Besides the confirmation through cross-validations to

other popular measurements (Fazekas and Kocsis 2017), corruption in public procurement is nonetheless assumed to well serve as an indicator for the overall level of corruption for two reasons. First, corruption in public procurement is lucrative. Because public procurement accounts for a great portion of governmental spending, expected kickbacks and therefore incentives for public officials to engage in corrupt activities are high. In 2015, public procurement amounted to an average of 30.26 percent of total government expenditure in the OECD states (OECD 2017). The most recent numbers available for Romania show a similar significance of public procurement. In 2013, public procurement made up 32 percent in total general government expenditure (Doroftei and Dimulescu 2015). Second, officials not only at the national but also at the county and municipal level possess great authority in the distribution of expenditure in public procurement (Coman et al. 2001). The misuse of this authority has been shown for the infrastructure sector (Doroftei and Dimulescu 2015) and EU funds (Dimulescu, Pop, and Dorofte 2013). In sum, because corruption in public procurement on the local level is both attractive and widespread, a change in overall corruption would be visible there.

6.2. Prosecution

The non-governmental anti-corruption organisation “Romania Curata” in collaboration with the Romanian Academic Society provide data for DNA prosecutions against 3420 persons (SAR 2015). Of these, 1240 are public officials and therefore fall in the scope of political corruption; prosecution against 267 persons occurred on the local level, that is either in the mayor’s administration, the local council or the local police. These prosecutions cover 32 out of 42 Romanian counties; the earliest case has the start of investigation date in 2003, the latest conviction takes place in 2015. The majority of cases lies in 2013 and 2014. DNA prosecution

is equally measured at locality level. Aggregated to locality and year, there are 160 observations.

There are two dimensions of prosecution which therefore constitute two different kinds of treatment and require two separate analyses: the investigations following an official announcement, and the final sentence. Each of them is indicated by a binary variable, taking the value of 1 for a given locality if they occur. Further, I construct two dummy variables for the estimation of the political selection effect. Respectively, they take the value of 1 if the prosecution takes place in a pre-election year or the mayor is re-elected in the upcoming election, zero otherwise.

6.3. Additional context knowledge

In addition to the quantitative data, eight expert interviews between forty and seventy minutes in length were conducted in person during the first two weeks of April 2019. The purpose of these interviews was threefold. First, to refine the theoretical predictions. Since the literature used for the theoretical predictions is based on empirical studies not concerning Romania, it is important to gain information about the extent to which the theories about deterrence and political selection are applicable to the Romanian context. Second, to find out about the working processes of the DNA and to what extent they need to be taken care of in the research design. Scholarly literature in English specifically on the DNA is, to my knowledge, not existent. Third, to improve the identification strategy through additional knowledge on how corruption ‘works’ in Romanian localities.

Table 1: List of interviewees, in alphabetical order

Name	Function
Anonymous interviewee	Former mayor, Sibiu county
Bulancea, Marius	Chief Prosecutor in the Division for Investigating Crimes Assimilated to Corruption, National Anticorruption Directorate, Bucharest
Badita, Florin	Founder of the civic anti-corruption movement “Corruption Kills”
Calistru, Elena	President and co-founder of “Funky Citizens”, a non-governmental organisation for advocacy on anti-corruption policies and civic education
Gant, Ovidiu	Member of Parliament, Democratic Forum of Germans in Romania, Bucharest
Hellwig, Karl	Member of the Local Council, Democratic Forum of Germans in Romania, Rupea, Brasov county
Macedonschi, Christian	Member of the City Council, Democratic Forum of Germans in Romania, Brasov, Brasov county
Sucaciu, Gheorghe	Mayor Făgăraș, independent candidate, Făgăraș, Sibiu County

Table 1 contains a list of interviewees and their respective functions, one interviewee preferred to stay anonymous. The interviewees were recruited in a snowball system through fellow students, one professor and one alumnus of CEU and they were not offered any incentives for their participation. Interview languages were English and German; full transcripts can be made available upon request.

7. Identification strategy

The goal of identification is to strip off all non-causal relations from the observed relation in such a way that only the causal effect remains. The methodological approach employed in this paper makes conceptual use of the counterfactual causal framework and applies propensity score matching in combination with permutation tests to identify the causal effect of DNA prosecution on corruption levels in Romanian municipalities. Further, two robustness checks, namely a sensitivity analysis and a test for spill-over effects, confirm the validity of the results. I will first give an introduction of the counterfactual causal framework before turning to the identification strategy. The following introduction draws heavily from the papers which first formalised the counterfactual framework applied to observational studies (Rubin 1974; 1977) as well as a formal review by Winship and Morgan (1999).

7.1. Estimating effects with the ATT

Applied to observational studies, the counterfactual framework is based on the same logic and jargon of classical experimental studies. Let us first consider what a causal effect is, independent of the study design. It is illustrative to think of two simultaneously existing worlds: one in which a unit receives a treatment and a “counterfactual” one where the unit does not. The effect of a treatment is denoted as the difference in the outcome variable of interest in these two different worlds. More formally, a unit-specific causal effect of treatment D on potential outcome Y for unit i is defined as the difference between the potential outcomes in the treatment and control state:

$$\delta_i = Y_i^1 - Y_i^0$$

With Y_i^0 = potential outcome for unit i in case of no treatment and Y_i^1 = potential outcome for unit i in case of treatment.

In the context of this study, one would think of the same locality which is observed at a given point of time both under the condition of DNA prosecution having taken place and in the absence of DNA prosecution. However, since there is only one world existing, a unit can always only be observed in one status at a same time, i.e. treated or non-treated, and a perfect counterfactual for the purpose of identifying the causal effect of the treatment does not exist. In other words, it is impossible to inspect a specific locality where both prosecution and non-prosecution take place at the same time. This is what is commonly referred to as the “fundamental problem of causal inference” (Holland 1986).

Whereas unit-specific causal effects cannot be estimated, an average causal effect can be. This is the difference in the variable of interest between the treated and untreated group of the population of interest and denoted as Average Treatment Effect (ATE):

$$ATE = E(Y_i^1 - Y_i^0)$$

With $E(.)$ as the expected value operator.

The ATE estimates the average causal effect for all units of the population of interest and consists of the Average Treatment Effect on the Treated (ATT) which estimates the average causal effect for those units who experienced the treatment D , and the Average Treatment Effect on the Non-Treated (ATNT) which estimates the average causal effect for those units who did not experience the treatment D , formally:

$$ATT = E(Y_i^1 - Y_i^0 | D_i = 1) = \underbrace{E(Y_i^1 | D_i = 1)}_{\text{observed}} - \underbrace{E(Y_i^0 | D_i = 1)}_{\text{unobserved}}$$

$$ATNT = E(Y_i^1 - Y_i^0 | D_i = 0) = \underbrace{E(Y_i^1 | D_i = 0)}_{\text{unobserved}} - \underbrace{E(Y_i^0 | D_i = 0)}_{\text{observed}}$$

Leading to the ATE being able to be reformulated as:

$$ATE = \pi \cdot ATT + (1 - \pi) \cdot ATNT$$

With π being the share of treated units.

Given the fundamental problem of causal inference, the goal of each scientific study with the aim of causal identification is to artificially reproduce this hypothetical, non-existent world to the extent it is necessary for the research question, i.e. to provide references of comparison which can be reasonably assumed to resemble the counterfactual of each of the units in the population of interest. Experimental designs are often assumed to be the gold standard in this regard because there is a random assignment of the treatment status and therefore equal conditions between treated and untreated (control) group.

However, an experimental approach is often not feasible due to practical or ethical considerations. In the given case, it is predominantly for obvious practical reasons. Because there is no random assignment of treatment, studies based on non-experimental methods like the present one, are likely to violate the Conditional Independence Assumption (CIA), also called ‘ignorability assumption’. This is the central identifying assumption. The CIA describes that the treatment status is independent of potential outcomes conditional on observable characteristics X . The effect estimated when the CIA is violated, also called ‘naïve estimator’, is different from the ATE because it potentially suffers from two biases: baseline differences

and causal effect heterogeneity (Winship & Morgan 1999).³ Intuitively, the baseline differences, as the name already implies, is the difference in the average outcome between treated and untreated if both groups were untreated. Causal effect heterogeneity refers to the difference in the causal effect of the treatment between treated and untreated group, i.e. the systematically different reaction between the two groups on the treatment.

Therefore, observational studies need to employ additional techniques to produce convincing counterfactuals and to be able to estimate the effect of a treatment. Which strategy is suitable to identify the causal effect of DNA prosecution on corruption? A common and convincing way in the counter-factual framework lays in concentrating only on the estimation of the Average Treatment Effect on the Treated (ATT) and applying propensity score matching to calculate this average causal effect (for example, see Caliendo and Künn 2011; Harding 2003). Given the data and the question at hand, this strategy is also employable here. Compared to the conventional estimation of regression models, this strategy is preferable because the validity of the results depend on fewer strong assumptions (Harding 2003). Most importantly, it does not require a specific functional form between independent and dependent variables, and collinearity is not an issue because one only uses the predicted values from the propensity score model and not the coefficients. Furthermore, it provides direct insights about the comparability between treated and untreated groups (Harding 2003). This comes at the loss of the restriction to binary forms of treatment. However, this restriction is acceptable here because it is hard to argue that prosecution would not closely resemble a discrete categorical variable. Another note

³ The vocabulary used to describe these biases differs from field to field. For example, one tends to speak of ‘self-selection’ and ‘heterogeneity from the start’ in economics. Other terminology for the bias resulting from baseline differences is selection bias or confoundedness.

of caution is needed: The ATT describes the average effect of prosecution on treated localities and not the effect for the entire population of localities. In other words, the effect of prosecution on those localities where prosecution took place is estimated but not the hypothetical effect of prosecution on localities where prosecution could have potentially taken place, but it has not. While restricting the share of the population on which statements regarding the effect of the treatment can be made, estimating only the ATT means that causal effect heterogeneity as described above does not play a role anymore: When only considering the share of the population which has received the treatment, systematic differences in the reaction to the treatment between treated and untreated (or potentially treated) groups are not relevant.

What is left to be dealt with is the potential bias stemming from baseline differences. Rosenbaum and Rubin (1983) suggest to match treated and untreated units on their probability to be assigned to treatment, so-called propensity scores. They show that, if the Conditional Independence Assumption (CIA) applies conditional on a vector of control variables X , conditioning on the propensity score $P(X)$ makes potential outcomes independent of the treatment status D . The propensity score is defined as:

$$P(X) = P(D_i = 1|X_i)$$

The above-mentioned identifying assumption, the CIA, therefore turns into:

$$\begin{aligned} (Y^0, Y^1) \perp D | X &\Rightarrow (Y^0, Y^1) \perp D | P(X) \\ \Rightarrow E(Y^0 | P(X), D = 0) &= E(Y^0 | P(X), D = 1) = E(Y^0) \\ \Rightarrow E(Y^1 | P(X), D = 0) &= E(Y^1 | P(X), D = 1) = E(Y^1) \end{aligned}$$

Additionally, one needs to assume that there is overlap. This means that there is no perfect predictor for treatment, formally:

$$P(D = 1|P(X)) < 1.$$

The ATT is then defined as:

$$ATT = E(Y_i^1 - Y_i^0 | P(X_i), D_i = 1) = \underbrace{E(Y_i^1 | P(X_i), D_i = 1)}_{\text{observed}} - \underbrace{E(Y_i^0 | P(X_i), D_i = 1)}_{\text{unobserved/counterfactual}}$$

And can be estimated as:

$$\beta_{ATT} = \sum_{i \in T} Y_i^1 - \sum_{j \in C} W_{ij} Y_j^0$$

With W denoting matching weights, i as index for treatment group (T), and j as index for control group (C).

This provides the estimates to confirm or reject Hypothesis 1 which states that there is a deterrence effect. Intuitively, the approach employed here is to match each of the treated localities with one or multiple untreated localities in a way that they are approximately identical before the treatment regarding all confounding variables, that is all those variables which introduce baseline differences. These untreated localities then serve as a control group, or counterfactual, to the treated localities. If treatment and control groups are identical regarding all those relevant variables before treatment, then the difference in the outcome variable of interest after treatment is due to the treatment.

Hypothesis 2 claims that there is a political selection effect: Voters get informed about (alleged) corruption in their locality and vote a candidate into office who makes sure that there is less corruption. If voters selected better candidates into office as a result of DNA prosecution shortly before elections, one should observe that the effect of prosecution is higher for localities where prosecution took place shortly before elections. To make sure that this is related to a better selection, one has to consider elections where the incumbent is replaced. As such,

prosecution in the pre-election year and the success of the incumbent are the conditioning variables of interest which allow to estimate the effect of political selection. A parsimonious way to make statements about the impact of these variables is to conduct the matching for the whole population and then calculate the effects through regressions with the respective interaction terms based on the matched population. This will provide the Conditional Average Treatment Effect on the Treated (CATT) for the specified subgroup where a political selection effect should be visible: prosecution takes place in the pre-election year and the incumbent is replaced with another candidate.

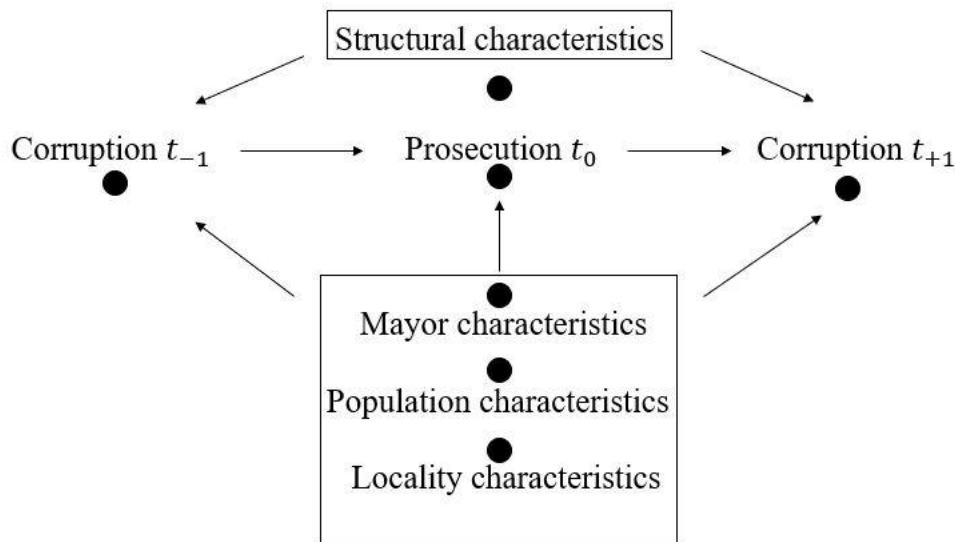
7.2. Identifying confounding variables

Which variables are selected for matching is an important contribution to the validity of the design since they decide on the plausibility of the CIA to hold. As relevant matching variables are considered all those variables which are confounding and therefore introduce baseline differences. I argue that the CIA holds because the selection of relevant matching variables is based on established previous research and ground knowledge acquired through interviews. Nonetheless, it is fair to acknowledge that a perfect matching process is never possible.

First, let us consider the assumed causal relationships in the given context. To illustrate them, this paper relies on Directed Acyclic Graphs (DAG) (Pearl 2009). These graphs are a visual representation of qualitative causal assumptions, mapping the researcher's beliefs about causal and noncausal relationships in a given context. A few words about notation may be necessary. Each node represents a variable. Solid circles are used for observed variables whereas hollow circles are unobserved variables. There is no restriction on the form of these variables (discrete or continuous) or the relationship between them (entirely non-parametric). Arrows or edges

represent direct causal effects between two variables while missing arrows mean that there is no causal effect between the two. Confounding variables are those which are causally affecting both the probability of treatment and the outcome variable.

Figure 6: DAG on the impact of DNA prosecution on corruption in Romanian localities



This DAG in Figure 6 contains the most relevant variables concerning corruption on the municipality level in relation to DNA prosecution. As it becomes clear, there are several confounding variables and they can broadly be classified into three groups: mayor characteristics, population characteristics, locality characteristics, and structural characteristics. Data for these variables comes from two sources. Electoral results of local elections are published and available for download on the website of the Romanian Central Electoral Bureau (Central Electoral Bureau 2019) and I obtained data for the local elections 2000, 2004, 2008 and 2012. Data for the other matching variables comes from the Romanian National Institute of Statistics' online portal (National Institute of Statistics 2019). Their assumed relationship will be explained in the following. Besides those variables, the units are

also matched on year to account for potential time-varying unobservable differences in the effect of the treatment or the control variables.

7.2.1. Mayor characteristics

Two mayor characteristics are important confounders. First, the mayor's *party affiliation*. Localities are financially highly dependent on the national level because they possess very limited tax autonomy. Supplementary central governmental resources are therefore essential to procure larger or more projects at the local level which enlarges the potential scope for corruption in public procurement. These resources are more easily secured if the mayor is in the same party (Calistru 2019). At the same time, prosecution also becomes more likely when the mayor is in the same party as the governmental party. Public officials in government have more opportunities for corruption because they decide about the execution of the governmental budget. Thus, the probability of corruption is higher. If the mayor is socially proximate to those politicians, she is more likely to become target of investigations as well (Paternoster and Piquero 1995). Therefore, I construct a dummy variable which takes the value of 1 if the mayor shares partisanship with the current national government.

Furthermore, *years in office* affect both corruption and prosecution probability. Experienced incumbents are perceived to be more corrupt and suffer a higher incumbency disadvantage (Klašnja 2015). This may be because they learn over time how to extract rents from office or they may establish necessary contacts with businesses or other public officials to do so more easily (Ferraz and Finan 2011; Fisman, Schulz, and Vig 2012). However, being in office longer also means that the incumbent is exposed to a longer period in which she is under increased public and judicial scrutiny. Therefore, the probability of becoming subject to investigations, even by chance, are higher. Hence, I balance for whether the mayor is re-elected with a dummy

variable. Since switching parties is not an unusual phenomenon, especially at local level, a value of 1 is assigned if a locality's mayor name matches with the mayor name of the preceding term.

7.2.2. Population characteristics

The locality's population is important because they can be the source of notifications about corruption for the DNA. However, citizens may be willing to tolerate corruption in exchange for material gains. One narrative that was present during the interviews to explain the passiveness of the citizenry when facing blatant corruption was: "He might be corrupt, but he is at least also doing something for us." [check again which one and cite]. This is also supported by the literature, for example in (Breitenstein 2019; Fernández-Vázquez, Barberá, and Rivero 2016). The marginal utility of material gains is highest when income is low. Hence, unemployment rate per locality as a proxy measurement of low income is included.

Second, corruption may not be recognised by the locality's population as such or its severe consequences underestimated. Education as has been shown to be an important predictor for corruption (Eicher, García-Peñalosa, and van Ypersele 2009; Glaeser and Saks 2006). Therefore, a variable which accounts for the share of educational personnel among the population is included. The focus on teaching personnel is made because although the schools often exist, a major problem in the country side is that teachers, like any other highly qualified personnel, has moved to the cities or leaves the country altogether (Goga and Ilie 2017).

7.2.3. Locality characteristics

There is an ambiguous effect of population size on corruption: The smaller the population, the easier a larger relative share of the population can be included in a corrupt network because information is more easily transmitted (Alatas et al. 2016) and coordination is facilitated

(Nickerson 2008). This would increase corruption. On the other hand, a relatively small locality population means that, similarly to a more decentralised country, public accountability and responsiveness is higher (Escobar-Lemmon and Ross 2014) which could lead to less corruption. Population size also effects prosecution through the budget of the locality: the more inhabitants a locality has, the higher the sums of money the public officials deal with and therefore the more likely that the DNA will become involved. Consequently, the inclusion of the number of the locality's permanent inhabitants is required.

Local media stations decrease corruption and increase prosecution probability. Local media is more likely to cover local politics. As such, it has been shown that local media makes politicians more responsive to citizens' interest and lowers malfeasance for example, (Ferraz and Finan 2011; Larreguy, Marshall, and Snyder 2014). Also, media is a source of information for DNA prosecutors. If local journalists publish the wrong doings of local politicians, the DNA is more likely to pick it up and start a case. Hence, I include the number of TV and radio stations per county.

Further, political competition may be confounding. Political environments where political competition is limited due to electoral rules are related to higher levels of corruption (Chang and Golden 2007; Persson, Tabellini, and Trebbi 2003). Corruption is more likely to persist if voters do not have a viable alternative to the incumbent and are therefore not able to replace her with another candidate (Schleiter and Voznaya 2014). Additionally, political competitors may serve as a 'watchdog' for state-exploitation through the incumbent (Grzymala-Busse 2007). Since political opponents have an interest that the incumbent is prosecuted for corruption, they are likely to notify the DNA in case they notice suspicious actions which increases the chances for DNA prosecution. To balance for political competition, I calculated the effective number of parties (ENP) following an approach by (Golosov 2010) for the

mayoral elections of 2000, 2004, 2008 and 2012. In this context, the ENP denotes the number of parties weighted by their relative chances of winning:

$$ENP = \sum_{i=1}^n \frac{p_i}{p_i + p_1^2 - p_i^2}$$

With p_i being the square of each party's proportion of all votes, and p_1^2 the square of the largest party's proportion of all votes. Political competition is higher if there are numerous parties with a roughly equal vote share, i.e. similar chances of winning.

7.2.4. Structural characteristics

Lastly, I add structural characteristics which have a direct effect on corruption and therefore an indirect effect on prosecution. Strictly speaking, these are just another form of locality characteristics with the difference being that they do not have a direct on the prosecution probability. Because they are preceding corruption, these variables need to be considered at an earlier point in time than the other covariates. The provision of utilities in hospitals is one field in which high amounts of contracts are awarded to private companies and where overpricing in the context of corrupt activities is a problem (Calistru 2019). A dummy variable for the existence of a hospital is therefore included. A similar reasoning is behind including the density of good roads in a county. Modernisation of roads through EU funds is one major field for public procurement in Romania, its abuse has been empirically shown (Dimulescu, Pop, and Dorofte 2013; Doroftei and Dimulescu 2015). Therefore, a continuous variable between 0 and 100 is included that indicates the share of highways and paved roads kilometres in a county's overall street network. Finally, the budget influences the scope for corrupt activities: If the administration is capable to spend large amounts, it becomes more lucrative to divert parts of it into corrupt deals. This effect has been shown in other contexts where spending was increased

suddenly and dramatically, such as when natural resources were found (Caselli and Michaels 2013) or during war time (Querubin 2013). Given the absence of local expenditure data, the included variable indicates the per capita spending from the national budget per county in millions of RON (in ROL before 2005).

7.2.5. Priority setting of the DNA

A remaining potential source of selection bias is the DNA's *priority setting* regarding the selection of early cases. Each prosecutor has several, sometimes dozens of cases at once to consider because each notification that fulfils the formal requirements needs to be turned into an investigation. Given that working on all of them simultaneously is humanly not possible, the prosecutor needs to decide on which cases she starts to work first. If the aspects which influence this priority setting are also causally related to corruption, these unobservables are confounding.

I argue that DNA priority setting does not distort the results in this design. One accusation often brought forward, especially in early years, is that the DNA would be an instrument by the government or certain political parties to attack the political opponents. This is unlikely, not only because of the institutional barriers to political interference that were described above, but also due to the high number of partly leading public officials which were prosecuted across all political parties and both from government and opposition (Gant 2019; National Anticorruption Directorate 2015). Further, in the absence of ideologically driven case prioritisation, the remaining potentially applied priorities are not relevant. The prosecutor is highly autonomous in her case selection, only two sorts of unbinding guidelines are provided by the DNA's managing level suspect (Bulancea 2019). First, to prioritize according to inflicted damage of the crime or the importance of the public official involved. At the local level, however, public

offices that are within the scope of the DNA mandate to prosecute are few and the damage that can be inflicted is limited. Second, guidelines published each year, for example to prioritize a certain sector. In case, these are applied by the prosecutor, these do not have an effect because the year is part of the matching process.

8. Results

8.1. Descriptive statistics

Below, summary statistics of treated and untreated groups are provided. To have a broad time window that includes all treated units, the dataset comprises all locality/year combinations between 2000 and 2016. This amounts to 52 928 observations. Out of these, there are 7 030 observations for which contracts could be collected. Here, it is worth to recall that the earliest contracts stem from 2006 and the overwhelming majority did originally not contain information on the location of the buying administration. Bucharest as a county-like entity is completely excluded from the population for two reasons that make identifying an effect implausible: First, Bucharest sectors contain multiple treatments, sometimes even per year, which constitutes a form of treatment heterogeneity that cannot be accounted for here. Second, spill overs are very likely to happen between sectors in Bucharest given their proximity and there is likely to be interference from cases of prosecution from the national level. This violates the Stable Units Value Assumption (Rubin 1980). Exclusion of Bucharest reduces the number of treated locality/year combinations from 160 to 141 for publicly started investigations and 142 for final sentence announcement.

Table 2: Descriptive statistics per whether unit was treated with investigation start announcement

	Untreated					Treated				
	n	mean	sd	min	max	n	mean	sd	min	max
Locality	52787					141				
Number of contracts	6962	162.25	567.49	1	16039	68	806.37	1079.5	1	4580
CRS score	6960	0.29	0.11	0	0.67	68	0.29	0.08	0	0.35
Market domination	6355	0.22	0.28	0	1	66	0.13	0.19	0	0.86

Mayor is co-partisan with nat. level	52222	0.45	0.5	0	1	141	0.48	0.5	0	1
Mayor was re-elected	52222	0.4	0.49	0	1	141	0.52	0.5	0	1
Unemployment rate	46871	6.31	3.9	0	41.4	141	5.01	3.54	0.7	21.5
Teaching personnel per capita	52725	0.97	0.31	0.05	5.26	141	1.12	0.38	0.46	2.37
Population	52787	6446.01	19952.91	122	363974	141	60459.55	9622.123	310	334767
Effective number of parties	52214	2.7	1.44	1	18.24	141	2.5	0.95	1.24	6.42
Radio stations per county	52787	15.67	8.02	1	40	141	18.95	8.08	4	40
TV stations per county	52145	12.72	10.34	1	45	141	18.3	11.8	1	45
Expenditure per capita per county	52787	0.06	0.12	0	0.51	141	0.01	0.05	0	0.39
Good roads density	46831	0.58	0.11	0.34	0.94	141	0.6	0.11	0.38	0.94
Hospital existent	52787	0.08	0.27	0	1	141	0.42	0.5	0	1

Table 2 contains summary statistics by treated and untreated group for the treatment of an officially announced start of investigations. In both groups, one can see that contracts are very unequally distributed: For some localities in a given year, only one contract could be collected, identified as local and belonging to the respective locality. For others, the same procedure lead to several thousand contracts. The high number of contracts in these localities is the result of them having one or more hospitals which buy large amounts of supplies, subdivided into many contracts. When focussing on the treated units, one notices that there is contract data for only roughly half of the 141 observations. Accordingly, the two dependent variables – corruption risk index and market competition indicator – could be calculated for a similar number of treated units. The corruption risk index values tend to be similar, but deviation from market competition is substantially lower in the treated group. Concerning the covariates, the data

shows notable differences between treated and untreated groups in three ways: The population tends to be almost ten times bigger in the treated group, and there are more than twice as many radio stations and almost double the amount of TV stations in the treated group. Further, the chance of having a hospital is more than four times higher in the treated group.

Table 3: Descriptive statistics per whether unit was treated with final sentence announcement

	Untreated					Treated				
	n	mean	sd	min	max	n	mean	sd	min	max
Locality	52787					142				
Number of contracts	6953	160.35	560.2	1	16039	77	903.09	1277.51	1	6075
CRS score	6952	0.29	0.11	0	0.67	76	0.3	0.06	0	0.34
Market domination	6346	0.22	0.28	0	1	75	0.17	0.2	0	0.98
Mayor is co-partisan with nat. level	52221	0.45	0.5	0	1	142	0.63	0.49	0	1
Mayor was re-elected	52221	0.4	0.49	0	1	142	0.54	0.5	0	1
Unemployment rate	46870	6.31	3.9	0	41.4	142	4.09	4	0.4	22.3
Teaching personnel per capita	52724	0.97	0.31	0.05	5.26	142	1.07	0.36	0.44	2.45
Population	52786	6445.3	19962.98	122	363974	142	60342.79	95064.04	370	334683
Effective number of parties	52213	2.7	1.44	1	18.24	142	2.23	0.76	1.1	5.55
Radio stations per county	52786	15.67	8.02	1	40	142	19.04	8.26	4	40
TV stations per county	52144	12.72	10.34	1	45	142	18.44	11.93	1	45
Expenditure per capita per county	52786	0.06	0.12	0	0.51	142	0	0	0	0
Good roads density	46830	0.58	0.11	0.34	0.94	142	0.63	0.11	0.42	0.94
Hospital existent	52786	0.08	0.27	0	1	142	0.41	0.49	0	1

Table 3 provides a summary of the same covariates, but this time split by whether the locality in a given year was part of those who were treated with the announcement of the final sentence

in a DNA case. As for the first treatment, one can see an unequal distribution of contracts. Further, the necessary data availability to construct the dependent variables is slightly better but still relatively low with 77 out of 142. Comparisons regarding the dependent variables bring similar conclusions: While corruption risks are almost equal, the market competition is again higher in the treated group. Additionally, the mayor has in the same group a higher chance of being co-partisan with the national government, the unemployment rate is on average roughly one third lower, and there are similar relations regarding population, media stations and the existence of a hospital as mentioned above.

8.2. Matching

The matching process consists of two steps. First, a logit model is estimated including the variables explained above to calculate the predicted probabilities, or propensity scores, for a locality to be treated. Second, the treated localities are matched with untreated localities based on their propensity score and checked for balance after matching. Several algorithms for this matching process exist and I test the most common ones: variants of nearest neighbour matching, caliper matching and kernel matching. Only the results with the highest matching quality are presented. The matching process needs to be done four times: once for each combination of treatment and dependent variable. Here, I describe in detail the matching results for the first combination - publicised beginning of investigations and the CRI composite score – and give an overview of the matching results in Table 5. Please find the remaining detailed matching results in Appendix B.

As noted in Section 8 on the identification strategy, it is required that there is an overlap in propensity scores, i.e. each unit can find a suitable comparison. For the variable combination currently under consideration, 216 out of 7 013 complete observations do not fulfil this

common support condition. Since these observations are exclusively within the untreated group and therefore constitute only a small relative share, their exclusion for the following matching and analysis is acceptable.

Table 4: Balancing results for publication of investigation start and corruption risk scores (CRS) with 20-nearest-neighbours algorithm

	Unmatched /Matched	Treated	Control	%bias	%reduct bias	V(T)/V(C)
Year	U	2010.1	2010.8	-29.5		0.50*
	M	2010.1	2010.1	1	96.6	0.45*
Mayor is co-partisan w/ national gov	U	0.51	0.49	4.5		.
	M	0.51	0.55	-9	-99.7	.
Mayor was reelected	U	0.54	0.52	4.1		.
	M	0.54	0.57	-7.2	-74.4	.
Unemployment rate	U	44.58	5.17	-21.2		0.7
	M	44.58	43.58	3	86	1.01
Teaching personnel per capita	U	12.66	10.07	68.2		1.12
	M	12.66	12.64	0.4	99.4	0.87
Population	U	110 000	16275	109.9		7.71*
	M	110 000	100 000	7.5	93.1	0.96
Radio stations countywide	U	18.93	18.82	1.3		1.06
	M	18.93	19.09	-1.9	-51.6	1.08
TV stations countywide	U	18.45	16.61	16.7		1.05
	M	18.45	19.57	-10.2	39.2	0.84
Effective number of parties	U	26.26	23.49	27.3		1.03
	M	26.26	25.91	3.4	87.4	0.85
Expenditure per capita on county	U	0.0001	0.00011	-23.3		0.69
	M	0.0001	0.0001	0.9	96.2	0.76
Good roads density	U	0.61	0.60	4		0.85
	M	0.61	0.60	6.9	-71.1	0.87
Hospital existant	U	0.75	0.30	101.8		.
	M	0.75	0.76	-1.6	98.5	.

Table 4 shows the result of the balancing process when the publication of investigation start is the treatment and the locality's average corruption risk score (CRS) is the outcome variable. Two aspects are considered when deciding on the matching quality and therefore the suitability of the matching algorithm: standardized bias and variance ratio. The former is the standardised

mean difference in each control variable X between treated and untreated locality, calculated in percentages. The latter is a simple comparison between the two groups regarding the variables' dispersion in case of continuous control variables, i.e. the ratio of variance for each control variable between treated and untreated locality. After the matching process that used the 20 nearest neighbours as algorithm, the standardised bias is near or below the conventional threshold of 10 percent. Further, a variance ratio of between 0.5 and 2 is conventionally considered as sufficient. This is achieved for all variables, the variable year being a very slight and therefore still acceptable deviation.

Table 5: Overview of Matching results

Matching combination	Algorithm	N	Off-support (untreated only)	Status	MeanBias	Average Variance ratio
Investigation & CRS	Nearest 20 neighbours	7,013	216	Unmatched	34.3	3.33
				Matched	4.4	0.51
Investigation & Market domination	Nearest 20 neighbours	6,414	299	Unmatched	35	3.07
				Matched	3.6	0.64
Final sentence & CRS	Nearest 10 neighbours	7,013	446	Unmatched	45.7	1.92
				Matched	2.8	0.83
Final sentence & Market domination	Nearest 20 neighbours	6,414	376	Unmatched	45.8	1.78
				Matched	4.1	0.62

8.3. Causal effects

The Average Treatment Effect (ATT) is estimated as specified in Section 8 on the identification strategy. Since the observed values are not coming from samples but are supposed to represent the full population, standard procedures of inference are not applicable.⁴ Instead, permutation tests are employed to check for whether the null hypothesis can be rejected at a certain significance level that the observed difference between treated and untreated groups in the form of the ATT is the result of random assignment of treatment to localities (Collingridge 2013). The intuition behind permutation tests is the following: After having observed the average difference between treated and the matched untreated group, the observations from both groups are pooled together. This pool of observations is divided into n combinations of treatment assignment and for each way of treatment assignment, the potential average difference is calculated and stored. Thereby, a distribution of possible average differences is created under the null hypothesis that treatment assignment is random. The null hypothesis is rejected if the observed difference lays in the tails of that distribution as specified by the confidence level, i.e. when it is unlikely that the observed difference stems from this distribution of random treatment assignment.

⁴ Since one might argue with this statement due to the previous filtering process of contracts, I additionally provide bootstrapped standard errors in Appendix C. The results remain unchanged.

8.3.1. Deterrence effect

Table 6: Results of Monte Carlo permutation tests with the respective ATT as test statistic

Variables	T(obs)	c	n	p=c/n	Std. Error	95 % Conf. Interval		N
Investigation & CRS	0.003552	390	500	0.78	0.01	0.74	0.81	7013
Investigation & Market domination	0.005845	424	500	0.84	0.01	0.81	0.87	6414
Sentence & CRS	-0.00209	431	500	0.86	0.01	0.82	0.89	7013
Sentence & Market domination	0.022856	249	500	0.49	0.02	0.45	0.54	6414
Note: Confidence interval is with respect to p=c/n.								
Note: c = $\#\{ T \geq T(\text{obs}) \}$								

Table 6 contains the effects of DNA prosecution in both forms – public announcement of investigations and the release of the final sentence – on both indicators of favouritism in local public procurement: a composite corruption risk score (CRS) and a market domination indicator. As such, these effects provide an answer to Hypothesis 1 which states that there is a deterrence effect of prosecution which lowers corruption. Monte Carlo permutation tests with 500 permutations are used to decide whether the observed effect is not the result of a random assignment of units into treated and untreated groups. As becomes apparent from the table, *none of the effects is significant* at the conventional five percent confidence level. This null finding remains robust for several other balancing specifications as well as when more conservative filtering approaches are used to identify contracts as local. Also considering each of the risk indicators separately does not yield a different result. Thus, Hypothesis 1 is not confirmed.

8.3.2. Political selection effect

Hypothesis 2 predicts that there is a political selection effect: The release of information about the bad performance of the incumbent on the issue of corruption enables the voter to replace the incumbent with a better candidate and thereby decrease corruption. Again, this *hypothesis cannot be confirmed* by the data.

Table 7: Results of an OLS regression on the respective ATT with the conditioning variables of interest

Variables	Coeff.	Std. Err.	t	p> t	95% Conf. Interval	
Investigation & CRS	-0.00014	0.025	-0.01	0.996	-0.05	0.05
Investigation & Market domination	-0.09772	0.07	-1.39	0.17	-0.23	0.04
Sentence & CRS	-0.02813	0.03	-0.89	0.37	-0.09	0.03
Sentence & Market domination	-0.10043	0.09	-1.07	0.28	-0.28	0.08

Table 7 contains the Conditional Average Treatment Effects on the Treated (CATTs) which are calculated based on the respective matched sample and an OLS regression on the respective ATT containing the conditioning variables of interest as an interaction term. As mentioned in the identification strategy, these variables of interest are whether prosecution takes place in the pre-election year and whether the incumbent is replaced in the following election. In this regression setting, the coefficients of interest are the ones where pre-election year is given, and the incumbent is not re-elected. These coefficients constitute the CATTs for this subgroup of the treated population and indicate how much the effect differs between this subgroup compared to the total treated group's average effect. However, none of them is significant at conventional levels of significance.

Besides simply not being a large enough effect, this is also likely to be due to the low number of treated units. The more rigorous way of testing for this hypothesis is to subset the population into the groups for which one assumes to find different effects, and then go through the

matching and inference process separately for each of the subgroups. This approach (not presented) does not yield other results and this is not surprising. When such a small treatment group is further subset for analysis, as being the case here, one runs into very low number of observations from which any inference is hardly possible.

9. Discussion and conclusion

The adverse consequences of corruption on various fields of society are well established. Consequently, a large body of literature has tried to tackle the question how to encounter it. The majority of scholars stresses the improvement of institutional structures which enhance judicial and electoral accountability and thereby increase the costs for abusing discretionary power in corrupt ways. Following this logic, there has been a substantial increase of Anticorruption Agencies (ACAs) in recent decades, also in the European Union, and some of them are having impressive prosecution records. However, their impact on effectively lowering corruption in environments of systemic corruption is controversial and has not been empirically assessed. The present study is a first step in filling this gap by bringing the theoretical expectations that the predominant principal-agent-theory based literature suggest to an empirical test in the critical case of Romania. The predictions are two-fold: The deterrence effect leads to public officials refraining from being corrupt because their perceived costs of corruption have increased. The political selection effect is indirect: Information which is spread shortly before elections about incumbents badly performing on the issue of corruption enables voters to replace the incumbent with a better candidate, thereby reducing levels of corruption. To assess these effects, the impact of National Anticorruption Directorate (DNA) prosecution in two forms – the public announcement of investigations and the announcement of the final sentence – on favouritism in local public procurement is considered. Based on 1.4 million public procurement contracts, Propensity Score Matching and Monte Carlo Permutation Tests are employed to estimate the Average Treatment Effects on the Treated (ATTs) and the Conditional Average Treatment Effects on the Treated (CATTs) concerning a composite risk

score based on three red flags in the tendering process and a market domination indicator. The data reveals that the theoretical predictions cannot be confirmed.

These results allow multiple interpretations. First, it may point into the direction that certain institutional features still need refinement to make prosecution an effectual tool. Indeed, the effect may be hampered, for example, because of the sometimes relatively long time the cases are negotiated in court, a certain volatility in court rulings, and the possibility that legislation may change overnight (Bulancea 2019). Further, as one interviewee noted, corruption may still be lucrative, despite a following prison sentence (Macedonschi 2019). This may call for stricter laws and even more determined and efficient prosecution.

However, this interpretation would not sufficiently recognize that the DNA is fulfilling its job in a way that is unprecedented in Romania and Central Eastern Europe: It does bring even high-profile public officials behind bars, hence substantially improving the implementation of law and, while this is not an explicit intention, spreads fear or at least considerable uneasiness in parts of the Romanian political elite. This is not only indicated by the numbers (National Anticorruption Directorate 2015) but also in unison confirmed in all the interviews that were conducted (Anonymous Interviewee 2019; Badita 2019; Calistru 2019; Gant 2019; Hellwig 2019; Macedonschi 2019; Sucaciu 2019). Thus, if there are nonetheless no measurable effects, one may also draw into question the anti-corruption approach almost exclusively focussing on law enforcement.

A second way of seeing the results is that even if DNA prosecution has an effect, this is not sufficient to change the actors' behaviour. An alternative strand of the literature argues that systemic corruption tends to be a collective action rather than a principal agent problem (Mungiu-Pippidi 2006; 2013; Persson, Rothstein, and Teorell 2013). In this scenario, the

problem is not, as argued by the predominant literature, that an exceptionally misbehaving agent needs to be “brought back under control”. Instead, corruption is to a large extent part of the rules of the game and nobody wants to be the “sucker” by not playing along. While all interviewees agree that corruption is not a daily matter for citizens anymore, for example because it is not more or less obligatory anymore to bribe the police in a traffic control (Bulancea 2019), the mentality of distrust towards other actors in the political and societal system remains widespread (Hellwig 2019), mutual accusations in an atmosphere of conflict characterise the political discourse (Gant 2019; Macedonschi 2019). The central question is instead, how to improve coordination among members in the society, i.e. how to make sure that a critical mass of society sticks to non-corrupt behaviour – as bribe giver and taker – because it has good reason to believe that the rest of society will equally not behave corruptly (Mungiu-Pippidi 2013; Persson, Rothstein, and Teorell 2013).

One integral part in the answer to that question are strong judicial and electoral accountability mechanisms. However, it goes further by stressing the role of a strong civil society as the basis for strong institutions. The DNA prosecutions are not necessarily helpful in integrating the Romanian society in the struggle against corruption. Instead, the attitude tends to be more that responsibility can be given away to the agency as this seems to be ‘their job’, leading to overboarding and often failed expectations of what the DNA can achieve (Calistru 2019). A strong civil society would consist of citizens having internalised the norm of universalism and being enabled to act upon that norm based on coordination facilitating structures, such as civic groups (Mungiu-Pippidi 2013). Correspondingly, civic education has repeatedly been described as a crucial feature in the Romanian anti-corruption efforts which is currently lacking (Calistru 2019; Hellwig 2019; Macedonschi 2019). As such, the findings may suggest that strong law enforcement, while it is certainly an important component, is not enough to tackle systemic

corruption and should be complimented through policies which strengthen universalistic norms in society. These implications are especially relevant for other countries with systemic corruption which have usually weaker law enforcement agencies, such as those who wish to join the European Union soon. Thus, broadening the scope of anticorruption research and exploring, for example, civil society's education as preventive safeguard against corruption is a promising future research endeavour.

However, given several limitations of the present study, future research may be in a better position to give a concluding answer. As especially the test for a political selection effect is not conclusive given the low number of treated units, the key for an improved understanding between DNA prosecution and corruption would be more extensive and higher quality data. If one wants to keep a similar research design, future data would have to not only comprise more localities in more years but also be more comprehensive in its measurement approach. This could be achieved, for example, through constructing an index of missing infrastructure which is put into relation with the mayors' wealth as in (Klašnja 2015). With a higher number of treated units, it could further be checked whether DNA prosecution has an effect only on certain subgroups of public officials. For example, given that the mandate of the DNA is targeted at high level officials, it is plausible that the effect is only existent for national level politicians. Lastly, the dynamics of the effect over time are an open question due to the data limitations of the present study. How does DNA prosecution affect corruption in different points in time after it has taken place? A dummy impact function in which the measurement of corruption following prosecution is defined for a number of time points would be helpful in this respect.

Besides issues related to the data quality, two identification challenges remain which could not be solved. The first one emerges due to potential violations of the no interference assumption which requires that the treatment of one unit does not affect other units' potential outcomes

(Rubin 1980). Within the theoretical framework at hand, non-interference is conditional on the proximity of localities. Localities which are very proximate because they are spatially close and socially interconnected may be affected by prosecutions close to them. Second, matching based on observables does not entirely solve the problem of baseline differences. There can be omitted variable bias in the specification of the model that estimates the propensity scores. Hence, despite the extensive matching process, there still might be a concern that the effect is a result of unobserved confounders. A creative instrumental variable approach could be a solution for these two issues.

Appendix A: Keywords for contract filtering

Appendix A: Keywords used for negative filtering of contracts

1. national	2. militar
3. nationala	4. militara
5. nationale	6. militare
7. regional	8. ministerul
9. regionala	10. frontiera
11. regionale	12. inspectoratul general
13. judetean	14. um*
15. judeteană	16. u m*
17. judetului	

*refers to the abbreviation of military units

Appendix B: Detailed matching results

a) Balancing results for publication of investigation start and market domination with 20-nearest-neighbours algorithm

	Unmatched /Matched	Treated	Control	%bias	%reduct bias	V(T)/V(C)
Year	U	2010.1	2011	-38.2		0.49
	M	2010.1	2010.1	0.3	99.3	0.43
Mayor is co-partisan w/ national gov	U	0.50704	0.49614	2.2		.
	M	0.50704	0.52606	-3.8	-74.4	.
Mayor was reelected	U	0.53521	0.52373	2.3		.
	M	0.53521	0.57042	-7	-206.6	.
Unemployment rate	U	4.393	51.441	-22		0.69
	M	4.393	42.247	4.9	77.6	1.04

Teaching personnel per capita	U	12.745	10.092	69.2		1.11
	M	12.745	12.645	2.6	96.2	0.84
Population	U	1.10E+0 5	17343	110.3		7.03
	M	1.10E+0 5	1.00E+0 5	8.9	91.9	0.93
Radio stations countywide	U	19.07	18.878	2.3		1.09
	M	19.07	19.069	0	99.3	1.07
TV stations countywide	U	18.648	16.659	18.1		1.07
	M	18.648	19.998	-12.3	32.1	0.8
Effective number of parties	U	26.231	23.409	27.9		1.08
	M	26.231	2.609	1.4	95	0.84
Expenditure per capita on county	U	0.0001	0.00011	-27.1		0.69
	M	0.0001	0.0001	-1.4	94.8	0.68
Good roads density	U	0.60183	0.60368	-1.7		0.88
	M	0.60183	0.60081	0.9	44.9	0.8
Hospital existant	U	0.76056	0.3183	98.7		.
	M	0.76056	0.75986	0.2	99.8	.

b) Balancing results for announcement of sentence and CRS using 10-nearest-neighbours algorithm

	Unmatched /Matched	Treated	Control	%bias	%reduct bias	V(T)/V(C)
Year	U	2012.7	2010.8	87.9		0.29
	M	2012.7	2012.7	1.8	97.9	0.40
Mayor is co-partisan w/ national gov	U	0.67901	0.48932	39.1		.
	M	0.67901	0.67778	0.3	99.3	.
Mayor was reelected	U	0.55556	0.52077	7		.
	M	0.55556	0.56914	-2.7	61	.
Unemployment rate	U	28.259	5.196	-70.9		0.67
	M	28.259	28.588	-1	98.6	1.60
Teaching personnel per capita	U	12.189	10.073	57.4		0.99
	M	12.189	1.232	-3.5	93.8	0.72
Population	U	1.00E+0 5	16204	105.8		7.68
	M	1.00E+0 5	99245	3.9	96.3	0.9
Radio stations countywide	U	18.753	18.825	-0.8		1.14
	M	18.753	18.807	-0.6	24.8	1.24
TV stations countywide	U	17.914	16.623	11.5		1.13
	M	17.914	18.09	-1.6	86.3	0.95
Effective number of parties	U	22.788	23.537	-8.2		0.62
	M	22.788	22.497	3.2	61.1	0.82

Expenditure per capita on county	U	0.00012	0.00011	47.1		1.38
	M	0.00012	0.00012	-3.6	92.3	1.1
Good roads density	U	0.63175	0.60076	26.9		1.06
	M	0.63175	0.62996	1.6	94.2	0.98
Hospital existent	U	0.69136	0.29587	85.9		.
	M	0.69136	0.7358	-9.6	88.8	.

c) Balancing results for announcement of sentence and market domination using 10-nearest-neighbours algorithm

	Unmatched /Matched	Treated	Control	%bias	%reduct bias	V(T)/V(C)
Year	U	2012.7	2011	81		0.30
	M	2012.7	2012.5	10.1	87.6	0.37
Mayor is co-partisan w/ national gov	U	0.6875	0.49384	40.1		.
	M	0.6875	0.7	-2.6	93.5	
Mayor was re-elected	U	0.55	0.52352	5.3		.
	M	0.55	0.565	-3	43.3	
Unemployment rate	U	2.675	51.669	-78.5		0.47
	M	2.675	26.556	0.6	99.2	1.54
Teaching personnel per capita	U	12.315	10.094	60.1		0.96
	M	12.315	12.292	0.6	99	0.74
Population	U	1.00E+05	17265	106.3		6.99
	M	1.00E+05	1.00E+05	4.1	96.2	0.89
Radio stations countywide	U	19.038	18.879	1.9		1.13
	M	19.038	18.517	6.1	-227.6	1.16
TV stations countywide	U	18.175	16.663	13.5		1.16
	M	18.175	17.748	3.8	71.8	0.99
Effective number of parties	U	22.545	23.452	-10.1		0.62
	M	22.545	22.751	-2.3	77.3	0.86
Expenditure per capita on county	U	0.00012	0.00011	44.1		1.43
	M	0.00012	0.00012	2.9	93.4	1.15
Good roads density	U	0.62969	0.60333	22.9		1.08
	M	0.62969	0.63032	-0.5	97.6	1.03
Hospital existent	U	0.7125	0.31828	85.6		.
	M	0.7125	0.76813	-12.1	85.9	.

Appendix C: Bootstrapped standard errors

	Reps	Observed	Bias	Std. Err.	[95% Conf. Interval]		N
Investigation & CRS	500	0.0035517	-0.00076	0.009621	-0.01535	0.022454	7013
Investigation & Market competition	500	0.0058451	0.008617	0.026129	-0.04549	0.057181	6414
Sentence & CRS	500	-0.0020894	0.003803	0.009252	-0.02027	0.016089	7013
Sentence & Market Competition	500	0.0228555	-0.0022	0.024734	-0.02574	0.071451	6414

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