

Digitizing Collective Action: How Digital Technologies Support Civil Society's Struggle against Corruption

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Summary

This dissertation looks at the use of digital technologies in anti-corruption. It thereby responds to the increasing prominence of the fight against corruption as a research topic, and issue to address for activists and politicians around the world, as well as the ever-growing impact of digitalisation on governance. It answers the research question in what way and how effectively information and communication technology contribute to the control of corruption.

In its first part, this dissertation provides an overview of the past twenty years of academic publications on the use and the effectiveness of digital technologies in anti-corruption. I structure the available literature according to its level of analysis, looking at theoretical and large-n studies compared to case specific and qualitative work. I also structure it according to the mechanism that is linking different technologies to a better control of corruption, namely e-government access, upward transparency, downward transparency and mobilisation. In doing so, it highlights gaps in the literature and open questions to research. Subsequently, I am zooming in on the role of civil society in its use of digital technologies, arguing that digital technologies are a tool that can support the role of civil society in controlling corruption. This argument builds on anti-corruption theories and thus lays the groundwork for testing it in two different settings.

First, I provide evidence from a global, quantitative dataset, using marginal effects analysis to provide evidence for a positive correlation of civil society capacity, access to information and communication technology and better control of corruption. Second, I analyse a case study, looking at the use of e-procurement in Ukraine since 2014. I am testing if different civil society capacities in Ukrainian regions had an impact on corruption risks measured in Ukrainian tenders. While the quantitative data analysis gives clear, positive results concerning the relationship described above, the case study on Ukraine does not offer conclusive evidence on the effectiveness of civil society capacity and ICT access in the fight against corruption. The dissertation concludes by calling for future research into this relationship, especially by using data on public procurement.

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Throughout my work I got to know a fantastic community of anti-corruption researchers and activists. Amongst them, I want to thank my colleagues at the Interdisciplinary Corruption Research Network whose work influenced me a lot and whose comments helped me to improve my work. Particular appreciations go out to the team at the Anti-Corruption Research and Education Centre at the Kyiv-Mohyla Academy who hosted me during my field research in 2018. For several years, I was able to work on short term projects with the research department at Transparency International Secretariat, the Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ) and Freedom House. Working with them on different topics has greatly inspired and influenced me and my work.

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List of abbreviations

CCSI	Core civil society index
CPI	Corruption perception index
CSO	Civil society organisation
e-Government	Electronic government
EU	European Union
GNI	Gross national income
GRI	Gross regional income
ICT	Information and communication technology
IT	Information technology
ITU	International Telecommunications Union
NGO	Non-governmental organisation
OCI	Online connectivity index
OECD	Organisation for Economic Co-operation and Development
OPEN	Online Procedures ENhancement for civil applications
TI	Transparency International
UN	United Nations
WGI-CoC	Worldwide governance indicator on the control of corruption

1 Introduction

Over the past 30 years, anti-corruption and good governance reforms have received a lot of attention from academia and policymakers alike (Michael, 2004; Mungiu-Pippidi & Hartmann, 2019). During this time, and especially in recent years the reforms have been influenced by the vast expansion of internet access and the spread of digital technologies (see Figure 1). As such, international organisations, national governments, donor organisations, civil society organisations (CSOs) and activists increasingly use digital tools as part of their anti-corruption programming.

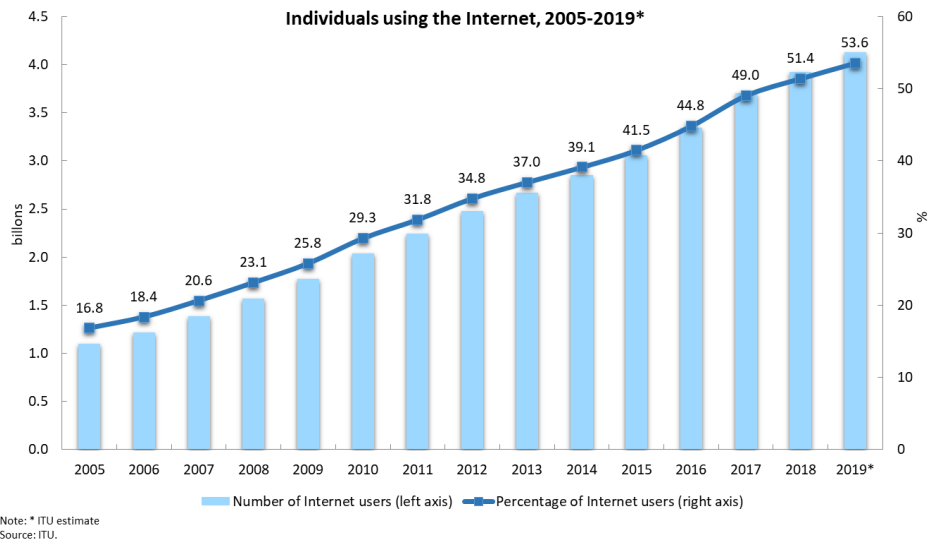


Figure 1: Global statistics on internet access (ITU, 2020).

Today, such tools range from the simple digitalisation of paper trails to data management systems involving machine learning algorithms promising the automation of governance processes. In the broadest sense they are often referred to as information and communication technology (ICT). Specific uses of ICT as a means to fight corruption, came up during the late 1990s and early 2000s mostly in the form of e-government projects.

A prominent place in this context is taken by South Korea, where e-government reforms, especially in the context of the Seoul metropolitan administration have been used since the mid-1990s and were later hailed as an effective tool against

corruption (Iqbal & Seo, 2008; OECD, 2016c; UN DESA, 2003). In the following years, several organisations and researchers turned to the question as to how effective ICT tools can be in fighting corruption looking either at the question in general terms (John C Bertot, Jaeger, & Grimes, 2010; Davies & Fumega, 2014; Kossow & Dykes, 2018b; Sturges, 2004), or with a focus on specific technologies such as e-government (Andersen, 2009; Elbahnasawy, 2014), social media (UNDP, 2011), open data (Gurin, 2014), crowdsourcing (Noveck, Koga, Garcia, Deleanu, & Cantú-Pedraza, 2018; Zinnbauer, 2015) or distributed ledger technology (K. Kim & Kang, 2019; Kossow & Dykes, 2018a).

As the research cited above demonstrates, the literature on digital tools in anti-corruption evolved quickly and can be traced back to the interest of both researchers and international donor organisations. The purpose of this PhD dissertation is to advance and concentrate the knowledge on these tools and on the question of how effective they are in the fight against corruption. My PhD brought together two research fields that are of equal interest to me: the study of corruption and anti-corruption measures, as well as the impact of digitalisation and the use of digital tools on societies and governance. The fight against corruption has rightfully gained the attention of the research community due to evidence of the negative effects of corruption on governance outcomes, economic development and societal cohesion. At the same time, the question of how to control or even curb corruption is far from answered, despite years of policy experience and research efforts (Dimant & Tosato, 2018; Mauro, 1996; Mungiu-Pippidi, 2015; Mungiu-Pippidi & Hartmann, 2019). Looking for evidence on tools and measures that work against corruption has thus fascinated me for many years. Equally, I am fascinated by the impact of digitalisation and ICT on our societies. Since the early days of computing and especially since the dawn of the internet, we have seen impacts in almost all spheres of our daily lives. The question of how ICT impacts governance has thus been on my mind ever since I started studying political science.

The central research question of this dissertation is therefore:

In what way and how effectively can information and communication technology contribute to the control of corruption?

As a fairly broad and overarching question, this research focus does, of course, lead to related questions as to what specific technologies will be the subjects of the investigation, how corruption is understood and how its control can be measured.

1.1 Research approach

In order to approach these questions, I chose a cumulative research model. My PhD dissertation thus consists of three academic papers that approach the topic from different perspectives. While these papers were developed in their own right, they have also been built up on each other and were written in order to address the central research question outlined above. The first paper surveys the existing literature on ICT and the control of corruption that has been published over the past 20 years and offers a structure to help understand what is already known, as well as open questions for research. The second paper puts together a theoretical model that links ICT and the control of corruption and offers quantitative evidence based on a global, large-n dataset to support this approach. Finally, the third paper takes this theoretical approach and tests it by analysing a specific reform using ICT against corruption, namely e-procurement reforms introduced in Ukraine after its 2014 revolution. Overall my dissertation thus follows a theory testing approach (Coppedge, 2007; Liebermann, 2005; Seawright & Gerring, 2008). In the following, I provide an outline of the individual chapters of the dissertation in order to show how they are connected to each other and how they answer the overarching research question as outlined above.

1.1.1 Chapter two: Digital anti-corruption: hopes and challenges

Chapter two presents the first research paper that I wrote as part of my PhD dissertation. It was published as a chapter of an edited volume titled *A Research Agenda for Studies of Corruption* (Mungiu-Pippidi & Heywood, 2020). It represents a comprehensive review of the literature on ICT and digital tools for anti-corruption purposes. The chapter was developed over several years – it was started in 2015 as a review of existing literature to facilitate work on this

dissertation. It ended up as a chapter within an edited volume, stating questions that studies of corruption need to answer in the coming years. It focusses on mechanisms that link ICT to a better control of corruption and uses these in order to structure the literature. The paper was continuously revisited and finally adapted for publication in the version that is included here. Its structure helped to guide the research that followed as part of my dissertation. It identifies core theories linking anti-corruption and ICT and the most important technologies that are to be considered in this context. As such, it is offering a foundation for further research. The chapter provides the most important perspectives on the use of ICT in anti-corruption and identifies gaps in the literature.

The initial and systematic analysis of prior literature, while being continuously updated, brought to light key questions early on in the research process that had not yet been thoroughly researched. Specifically, this concerned three main questions: In which way can the use of ICT in anti-corruption be related to theories on corruption and anti-corruption? What mechanisms link ICT to the better control of corruption? How can specific types of digital tools contribute to the control of corruption and thus serve as case studies to illustrate these mechanisms? The literature review helped to structure my research throughout the dissertation process. It also brought to light the main focus of my empirical work in this context: the role of civil society in making ICT a useful tool in the fight against corruption. In the following chapters I am trying to answer some of the questions that it brought up, first by choosing a theoretical approach for my research and subsequently by testing this theory.

1.1.2 Chapter three: Civil society and online connectivity: controlling corruption on the net?

In the third chapter, I develop the theoretical groundwork for my dissertation. My theoretical approach connects civil society capacity and ICT access to lower corruption levels. It argues that these two factors are jointly associated with lower corruption levels and can thus play a crucial role in the control of corruption. Testing this approach empirically, the research applies marginal effect analysis to

make the case that ICT are more effective in the control of corruption at higher levels of civil society capacity.

The theory is deduced from key theories on corruption and anti-corruption that developed largely in the context of political science. Namely, these are the perspectives of principal-agent and collective action theory on corruption. The debate between these two schools of thought has dominated research work on anti-corruption for much of the past fifteen years. The principal-agent perspective on corruption has shaped most of the early research on corruption, as well as anti-corruption programming that has been formulated in the 1990s (Marquette & Peiffer, 2018; Mungiu-Pippidi & Hartmann, 2019; Persson, Rothstein, & Teorell, 2013). It sees corruption as a result of information asymmetries between the principal (the citizens of a constituency) and the agents (civil servants working on their behalf). Since agents cannot control the principals, these are free to work in their own self-interest and thus abuse their “entrusted power for private gain” (Transparency International, 2020) – as per the standard definition of corruption put forward by Transparency International. Robert Klitgaard famously summarised this perspective in the formula stating that “corruption equals monopoly plus discretion minus accountability” (Klitgaard, 1988). The assumption for anti-corruption work thus followed that decreasing discretion over funding or resources, decreasing monopolies of power and resources, and increasing accountability should lead to lower corruption levels.

As the review of literature will show, early applications of ICT in anti-corruption contexts largely followed this logic. They were used to decrease discretion of individual civil servants over decision-making and create greater transparency within bureaucratic processes, for instance by enabling citizens to follow up on applications for permits or other documents (Cho & Choi, 2004; UN DESA, 2003). Yet, research also showed that in several instances, the introduction of ICT did not necessarily lead to lower levels of corruption (Rotchanakitumnuai, 2013). Overall, this is in line with the critique of the principal-agent approach to the study of corruption which became prominent in the past fifteen years. Researchers increasingly were able to show that anti-corruption measures were not effective

in actually controlling corruption. This spurred a debate about the nature of corruption, leading researchers to argue for an approach which looks at corruption as a collective action problem (Marquette & Peiffer, 2018; Mungiu-Pippidi, 2013a; Mungiu-Pippidi & Hartmann, 2019; Persson et al., 2013). They argue that in contexts where corruption is the norm, rather than the exception, corruption is defining the rules of the game. Anti-corruption policies aiming at enforcement of rules or accountability through institutions are thus likely to fail – since those enforcing these rules of working for such institutions are likely to be corrupted themselves (Mungiu-Pippidi & Hartmann, 2019). As such, the instruments used to control corruption have to look different. As Peiffer and Marquette (2018) point out, both theoretical perspectives have their merit for anti-corruption programming since they apply to a specific contextual setting.

Chapter three of this dissertation is building upon this theoretical debate and follows the collective action approaches to the study of corruption. As identified in the literature review, the chapter is looking in particular at the role of civil society as a key factor in making use of ICT and contributes to the control of corruption through collective action (Mungiu-Pippidi, 2013a). It argues that civil society capacity is key in making digital tools successful in the control of corruption. While drawing from theory, the chapter is also building a quantitative model in order to test this theory in a large-n setting. Putting together a global dataset on online connectivity and the control of corruption, the paper is connecting civil society capacity and ICT access to lower corruption levels. It argues that these two factors are jointly associated with lower corruption levels and can thus play a crucial role in the control of corruption. Marginal effect analysis is used to show the effect of ICT on the control of corruption at different levels of civil society capacity. The chapter was co-authored with Roberto Martínez Barranco Kukutschka and published in the journal *Crime, Law and Social Change* in 2017 (Kossow & Kukutschka, 2017).

1.1.3 Case selection

By deriving a theoretical framework from established literature and then testing it empirically, I am choosing a theory-testing approach as the framework of my

dissertation. The third chapter is not only providing this framework but also offering initial quantitative evidence in a global, large-n dataset. This helps to initially test the theoretical approach before moving to a case study. By proceeding like this, my aim is to combine different methods of theory testing and provide a more solid base for my empirical findings. Both large-n samples and case studies offer distinct advantages and disadvantages for theory testing. Large-n studies are good to provide evidence for generalized theories, while case studies can help to test theories on more specific mechanisms (Coppedge, 2007). At the same time, large-n studies can support the mechanism for case selection. While the approach used here does not strictly follow a nested research design as suggested by Liebermann (2005), which suggests further refining of theoretical perspectives before applying it to case studies. My dissertation nevertheless follows the case selection technique for small-n research as a method for theory testing. As such, I will rely on a case that is well-predicted by the model at hand as a means to test the theory. This can also be referred to as an “on-the-line” case (Liebermann, 2005, p. 444) or a typical case (Seawright & Gerring, 2008), since I am focussing on a single case rather than a strictly comparative study with regards to the selection of the case from the global sample.

The decision to focus on a single case, rather than a small-n comparative study was taken for two separate reasons: firstly, this provided me with the opportunity to conduct a more specific analysis of a single case on the regional level *within* a country, a research approach that chapter two of this dissertation found to be under-researched. Secondly, in the context of a cumulative PhD, investigating one country case more thoroughly was more practical and economical in terms of timing and resources. Since chapter three of the dissertation provides a further quantitative study, I saw this approach to be justified.

With regards to case selection, chapter four focuses on Ukraine. The selection of this case is based on several factors:

Firstly, looking at the data analysed in chapter three, Ukraine is a typical case with regards to the relationship between ICT and the control of corruption, as well as

the relationship between civil society capacity and the control of corruption (cp. Figures 2 and 3).

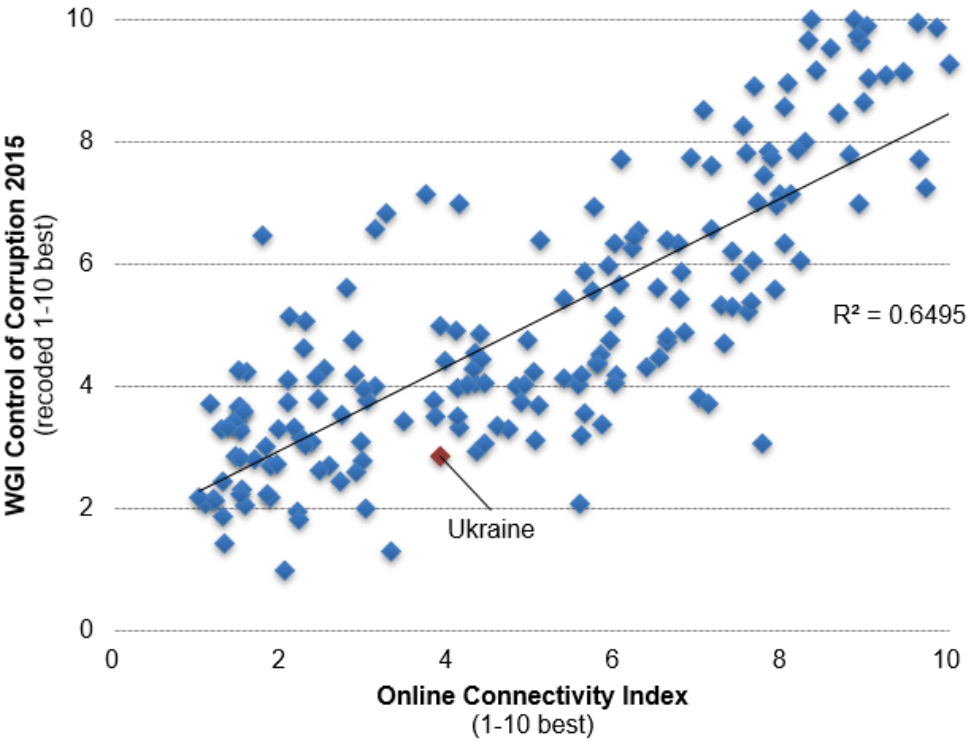


Figure 2: Relationship between Control of Corruption and Online Connectivity, adapted from Kossow & Kukutschka (2017).

While Ukraine cannot be defined as a case lying exactly “on-the-line”, it is nevertheless typical for the relationship described in my theoretical approach. Showing low levels in the control of corruption in a global comparison, its online connectivity is slightly below average (Figure 2). Civil society capacity, however is slightly above average (Figure 3) which is still typical for its level in the control of corruption. As a country that shows high corruption levels, the theoretical framework of collective action theory is likely to be applicable, since particularism can be seen as the norm by which public resources are distributed (Mungiu-Pippidi & Hartmann, 2019). Ukraine is therefore an adequate case for theory testing since it can be counted as a typical case for the main relationships described by the theory put forward on ICT and civil society capacity being jointly significant for the control of corruption.

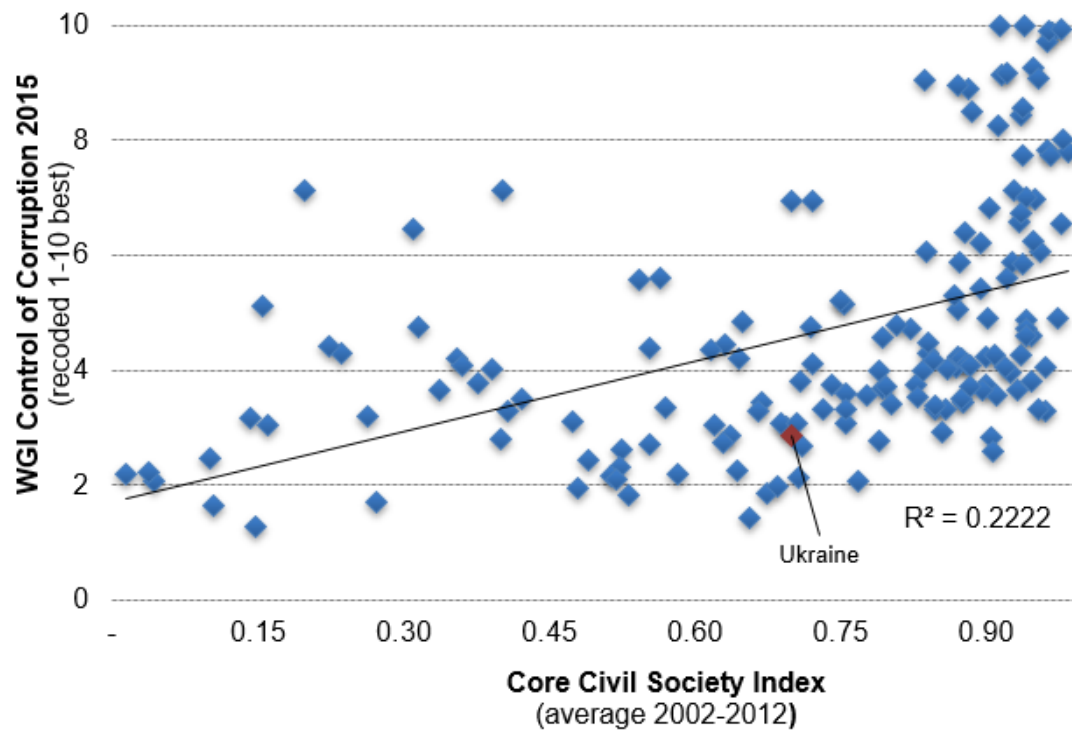


Figure 3: Relationship between Control of Corruption and Civil Society Capacity, adapted from Kossow & Kukutschka (2017).

Secondly, Ukraine also is an interesting case study due to its political context. The 2014 “Revolution of Dignity”¹ (Shveda & Park, 2016) opened a window of opportunity for anti-corruption reforms. Citizens and civil society organisations involved in the revolution initially took to the streets in response to the Ukrainian government backing out of an association agreement with the European Union. Soon, however, the protesters turned their anger towards the government itself and the widespread corruption in Ukraine became a focus of the protests (Reznik, 2016; Shveda & Park, 2016).

In the following years, civil society actors played a crucial role in demanding and implementing such reforms. At the same time, digital technologies were a key part of these anti-corruption measures. Many of them were developed by civil society organisations themselves (Harasymiw, 2019; Huss, Bader, Meleshevich, & Nesterenko, 2020; Manthorpe, 2018; Nitsova, Pop-Eleches, & Robertson, 2018).

¹ Often also referred to as the Maidan Revolution.

Anti-corruption strategies adapted in Ukraine were largely seen as innovative and some of the technologies applied in this context set new standards, for instance in the field of e-procurement (OECD, 2016a). As such Ukraine is also of great interest to the international research community, as well as practitioners in anti-corruption. My research will contribute to the knowledge on digital anti-corruption generally, and on a specific case that is of interests to researchers and policy-makers alike.

1.1.4 Chapter four: Can the civil society-technology alliance deliver integrity? An empirical case from Ukraine

Chapter four of this dissertation thus zooms in on Ukraine as a case study. While being a typical case with regards to the theoretical model applied in my dissertation, Ukraine also showed an active civil society that used a window of opportunity for anti-corruption reforms. In this context, Ukrainian civil society actors very prominently applied digital tools as part of their reform proposals and implemented some of them together with government actors and the private sector. By looking specifically at e-procurement reforms in this context, I answer the question whether levels in civil society capacity and online connectivity had a joint effect on corruption risks in public procurement.

Using a combination of quantitative and qualitative methods, the core of the chapter is based on field research that was conducted in Ukraine in early 2018 and led to an in-depth data analysis. The chapter looks at digital procurement reforms in different Ukrainian regions. This focus was chosen as a specific and tangible case study on which to apply my theoretical model. As such it provides an answer to the overall research question behind this dissertation, attempting to show an example of a specific tool used to control corruption and trying to assess how effective it was in this process. This focus is also in line with the findings of the literature analysis that did not find many studies looking at ICT in anti-corruption on a regional level. Specifically, chapter two calls for research that asks “under what circumstances or how” ICT contributes to the control of corruption (Kossow, 2020, p. 157).

For this chapter, I hence decided to focus on the Ukrainian ProZorro reforms. These reforms introduced an e-procurement platform by Ukrainian civil society organisations in 2014. The ProZorro platform was adopted nationwide through a partnership between civil society, businesses and government institutions in 2016. It was hailed as a flagship anti-corruption project inducing transparency into the corruption-prone Ukrainian procurement sector (Manthorpe, 2018; Nestulia & Bilyk, 2017). Since then, ProZorro has been used for all procuring entities in Ukraine, including local councils, regional administrations and national ministries. Data on procurement tenders is provided through an online portal and thus offers a great opportunity for quantitative analyses.

By comparing tender processes between Ukrainian regions, I am uncovering differences in average procurement corruption risks in tenders. These risks are taken as a proxy for corruption levels. Following the theoretical approach briefly outlined above, I collected structural data related to the control of corruption to build regression models to explain differences in corruption risks in 2016. Equally, I try to explain the change in corruption risks over a two-year period, 2016-2018. These analyses are supplemented by data derived from qualitative interviews conducted in early 2018, as well as secondary sources. Ultimately, the differences in corruption risks are significant, but only to a limited degree. In my quantitative analyses I am unable to show a significant correlation between corruption risks in public procurement and differences in civil society capacity or levels of ICT access between Ukrainian regions. The qualitative analysis suggests that in this context political will is more important, but the results also point to the data quality being insufficient for a definitive analysis.

Chapter four of this dissertation thus builds on the previous chapters in several ways: firstly, it tests the theory developed in chapter three in a single case study and is an extension to the empirical work offered within this chapter. The empirical results of the quantitative analysis provided here inform the case selection for chapter four. Furthermore, the chapter addresses some of the questions open to research identified in chapter two. It investigates the circumstances under which e-procurement as an anti-corruption measure can be

successful by analysing Ukrainian regions and structural differences between them. In doing so, the chapter also provides a small-n study that takes the regional level as its level of analysis, something which has, so far, been rarely studied in the context of ICT use in anti-corruption. As opposed to the other chapters of this dissertation, chapter four has not yet gone through a thorough peer review process at the time of writing. I have, however, presented its research outline and early drafts at several academic conferences. The comments I received there, as well as conversations with colleagues have helped me greatly in developing this chapter and I am aiming to prepare for submission following the defence of my dissertation.

1.2 Outlook

Overall, my dissertation provides only a partial answer to its central research question. It summarises research on a variety of digital tools and by doing so shows what mechanisms link their use to a better control of corruption. Based on previous theoretical work it then argues that civil society capacity is key for the successful use of ICT tools in anti-corruption. The global, large-n analysis in chapter three provides evidence for this relationship. The case study on e-procurement in Ukraine, however, does not provide sufficient evidence to confirm the theoretical assumptions. The analyses provided here offer limited variance in corruption risks and a spurious relationship between these and indicators measuring civil society capacity and ICT. As such, chapter four suggests further questions that remain open for research.

Following these three substantive chapters; I conclude my dissertation by summarising the results of the individual chapters and drawing conclusions from the research results. By doing so I show how the results of my dissertation add to the field of anti-corruption research. In particular, I show how it contributes to the knowledge on the relationship between ICT and anti-corruption. Finally, when highlighting the limitations of my research, I point to open questions for future research.

2 Digital anti-corruption: hopes and challenges²

2.1 Introduction

The digitalization of anti-corruption is progressing at full steam. The rise of information and communication technology (ICT) has for many years influenced anticorruption programming around the world. Non-governmental organizations and governments are eager to try new tactics to fight corruption, while international donors seem more than willing to support such projects and contribute to their documentation (Davies & Fumega, 2014; Kossow & Dykes, 2018b).

This chapter collects references to establish a state-of-the-art explanation of what we know about the use of ICT in anti-corruption with an emphasis on peer-reviewed, academic literature. In doing so, it evaluates how far ICT can be seen as an effective contributory factor to the control of corruption. The term ICT is used in this context to encompass all types of digital tools, starting with the Internet or mobile phone access and ending in more specific technologies. The chapter will also identify gaps in the literature and formulate calls for future research.

This chapter provides a similar overview of the literature to the ones produced by Chêne (2016) and Adam and Fazekas (2018). However, it focuses specifically on academic literature and provides a structure to understand the literature that helps the reader to spot gaps in the current state of the art. The structure presented here follows a deductive logic. Based on the available literature, it looks at the similarities and differences between the topics and ICT tools covered and thus structures the literature review as follows:

- *Theoretical and macro-level* studies that look at the correlation between Internet access and a better control of corruption;
- *E-government* access and the effect of e-government tools, in particular e-procurement;

² Published as: Kossow, Niklas (2020). Digital anti-corruption: hopes and challenges. In *A Research Agenda for Studies of Corruption* by Alina Mungiu-Pippidi and Paul Heywood (eds.). Cheltenham: Edward Elgar Publishing.

- Tools enabling *downward transparency*, including open data and transparency platforms, as well as social media use by governments;
- Tools enabling *upward transparency*, including crowdsourcing and whistleblowing tools and
- Tools used for the *mobilization* of anti-corruption movements.

Following the presentation of the literature, the chapter will point to gaps within the research looking at digitalization of the anti-corruption sphere. Listing these unexplored areas will help formulate a call for a future research agenda.

2.2 Theoretical and macro-level approaches

While this chapter does not review general anti-corruption theory and the variations in how to understand corruption, it will consider the work of scholars who theorize specifically on the questions as to how and why ICT use relates to corruption levels.

The most widely cited work in this context is an article by Bertot, Jaeger and Grimes (2010). Reviewing relevant literature, they argue that ICT, e-government and social media can increase transparency and provide citizens with information to hold governments to account. They see a potential for social media to have a transformative impact on society, creating “an atmosphere of openness that identifies and stems corrupt behaviour” (John C Bertot et al., 2010, p. 269). While identifying several obstacles that need to be overcome, they maintain a positive view of the potential of ICT and social media to create a link between citizens and their governments, as they also do in a later paper (John Carlo Bertot, Jaeger, & Grimes, 2012). Already, several years earlier, Sturges (2004) had made a similar argument. For Sturges, the use of ICT in government could induce greater transparency, yet both political will and a strong civil society are needed to make it useful for anti-corruption. Looking at African countries, Schroth and Scharma (2003) argue that technology more generally, and Internet access in particular, could help to fight corruption by providing information, contributing to education and helping coordinate action against corruption.

Robert Klitgaard also argues that “social media are growing in prominence in the fight against corruption” (Klitgaard, 2012, p. 56), citing several projects around the world which are using ICT tools to mobilise citizens. He stresses the importance of cooperation between civil society actors, the public and state institutions in order to make the best use of such technologies. Similarly, Mungiu-Pippidi (2013a) stresses the potential of social media and ICT to support collective action against corruption. For her, internet and social media access help to turn citizens into watchdogs, ready to exert “normative constraints” on government officials and thus contributing to the control of corruption. Looking at e-government, Shim & Eom (2008) argue that its use reduces the discretion of civil servants by removing decision-making powers and increasing the possibility to be monitored through the internal collection of data.

2.2.1 Macro-level studies

DiRienzo et al. (2007) offer a study summarizing different perspectives on corruption and arguing that access to information through ICT can be a useful tool against it. They use Transparency International’s Corruption Perceptions Index (CPI) to measure corruption and a Digital Access Index to measure access to information by the number of fixed and mobile telephones and Internet connections, the quality of ICT services and the actual usage of Internet and education levels, finding it to be positively correlated to lower levels of corruption. A similar analysis is conducted by Garcia-Murillo (2010). Pointing at the complexity of corruption as a topic for analysis, she puts together a cross-sectional model taking into account economic, political and technological factors and argues that Internet and information access “can support democratisation efforts, law enforcement, investment, and education” (M. G. Murillo, 2010, p. 28). She finds Internet access to be significantly correlated with corruption levels.

A slightly more nuanced approach is taken by Lio et al. (2011). They provide a dynamic panel model regressing Internet adoption on the CPI, including several controls. They also present positive results using a Granger causality test where the causality runs both ways and the effect remains small. A panel analysis by

Bailard (2009) finds a strong negative correlation between the CPI and mobile phone penetration. Bailard substantiates this result by also providing analysis of a country-level analysis using Afrobarometer data on different Namibian regions.

Some of these contributions note that while correlation between Internet access and lower corruption levels seems to be established, the direction of the causation is not so clearly defined (Bailard, 2009; Lio et al., 2011). This argument is also made by Charoensukmongkol and Moqbel (2014). They run an ordinary least squares (OLS) regression with panel data from 42 countries observed between 2003 and 2007, focusing on investment in information technology (IT) infrastructure, as provided by the World Development Indicators database. They find a significant correlation between IT investment and the CPI; however, it is presented as a U-curve: IT investment can lower corruption up to a certain point, but over-investment might even increase corruption as available resources might lead to additional opportunities for corruption.

Another interesting approach is taken by Andersen et al. (2011). They argue for a causal relationship between changes in Internet diffusion and the control of corruption by providing an instrumental variable analysis, using lightning as an instrument for Internet diffusion. While the authors are successful in establishing this significant link, they do not theorize about a mechanism linking corruption levels and Internet diffusion. Such a mechanism is very clearly provided by Goel et al. (2012). Using a dataset compiled of Internet searches about respective countries and “corruption” or “bribery”, they use these as an indicator for corruption awareness. Their analysis shows fairly robust and significant results, suggesting that more Internet searches correlate with lower corruption levels. The authors link this to work, arguing that press freedom also has a positive impact on the control of corruption. In a working paper, Sorak (2016) makes a similar point, arguing that “the internet has the potential to act as a new form of press freedom” (p. 57). He points out in particular that online censorship will thus limit the effect of Internet access on the control of corruption, which is thus often moderated by other factors.

2.3 E-Government

While for the most part the studies above examine Internet access generally, the topic of e-government use and its effect on corruption has been subject to a large number of academic studies. Summaries of related literature are provided by Abu-Shanab et al. (2013) and Makowski (2017). The latter presents the development of e-government in the tradition of the Weberian bureaucracy and as a way to open up governments and enable information sharing. In this context he also highlights the role of open data for greater transparency.³ An overview of both quantitative and qualitative research linking e-government to the control of corruption is provided below.

2.3.1 Quantitative studies

Shim and Eom (2008, 2009) test the relationship between e-government and corruption using a score for e-government based on a review of government websites, as well as the United Nations (UN) E-Participation Index, which also measures whether e-government stimulates deliberation between government and citizens. Regressing these measures on the CPI, both papers find evidence that e-government use is correlated with lower corruption levels. Shim and Eom (2009) additionally find that besides e-government, social capital, as measured by data taken from the World Values Survey, represents a major factor in reducing corruption but that the relationship between social capital and ICT is inconclusive.

Starke et al. (2016) look at ICT and anti-corruption from three perspectives: media freedom, Internet access and e-government, with the latter measured by the Online Service Index of the UN E-Government Survey. They run hierarchical OLS models at three data points (2003, 2008, 2013) and find all three factors to be significant in reducing corruption, with the effect of e-government increasing significantly between 2003 and 2013. Interesting results from an econometric perspective are delivered by Andersen (2009). He regresses the e-government

³ Open data in this context refers to data that are freely available, machine readable and in an open format. In the context of this paper it refers to open government data.

website score on the Control of Corruption component of the Worldwide Governance Indicators. Andersen tests the change in Control of Corruption between 1996 and 2006 and finds it positively correlated with better e-government scores. E-government proves to be an important factor in supporting the control of corruption, however, only in the context of non-OECD (Organisation for Economic Co-operation and Development) countries.

Kim (2014) also uses the CPI and the UN E-Government Development Index to show the impact of e-government on corruption levels. In a pooled OLS model, the analysis presented here covers up to 190 countries between 2005 and 2007. Kim argues that e-government is more effective in contributing to the control of corruption if applied in a setting with effective bureaucracy and the rule of law. Choi (2014) takes the three dimensions of the UN E-Government Index into account separately: online service provision, telecommunications infrastructure and human capital (referring to the ability to use online tools effectively). Choi finds a positive correlation between all three dimensions of e-government and the control of corruption, both individually and collectively. Analysing regression results including the UN E-Government Survey and data on national cultures, Nam (2018) finds that e-government can be effective in controlling corruption, but this effect is often mitigated by national culture.

Quite widely cited is Elbahnasawy (2014), who provides evidence from a large panel dataset. He runs a variety of panel data models, including dynamic models. His results show that e-government reduces corruption across all models and proves to be fairly robust, including causality tests that e-government reduces corruption without reverse causality. Another interesting study is provided by Garcia-Murillo (2013). Using a fixed effects model based on the UN E-Government Readiness Survey, Garcia-Murillo finds strong evidence for a positive relationship between a higher government web presence and better control of corruption, and grounds these findings in anti-corruption theory. The paper also gives some indication of potential mechanisms based on a short case study description looking at government procurement in Peru.

2.3.2 Case studies

In the context of e-government, one case that stands out is the OPEN (Online Procedures ENhancement for civil applications) system that was introduced in Seoul in 1999. The system helps citizens to track and review public procedures, such as applications for construction permits, through an online system. Kim et al. (2009) present OPEN as an anti-corruption tool, based on survey data, qualitative interviews, and internal and external assessments. They identify three mechanisms through which OPEN helps to fight corruption: normative mechanisms (demand by citizens for better services and transparency), regulatory mechanisms (helping to track decisions leading to better enforcement and corruption prevention) and better training of public officials. OPEN was also documented by Choi and Ahn (2001) and Iqbal and Seo (2008), as well as in several reports by international organizations. It has inspired governments and researchers to release a number of speculative studies on the potential of e-government to reduce corruption.

Nurunnabi and Ullah (2009) and Seo and Mehedi (2016) consider the case of Bangladesh. Both describe the efforts of the government to introduce e-government applications as a means to fight corruption. However, their articles demonstrate that while public offices were computerized, the introduction of e-government fell short due to poor IT infrastructure and lack of political commitment. Based on survey results, Pathak et al. (2009) analysed the potential for e-government in reducing corruption in Fiji, arguing that the introduction of e-government services could support the fight against corruption by reducing red tape and leading to greater access to information and social accountability. Similar results were found in a study carried out in Ethiopia by Pathak et al. (2007), in a comparison of these two cases by Pathak et al. (2008), as well as by analysing survey data from India (2006). The case of India highlights, however, that the citizen–government relationship seems to be comparatively more important in Ethiopia (2010). Additional studies looking at Nigeria (Eddy & Akpan, 2008) and Albania (2013) make similar points but lack sufficient data to back up their claims.

Sheryazdanova and Butterfield (2017) provide an analysis of the e-government system introduced in Kazakhstan since 2004. Analysing secondary sources they show that the country's e-government initiative has been fairly successful in limiting contact between citizens and public officials: where e-services were introduced, Kazakhstan showed advances in the World Bank's Doing Business Index. They conclude that e-government does not address the entrenched high-level corruption in the country, but was successful in lowering petty corruption. Based on a survey of 101 managers of domestic and multinational companies in India, Prasad and Shivarajan (2015) developed a transaction cost approach to the applicability of e-government as an anti-corruption tool. They argue that e-government can reduce corruption by providing information (and thus reducing uncertainty resulting from information asymmetries) and by reducing the need for face-to-face interaction between public officials and managers. They also review Indian government websites and find them to lack interactivity.

2.3.3 E-procurement

A subset of e-government applications that have been subject to anti-corruption research come from the field of public procurement. The OECD notes that an increasing number of its member states are introducing e-procurement systems, "enabling more open, innovative and trustworthy government" (OECD, 2017, p. 176). These benefits of e-procurement are also highlighted by Neupane et al. (Neupane, Soar, & Vaidya, 2012b). They look at corruption in procurement through a principal-agent approach and analyse risk factors in relation to different stakeholders. Citing several case studies, they argue that e-procurement can reduce information asymmetries, power monopolies and opportunities for corruption.

The Republic of Korea is also a widely cited case study in reference to e-procurement. The country's Government e-Procurement System was introduced in 2002 and soon after was handling 80 per cent of its bidding processes.⁴ The system enables transparency in the procurement process and competitive bidding

⁴ Also called KONEPS (Korean ON-line E-Procurement System).

and minimizes face-to-face interactions between public servants and bidders (Iqbal & Seo, 2008). A recent OECD (2016c) report on the system also highlights this and notes that the system ‘greatly expanded’ transparency in the procurement process. E-procurement is also argued to create efficiency gains, as Singer et al. (2009) demonstrate in reference to the case of Chile where, however, the system did not apparently lead to less corruption. Using data gained through digital procurement should make measuring corruption in this context a possibility, as Fazekas et al. (2016) show with their suggestion of a corruption risk index based on procurement data.

Rotchanakitumnuai (2013) presents research on the Thai e-procurement system, which includes procurement auctions. Based on a survey among 169 procurement professionals, the study argues that despite the e-procurement system, interactions between vendors and service providers are still commonplace and offer opportunities for corruption, implying that greater transparency in the procurement process does not always mean less corruption.

Coppier and Piga (2006) share this view in reference to game theoretical models. They argue that “countries where corruption is more pervasive and less easy to eradicate will stop short of implementing the level of transparency in procurement that would dissolve corruption” (p. 203). However, they also write that e-procurement might change this as transparency becomes less costly and makes it easier to involve citizens in monitoring procurement. In a working paper on an unnamed Asian country, Tran (2011) presents data from 562 contracts between a firm that imports electronics and its government buyers, all but three of which involved a bribe (hence the anonymity). Looking at the e-procurement auction process that the government introduced, Tran finds that best-value auctions did not reduce corruption. However, best-price auctions that were introduced later significantly reduced corruption since they gave public officials less discretion on whom to award the contract to. Further studies on Nepal (Neupane, Soar, & Vaidya, 2012a) and on South Africa (Habtemichael & Cloete, 2009) argue for potential benefits of e-procurement in these countries, while remaining speculative as they cover systems that were not yet introduced.

As shown above, e-government tools are seen to be an effective contributor to the control of corruption, albeit within certain limitations.

2.4 Downward transparency

The overall review of literature also found a number of scholars who looked at different ICT tools in anti-corruption that work in different ways. The first to be listed is ICT promoting downward transparency. These tools aim at providing information from the government to citizens, civil society organizations or the private sector. They can in theory use this information to hold the government accountable. There are two types of tools using this mechanism: transparency or open data platforms, and citizen outreach tools, such as specific websites or social media applications.

2.4.1 Open data and transparency platforms

Gurin (2014) looks at the provision of open data from a conceptual perspective, writing that “open data can boost economic development, improve trust in government, and fight corruption” (p. 72). He also highlights that thus far the main efforts in publishing government data in open formats were concentrated in the United States and the United Kingdom, as well as other developed nations. Further papers also take the perspective that these platforms can contribute to greater transparency and thus support the fight against corruption (Davies & Fumega, 2014; Gray, 2016; Lourenço, Piotrowski, & Ingrams, 2017).

However, there is only little empirical evidence supporting this claim. In a conference paper Matheus et al. (2011) compared different transparency platforms in 16 countries in the region. They highlighted the potential of these platforms to contribute to transparency and anti-corruption efforts by promoting “social control of public administration” (p. 27). Matheus et al. (2012) explored online monitoring systems of the Brazilian court of accounts. They mapped the existence of such transparency platforms that show characteristics of an anti-corruption tool. Those platforms seemingly do contribute to increased transparency, but not necessarily to a decrease in corruption. An interesting

perspective on this question comes from Murillo (2015). Looking at a Latin American transparency platform from a principal–agent perspective, he develops a Data Openness Index for 16 Latin American countries that takes into account legislation, as well as specific indicators assessing the provision and availability of data. Despite decent data availability, in many cases the data were neither relevant nor accessible enough to affect areas in which corruption is generally present.

This case study points out that, at least in Latin America, these platforms fail due to bad implementation, but could work in principle. Looking at potential further developments of these platforms, Sieber and Johnson (2015) outline four different models along which government data publication could develop, showing a possible way forward for anti-corruption programming using open data. Mattoni (2017) also highlights the importance of data not only to enable activists to hold governments to account, but also to form coalitions and inspire collective action.

2.4.2 Government outreach and social media

It has also been argued that governments can use digital technologies to reach out to citizens and form connections between them and government officials. This was applied in particular to social media which can also help citizens organize and share information.

Bertot, Jaeger, Munson and Glaisyer (2010) show how several governmental agencies in the USA embraced social media for citizen outreach already prior to 2010. They stress that to make social media a useful tool in creating more transparent and open government they also need to be properly used, for instance, by enabling participation in governance processes. A related paper (John Carlo Bertot, Jaeger, & Hansen, 2012) argues that social media use by governments depends on underlying policies which often have not been adapted to provide for the use of social media in government. Magro (2012) also stresses the need for change in policy and governance culture if social media is supposed to be a successful addition to e-government efforts.

Evaluating the use of social media in local governments Bonsón et al. (2012) and Bonsón et al. (2015) both see potential for social media to improve citizen–government relations but argue, however, that it has not yet been fulfilled. Song and Lee (2016) base their analysis of social media interaction of citizens with governments on a US-based survey. Their results suggest “that social media in government enable citizens to gain easier access to government and be more informed about current events, policies, or programs, heightening their perception of transparency in government” (Song & Lee, 2016, p. 443). In a study looking at citizens’ perceptions of local governments in Mexico, Valle-Cruz et al. (2016) find that citizen perception of transparency, efficiency and corruption can be improved by governments’ use of technology, specifically websites, Twitter and mobile technologies.

An analysis conducted by Jha and Sarangi (2017), using quantitative methods, also supports this argument. Building cross-sectional OLS models with data from over 150 countries, they show that Internet access and Facebook penetration are positively correlated with the control of corruption. They also run falsification tests, precluding potential bias from omitted variables. Furthermore, Jha and Sarangi argue that press freedom and Facebook penetration have complementary effects, with their data suggesting that Facebook use has a stronger effect on the control of corruption where press freedom is weak.

Another quantitative study in this context is put forward by Kossow and Kukutschka (2017). Also relying on data on Internet access (Internet users and broadband subscriptions) and the percentage of Facebook users in the population, they construct an Online Connectivity Index which in a series of OLS models covering 154 countries they show to be positively correlated with the control of corruption. Further, they argue that civil society and online connectivity not only both positively influence the control of corruption, but also reinforce their effect.

2.5 Upward transparency

Another way of engaging citizens against corruption is through tools supporting upward transparency; that is, the transfer of information from citizens to different levels of government or from lower-ranked public officials to their superiors. In this context there are several studies that have looked at the use of crowdsourcing in anti-corruption.⁵ Additionally, the use of whistle-blowing tools also contributes to upward transparency.

The most widely known corruption reporting tools using crowdsourcing is *ipaidabribe.com*, based in India where it has been seen as a success story since it managed to engage a large number of people in corruption reporting. To assess how effective this type of project can be, Ryvkin et al. (2017) provide insight from bribe-paying experiments. They find that in its current form, a system like *ipaidabribe.com* does not reduce the demand for bribes on the part of public officials. To them, this is not surprising since the application was not intended as a tool to fight corruption, but rather to raise awareness. An interesting case study is provided by Ang (2014) who looks at why the project was successful in India, but failed when it was introduced in China. Ang attributes the failure not only to direct restraints on the functioning of the website (i.e. censorship), but also to indirect restraints like libel, failure to organize and undermining the discourse advanced by the project. Ang's study shows that the mere provision of a tool is not enough: it needs an appropriate organization to back it up.

Hellström and Bocast (2013) consider the Ugandan project *Not In My Country*, a tool soliciting reports on bribes from Ugandan university students that proved to be unsuccessful. Based on a survey and a focus group, they argue that motive alignment is key in ensuring crowdsourcing success: students were often themselves benefitting from corrupt practices and thus had no motive to report bribery cases – even if they were in principle supportive of anti-corruption ideals. Another crowdsourcing anti-corruption tool called *Bribecaster* is discussed in a

⁵ Acquiring resources by engaging a large and open group of individuals, mostly Internet users.

conference paper by Mittal et al. (2012) without, however, an assessment of its practical merit.

Looking at the Philippines, San Juan and Resurreccion (2015) make an argument for crowdsourcing based in principal–agent theory. They propose that crowdsourcing tools have the ability to engage the public (as the principal) in direct participation and thus help to ensure that governments (as the agent) fulfil their mandates. Zinnbauer (2015) takes into account several implementations of crowdsourcing tools. He brings in the perspective of corruption as a collective action problem. He argues that the design of many platforms often does not focus on solutions and gives several recommendations on the design of anti-corruption crowdsourcing platforms. Suggestions on the future of crowdsourcing in anti-corruption also come from Noveck et al. (2018) who lay out an approach they title “smart crowdsourcing” in a report for the Inter-American Development Bank.

Noveck et al. (2018) also highlight the importance of online whistle-blowing systems in the context of anti-corruption strategies. These are said to be more secure and thus could encourage whistle-blowers to come forward and report corruption. Academic evidence for this is, however, quite rare. Apaza and Chang (2011) noted the general need for whistle-blower protection and better systems to make sure cases of whistle-blowing are followed up and lead to proper investigations with regard to corruption. Online whistle-blowing tools are considered by Asiimwe et al. (2013). They examined two case studies from Uganda where ICT tools were used to encourage whistle-blowing based on interviews and focus group discussions. They argue that users were more likely to report corruption thanks to the efficiency of the systems and the ease of use. However, lack of ICT skills and mistrust in officers handling complaints both contributed to deterring reports.

2.6 Mobilisation

The final group of tools considered in this chapter are those aimed at mobilizing citizens against corruption. This can, on the one hand, be news reporting websites

providing information on corruption-related issues and, on the other hand, social media tools, including different types of social networks and blogs.

An interesting case study in this context is Russia. Alexanyan et al. (2012) present results from a three-year research project analysing the Russian Internet. They found several examples of collective action that were inspired by online movements, as well as a public sphere based around blogs. In this context they found several examples where cases of corruption generated a strong online response. In a recent paper Enikolopov et al. (2018) present highly interesting results from an analysis of blog posts about corruption in Russian state-controlled companies, published by blogger Alexey Navalny. They are able to show that blog posts reporting on corruption have a direct negative effect on stock prices of the companies covered in the blog posts, as well as an indirect effect through higher staff turnover and fewer conflicts with minority shareholders. Blog posts are thus associated with “increased accountability within state-controlled companies”. The researchers conclude that “social media can improve the quality of governance in places that need it the most” (Enikolopov et al., 2018, p. 171).

An analysis of an online anti-corruption campaign using social media is provided in a conference paper by Breuer and Farooq (2012), who look at the Brazilian anticorruption campaign Ficha Limpa. While not calling the campaign successful on a policy level, they highlight survey results showing that the use of online campaigns was efficient and cost-effective: having taken part in a targeted campaign seems to be associated with people taking ‘offline’ political action. Writing about the 2011 Indian anti-corruption movement, Rodrigues (2014) argues that the movement that started on social media and through online activism successfully managed to push the issue onto the agenda of the traditional media. It was thus able to influence the policy agenda.

2.7 Looking ahead: what have we learned and where are the gaps?

This chapter has presented a rich array of studies that look at the use of information and communication technology in anti-corruption. Clearly, the

digitalization of the anti-corruption sphere is already well advanced and the link between ICT access, e-government use and better control of corruption is well-established. Reviewing studies looking at different types of ICT helps us to boil down this key mechanism that links ICT and anti-corruption: e-government, downward transparency, upward transparency and mobilization. These case studies give some indication of why and in what way ICT tools were able to support better control of corruption. Overall the theoretical and empirical field on the use of e-government as an anticorruption tool is well-researched. Yet, it leads us to look at the questions which are still open for research.

Case studies leave open some specific questions on how ICT tools can be effective in controlling corruption. This applies in particular to open data and transparency platforms, whistle-blowing tools and e-procurement. Research suggests that these tools can be used to lower corruption, but not *under what circumstances* or *how*. This points at fairly specific research questions that look at the interaction of ICT tools with other factors contributing to the control of corruption. It also raises questions about what other policies and institutions are necessary to make ICT tools effective against corruption. Furthermore, new ICT tools such as distributed ledger technology or machine learning are increasingly noted as anti-corruption tools, but little is known about how big their potential is.⁶ The same goes for digital whistleblowing tools and actual data leaks that might lead to better data availability.

One key area that has not yet been investigated sufficiently is the effect of ICT anticorruption tools on individuals' motivations to engage in corruption:

- How do individual decisions whether or not to engage in corrupt acts take into account greater transparency provided through ICT?
- What effect does social media have on those calculations in comparison to traditional media?

⁶ Distributed ledger technology is commonly referred to as blockchain technology.

- In what settings do e-government tools change the behaviour of civil servants?

At the same time, researchers also need to look into possible unintended consequences of technological innovations. ICT tools can also contribute to corruption. Machine learning can potentially contribute to efforts in predicting and uncovering corruption, as López-Iturriaga and Pastor Sanz (2018) highlight in a study predicting corruption in Spanish provinces. However, as Aarvik (2019) points out, besides its anti-corruption potential, machine learning also has ethical concerns and is often feared to lead to a loss of jobs. Distributed ledger technology, for instance, is often referred to as a potential tool to address corruption risks (K. Kim & Kang, 2019; Kossow & Dykes, 2018a). However, it is also associated with digital currencies which have in some cases been associated with money laundering. Social media is increasingly associated with fostering political discourse that weakens democracy and thus can support more corruption. Finally, as Charoensukmongkol and Moqbel (2014) point out, IT infrastructure investment can also lead to more corruption. Yet, this aspect is rarely studied and should be an issue for research in the future.

Overall, anti-corruption scholars have established the importance of ICT tools in the control of corruption. Yet, more research is needed to understand how these tools can be used effectively and what their unintended consequences might be.

3 Civil society and online connectivity: controlling corruption on the net?⁷

3.1 Introduction

In March 2014, Turkish internet users found it unusually hard to access the social media service *Twitter*. *Twitter.com* and its mobile services had been added to the evergrowing list of websites that are banned in Turkey. Blocked websites have become a common thing for Turkish internet users. In 2015 already over 80,000 websites had been added to the list for either moral or political reasons (Freedom House, 2015) and many users know how to circumvent the ban to access most websites that they want to access. The 2014 Twitter ban, however, was different. It came as a direct reaction to corruption allegations against Turkish President Recep Tayyip Erdogan and close allies of his that were spread using Twitter and other social media networks. In a way it showed one thing: social media services were perceived as a threat by corrupt regimes.

Social media offer citizens the possibility to spread news about corruption and particularistic governance, even in a tightly controlled media context such as in Turkey. They also enable civil society to mobilize citizens for the fight against corruption. In Ukraine, for instance, Facebook, Twitter and V Kontakte, a social networking and messaging app especially popular in Russian speaking countries, were important tools in the 2013/14 Maidan movement that swept the corrupt Yanukovich regime out of power (Onuch, 2015a, 2015b). Civil society in Ukraine continues to use these tools to push for anti-corruption reforms and actual policy change.

For several years, scholars have been looking at the role that social media and other internet and communication technology (ICT) can play in the control of corruption. Today, there are few doubts that the right use of ICT can play a vital role in a successful national integrity system (John C Bertot et al., 2010;

⁷ Published as: Kossow, Niklas, and Roberto Martínez Barranco Kukutschka (2017). Civil society and online connectivity: controlling corruption on the net?. *Crime, Law and Social Change* 68.4 (2017): 459-476.

Elbahnasawy, 2014; Gurin, 2014; Starke et al., 2016; Sturges, 2004). However, what has been less clear so far is in what context ICT tools can be effective against corruption and if the mere provision of internet or social media access is enough to support the control of corruption. This paper seeks to address this gap in academic literature. It argues that ICT contributes to anti-corruption by providing a set of tools that helps to empower and educate citizens. Social media, open data and other ICT tools create and enlightened citizenry that is able to organise and mobilise against corruption. With this argument we build on literature that defines corruption as a type of collective action problem, rather than merely a principal agent problem. ICT in particular helps civil society to spread information and increases their ability to mobilise an informed citizenry that is able to effectively work for the control of corruption.

Our research will first elaborate on the theoretical considerations regarding the use of ICT for the control of corruption. It will nest the paper in a strand of literature defining corruption as an expression of a societal norm defined by the particularistic distribution of public resources (Mungiu-Pippidi, 2006, 2015). It will then go on to briefly review the literature that has previously considered the impact of ICT on the control of corruption. In doing so it will especially look at the empirical evidence brought forward in this context. In order to build on this and to provide evidence for the underlying theory of our research we will analyse a global dataset comprising around 170 countries. The findings confirm the hypotheses that ICT in general, and social media in particular, can be important tools in the fight against corruption. They also confirm the core argument of our paper, i.e. that ICT are only fully effective in controlling corruption when used by an active and strong civil society.

3.2 Theoretical background

In recent years, anti-corruption scholars have increasingly turned to a theoretical approach based less on the conception of corruption as a principal-agent-problem and more to looking at corruption as a collective action problem (P. M. Heywood & Rose, 2015; Mungiu-Pippidi, 2013a, 2015; Persson et al., 2013). The former approach resulted in anti-corruption advocates introducing national integrity

system reforms ready-made solutions in which they were unable to work. Reforms failed to take local contexts into account and failed to recognise the systemic nature of corruption, which inhibits national integrity systems to work the way they were intended to. They supported laws curtailing the authority of state officials and asked for greater transparency to help citizens hold state officials to account (Groenendijk, 1997; Klitgaard, 1988). However, as empirical research showed over the years, many of the championed anti-corruption instruments did not lead to greater control of corruption. Not even transparency can be seen as automatically leading to more accountability (Bauhr & Grimes, 2014; Lindstedt & Naurin, 2010). Anti-corruption scholars were not able to find the perfect set of laws that provided the silver bullet needed to put an end to corruption in a given society.

Viewing corruption as a type of collective action problem provides some needed explanations for the lack of success that anti-corruption reforms have seen over the past years. This perspective argues that citizens and state officials are more likely to be complicit in corruption as the short-term losses of stepping up against corruption are perceived to outweigh the long-term benefits for society as a whole (Persson et al., 2013). Corruption thus becomes the symptom of a governance model based on the particularistic distribution of public goods, as opposed to one based in norms of ethical universalism (Mungiu-Pippidi, 2013a, 2015; Mungiu-Pippidi et al., 2011). Following this line of argument, several scholars have looked at civil society as key factor in the control of corruption and established a link between civil society strength and levels of corruption. Evidence was found for an enlightened citizenship being a strong predictor of corruption levels, as measured by newspaper readership and press freedom in a given country (Adserá, Boix, & Payne, 2003; Brunetti & Weder, 2003; Chowdhury, 2004; Themudo, 2013). Likewise, previous evidence was also found that an organised civil society is a vital part of an effective control of corruption (Ackermann, 2005; Grimes, 2008a, 2008b; Jenkins, 2007; Mungiu-Pippidi, 2006, 2013a, 2015; Themudo, 2013).

The idea that civil society is vital for a functioning democracy goes back already to Alexis de Tocqueville (2002), who described the rich associational life of the

United States in the nineteenth century as one of the key features of the country's democracy. In this paper, we understand civil society as "the sphere of institutions, organizations and individuals located between the family, the state and the market in which people associate voluntarily to advance common interests" (Anheier, 2004, p. 22). As such, an active and strong civil society can offer constraints on corruption. It does so by checking on the actions of state officials, mobilise citizens to put pressure on the government and disclose information on corrupt behaviour. It consists both of an enlightened citizenry that is aware of government actions and able to hold governments to account, and more formalised associations of people in the form of civil society organisations.

In short, civil society provides social accountability and helps in the enforcement of ethically universalistic norms to make anti-corruption more than a mere legislative initiative (Arato, 2006; Grimes, 2008a, 2008b; Mungiu-Pippidi, 2006, 2013a, 2015, Chapter 6). This view on the control of corruption reflects ideas brought by modernization theory, stating that the structural modernization of societies brought about political development in Europe and the United States (Gellner, 1994; Lipset, 1981; Mungiu-Pippidi, 2015; North, Wallis, & Weingast, 2009). Lipset (1959, 1981, 1994) highlights in particular the importance of the existence of personal autonomy and the rise of middle class as the basis for a well-functioning democratic society. Similarly, Dahl (1989) defines essential features enabling an active civil society as key characteristics of a polyarchy - notably freedom of expression, the right and possibility to seek out alternative information and the right to association. Dahl's ideal type of democracy asks for citizens that have the possibility for effective participation and who have reached an enlightened understanding of the choices they face in their society. An active civil society, as defined above, is key in the way towards this ideal type and was also key in the development of many countries to societies centred around ethical universalism (Mungiu-Pippidi, 2015, Chapter 6).

Considering the role of ICT in this context is a novel idea. As we will show below, several previous studies have looked at how ICT is used in the context of anti-

corruption reforms and in supporting collective action and democracy more generally. This paper offers a new perspective to these studies: It sees access to and usage of ICT tools as an essential feature of civil society in the twenty-first century. They serve as means to create what Robert Dahl calls an “informed and enlightened citizenry” (Dahl, 1994, p. 31). They do so by supporting deliberation and discussion and by supporting public education. Citizens can thus exchange ideas and gather information about corruption. Previously it was argued that newspaper readership can be an important predictor for the control of corruption (Adserá et al., 2003). As more and more readers rely on online sources in order to inform themselves, ICT tools can be seen to increasingly fulfil this function: data from the World Press Trends Database, for example, shows that overall print circulation is declining in every continent except Asia and while daily print newspaper circulation increased by 2% between 2012 and 2014, digital readership increased 23% over the same period (Milosevic, Chisholm, Kilman, & Henriksson, 2014).

Further, civil society organisations can use ICT tools to mobilise citizens against corruption. Social media, for instance, are used to communicate the time and place of protests and enable activists to exchange ideas (Theocharis, Lowe, Van Deth, & García-Albacete, 2015). They thus contribute to create an active citizenry at the grassroots level and empower ordinary citizens (Mungiu-Pippidi, 2013a). They are instrumental in supporting and strengthening civil society on its quest for ethical universalism. In supporting personal autonomy and a rising middle class, they become an essential part of a functioning, democratic society (cp. Lipset, 1959). Following the Tocquevillian model, we can say that ICT tools lay the foundations for a civil society that is able to organise collective action and hold their government to account. As Mungiu-Pippidi (2013a, p. 106) puts it:

“Once co-operation and the habit of association exist, it becomes easier to use the social capital these produce for any collective action. Tocqueville acknowledged that people can organize for any purpose, good or bad, but he viewed the capacity to act collectively as undeniably positive and as the only possible path to good governance.”

ICT tools encourage citizens to connect and co-operate and organise. This capacity is something that can be harnessed by civil society organisations that are active against corruption. They can use these tools to mobilise citizens for their causes, inform them about corrupt leaders and put pressure on the government.

The following section of this paper presents a review of literature of the relationship between ICT tools and the control of corruption. This will be followed by quantitative evidence that supports the theoretical framework provided here.

3.3 State of the art

Several scholars looked at the connection between ICT use and corruption levels over the past year. Bertot et al. (2010) provided a widely cited, conceptual paper on the topic. They argue that internet access can promote government openness and transparency and, in doing so, help to reduce corruption. Their point of view is supported by quantitative evidence (Goel et al., 2012; Mungiu-Pippidi et al., 2011) stressing that Internet access, and increased use can lead to an increase corruption awareness and may help to uncover corrupt practices. The Goel et al. (2012) study, however, also highlights that higher internet use may also lead to increased levels of perceived corruption, as experts become simply more aware about corruption levels as reporting about it increases.⁸ Jha and Sarangi (Jha & Sarangi, 2017) offer further quantitative evidence for this relationship, arguing that both internet access and *Facebook* use are effective tools against corruption. They are using an IV analysis to support the claim of causality between the two, saying that it's increased internet and social media access are leading to lower corruption, rather than the other way around. Building on these studies Starke et al. (2016) present further evidence for the impact of media freedom, internet access and governmental online service delivery on the control of corruption. They show that the impact of internet access on corruption increased significantly between 2003 and 2013 and explain this by the development of internet and communications technology.

⁸ This is a common issue when measuring corruption, as the most commonly used measures usually refer to corruption perception, rather than control of corruption (see Lambsdorff, 2006).

Social media can also play an important role in controlling corruption by fulfilling in part the “watchdog function of the media” (ibid., p. 4714) and by helping to mobilise citizens against corruption. Civil society also fulfils a type of watchdog function when using so-called crowdsourcing tools which call on citizens collectively to report incidences of corruption that they witnessed. The information gathered in this way can be used to uncover corruption and identify areas for reform. In this context scholars noted that these platforms can be effective tools in the fight against corruption, but that their use is highly context dependant (Ramanna & Tahilyani, 2012; Zinnbauer, 2015): While *ipaidabribe.com*, a website and mobile app that allows citizens to report the place and the amount they paid in bribes to specific authorities, was widely used in some Indian cities and contributed to anticorruption reforms there, it was unsuccessful when recreated in China (Ang, 2014).

Starke et al. (2016) also argue that government online service delivery, or e-government, is instrumental in the control against corruption. Their quantitative model also shows evidence for an increasing effect of e-government between 2003 and 2013 and for a stronger effect of e-government on the control of corruption in conjunction with higher internet access per capita. As citizens are increasingly using government services online, contact points between state officials and them are reduced, leading to less opportunities for corruption. More e-government services in many cases also means more digital availability of government data, which, in combination with freedom of information legislation can support the ability of civil society to hold the state officials to account. Previous studies have also provided evidence for this relationship, including the analysis of both micro- and macro level data (Andersen, 2009; Elbahnasawy, 2014; Gurin, 2014; Shim & Eom, 2008).

Overall our review of literature shows a good body of research supporting the idea that internet access, social media use and e-government services are successfully contributing to the control of corruption. Both quantitative and qualitative studies show a significant influence of such ICT on corruption levels. However, while this influence seems to be clear, studies so far are not clear on why and how ICT

influence the control of corruption. We argue that a clearer link to the wider anti-corruption literature and the more recent development of theoretical arguments in this field can help answer these questions. Based on this literature and on modernization theory our argument highlights the importance of civil society actors in controlling corruption.

ICT in general, and internet access and social media use in particular, support the work of civil society. They help to create an empowered and enlightened citizenry that is better equipped to hold governments to account. In themselves they can thus contribute to a rising middle class. Their full potential, however, is harnessed by civil society organisations. They can use ICT tools for the mobilisation of citizens, in gathering information from citizens and in spreading information to citizens. The use of e-governance tools, in particular open government data, can make data of government spending easier to access and thus potentially help in exposing corruption. ICT support greater government accountability. They should be considered as tools, that can be used by certain actors towards a specific aim. ICT can support personal autonomy and the rise of a middle class, but become more effective tools if used by civil society organisations which are dedicated to the fight against corruption. The effectiveness of ICT tools in the fight against corruption thus highly depends on a given country context.

3.4 Research approach

The aim of this paper is to address the gap in literature and the arguments that were pointed out above. In order to do this, we are advancing two hypotheses to be tested in our quantitative analysis:

- *H1: An enlightened citizenry and a strong, organised civil society is positively correlated with control of corruption.*

Based on the analysis of key literature on control of corruption, we argue that civil society strength is a key factor in controlling of corruption, as only an informed and organised citizenry can provide social accountability and advance norms of ethical universalism. As argued above, this hypothesis has already been positively

tested by other scholars, we thus strongly expect it to be confirmed. However, as we are using new data on civil society strength which, to our knowledge, has not yet been used to test this relationship our paper also aims to contribute to this argument made in anticorruption literature. We bring forward the idea that, internet access and social media usage can be used as a proxy for an enlightened citizenry in this context, similarly to the amount of newspaper readership (cp. Adserá et al., 2003) This hypothesis is formulated as the basis of our analysis. We strongly expect it to be confirmed, given that it is grounded on the strong body of previous empirical research.

- *H2: The positive impact of internet access and social media are amplified by a strong, organised civil society that can make use of these tools in their fight against corruption.*

H2 expresses the core interest of our research. We expect our tests to provide evidence for this hypothesis, which is grounded in previous theoretical and empirical research. Investigating this hypothesis will contribute to the growing body of anticorruption literature and represent a step forward in understanding in what contexts ICT can be useful in the fight against corruption. It argues that the different aspects of civil society – an enlightened citizenry and an organised civil society- reinforce each other in their effect on the control of corruption.

Our research also contributes to the wider literature on the impact of ICT on democratization and social mobilization. In the past, roughly two camps have emerged in these contexts. Optimists have seen ICT as a type of “liberation technology” (Diamond, 2010) that can empower citizens and help them mobilise against authoritarian rulers by opening up the media space of authoritarian regimes. More pessimistic scholars described ICT as potentially endangering to civil movements in these contexts as they collect information on activists and make them easier to identify for state actors and thus serve as a tool for oppression (Stockmann & Luo, 2015). Our argument is nested in between those camps; we argue that the impact of ICT technology on authoritarian or corrupt regimes is

generally positive, but strongly depends on the given country context and, in particular, on the societal context that civil society organisations operate in.

3.5 Quantitative analysis

3.5.1 Data description

In order to investigate the three hypotheses outlined above, we constructed a global dataset containing data covering around 170 countries. We collected data on corruption, internet and social media usage and socio-economic contexts, which prove to be necessary controls for our analysis. We will use the Control of Corruption indicator from the World Bank's Worldwide Governance Indicators dataset (WGI-CoC) as our dependent variable. This corruption index is an aggregate measurement that relies on several data sources.⁹ As the WGI-CoC uses a large variety of data sources and keeps a consistent methodology over time we prefer it to similar measures, such as Transparency International's Corruption Perception Index.

Our main independent variables of interest are different proxies for measuring enlightened citizens and civil society. We use a variety of proxies for enlightened, informed citizens: First, we use data on internet access, as offered by the International Communications Union (ITU), which measures the percentage of population that has used the internet at least once over the past 12 months. Additionally, we include the percentage of population with broadband access, as it reflects the share of the population with more frequent and stable access to the internet. Finally, in order to approximate how active citizens are on social media, we also use the number of Facebook users over the population of a given country. To test our first, initial hypothesis, we also look at data on the daily circulation of print newspapers in a range of countries, as provided by the World Press Trends Database (Milosevic et al., 2014).

⁹ For a description of the composition of the WGI-CoC, please refer to the World Bank's page on the Worldwide Governance Indicators: <http://info.worldbank.org/governance/wgi/#doc>

While we are aware that other social networking sites are more popular in some countries, we note that Facebook is globally the dominating page to represent online social networks and that alternative sites are primarily prevalent in online spaces that are subject to more state control. Twitter use, another proxy for social media access that could have been useful for this paper proved to be still too concentrated on certain countries to be considered in the analysis: As of October 2013, half of all Twitter users came from only five countries: the United States (24%), Japan (9%), Indonesia (7%), the United Kingdom (6%) and Brazil (4%). Given Facebook's broader usage and penetration, we decided to use this platform as main proxy for social media access.

Measuring organized civil society is a difficult task and any attempt to do so will always remain an approximation. To capture this concept, we rely on the core civil society index (CCSI) developed on the basis of the V-Dem dataset (Bernhard, Tzelgov, Jung, Coppedge, & Lindberg, 2015). This index "captures the robustness of civil society by measuring the level of citizen activism and the organizational environment for CSOs – namely state repression and entry/exit control" (ibid.). The score ranges from 0 (weakest) to 1 (strongest). The V-Dem data is based on multiple, aggregated country expert scores and underwent several validity checks to ensure its comparability across countries and time. We are, aware of the limitations of the data and while we would have preferred using an objective, fact-based, measurement of civil society. One example for this is Grimes' (2008a) indicator on civil society organizations per million inhabitants. This data has not been updated in a decade and, to our knowledge, there are currently no other objective indicators measuring this concept. As we expect civil society levels to remain relatively stable and as we want to mitigate for exceptional situations in a given year, we use a ten-year average for the CCSI rather than relying on a single year, starting with the last available data.

As control variables we included in our database the different components of the Human Development Index, i.e. life expectancy at birth, the average years of schooling and the GNI per capita. These measurements serve as proxies for the socio-economic development of the countries in our dataset, which, in line with

our theory on the control of corruption, is an important factor in determining corruption levels. In our analysis we will rely on these variables as controls to reflect the development outcomes, rather than just economic success (McGillivray & White, 1993; Sen, 1999).

3.5.2 Testing our hypothesis

In order to test the hypothesis that an enlightened citizenry and a strong, organised civil society are positively correlated with control of corruption we checked the association between our dependent and selected independent variables through simple linear regressions. For the sake of simplicity, we only include GNI per capita as a control for the different levels of economic development in our sample.

Table 1 presents the results of this exercise and shows that all proxies are positively associated with control of corruption and that this relationship is statistically significant. We can thus say that an enlightened citizenry - captured here through newspaper readership and the three different variables related to access and usage of internet and social media (broadband subscriptions, internet access and Facebook users) - is indeed associated with higher levels of control of corruption. All five models also show a high explanatory power with adjusted R^2 ranging from 0.51 for Facebook usage (Model III) to 0.72 for newspaper readership (Model I). It is necessary to highlight, however, that the results in Model I are based on a significantly smaller sample size of $n = 50$. Model V shows that the V-Dem indicator selected to capture the strength of civil society also has a positive and statistically significant relationship to control of corruption. These results fall in line with the relationship described by other authors such as Grimes (2008a) and Mungiu-Pippidi (2010).

Table 1: Linear regression models explaining control of corruption

Variables	Model I	Model II	Model III	Model IV	Model V
Newspaper circulation (per 1000 people)	0.01*** (0.001)				
Internet users per 100 people		(0.04)*** (0.009)			
Percentage of facebook users			0.02** (0.010)		
Broadband subscriptions (per 100 people)				0.106*** (0.014)	
Core civil society index (avg 2002–2012)					2.46*** (0.487)
GNI per capita 2015 (in PPP in 2011 \$)	18.22*** (3.240)	2.72* (1.589)	7.53*** (1.369)	2.72*** (1.02)	8.31*** (0.716)
Constant	-9.71*** (2.613)	0.97 (0.753)	-1.00 (0.690)	1.73*** (0.577)	-2.77*** (0.587)
Observations	50	180	179	181	158
R-squared	0.73	0.56	0.52	0.62	0.56
Adj. R-squared	0.72	0.56	0.51	0.61	0.55

Robust standards errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.10

The core argument of this paper is that ICT supports the work of civil society actors working to control corruption. It does so by facilitating collective action and realizing social accountability. We will test this through a multivariate regression using the variables outlined above. For the purpose of this analysis, however, we will, construct an indicator that combines internet access, Facebook membership and broadband internet access into one variable. We call this indicator the Online Connectivity Index (OCI). It reflects how many people in a given society have access to ICT tools (by measuring internet access), how many use them on a more regular basis (by measuring broadband access) and how many use them for social interaction with their peers (by measuring the number of Facebook users). By referring the Facebook users, the index also implies free and unrestricted access to the internet as other social networks tend to be more prevalent in societies with restrictive online access and censorship.

To calculate the OCI, we took the data for internet access, broadband access and Facebook usages and standardized it by constructing their z-score in order to equalize their mean values and standard deviations. The OCI was then normalized to range from 1 to 10 using a min-max transformation. A higher OCI value represents a better performance (more access, more users) of a given country. Figure 1 shows bivariate regression results that illustrate that the OCI is a powerful indicator for the effectiveness of ICT tools in the control of corruption.

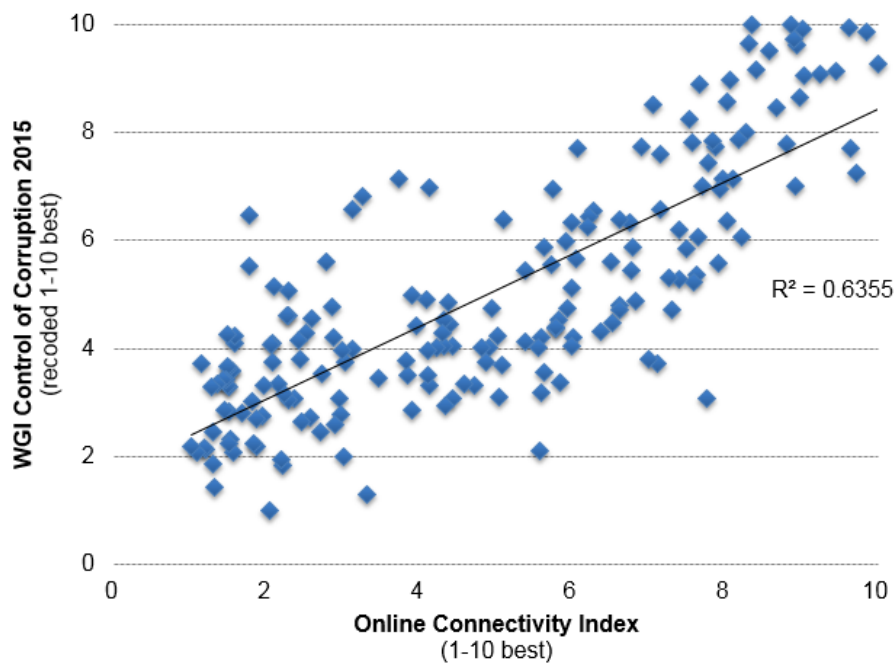


Figure 4: Correlation between the control of corruption and the online connectivity index (OCI), $n = 161$

The explanatory value of the OCI on control of corruption is also considerably higher than the one of its individual components. We will thus use it when building a multi-variate regression model in order to test our hypotheses. In this model we will regress all variables outlined above on our proxy variable for control of corruption, i.e. the WGI-CoC. We are including an interaction term between civil society strength and online connectivity in order to reflect the idea that the impact of ICT on control of corruption is magnified when supported by the work of civil society actors.

Our final model thus looks as follows:

$$Y \text{ (Control of Corruption)} \\ = \\ \beta_0 + \beta_1 CCSI + \beta_2 OCI + \beta_3 Education + \beta_4 Life Expectancy + \beta_5 CCSI * OCI + \varepsilon$$

The results of the statistical model are summarized in Table 2 below.

Table 2: OLS models with control of corruption 2015 (recoded 1–10 best) as dependent variable, $N = 154$

Variables	Model I	Model II
Online Connectivity index (recorded 1–10 best)	0.71*** (0.096)	0.27 (0.230)
Core civil society index (avg. 2002–201)	1.45*** (0.452)	-0.66 (0.890)
OCI Index x Core Civil Society Index		0.55** (0.233)
Life Expectancy at Birth (in years)	-0.01 (0.021)	-0.01 (0.021)
Mean years of Schooling	(-0.07) (0.058)	-0.08 (0.057)
Constant	1.69 (1.278)	3.23** (1.375)
Observations	154	154
R-squared	0.64	0.66
Adj. R-squared	0.63	0.65

The table contains two multivariate models with some important findings. First, Model I provides further proof to back our hypothesis that both ICTs and civil society are important tools to fight against corruption. As expected, these two variables have a positive and statistically significant effect on control of corruption even in the presence of additional development controls (life expectancy and average years of schooling). This parsimonious model explains almost two thirds

of the variation in the dependent variable ($R^2 = 0.64$) and shows that the effect of civil society and ICTs are not simply due to a coincidence with the level of development of the 154 countries included in our sample. The second interesting finding is that the positive impact of internet access and social media use do indeed depend on a strong civil society that can make use of these tools in their fight against corruption. Model II shows that the interaction term between ICTs and civil society is also positive and statistically significant.

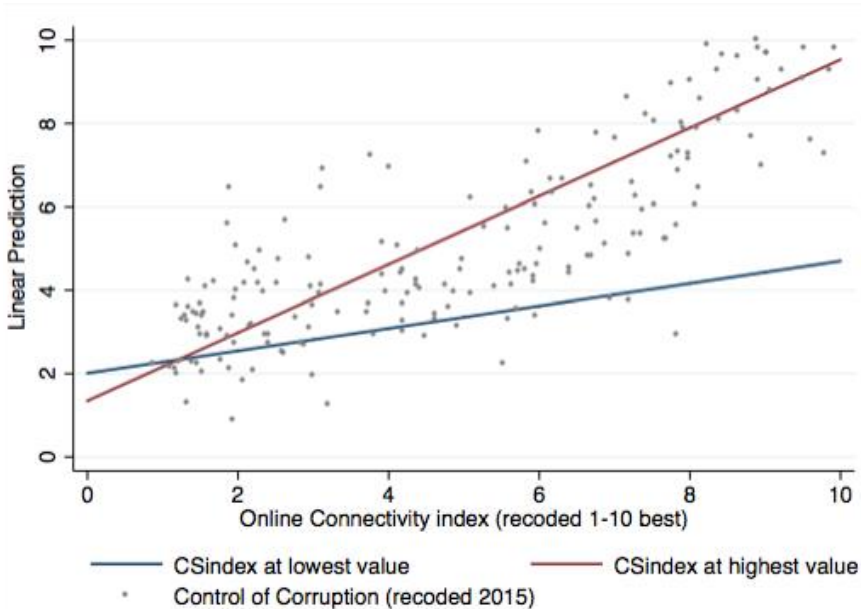


Figure 5: Marginal effect of OCI at different levels of CCSI.

The effects of the interaction in Model II are better understood graphically. Figure 5 illustrates the impact of ICTs, measured through the Online Connectivity Index, on control of corruption when holding the values of the civil society variable constant. The graph shows that the effects of internet tools on control of corruption are positive even when the levels of civil society are low. This positive effect, however, becomes more evident as the strength of civil society increases. This model therefore suggests that the proliferation of internet tools in a specific country can indeed help reduce corruption by itself, but that these tools are more likely to have a greater impact in an environment where organised civil society is stronger. While they support the creation of an enlightened citizenry, they also have potential for mobilisation and increased government transparency. A

fostered and organised civil society thus is a catalyst for the effective use of ICT tools in the fight against corruption.

We can repeat the same exercise as above, but holding the values of OCI constant in order to study the effects of civil society on control of corruption. The results of this exercise are depicted in Figure 6 and show that when OCI is held at its lowest possible value, even a strong civil society has no effect on the levels of corruption. The slope of the marginal effect in this case is even slightly negative, meaning that if online connectivity is low, increasing civil society might even worsen the levels of corruption. This negative effect, however, gets quickly reverted: when holding the OCI constant at its mean value of 4.87, the slope of the effect of civil society on control of corruption is already positive and keeps getting steeper as the values of OCI increase. This means that corruption can thrive even in environments where civil society is strong, if citizens are not empowered by tools that help them to increase their personal autonomy and become more informed.

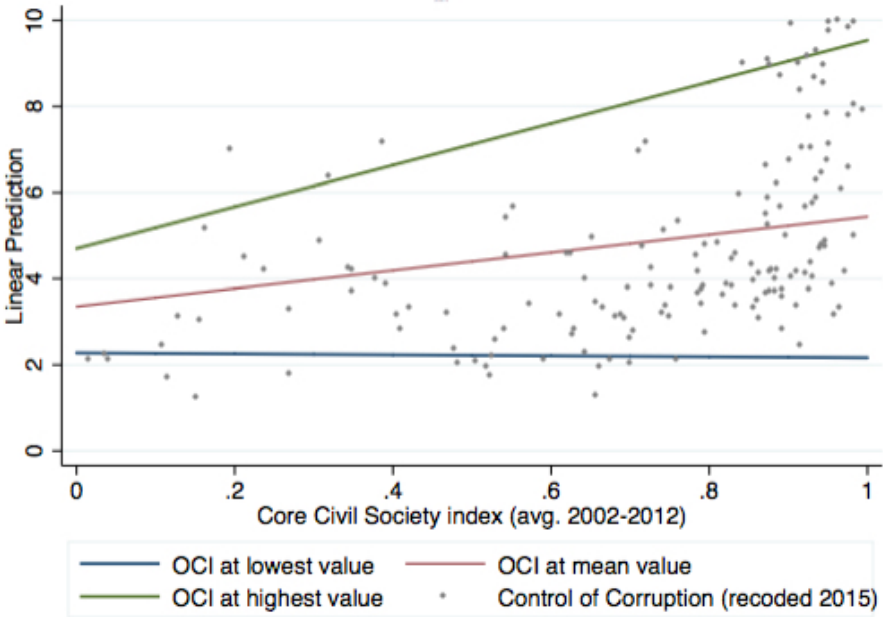


Figure 6: Marginal effect of CCSI at different levels of OCI.

Although the results of the statistical models are significant and robust, the analysis has its limitations. First, we had to rely on a simple cross sectional OLS because our dependent variable does not have enough variation within cases. Moreover, despite our best efforts to rely mostly on objective indicators, we were only able to do so for our OCI index. Finding a measurement of corruption that is objective, sensitive to change and available across a wide array of countries proved to be impossible. The same applied to our measurement of civil society: despite the existence of data regarding the number of civil society organisations per country, this data was last updated in the year 2000. For this reason, we preferred to rely on more recent, albeit less objective data.

3.6 Discussion and conclusions

The results above confirm the hypotheses set out in the beginning of our paper. In a robust, parsimonious model covering data from 154 countries we find clear evidence that proxies of an enlightened citizenry, notably online connectivity and newspaper readership, are strong predictors for the control of corruption. The same results hold true for measurements for the strength of organised civil society. Most crucially, the interaction between organised civil society and online connectivity (see Model II in Table 2) proved to be statistically significant thus showing that organised civil society and online connectivity only fulfil their true anti-corruption potential when they are combined. In practice this means that improving internet access as a strategy to fight corruption will be insufficient in a context where civil society is weak. Similarly, even a strong organised civil society can struggle to make a difference against corruption if internet access and social media usage is low.

Our results are also in line with the theoretical framework outlined at the beginning of this paper. An enlightened and autonomous citizenry and organised civil society play a crucial role in the democratisation of society and the control of corruption. They are vital for a well-functioning governance system. When talking about the control of corruption we can see civil society as a key factor in offering constraints on corruption. In this spirit, a strong civil society can be seen as prerequisite to a society that is governed according to norms of ethical

universalism (Mungiu-Pippidi, 2015). It represents, as Ernest Gellner (1994) puts it, a vital condition for a free society. Our statistical analysis shows that ICT is an important factor in this context. It has become a vital part of the toolkit of civil society that helps them to control corruption and work towards a society governed by ethical universalism.

The results of our analysis would be strengthened further by additional robustness checks. For this we would in particular need more objective and up-to-date data on organised civil society, something which is not available at the moment. Finding such data should be a focus of future research. Further, our results are based on cross-sectional OLS regressions. Using panel data would strengthen our findings. However, our dependent variable, the WGI-CoC, score, shows very little variation within cases over time. For this reason, running panel models with this indicator would reveal little more than the analysis conducted here. This brings us to a second potential source for improvement: the dependent variable itself. Given the difficulty of measuring corruption, most available indexes capture corruption perceptions rather than the objective levels of corruption in a country. For this reason, there is little variation in the scores across time. Using an objective measurement of corruption could potentially solve the issue and allow us to estimate the effects of civil society strength and ICT usage on real levels of corruption over time. This, however, is not yet possible given that the objective measurements of corruption available at the time also have restricted geographical and temporal coverage. There is also scope to improve the quality of the independent variables. Currently we relied on an expert assessment for measuring the strength of organised civil society. However, expert scores are inherently flawed as they only present a point of view, no matter how well the score is put together. As mentioned above, finding an objective and up-to-date measure for civil society levels would be a crucial step to advance similar research. Grimes (2008a, 2008b) successfully proved the relationship between civil society levels and the control of corruption using data looking at the number of civil society organisation over the populations. However, the data she uses dates back to the year 2000 and is thus not fit to use in this context. Having recent and

objective civil society measurement would thus be a crucial step to advance the hypotheses presented here.

Keeping these caveats in mind, we still argue that our analysis confirms the hypotheses as set out above. ICT supports the work of civil society in advancing a society based on ethical universalism and thus helps create control of corruption. They thus support the function of civil society as a motor of modernisation and as a bedrock of free societies (Dahl, 1989; Lipset, 1959, 1981). In a next step, we would need more research to look specifically how ICT supports civil society actors in this context. Considering modernization theory, we argued here that ICT help citizens to effectively participate in politics by informing them and supporting them in developing informed choices (Dahl, 1989, 1994). This function as a means of information also helps civil society organisations to mobilise citizens, as information on public protests is more easily spread. As such ICT tools can contribute to produce enlightened citizens (Dahl, 1994; Mungiu-Pippidi, 2013a) that can hold governments to account. They can also serve as a means to gather information from state institutions, by providing information in accessible data formats. ICT also offer safer options to share classified or exclusive information that citizens could potentially use in the fight against corruption.

As these are just some speculations, it is clear that more research is needed on the relationship between civil society, ICT and the control of corruption. Are ICT the promised liberation technology that can fight authoritarianism and help establish good governance? Based on our analysis we can only say: it depends. Yes, ICTs can empower citizens to get active against corruption. They help them to stay informed and can support to create an enlightened citizenry that can hold governments to account. However, our analysis also showed that ICT are a crucial part of the toolkit of organised civil society actors set to fight corruption. ICT tools are much more effective if there are a variety of civil society actors to make use of them. In a country where civil society is sufficiently strong corrupt leaders are, however, likely take action to restrict access to such tools and potentially use them against civil society activists. Their effectiveness thus also depends on potential reactions of political regimes (Stockmann & Luo, 2015).

In the context of the efforts to establish a better control of corruption, ICT tools can empower individuals and organised civil society to mobilise citizens against corruption and to coordinate their efforts. Promoting access and use of such tools should thus be part of any serious anti-corruption strategy.

4 Can the civil society-technology alliance deliver integrity?

An empirical case from Ukraine

4.1 Introduction and main argument

It is generally accepted that good governance depends on more than the government itself: the way a society is run, in particular the degree of individual autonomy and the thickness of the associative texture within the society shape the relation between the government and the governed (Lipset, 1959, 1981; Putnam, Leonardi, & Nanetti, 1994; Wucherpfennig & Deutsch, 2009). In relation to corruption, Pope (2008), Johnston & Kpundeh (2002), Grimes (2013), Mungiu-Pippidi (2013a) and Johnston (2014) have insisted that civil society¹⁰ plays an essential role in controlling government corruption. It represents those who are losing out in the context of corruption and also acts as the chief agent to organise collective action against corruption.

Corruption is, however, still most prominent in less developed countries. Considering the role of civil society this is an important factor to remember: socioeconomically weaker groups are less likely to organise around common topics and support collective action. Already political modernisation theory held that the existence of a well-situated middle-class is crucial to hold the governments accountable (Diamond, Linz, & Lipset, 1989; Huntington, 1966; Inglehart & Welzel, 2005; Lipset, 1959, 1981). Socioeconomic status gives people the liberty and time to engage in political action and collective action, which is hence harder to accomplish in less developed society. An absence of welfare thus leads to a vicious circle: a lack of collective action leads to a missing demand on good governance, allowing predatory elites to spoil public resources, subvert development and thus prolong poverty (Acemoglu & Robinson, 2012; Mungiu-Pippidi, 2015; North et al., 2009). The extraordinary advancement of information and communication technology (ICT) in the past thirty years provided hope that

¹⁰ While the idea of civil society has been widely debated, this paper will use a definition put forward by Anheier (2004, p. 22): “Civil society is the sphere of institutions, organizations and individuals located between the family, the state and the market in which people associate voluntarily to advance common interests.”

a different road to good governance could be created by reducing government discretion through transparency and e-government, as well as empowering even less economically affluent citizens to create a stronger demand for good governance by giving them the tools to connect with each other and hold government to account (John C Bertot et al., 2010).

This hope seemed supported by data analysis. Several authors found correlations between lower corruption and e-government use (Andersen, 2009; J.-W. Choi, 2014; DiRienzo et al., 2007; Elbahnasawy, 2014; Garcia-Murillo, 2010, 2013; Lio et al., 2011; Shim & Eom, 2008, 2009; Starke et al., 2016). Similarly, others related lower corruption to the number of social media users, linking them to digitally empowered citizens, defined as people with access to ICT and associated through social media (John Carlo Bertot, Jaeger, & Grimes, 2012; Enikolopov et al., 2018; Jha & Sarangi, 2017; Kossow & Kukutschka, 2017; Mungiu-Pippidi & Dadašov, 2016). Empowered citizens and civil society can thereby play an important role in the cycle leading from digitally-enhanced government transparency and the provision of information to accountability. Kosack and Fung (2014) describe this as a four-step process that the availability of important and salient information: (1) causes information users to change their decisions and actions, (2) these actions affect service providers, (3) and providers respond constructively (4) to those changes. In reference to the control of corruption, some empirical evidence also exist linking civil society and transparency to better control of corruption, showing that freedom of information has a higher marginal effect of corruption where civil society capacity is higher (Mungiu-Pippidi, 2013b; Vadlamannati & Cooray, 2017).

Despite this evidence based on data analysis, an empirical success story is still missing in a country where the alliance between civil society and technology managed to produce a change in the rules of governance. Estonia, an often cited success story of digital governance, had reached control of corruption before its digital development (Kalniņš, 2017). The present battlefield where this hypothesis is put to the test is Ukraine, a country in which grievances related to corruption played a major role in the 2014 overthrow of its government (Aslund, 2015). Anti-

corruption policies have been a cornerstone of Western-funded reform efforts ever since then. As part of it, Ukraine developed one of the most advanced e-procurement platforms in the world: ProZorro. Testing if civil society capacity delivers less corruption where ProZorro is used provides a unique empirical case study.

4.1.1 The ProZorro Project: a key reform initiated by civil society

Civil society actors, while not the only factor, played a crucial part in advancing the 2014 “Revolution of Dignity”, often referred to as the Maidan Revolution, that swept Viktor Yanukovich out of power. Following the revolution, they also started promoting key reforms after a new government took office in 2014 (Diuk, 2014; Onuch & Sasse, 2016; Reznik, 2016; Way, 2015). To many, the situation provided Ukraine with a unique window of opportunity (Aslund, 2015; Hale & Orttung, 2016; Shveda & Park, 2016). In this context, anti-corruption reforms were one of the most central demands of those activists who had taken the street in the months before. Activists looking to reform the procurement system started to meet in Kyiv in Spring 2014. With support of the Ukrainian Ministry of Economic Development and Trade, and together with experts from Georgia, concepts for reform and for a pilot project were developed over several months¹¹. The pilot was tested with several procuring authorities, including the Ministry of Defence. In 2016, following the proof of concept through the pilot and increasing political support, the necessary steps were taken to implement the ProZorro system and procurement reforms for all public institutions in Ukraine. It came into effect through the “Law on Public Procurement” from April 2016. Since August 2016, all public tenders in Ukraine have to go through the system (Bugay, 2016; Nestulia & Bilyk, 2017).

The law, together with several bylaws, specified different procedures for public procurement tenders, depending on their value. Competitive procedures¹² are all

¹¹ Together with Transparency International Ukraine, a pilot for an electronic system was developed until 2015. This pilot ran throughout 2015 for a limited number of procuring authorities and for items below a threshold of UAH100,000.

¹² Below-threshold and above-threshold.

run through the platform. Here, above threshold¹³ procurements have to run through the platform. Tenders are posted on the ProZorro platform and offers are submitted using accredited but independent platforms¹⁴ that copy the data from the central database. With two or more companies submitting offers, ProZorro initiates a descending price auction where the price is the main or most important criterion. It thus automates part of the procurement process, trying to limit discretion of individual civil servants. Below threshold procurement *can* still run through the platform but do not have to be. Tender can also be awarded through non-competitive procedures like direct negotiations with suppliers. In these cases, the tender and corresponding contract have to be published on the ProZorro platform following the agreement¹⁵. This procedure of course has several flaws, as Nestulia and Bylik (2017) point out: the threshold excludes a bulk of the procurement of local councils from open tenders, and thus gives some room for abuse in this context.

The ProZorro e-procurement system fulfils many benchmarks of a best practice case of e-procurement. It embraces transparency¹⁶ and also automates specific steps of the procurement process (OECD, 2015). The system has become a showcase and a perceived success story receiving attention not only from within Ukraine, but from international and donor organisations around the world (Manthorpe, 2018; Nestulia & Bilyk, 2017; OECD, 2016a; OGP, 2018; TI Ukraine, 2019). It was developed as an open source application¹⁷ using open contracting data standards (Bugay, 2016; Open Contracting Partnership, 2020). In its

¹³ The threshold stands at UAH 200,000 (roughly US\$8000, depending on the exchange rate) for services and goods, and UAH 1.5 million (around US\$58,000) respectively for works and construction. Above threshold tenders have different bidding conditions and slightly longer application times.

¹⁴ The ProZorro platform, initially run by civil society organisations, was handed over to state authorities following the 2016 procurement law. The marketplaces used for bidding are independently run. This system is put in place in order to limit the control of a centralised authority (Interview 1).

¹⁵ Below a value of UAH 50.000 (around US\$1,900), the option of direct procurement remains (ProZorro, 2017)

¹⁶ Прозоро (prozorro) literally means *transparent* in Ukrainian. The project website can be found at <https://prozorro.gov.ua/>.

¹⁷ “Open source software is software with source code that anyone can inspect, modify, and enhance.” (Red Hat, 2019)

approach, it represents a partnership between the government, the private sector and civil society (OECD, 2016a). While the explicit aim of the project was to increase transparency in the procurement process – a claim which the project carries within its name – the implicit aim was to reduce corruption, or at least corruption risks, in the procurement process. This is why corruption risk analysis was soon a part of the project. Additionally, Transparency International (TI) Ukraine mobilised a group of non-governmental organisations (NGOs) to support the project. Using a platform titled DoZorro,¹⁸ these twenty-nine organisations work on following up claims and complaints filed through the ProZorro system, thus supporting the monitoring efforts to ensure the legality and accuracy of tendering processes.

By introducing radical reforms to public procurement reforms, ProZorro addressed a policy area that is particularly prone to corruption (OECD, 2016b; Williams-Elegbe, 2012). Nowadays, Ukrainian news stories on government spending, and in particular, graft and misspending, are often citing the system as a source¹⁹. As an e-procurement platform, the introduction of ProZorro also reflected a wider trend in anti-corruption programming around the world: the use of digital technologies and e-government tools (Adam & Fazekas, 2018; Kossow, 2020; Kossow & Dykes, 2018b).

4.1.2 Research approach

Given its prominence as a showcase of anti-corruption reforms, this paper analyses the ProZorro project as a case study to assess theories on the effectiveness of digital tools in the fight against corruption. The paper will test hypotheses on Ukraine as a significant country displaying high corruption risks contexts. It will use regional differences in Ukraine as the setting for a quasi-experimental case study using tender data taken from the ProZorro project, structural data on Ukrainian regions, as well as data from qualitative interviews. While general statements about the effectiveness of technology in the fight against corruption will be difficult to derive from a single case study, it can nevertheless

¹⁸ See <https://dozorro.org/community/ngo>.

¹⁹ See, for instance, Sorokin (2020) or Fakty (2020).

serve as a means for theory testing. Specifically, it looks at anti-corruption theories and their applicability to e-procurement reforms.

As a reform initiated by civil society and developed in partnership with state institutions and the private sector, ProZorro provides an interesting case to test theories on the relationship between civil society capacity, e-government tools and corruption. The paper looks at corruption as measured by so-called red flags in public procurement²⁰. It argues that different levels of civil society capacity play an important role in determining the impact of ICT tools on corruption levels. In this context, civil society capacity is referring to the readiness of civil society to fulfil its role as a stakeholder in the control of corruption.

4.2 Literature review and theoretical underpinnings

E-procurement is seen as a means to increase efficiency and cost savings in procurement processes. Although such systems have been in use for almost twenty years, recent years have seen numerous efforts to refine and expand them (Engström, Wallstrom, & Salehi-Sangari, 2009; OECD, 2016c, 2019; Quesada, González, Mueller, & Mueller, 2010; Singer et al., 2009; Vaidya & Campbell, 2016). A growing body of interdisciplinary social science literature analyses the effect of e-procurement on corruption and corruption risks, especially as researchers increasingly base the measurement of procurement process corruption risks on tendering data (Bauhr, Czibik, de Fine Licht, & Fazekas, 2019; Charron, Dahlström, Fazekas, & Lapuente, 2017; Fazekas, Cingolani, & Tóth, 2016; Fazekas & Kocsis, 2017; Fazekas, Tóth, et al., 2016).

4.2.1 Case studies in e-procurement

Several case studies have analysed the introduction of e-procurement in different countries to delineate how procurement processes and outcomes are affected. Neupane, Soar & Vaidya (2012b) present examples from Denmark, the Republic of Korea, India and Singapore, and explain how e-procurement can mitigate corruption risks by reducing monopoly of decision-making and information

²⁰ As red flags we understand indicators that point towards corruption risks in public procurement tenders (Fazekas & Kocsis, 2017; Fazekas, Tóth, et al., 2016).

asymmetry. The authors argue that the transparency induced by e-procurement can reduce discretion held by public officials and thus support bidders. The Republic of Korea provides a particularly prominent example in this context, using an e-procurement system since 2002 (OECD, 2016c). Iqbal & Seo (2008) argue that this system greatly increased transparency in the procurement processes and limited face-to-face interactions between bidder and the public servants who decide on who to award a tender to.

Rotchanakitumnuai (2013) presents qualitative research on the Thai e-procurement system, showing that the rules of the system are not fully enforced and often circumvented by both vendors and service providers. This implies that more transparency does not always reduce corruption. This appraisal is supported by Coppier & Piga (2006) who base their analysis on game theoretical modelling. They show that transparency is more costly for the players involved in contexts where corruption is pervasive – a statement that makes sense since increased transparency could threaten the interests of corrupt officials. Rules on transparency are thus unlikely to be fully applied: e-procurement systems thus will not lead to less corruption. Coppier and Piga suggest changing the nature of transparency in e-procurement system in order to make data more accessible to citizens, and not only to civil servants or stakeholders such as the companies involved in the procurement process. Based on an analysis of procurement contracts in an unnamed Asian country, Tran (2011) shows that corruption strongly depends on the procedure type rather than the use of technology itself.

4.2.2 Transparency

Looking at the perspectives offered on the relationship between e-procurement and corruption, this paper identifies the importance of *transparency* as a concept to be discussed in the context of e-procurement. This seems intuitive as procurement procedures that are handled digitally and online can make data more accessible to a wider range of bidders or citizens. How exactly data sharing and transparency relate to each other depends, of course, on the implementation of the digital procurement system. Government transparency generally implies that data produced or used by the government is made available to citizens,

businesses or other stakeholders (Bauhr & Grimes, 2017; Fox, 2007; Halachmi & Greiling, 2013; Soonhee Kim & Lee, 2012; Kosack & Fung, 2014; Lourenço, 2013; Lourenço, Jorge, & Rolas, 2016; Michener & Bersch, 2013).

Bauhr and Grimes (2017) point out that there is no generally agreed upon definition of government transparency as to what it entails. They highlight that any workable definition of transparency needs to be context-specific and related to the stakeholders involved. Kosack and Fung (2014) make a similar point by highlighting four varieties of transparency²¹, conditioned by the targets of transparency (governments or private firms) and the users of transparency (self-governing citizens or individual customers). The type most applicable to transparency in the context of public procurement can be defined as their fourth type: “transparency for accountability” (Kosack & Fung, 2014, p. 68). The people holding government to account are not just citizens, but rather “individual consumers or beneficiaries of public services” and often represent a coalition of actors which Kosack and Fung (2014) refer to as the “transparency and accountability (T/A) movement” (ibid., p. 69). In order to lead to more accountable and better governance, transparency thus not only needs to provide relevant and usable data, but also needs a set of actors²² to make use of the provided data and enforce accountability.

4.2.3 Perspectives on corruption

In the context of public procurement, this paper defines better governance on the lines of lower corruption risks and links it to theories on anti-corruption. E-procurement systems generally can increase transparency, reduce discretion, and increase competition as they enable more companies to bid for public tenders. In doing so, e-procurement can be seen as a measure to reduce information asymmetries and power relations between a principal (the public) and an agent

²¹ 1. Freedom of information, 2. Transparency for responsible corporate behaviour, 3. Regulatory transparency, 4. Transparency for accountability (Kosack & Fung, 2014).

²² Kosack and Fung define these as a broad coalition of “grassroots activists [...] and their allies in international donor organizations and aid agencies” and also note the importance of individual consumers or beneficiaries of public services” (Kosack & Fung, 2014, p. 69).

(government officials). This perspective on procurement processes is reiterated in several studies on e-procurement (Bauhr et al., 2019; Coppier & Piga, 2006; Iqbal & Seo, 2008; Neupane et al., 2012b, 2012a). This principal-agent perspective is also a dominant theoretical stance in the academic debate surrounding the nature of corruption (Klitgaard, 1988; Rose-Ackermann, 1978). These theories see corruption as a “form of moral hazard when the interests of the principal and the agent are not aligned, and the agent pursues his or her own self-interest at the expense of the interest of the principal.” (Mungiu-Pippidi & Hartmann, 2019, p. 13). In the case of public procurement, the principal can be seen as the public, depending on the outcomes of tendering processes; the government officials deciding on tenders as the agent, potentially working towards their own advantage or to the advantage of their cronies. However, how applicable is this perspective on the nature of corruption and public procurement?

As pointed out above, prior studies on e-procurement also make reference to the principal-agent perspective. However, as Coppier & Piga (2006) hold, in political systems where corruption is the norm, e-procurement by itself might not be effective against corruption – since public servants and bidders are both more likely to circumvent transparency rules. In this context, assumptions put forward by the principal-agent perspective on the control of corruption thus do not seem to hold true. Here, however, alternative perspectives on corruption might help to understand corruption in public procurement.

Following the work advanced by Elinor Ostrom on collective action and the governance of the commons (Ostrom, 1990, 1998), scholars increasingly define corruption as a collective action problem. Persson, Rothstein & Teorell (2013) and Mungiu-Pippidi (2006, 2013a, 2015) argue that when corruption is the general ‘rule’, social norms play an important role and make it harder to fight corruption through legal enforcement and through better control of the agent²³. Scholars

²³ Mungiu-Pippidi (2015) hereby speaks of an equilibrium between resources for and constraints on corruption that lead to corruption either being the norm or the exception. In this context she also speaks about a continuum between norms of ethical universalism and particularism which can either be prevalent in the distribution of public resources. See also Mungiu-Pippidi and Hartmann (2019).

have noted the absence of the “principled-principals” in this context, meaning that reducing information asymmetries and imbalances would not make a difference since there is no one to hold agents to account (Persson et al., 2013, p. 451). Bauhr and Grimes (2014) even suggest that in this context, increased transparency can lead to resignation amongst citizens since it is unlikely that greater transparency will lead to accountability due to agency capture. The political system and the question of corruption can be seen as the exception or the norm, thus can be seen as a decisive factor as to how anti-corruption efforts should be developed. Yet, scholars continue to highlight the effect of modernisation that is decisive for the development of governance systems (Mungiu-Pippidi, 2015; Mungiu-Pippidi & Hartmann, 2019).

The expected effect of e-procurement and transparency on corruption risks, thus can be expected to depend on the nature of the system in which e-procurement is introduced (Bauhr & Grimes, 2017). However, the form of transparency and the information provided is equally crucial: In their analysis of procurement data from twenty-eight EU member states, Switzerland and Norway, Bauhr *et al.* (2019) highlight this point by introducing the distinction between ex-ante transparency (“availability of information before the contract is awarded”) and ex-post transparency (“availability of information after the contract has been awarded to the bidder”) (Bauhr et al., 2019, p. 5). In their analysis, both transparency types are positively correlated with lower corruption risks, but ex-ante transparency has a stronger effect. They argue that this is due to information being available to “insiders”, meaning firms actually or potentially bidding on a respective tender.

This is also in line with Kosack and Fung (2014) who specify that for transparency to lead to accountability, “the information provided is salient and accessible to at least one group of information users” (Kosack & Fung, 2014, pp. 70–71). When applied to public procurement, suppliers, bidders, as well as citizens, can be seen as the information users to whom public procurement transparency could be relevant.

4.2.4 Building a theory on civil society, e-procurement and corruption

These examples also highlight who is needed in making transparency work for accountability: stakeholders who make use of provided data to advance their interests. Bauhr *et al.* (2019) argue that in the case of ex-ante transparency firms can cooperate to spot collusion or specific conditions designed to exclude bidders. Ex-post transparency is, however, more dependent on external factors. The data provided in this context is more relevant for the wider public and journalists. E-procurement and the resulting ex-ante transparency reduce opportunities or resources for corruption by decreasing discretion of individual civil servants and enabling actors to act before tenders are successful, for instance by pointing out that tender criteria are written specifically to advantage certain bidders (Mungiu-Pippidi, 2015). Looking at ex-post transparency, this paper identifies a more indirect effect on the control of corruption. How effectively transparency is used also depends strongly on the capacity of civil society and citizens to make use of the data. Kossow and Kukutschka (2017) in this context refer to e-citizenship, meaning citizens' connectedness through ICT and their ability to use online tools to increase public accountability.

Considering different theoretical perspectives on the control of corruption *can* help to understand why e-procurement has not proven to be successful in cases where corruption is pervasive and thus shaping social norms. In such contexts, transparency is unlikely to lead to lower corruption risks through the provision of information and the balancing of information asymmetries alone. As Fox (2007) points out, to reach hard accountability means going “beyond the limits of transparency and dealing with both the nature of the governing regime and civil society's capacity to encourage the institutions of public accountability to do their job” (Fox, 2007, p. 669).

4.2.5 Hypotheses

Based on these theoretical underpinnings as outlined above, this paper seeks to analyse the impact of the ProZorro reforms in Ukraine. Building on collective action approaches in anti-corruption, it will look at constraints on corruption risks through civil society capacity (Mungiu-Pippidi, 2015) and how they interact with

the provision of e-government and the resulting ex-ante and ex-post transparency. Since it is argued that civil society is a crucial stakeholder conditioning the effect of transparency on corruption, the paper thus presumes that civil society capacity should have an effect on lowering corruption risks in public procurement. Civil society capacity will be measured both through proxies for the density of NGOs and numbers on internet access, arguing that these two factors should have a joint effect for civil society when using e-government tools. These factors form constraining contextual factors for the control of corruption. Furthermore, the number and density of enterprises in a given region will also be considered as a factor, since companies were identified as a key stakeholder in the context of public procurement. Although the public procurement reforms in Ukraine were applied uniformly across the country, the structural conditions on civil society capacity varied across Ukraine. The different regions within the country thus provide a quasi-experimental setting.

Building on the theory outlined above, the paper will thus try to estimate the relationship between civil society, ICT and corruption risks in public procurement. It builds arguments outlining a connection between transparency and accountability as outlined above, and anti-corruption theories arguing that a reduction of resources for corruption (through ex-ante transparency) and an increase in constraints on corruption (through ex-post transparency) will lead to decreased corruption risks. Also, the paper considers political modernisation theory and argues that levels of modernisation are likely to have an impact on the control of corruption. The following hypotheses are derived from these theoretical underpinnings:

- *H1: The increased level of modernisation in a given region lowers corruption risks in public procurement*
- *H2: Civil society capacity plays a significant role in decreasing corruption risks in public procurement.*
- *H3: The interaction between NGO density and internet access enhances the impact of e-government tools on corruption risks.*

They will be tested using tender data from the Ukrainian ProZorro project and regional level data from twenty-four regions in Ukraine.

4.3 Methodology and data

To test these hypotheses derived from theories on anti-corruption, transparency and e-procurement, this paper is looking at the prominent ProZorro case in Ukraine. As pointed out before, the ProZorro system was first introduced in Ukraine in 2014 and is used nationwide since 2016. The rich procurement data available on all levels of government throughout Ukraine provides an opportunity to analyse corruption risks in public procurement on the regional level.

This paper uses twenty-four Ukrainian regions²⁴ as the unit of analysis to examine if a change in control of corruption has de facto followed the introduction of the system and explain the variation across regions. The hypotheses will be approached through a triangulation of data:

- Data derived from procurement tenders through the ProZorro system;
- Regional data from the State Statistical Service of Ukraine and polling agencies;
- Interview data gathered in Ukraine January-March 2018.

The data compiled in the first step will be used as dependent variables in a series of regression analyses. The aim of this exercise is to understand the structural factors conditioning change in procurement risks and outputs over a two-year period. This approach will be further outlined below.

4.3.1 Procurement data

Ukrainian tender data was gathered through a ProZorro business pro account, kindly provided by TI Ukraine. This allowed this paper to build a dataset of 4,346,454 procurement tenders reported to or handled via the ProZorro system

²⁴ Ukraine has twenty-seven regions: twenty-four oblasts, one autonomous republic and two cities with special status (Kyiv and Sevastopol). Due to the annexation of the Crimean Peninsula, Crimea and Sevastopol will not feed into this analysis. Because of the ongoing conflict in Donetsk and Luhansk regions, the occupied territories within these regions are not covered by the analysis. The City of Kyiv and Kyiv oblast will be considered together as one region due to data constraints. The analysis will thus look at twenty-four regions within Ukraine.

between August 2016 and September 2019 (Table 3)²⁵. This data was broken down to be analysed by regions and to be comparable over time.

Table 3: ProZorro tender data

	August 2016 - September 2019	October 2016 - March 2017	October 2018 - March 2019
Number of Tenders	4,346,454	562,661	837,306

The data of interest within this dataset covers tenders handled through the ProZorro e-procurement system. It includes “below threshold” and “above threshold” procurements that were handled through the system²⁶. This means tenders that have a value high enough so they needed to be processed competitively through the ProZorro e-procurement system. The analysis also excludes tenders that were only reported to the system after negotiations.

This paper seeks to investigate the effects of structural factors on a regional level on corruption risk within public procurement tenders. It will first apply its explanatory model to corruption risks as measured in 2016/17. It will then look at change: within the data outlined above, this research focuses on two time periods to track the change between them. Data was analysed for the last quarter of 2016 and the first quarter of 2017, as well as the last quarter of 2018 and the first quarter of 2019. Different structural conditions in Ukrainian regions during this time period thus provides a quasi-experimental setting. The first six months between 1 October 2016 and 31 March 2017 provide a baseline, and the second six months between 1 October 2018 and 31 March 2019, a data point post treatment²⁷.

²⁵ Tenders involving product groups with less than ten bidders overall were excluded from the analysis. This applied to 21,214 tenders over the given time period.

²⁶ The threshold stands at UAH 200,000 (roughly US\$8000, depending on the exchange rate) for services and goods, and UAH 1.5 million (around US\$58,000) respectively for works and construction. Above threshold tenders have different bidding conditions and slightly longer application times.

²⁷ Since the two time periods cover the same periods within the respective years, the analysis avoids potential seasonal variation.

The paper will provide analysis of the change between those points and what conditioned it. The variables that will be analysed are proxies for corruption risks in public procurement: the percentage of competitive tenders with only one bidder (single bidding), and the number of claims and complaints received for tenders handled through the ProZorro system.

Single bidding is used as an indicator for potential corruption risks, often referred to as a “red flag”. Since competitive tenders should attract multiple bidders, receiving only one offer in the tendering process suggests that the process was unduly influenced (Fazekas, Cingolani, et al., 2016; Fazekas & Kocsis, 2017; Fazekas, Tóth, et al., 2016). Monopoly products with few supplies were excluded in the first step of the analysis. In the following analysis, two variables will be used as dependent variables: the initial levels of single bidding in 2016/17 and the change in single bidding as a way to approximate the change in corruption risk over the observed two-year period. As a control, this paper will also look at the change of the number of claims and complaints received. These are claims and complaints submitted to an independent advisory body (in the case of below threshold procurement) or the Ukrainian Anti-Monopoly Commission (for above threshold). While not measuring corruption risk, they measure companies’ actions against potential corruption risks and are thus a useful proxy to be used as a control variable. They approximate the degree to which procurement tenders are contested. As such, they also measure an outcome of the structure surrounding public procurement in Ukraine and the analysis will try to show what structural factors were decisive in these changes. Table 1 and Figure 1 display the results of the initial analysis. The change in single bidding was calculated in relation to the level of single bidding in the original year, arguing that relative changes are a better reflection of actual change.

Table 4: Change in corruption risks in Ukrainian regions, 2016/17 - 2018/19.

Region	Single Bidding 2016/17	Single Bidding 2018/19	Change	Relative Change	Change in Number of Claims and Complaints
Cherkasy	60.63%	59.08%	-1.56%	-2.57%	48.58%
Chernihiv	64.73%	65.81%	1.08%	1.67%	5.59%
Chernivtsi	53.30%	53.80%	0.50%	0.94%	43.09%
Dnipropetrovsk	64.09%	65.80%	1.71%	2.66%	9.21%
Donetsk	65.13%	66.45%	1.32%	2.03%	10.17%
Ivano-Frankivsk	57.04%	58.02%	0.99%	1.73%	96.38%
Kharkiv	63.17%	66.01%	2.83%	4.49%	44.82%
Kherson	57.36%	53.22%	-4.14%	-7.22%	119.80%
Khmelnytskyi	61.39%	57.76%	-3.63%	-5.91%	47.11%
Kirovohrad	59.68%	56.06%	-3.62%	-6.06%	35.14%
Kyiv	62.40%	63.44%	1.04%	1.67%	16.90%
Luhansk	59.71%	52.78%	-6.93%	-11.61%	11.83%
Lviv	61.74%	62.04%	0.30%	0.49%	18.70%
Mykolaiv	59.34%	61.52%	2.18%	3.67%	25.34%
Odesa	59.59%	61.06%	1.47%	2.47%	57.79%
Poltava	54.62%	54.82%	0.21%	0.38%	58.29%
Rivne	60.95%	57.76%	-3.19%	-5.24%	26.27%
Sumy	62.70%	61.68%	-1.02%	-1.62%	13.62%
Ternopil	59.87%	57.25%	-2.62%	-4.37%	0.00%
Vinnitsia	61.50%	64.97%	3.47%	5.63%	72.73%
Volyn	62.26%	63.84%	1.59%	2.55%	-28.69%
Zakarpattia	55.34%	50.97%	-4.37%	-7.90%	107.86%
Zaporizhzhia	61.08%	62.55%	1.47%	2.40%	14.21%
Zhytomyr	62.60%	63.10%	0.50%	0.80%	63.70%

The data on corruption risks seems to vary little across regions and time, with some exceptions (see Figure 7). In the baseline semester of 2016/17, single bidding continues to be widespread in Ukrainian procurement. Between 53% and 65% of all procurement tenders advertised through the ProZorro system received only one bidder in this semester, indicating high procurement risks in these contexts. Looking at the change over the two-year period specified in the analysis, numbers provided are both the *actual* declines, and the *relative* decline in relation to original numbers of single bidding. Single bidding declined in nine out of

twenty-four Ukrainian regions covered in the analysis. In six regions, the decline was significant (cp. Table 3). These regions will thus be analysed in some more detail throughout the data analysis. Single bidding stagnated in four regions and actually increased in the remaining eleven regions. The number of claims and complaints overall increased in almost all regions, but to varying degree. In fact, in Volyn the number decreased by 28.69%, whereas the number of claims and complaints increased by 119.8% in Kherson.

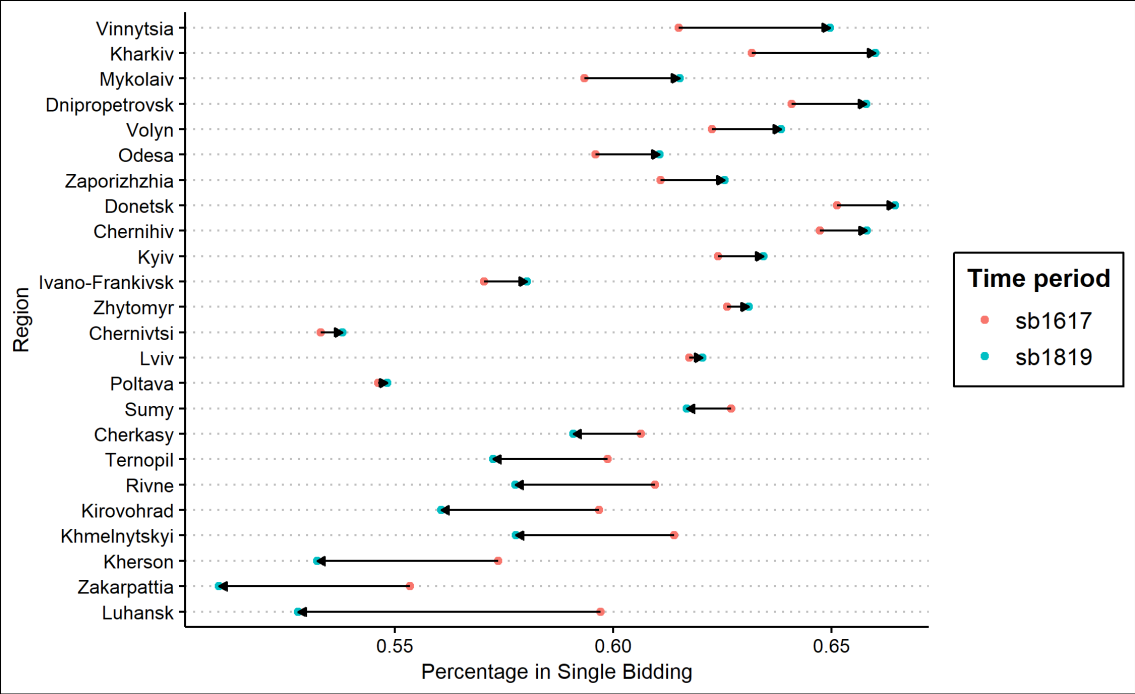


Figure 7: Single bidding in Ukrainian regions.

As shown in Table 5, single bidding in Ukraine did not decrease significantly on average. Yet, we can see the spread of single bidding numbers increased between the two time periods that were observed. Developments are not regionally clustered. For instance, Lviv and Zakarpattia regions, both in Western Ukraine, differ from one another (Lviv 61.74% and Zakarpattia 55.34% in 2016) and across time. The level of single bidding did not change significantly in Lviv, whereas Zakarpattia showed a relative decline by 7.90%. The biggest increase in single bidding also occurred in geographically different regions. Predominantly Ukrainian-speaking and Catholic regions (Ivano-Frankivsk, Lviv, Ternopil, Zakarpattia) show slightly better average numbers in both observed time periods

than the remaining twenty regions in the sample, but amongst them only Ternopil and Zakarpattia show a positive change between these periods. The influence of religion and culture can thus not be discarded, but should also not be overstated (Miller, Grodeland, & Koshechkina, 2000).

Table 5: Descriptive statistics, single bidding

Variable	Obs.	Mean	Std. Dev.	Min	Max
Single Bidding in 2016/17	24	60.43%	3.08%	53.30%	65.13%
Single Bidding in 2018/18	24	59.99%	4.69%	50.96%	66.45%
Relative Change in Single Bidding	24	-0.79%	4.51%	-11.61%	5.63%
Change in Claims and Complaints	24	38.27%	35.77%	-28.69%	119.80%

4.3.2 What determines corruption risks across regions and time?

The analysis of Ukrainian procurement data as outlined above shows primarily that corruption risks, as estimated by levels in single bidding, remained mostly unchanged across Ukraine, with some regional exceptions. To the extent that significant change exists, the trend is not uniform. The relative change in single bidding varies between a decrease of 11.61% (in Luhansk) and an increase of 5.63% (in Vinnytsia).

What explains both the change and the lack of change in procurement patterns? This research also tests alongside the main variables of interest (civil society and ICT) several structural factors in a series of bivariate regressions with robust standard errors. Despite covering all the regions, the number of observations is rather low. The confidence level considered in this context will thus be extended to take the 10%. The paper first discusses the analysis of the baseline on single bidding in 2016/17. In doing so, it introduces the proxy variables used to apply the explanatory model of bivariate regressions to corruptions risks, as measured by the percentage of single bidding. Next, these regressions will be analysed based on the change of single bidding between the two points of observations.

4.3.2.1 *Modernisation theory*

The hypotheses to be tested in this context were derived from state-of-the-art anti-corruption theory. Modernisation theory comes first: variables associated with human development are expected to be significant in this context. The higher the level of modernisation of a region, the better should its governance be. A growing and urbanized middle-class is often seen as a fundamental condition for good governance (Inglehart & Welzel, 2005; Lipset, 1981; Mungiu-Pippidi, 2015). The gross domestic product (GDP) per capita is in this context still seen as one of the most important indicators of development. It is today often used in combination with indicators for education and life expectancy, to form the Human Development Index (HDI) (Anand & Sen, 1994; Norris, 2012).

This research tests two variables measuring economic development, as reliable and recent data on education and life expectancy are not available for all Ukrainian regions. The first variable is the gross regional product per capita (GRPPP²⁸), to capture economic development within each Ukrainian region. The data used here starts from January 2017, since this is the base point for the analysis. This research also tests the growth rate of the gross regional product per capita (Δ GRPPP²⁸) in each region between 2016 and 2017, to reflect current economic trends. Table 4 summarises the results of this analysis. In this context, neither the GRPPP nor the Δ GRPPP shows a significant correlation with single bidding. This can be illustrated by zooming in on individual regions. Kyiv, the region with the highest GRPPP shows average numbers on single bidding (62.40%) whereas Poltava, the second highest in average economic development, displays significantly lower numbers on single bidding in 2016/17 than the average Ukrainian region (54.62%).

Another variable to be tested here following modernisation theory will be the rate of urbanisation per region (Urban)²⁸ above. This follows several arguments. On one hand, urbanisation lends itself to the development of a middle-class, which Lipset (1981) sees as a prerequisite for democratic societies. Billger and Goel

²⁸ Provided by the Ukrainian State Statistical Service.

(2009) also highlight that urbanisation might lead to a better control of corruption since a higher density of citizens would mean more citizen watchdogs acting as deterrent, an assumption that Mungiu-Pippidi (2015) shows empirically in a dataset of 180 countries. Conversely, in more urbanized societies there might also be more opportunities for corruption (Billger & Goel, 2009). Testing the correlation between the urbanisation rate in Ukrainian regions and the level of single bidding finds it to be significantly correlated with the former at 1% (Table 6). However, the correlation does not run in the expected direction. Urbanisation is correlated with higher levels of corruption risks in public procurement.

Table 6: Regressions on percentage of single bidding in 2016/17

Variable	Bivariate Regressions									
	Percentage of Single Bidding 2016/17									
Stakeholder indicators										
NGOs per 1000 citizens	0.000									
Internet access, percentage		-0.062								
Internet subscribers per 1000 citizens (log)			-0.003							
Number of enterprises				0.000	*					
Enterprises per 1000 (log)						0.004				
Interaction terms										
NGOs and Int. Subs. (log)									-0.003	
NGOs and Int. Acc. (log)										-0.013
Modernisation indicators										
GRPPP in 2017 (log)									0.015	
Change in GRP PP										-0.025
Percentage of urban population										0.115 ***
Constant	0.604 ***	0.639 ***	0.617 ***	0.599 ***	0.598 ***	0.616 ***	0.599 ***	0.437 **	0.611 ***	0.532 ***
N	24	24	24	24	24	24	24	24	24	24
r2	0	0.029	0.003	0.052	0.003	0.005	0.022	0.054	0.005	0.32
legend: *p<.1; ** p<.05; *** p<.01										

4.3.2.2 *Civil society and internet access*

ICT and its relation to civil society capacity, as well as the importance of key stakeholders remain the key interest of this research. As highlighted above, collective action theory defines civil society as a centrally important actor in the control of corruption. Does civil society capacity correlate with the level of corruption risks in the context of e-procurement? Following previous work by Grimes (2013), the paper looks at the density of non-governmental organisations in a given region, taking the number of NGOs per 1000 citizens as a proxy variable for civil society capacity²⁹. Furthermore, two variables will be used separately to approximate online connectivity of citizens. This will first be the number of internet subscribers³⁰ relative to the population (InSub). Additionally, serving as a robustness check, the number of internet subscribers will be estimated through survey results by the Kyiv International Institute of Sociology (KiiS)³¹ and the Life in Transition Survey (LiTS) conducted by the European Bank for Reconstruction and Development³². Both surveys were published in 2016 and asked respondents if they had an internet connection at home (InAcc). Following the theory outlined above and work by Kossow & Kukutschka (2017), the paper uses those two variables to test if online connectivity is correlated with corruption. It also tests the significance of an interaction term between the number of NGOs and the respective estimators of online connectivity. This follows the argument that civil society capacity depends on its ability to connect to citizens.

The paper also tests the number of enterprises in a given region (Ent), as well as the number of enterprises per capita (EntPP)³³. These are, naturally, linked to the level of economic development. However, in the context of corruption risks in public procurement, the number and density of enterprises can be seen as an indicator for stakeholders that have an interest in controlling corruption in this

²⁹ Data on the number of NGOs per region was provided by the Ukrainian Ministry of Justice and accessed through <https://opendatabot.ua/>. Current population data was provided by the Ukrainian State Statistical Service.

³⁰ UkrStat, 2019

³¹ Kharchenko, 2016

³² EBRD, 2016

³³ Provided by the Ukrainian State Statistical Service.

context. Given the theory on ex-ante procurement outlined above, the model would expect a higher number of stakeholders leading a decrease in corruption risks (Bauhr et al., 2019; Coppier & Piga, 2006).

Out of these variables, only the total number of enterprises shows a correlation at the 10% with the level of single bidding in 2016/17. This could confirm the theory that a higher number of stakeholders using ex-ante transparency helps to control corruption risks in public procurement. However, looking at proxies for civil society capacity, this paper does not find a correlation with initial levels of single bidding, recorded shortly after the introduction of the ProZorro system. This does not yet refute this paper's main hypotheses. The assumptions of modernisation theory do also not seem to apply in this context. Yet, the question remains how the variables presented here relate to the *change* in corruption risks. Since the ProZorro e-procurement system was introduced nationwide only in August 2016, the numbers from late 2016 to early 2017 provide only a snapshot of corruption risks at this time. Arguing that key stakeholders do not immediately make use of the increase in transparency and that the effect of the reforms will take some time to become noticeable, these results could be expected. However, the next step of this research will go on to analyse the change in corruption risks to see if it is more related to the structural context described here.

4.3.3 What determines change?

The above showed little correlation between structural factors and the percentage of single bidding in competitive tenders within the ProZorro e-procurement system. Table 5 summarises the independent variables used here. These are indicators focussing on the capacity of stakeholders (civil society organisations, internet access and enterprises), interaction terms between proxies for civil society capacity, as well as indicators for the level of modernisation (GRP, GRP growth and the rate of urbanisation). All variables show sufficient variation to merit an analysis. The divergence between the twenty-four regions are significant enough to account for structural differences. In the second step, this research is now zooming in on the change in single bidding between 2016/17 and 2018/19. As described above, the observation period in these years ran both times between

October and March to account for seasonal variations, this enables the research to focus on differences in the structural factors as described above and as presented in Table 7.

Table 7: Summarising statistics, independent variables.

Variable	N	Mean	Std. Dev.	Min	Max
Stakeholder indicators					
NGOs per 1000 citizens	24	1.222	0.432	0.735	3.03
Internet access, percentage	24	55.87%	8.45%	40.50%	75.38%
Internet subscribers per 1000 citizens	24	105.209	105.445	29.408	468.543
Total number of enterprises	24	14094	20354.87	3408	104502
Enterprises per 1000 citizens	24	6.915	3.933	1.576	22.512
Interaction terms					
Interaction term, NGOs and internet subscribers	24	161.194	265.9924	23.60645	1236.453
Interaction term, NGOs and internet access	24	0.700	0.372	0.449	2.285
Modernisation indicators					
GRP PP in UAH	24	58957.38	29742.47	13883	164325
ΔGRPPP	24	26.06%	8.52%	-2.58%	45.69%
Percentage of urban population	24	63.09%	15.13%	37.00%	90.78%

Looking at these numbers the total number of enterprises within a region shows particularly high standard deviation, since Kyiv has an unusually large number of enterprises compared to all other regions. The focus on the number of enterprises per 1000 citizens thus seems more appropriate, even though Kyiv continues to be an outlier in this context.

4.3.3.1 Bivariate results

Table 8 shows the bivariate regression results of the independent variables on change in single bidding. Considering the variables approximating factors associated without modernisation, the research does not present a clear picture.

Although urbanisation does not show a significant correlation in this context, the level of gross regional product per capita is significant at the 1% and the change in GRPPP in 2016 appears to be significant at the 10%. However, GRPPP appears to be positively correlated with change in single bidding: it is associated with increasing numbers in single bidding over the observed two-year period, rather than decreasing numbers. H1, based on modernisation theory, thus cannot be confirmed on the basis of the bivariate analyses presented here.

Table 8: Regressions on change in single bidding 2016/17 - 2018/19.

Variable	Bivariate Regressions Change in Single Bidding 2016/17 – 2018/19									
Stakeholder indicators										
NGOs per 1000 citizens	0.021									
Internet Access, percentage	-0.124									
Internet Subscribers per 1000 citizens (log)	0.028**									
Number of enterprises	0.000*									
Enterprises per 1000 (log)	0.040*									
Interaction terms										
NGOs and Int. Subs. (log)	0.019*									
NGOs and Int. Acc. (log)	0.010									
Modernisation indicators										
GRPPP in 2017 (log)	0.057***									
Change in GRPPP	0.198*									
Percentage of Urban Population	0.056									
Constant	-0.034	0.061	-0.134*	-0.016	0.080**	-0.096*	-0.004	-0.633***	0.060	-0.043
N	24	24	24	24	24	24	24	24	24	24
r2	0.042	0.054	0.145	0.073	0.198	0.124	0.006	0.350	0.141	0.035

legend: *p<.1; ** p<.05; *** p<.01

The number of NGOs per capita and the percentage of internet access are both not significantly correlated to the change in single bidding. However, the research finds a correlation at the 5% with InSub, as well as a correlation at the 10% with Ent and EntPP. In all of these cases, the correlation is an increase in single bidding and thus not able to confirm the hypotheses outlined above.

4.3.3.2 *Individual cases and outliers*

Analysing the independent, this paper cannot robustly confirm the assumptions derived from theory. Looking at individual cases within the dataset still gives some interesting perspectives and also enables this research to identify outliers within the data. First of all, this concerns the Ukrainian capital city of Kyiv, which in this paper is analysed together with Kyiv region. It represents an outlier in several regards: Kyiv has a considerably higher number of NGOs per capita than other Ukrainian regions (see Figure 8), as well as the largest number of enterprises (both overall and per capita). Yet, it does show an average percentage of single bidding (62.40%) and an insignificant *increase* over the two-year time period, so no progress (+1.04%). Odesa also shows an unusually high number of internet subscribers per capita, and a fairly high number of NGOs per capita. Yet, it presents average number in both single bidding and relative change. Figure 8 shows how the rest of Ukraine lacks civil society capacity compared to Kyiv, so in view of the hypothesis, no region would be expected to progress more than the capital. A striking outlier is Luhansk region, which shows a significant reduction in single bidding between 2016/17 and 2018/19 (-11.61%). However, Luhansk underperforms significantly in the context of NGOs and EntPP – showing the lowest numbers per capita of all of Ukraine. This is likely to be related to the ongoing conflict in Luhansk region, that disproportionally affects the region and its economy (Bluszcz & Valente, 2019).

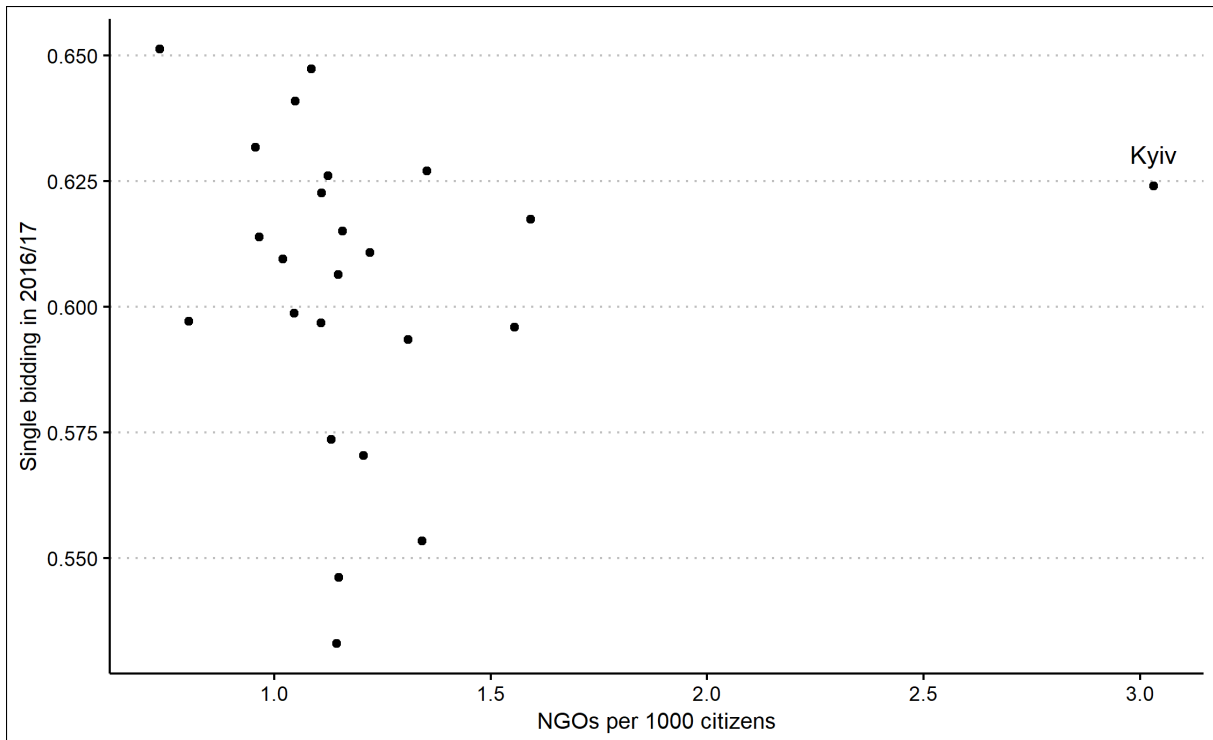


Figure 8: Regression NGOs per 1000 citizens over single bidding in 2016/17.

Considering other regions show a significant decrease in corruption risks over the two-year period (Zakarpattia, Kherson, Khmelnytski, Kirovohrad, Rivne, Ternopil, see Figure 1), the explanatory model does not appear sufficient in explaining their developments, at least in bivariate models. Zakarpattia, for instance, has a GRPPP slightly below the mean, a low urbanisation rate, an average density of NGOs, and a number of enterprises per capita which is slightly below the mean.

4.3.4 Multivariate analysis and interactions

The data sample of twenty-four Ukrainian regions is rather small for this type of analysis and can only provide some indication on ways to test the hypotheses outlined above. The bivariate tests suggest that few of the variables applied in the models help to explain variations in single bidding across Ukrainian regions as measured through tendering data in 2016/17, briefly after the introduction of the ProZorro system. Yet, there were some variables that helped to explain the change in single bidding between the two observed time periods. Jointly, they might provide a better model to explain the changes in single bidding and thus help to

understand which structural conditions are conducive to lowering corruption risks in e-procurement.

The models tested here³⁴ include those variables that show significance at least at the 10% in the bivariate tests. Furthermore, this research also runs tests on the additional variables of interests to test its hypotheses: the number of NGOs per capita and the interaction term between the number of internet subscribers per capita and the number of NGOs were also included.

Table 9: Multivariate regressions on relative change in single bidding 2016/17 - 2018/19.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Internet subscribers per 1000 citizens	0	0	0	0	0.000 *	0.000
Enterprises per 1000 (log)	0.042	0.052	0.02			
Percentage of urban population	0.043	0.041	0.084	0.012	0.004	0.027
NGOs per 1000 citizens		-0.031	-0.060 **		-0.036 **	-0.050 *
NGOs and Int. Subs. (log)			0.065			0.026
GRPPP in 2017 (log)				0.058 ***	0.069 ***	0.058 *
Constant	-0.108 **	-0.095 **	-0.296 **	-0.646 ***	-0.721 ***	-0.708 ***
N	24	24	24	24	24	24
r2	0.218	0.248	0.295	0.353	0.397	0.407

*legend: *p<.1; ** p<.05; *** p<.01*

Multivariate regression analysis provides us with some interesting results (cp. Table 7). Looking at H1 and modernisation theory, the results of the multivariate regression model do not provide any evidence to the hypothesis and the assumptions drawn from theory. When included, the level of GRPPP proves to be significant at the 1% and 10% levels of significance respectively. Consistently,

³⁴ For model specifications please see Annex III.

however, higher GRP per capita proves to be associated with an increase in single bidding, rather than a decrease. However, it must be noted that the included variables following modernisation theory helped the model specification.

Looking at proxies for civil society capacity, this paper notes that the number of enterprises per 1000 citizens does not prove to be significant in this context. However, in fully specified models (Table 7, Models 3, 5 and 6), the number of NGOs per 1000 citizens significantly correlates with a decrease in single bidding at the 5% (Model 3 and 5) and the 10% (Model 6) respectively. At the 10% significance level, the number of internet subscribers and the density of NGOs show joint significance. The multivariate models thus provide this research with some evidence on H2 and H3. The density of NGOs proves statistically significant in a better-specified multivariate regression model. Yet, this paper finds the evidence not convincing enough to confirm H2 and H3. Robustness checks using different data (on internet access) and different dependent variables (the change in claims and complaints, and the original level of single bidding) did not provide significant results (see Annex IV). Overall, based on the data collected here and the analysis above, the null hypotheses cannot be rejected. *H1*, *H2* and *H3* thus cannot be robustly confirmed in this context.

4.4 Interpretation and discussion

This paper compiles a new, detailed dataset on the misuse of public funds. It takes data from the Ukrainian ProZorro project and by analysing it, gives a snapshot of corruption risks in public procurement across different Ukrainian regions.

Yet, being unable to robustly confirm its hypotheses, the paper needs to discuss how to interpret these results in reference to the theoretical assumptions described above. Therefore, this paper will first look at the shortcomings and limitations of the analysis itself, and then offer some alternative explanations taken both from a limited number of qualitative interviews conducted in Ukraine in early 2018, and related studies that were recently published.

4.4.1 Limitations

4.4.1.1 *Lack of variation*

As shown above, the variation between Ukrainian regions with regards to single bidding is not very big. Only a minority of regions show significant changes in single bidding and the variance within individual periods is rather low. While there were some significant differences, these might not have been enough to derive inference. With regards to the timing of this study, not enough time might have passed between the two points of observation. Can e-procurement reforms really be expected to have a noticeable effect only few months after their nationwide introduction and see lasting changes two years after? While it still seems worthwhile to conduct this experiment, the variance might not have been sufficient.

4.4.1.2 *Data availability*

Reliable data could be obtained to approximate economic development, and to a certain degree, modernisation. However, in this context no current data was available to approximate education and health levels. The Human Development Index in this context uses data on the average years of schooling and the life expectancy at birth (Anand & Sen, 1994). For Ukraine, no such data was available for the years covered in this paper.

Looking at the data obtained to approximate civil society and internet access, there are some shortcomings: the number of NGOs per capita in a region does give a snapshot of civil society organisations in a given region. Yet, this might not be sufficient as a proxy for civil society capacity. For instance, the numbers obtained from the Ukrainian Ministry of Justice say nothing about the size, activity and sustainability of these NGOs. The number of organisations could include NGOs working under false pretext and representing government institutions³⁵. It could also include inactive organisations that are formally still registered as NGOs, but do not have any members or provide any activities. Thus, whether or not the

³⁵ Often referred to as governmental non-governmental organisations (GONGOs) (Kleinschmit & Edwards, 2017).

number of NGOs per capita is a good proxy for civil society capacity in Ukrainian regions is not entirely clear. Way (2015), for instance, argues that the strength of Ukrainian civil society is often overestimated.

Similarly, the measure of internet access and usage remain imperfect. While the number of internet subscribers per capita provides an objective measure, it of course says nothing about how internet subscriptions are used or if they are concentrated with few people or companies who might have multiple connections. In their global analysis, Kossow and Kukutschka (2017) use the number of Facebook users per capita to show connectivity between citizens. This type of data was not available for Ukrainian regions but could have benefitted the analysis.

Finally, it has to be pointed out that the data sample based on Ukrainian regions is rather small. With twenty-four regions it is doubtful that the results of the analysis can be generalised to speak for the general applicability of anti-corruption theory. This paper maintains that the theory testing approach on this level of analysis is valuable. However, the possibility of the small data sample limiting inference should not be discarded.

4.4.1.3 Applicability of data

The theoretical underpinnings for the analysis of these results were derived from theories focussing on the nature of corruption and anti-corruption. This approach was chosen because of the growing body of evidence presented above that highlights the importance of said theories to better understand the nature of corruption and the efficiency of anti-corruption issues. However, the question remains if the data derived from the dataset on tenders in Ukraine is appropriate to fully capture corruption to the extent it is used in the theoretical contexts.

Mungiu-Pippidi and Dadašov (2016) for instance, use the theoretical approach to derive an index measuring a national framework for public integrity³⁶. Due to data inavailability, not all aspects of the theoretical approach could be tested here. Assumptions were made, for instance, that judicial independence – an important

³⁶ Presented in the Index of Public Integrity: <https://integrity-index.org/> (Mungiu-Pippidi et al., 2017).

constraint on corruption – is assumed to show no variation across Ukrainian regions, since they all share a similar make-up of political and judicial institutions. The analysis provided here might thus suffer from misspecification, especially when dealing with small data samples.

Measuring corruption is by nature an inexact science. Several approaches have been tested over the past twenty-five years, however, none of them seems to cover the full picture (Fazekas & Kocsis, 2017; Heinrich & Hoddess, 2011; P. M. Heywood & Rose, 2014). While the use of proxy indicators does remain a valuable approach, Fazekas and Kocsis (2017) underline that procurement risks indicators are primarily a proxy for high-level corruption in the context of public procurement. Scholars providing the fundamental, theoretical approaches to the control of corruption discussed above seem to be rather focused on the big picture. Procurement risk analysis might thus not provide the right proxies to test such theories on.

4.4.2 Adjusting the theory

Having considered the limitations of the data provided here, the results of the analyses above also prompt additional considerations on the nature of the relationship between civil society capacity, corruption and ICT. In order to do so, this paper will rely on quantitative interview data. Semi-structured interviews were conducted in January and February 2018 in Ukraine³⁷. They focused on the nature of civil society anti-corruption projects with a particular focus on ICT tools. All respondents were civil society activists who support anti-corruption efforts in various capacity. Interviewees were selected to reflect different types of civil society activists: they included individuals affiliated with NGOs, as well as people active in less formalised movements. Interviewees were grassroots activists, as well as civil society leaders and journalists, both on a national and regional level. These interviews offer alternative perspectives on the effectiveness of the ProZorro system in supporting the control of corruption.

³⁷ For a list of interview partners see Annex V.

This interview data gives some indication on why no positive correlation between civil society capacity and corruption risks in public procurement could be found. It thus helps to make sense of the data analysis. It highlights the role that ICT tools played for activists in the post-Maidan era. In this context, ProZorro stood out as a key reform project which several activists cited as an important influence on their anti-corruption work. They all said they are using the data provided through the ProZorro platform in order to enter a dialogue with public authorities and, in some cases, demand accountability. Examples of this were given by several respondents. The interview data also provides an explanation to the obstacles that civil society actors faced in enforcing accountability in the context of public procurement. A key factor not covered by the data analysed above is political will of authorities to engage in anti-corruption reforms. Yet, this was highlighted several times by interview respondents.

Digital tools found wide-ranging applications in post-Maidan good governance reforms. Besides ProZorro, activists used digital technology in order to restore and digitise documents destroyed by the Regime, to make more data available to citizens, to increase budget transparency and to digitise and publicise conflict of interest register and asset declarations³⁸. The ProZorro reforms in this context remained, in a way, the flagship reform project. An investigative journalist cited the introduction of the platform as a key step in post-Maidan reforms, arguing that the best results were achieved by introducing new technologies into state processes rather than “switching people”³⁹.

Another interview highlights how the platform can serve as a tool for citizens to pressure authorities and assert public accountability: a specific situation was described by a local community activist who cited using the platform to check for construction works at their university. The activist and fellow students looked at contracts between their university and contractors hired to do renovations. Since

³⁸ Interviews 1, 3, 6, 7, 8

³⁹ Interview 3

these were not completed, the contracts were used as leverage in negotiations between the university and the students⁴⁰.

Other activists working with anti-corruption NGOs confirmed that ProZorro data helped them in their work on highlighting corruption in specific tender contexts. They also stressed that the DoZorro project especially helped activists to, in some cases, get tenders to be reviewed and cancelled. Some tendering authorities and local administrations were willing to change their procedures in order to comply with the new procurement laws and work with local anti-corruption organisations on internal reforms⁴¹. However, when asked about why reforms were implemented in some parts of administration within a region but not in others, several activists stress the importance of political will⁴².

A leader of a regional NGO working as part of the DoZorro network stressed that they use claims and complaints filed via the DoZorro system to follow up on questionable tenders. They hereby stressed that some audit institutions were readily answering their letters. Others only responded after being contacted several times. In both cases they cited tenders got cancelled after irregularities were found. However, they also found cases where authorities were not responsive and not willing to engage in a dialogue. From the perspective of the NGO, this was down to political considerations. They saw good cooperation with the mayor of the regional capital and hence, got responses from members of the city administration. However, they argued that the leadership of the regional administration was unwilling to cooperate and did not engage in a reform dialogue⁴³.

The opposite example was given by another civil society leader involved in the ProZorro project. They spoke at length about the work of NGOs on limiting corruption risks in procurement, both through monitoring contracts ex-ante and by making use of ex-post transparency. Thereby, they noticed several examples of

⁴⁰ Interview 4

⁴¹ Interview 1, 2

⁴² Interview 1, 2, 4

⁴³ Interview 2

state authorities cooperating on the implementation of reforms, and in particular, monitoring systems. However, they stressed that it very much depends on individual authorities and their willingness to cooperate, citing examples from several regions. They highlighted the case of an NGO active one region:

“So, we have the great case of [region], where we have an amazing NGO. They are working with [the] regional administration because the team at [the] regional administration are great guys who are willing to implement reforms. [...] They will work with civil society to identify bad vendors to punish those who are trying to manipulate. They started doing this. And in the same city with the same NGO there is the city council. And, I'm sorry for being rude, but their Mayor literally said, ‘go fuck yourself publicly.’”⁴⁴

Asked if local NGO activities could make a difference in lowering corruption in procurement, they stressed the important work of the NGOs but also highlighted that it does not primarily depend on NGO activity.

This interview data gives some indication on why no positive correlation between civil society capacity and corruption risks in procurement could be found. This also corroborates with the results from a recent research project on the capacity and activities of civil society based anti-corruption initiatives in Ukraine. While financial and human resources, as well as a supporter base are crucial factors, the research stresses the importance of political will. Without political will of the respective authorities, civil society organisations in Ukraine struggle to have an impact in the fight against corruption. At the same time, the presence of political will was conducive to the aims of civil society initiatives (Bader, Huss, Meleshevich, & Nesterenko, 2019). The research identifies political and economic pluralism as a key factor in defining political will. However, it also stresses the multitude of factors that influence political will. In interviews, some respondents were quite specific what they defined as willingness: upon noticing violations of procurement regulations, they approached audits institutions as well as procuring

⁴⁴ Interview 1

authorities. In the case of the former, they got responses from some institutions who even cancelled tenders that were wrongly advertised. Others ignored their requests. In the case of procuring authorities, some responded and discussed the way that tenders were written with experts from NGOs. Others completely ignored these approaches and continued to write tenders in ways that benefitted individual enterprises⁴⁵. Bader *et al.* highlighted that political will, if present, can enable cooperation between state authorities and civil society organisations that include “examples of co-governance, in which the anti-corruption organization is engaged to fulfil a specific task alongside state authorities.” (Bader et al., 2019, p. 14)

As a concept, political will has been analysed from different perspectives and always includes a multitude of factors. Civil society pressure and activism also feature into calculations about political will (Brinkerhoff, 2000; Persson & Sjöstedt, 2012; Post, Raile, & Raile, 2010). While discussing these factors in the context of Ukrainian procurement reforms goes beyond the scope of this paper, the research notes that political will might provide an answer as to why this paper was unable to show a robust correlation between civil society capacity and corruption risks. This would not lead the paper to discard established anti-corruption theory, but to highlight an additional factor that cannot easily be captured by data. In a similar conclusion, Olken (2007) finds that increased grassroots participation does not prove to be as effective as principled, external auditing, citing evidence from a field experiment in Indonesia. If external auditors cannot be bribed, they can reduce corruption more effectively than bottom-up monitoring by citizens.

⁴⁵ Interviews 1,2, 8.

4.5 Conclusions

Two main conclusions can be drawn from this paper. Firstly, transparency in public procurement does not necessarily lead to an increase of competitiveness in the procurement process, at least in the short run. Since the correlation between those factors remains a matter of debate, the empirical results presented here should be revisited in the coming years as more data becomes available. That such data will be available is exemplified both by the EU Horizon 2020 DIGIWHIST project that published its Opentender portals in 2018 (DIGIWHIST, 2018) and by the World Bank (2020) recently launching an initiative to provide databases on country level procurement data.

Secondly, in the Ukrainian context, civil society with higher capacity and better online connectivity (such as in Kyiv and Odesa) does not show an association with lower corruption risk or improvements in the control of corruption. While the models presented here might suffer from misspecification as only part of the theoretical model could be captured by the data at hand. More complex analysis could consider if higher resources for corruption, for example through increased procurement volumes or through influx of aid money, might counterbalance civil society capacity. Correlations between changes in corruptions risks and civil society capacity were noted, but did not turn out to be robust.

With the limitations shown, this paper contributes by providing timely, although maybe early evidence from what is currently seen as the state-of-the-art procurement reform. It adds to academic debates within anti-corruption research by testing theories on collective action approaches in anti-corruption and provides a test for the interaction between resources for and constraints on corruption (Bauhr & Grimes, 2017; Grimes, 2013; Mungiu-Pippidi, 2013a, 2015; Mungiu-Pippidi & Dadašov, 2016; Persson et al., 2013). It also provides an example of an analysis of corruption risks through tendering data, and contributes to the understanding of corruption risks in public procurement and what systemic factors conditions them (Bauhr et al., 2019; Charron et al., 2017; Fazekas, Cingolani, et al., 2016; Fazekas & Kocsis, 2017; Fazekas, Tóth, et al., 2016).

ProZorro is an ambitious reform project that increases transparency in public procurement. It stipulates a partnership between the state, business and civil society to reform the corruption-prone public procurement sector. It has become an important tool for journalists and activists alike. Yet, in the short run, it did not lead to lower corruption risks. Research into its effects should thus be continued, to contribute to knowledge on the use of digital tools in anti-corruption more generally.

5 Conclusion

This research has focussed on the use of information and communication technology for anti-corruption purposes. It sets out to give a broad overview of the state of the art on the issue, and then moves on to illuminate different perspectives through more specific research questions. My overarching research question asks: *In what way and how effectively can information and communication technology contribute to the control of corruption?*

I approach the answer to this question through a cumulative research model including elements of nested research. To this end, I firstly conducted a thorough analysis of current academic literature, in order to review and classify what we know on the relationship between ICT and anti-corruption. Based on this literature review, I specified my research question to investigate more specifically the role of civil society in turning ICTs into effective anti-corruption instruments. Secondly, I derived a theoretical model on the relationship between ICT, civil society and the control of corruption and tested it empirically on a global dataset analysing marginal effects. I thirdly applied this theoretical approach to analysing the use of a specific digital tool in controlling corruption in a single country case study. Based on the previous analyses, I chose to direct my research efforts at investigating e-procurement reforms in Ukraine and comparing their effects between Ukrainian regions. To conclude my dissertation, I will briefly summarise the results of these individual chapters, before offering some thoughts on what this means for future anti-corruption research.

5.1 Chapter two: Digital anti-corruption: hopes and challenges

Chapter two of my dissertation represents a thorough review of the available literature, outlining different ICTs and how they are used in the fight against corruption. This chapter was continuously edited since 2015 and published in 2020 as part of the edited volume *A Research Agenda for Studies of Corruption* (Mungiu-Pippidi & Heywood, 2020).

From this research I derived a structure to better systematize and understand the body of literature: The chapter firstly presents theoretical and macro level studies

that consider the relationship between internet access and the control of corruption. Secondly, the chapter structures academic works according to distinct mechanisms that connect digital technologies to a better control of corruption. Namely these are:

- Access to e-government that can help to lower opportunities for corruption by limiting discretion of individual civil servants and increasing transparency in administrative processes.
- Downward transparency, meaning the provision of information from the government to citizens through transparency or open data portals, as well as social media.
- Upward transparency, referring to tools providing information from citizens to state institutions, for instance, through crowdsourcing.
- Mobilization, in reference to tools that support the mobilization of anti-corruption movements.

Using this structure to help readers understand the overall literature on ICT and anti-corruption, the chapter analyses both quantitative and qualitative studies covering the individual topics. Overall, it finds a well-documented positive association between the use of ICT and lower corruption levels. The literature analysed found evidence in reference to general internet access, as well as in reference to specific tools, like e-procurement. In conducting this analysis, however, I also found significant gaps in the literature that still need to be addressed in order to answer not only the question of how effective ICT can be used in the fight against corruption, but also what makes them effective in this context.

The chapter found that several research questions remain unanswered. Specifically, while a lot of research established that there is a clear link between ICT and lower corruption levels, it is less clear under what circumstances digital tools can work against corruption and how they interact with other factors. The chapter also notes that as of yet, not much is known about the effects of ICT on individuals' decisions on whether to engage in corrupt acts, and how their

behaviour is influenced by the use of such tools. Furthermore, the potential unintended consequences of ICT in anti-corruption are under-researched. This is particularly relevant seeing that some scholars found digital tools to actually be a potential gateway to corruption.

Proceeding with my research, I want to answer some of these questions. Namely, I am looking at circumstances and factors that make ICT successful in fighting corruption. To do so, I first establish a theoretical framework to understand this context, which I present in chapter three.

5.2 Chapter three: Civil society and online connectivity: controlling corruption on the net?

In chapter three I develop a theoretical framework connecting civil society, ICT use and the control of corruption. To this end, I reviewed the most common theories on corruption and anti-corruption, which define corruption as a principal-agent problem and a collective action problem respectively. Stressing the importance of civil society, the perspective of corruption as a collective action problem ultimately became the most important strand of theory underlying this dissertation. However, as chapter three highlighted, both theoretical perspectives are important in order to understand the nature of corruption and potential approaches to fight it.

The argument I make in chapter three is that ICT tools can be important in the fight against corruption and their use has a positive correlation with lower corruption levels. However, I also argue that civil society is a crucial factor in determining the impact of digital tools. In fact, digital tools support the work of civil society in the fight against corruption.

Chapter three is providing a first quantitative analysis to test this theory. For this I collaborated with Roberto Martínez Barranco Kukutschka to construct a global dataset on corruption levels (as measured by composite expert indicators), structural factors and in particular on internet and social media access, as well as civil society capacity. It thus took the hypotheses that 1) civil society capacity is

positively correlated with a better control of corruption and 2) internet and social media access is supporting the positive effect of civil society capacity on the control of corruption. We tested this relationship on a dataset covering 170 countries. Using several measures as controls, we found robust evidence for a positive correlation between higher civil society capacity and lower corruption levels, as well as ICT usage (as measured by an online connectivity index) and lower corruption levels. The research also found ICT usage and civil society to be jointly correlated to a better control of corruption, thus confirming the theoretical assumption that both factors interact in their effect on corruption levels.

While this confirms the most basic assumptions derived from the theory, chapter three went further. It also used marginal effects analysis to provide more specific evidence on the joint relationship between civil society capacity, ICT and anti-corruption. The analyses confirmed our previous hypothesis on the importance of civil society capacity. ICT usage does indeed have a higher marginal effect on the control of corruption when civil society capacity is high. In turn, civil society capacity also shows larger marginal effects on corruption levels in contexts in which ICT usage is higher. Overall, the chapter thus provides quantitative evidence for the theoretical assumptions based on a collective action perspective on the control of corruption. Given this initial, quantitative evidence, I decided to focus on a single country case study to further put this theory to the test in my fourth chapter. In doing so, I follow a simplified variance of a nested research model as outlined by Liebermann (2005), since the case study built on the results of the initial large-n analysis outlined above. Following a typical case approach to case selection (Seawright & Gerring, 2008), I focus on a country that both proved typical for my theory, and is of great interest to policymakers and researchers alike: Ukraine.

5.3 Chapter four: Can the civil society-technology alliance deliver integrity? An empirical case from Ukraine

Following the 2014 Revolution of Dignity, anti-corruption reforms became a central issue for Ukrainian policymakers and civil society organisations alike.

Chapter four of my dissertation is looking at a cornerstone of these reforms: the ProZorro e-procurement reforms. The chapter shows how a civil society initiative built a bridge between civil society organisations, private companies and state institutions with the aim of reforming the Ukrainian state procurement market. The aim of the reform was to increase transparency through digitalisation of the procurement process and by doing so address the issue of rampant corruption.

My analysis thus goes from a global, large-n study to the analysis of a specific case study of one technological tool applied in a specific country context. The aim of this exercise is to see, if the generalized theoretical approach outlined in chapter three would also be applicable to such a specific case. The chapter thus tests if corruption levels in procurement are influenced by civil society capacity and ICT usage, and if these two factors have a joint effect on corruption levels in procurement. To test this, I chose Ukrainian regions as a level of analysis. The ProZorro project offers a rich pool of tender data classified by regions and Ukrainian regions show structural differences that link to lower corruption levels. To measure corruption in procurement, I use a proxy for corruption, looking at single bidding as a measure of corruption risks.

For this analysis I put together a dataset of 4,346,454 procurement tenders, a subset of which I was able to break down to Ukrainian regions and analyse in a two-step process. The results of these analyses were ultimately not able to confirm the theoretical assumption of the previous parts of my dissertation. E-procurement and the resulting transparency did not lead to significantly lower corruption risks in tendering processes. Equally, I was unable to show a clear linkage between higher ICT usage, stronger civil society capacity and lower corruption risks in procurement. Qualitative interviews conducted in Ukraine in 2018 confirmed the impression from the data that civil society capacity and internet access were not enough to impact corruption risks in the short term. While not providing conclusive results, my research, both quantitative and qualitative, points to additional factors that need to be considered, and should be part of future research. Both interviews with civil society leaders, as well as research by Huss *et al.* (2020), thus suggest that the effectiveness of civil society

action against corruption strongly depends on the political will of political leaders to engage in reform processes. While this points to exciting avenues of research to be pursued at a later date, chapter four could not reject its theoretical approach entirely due to shortcomings in data availability. It thus did not delivery conclusive results.

5.4 Implications for future research

While ultimately not being able to confirm its hypotheses on the level of a specific case study, my dissertation nevertheless managed to provide an answer to its overall research question. ICT and digital tools based on it can be an important part of anti-corruption strategies and should be embedded in programs strengthening civil society capacity. My research shows that while ICT usage and lower corruption levels have a strong correlation, this correlation is dependent on several structural factors. Zooming in on civil society capacity, I showed that while a theoretical approach looking at the interaction between civil society capacity and ICT usage holds on a global, more generalized level it did not translate sufficiently to account for a specific technological and country context. While, as chapter four points out at length, this might be down to measurement errors and problems with data availability, this could also point at a higher importance of political will.

The approach of measuring corruption risks in procurement tender and using it as an objective proxy for corruption levels should be continued in future, especially as more procurement data around the world becomes available. This will also make it possible to conduct comparative studies between different procurement systems applied in different countries, to see how the introduction of e-procurement influences corruption risks in these contexts. As chapter two highlights, significant gaps in the literature remain, and further research is needed to increase our knowledge on the use of ICT in anti-corruption work. This concerns specifically the use of emerging technologies, as well as the unintended consequences that might arise through the introduction of said technologies. One especially under-researched field is one that focuses on the individual level. More work needs to be done to understand how citizens and civil servants alike are using ICT and how it impacts their likelihood to engage in corrupt activities.

Experimental research on these questions would also aid in advising policymakers and civil society leaders on how to design better anti-corruption tools relying on ICT.

Overall, my PhD confirms the importance of ICT in anti-corruption. However, it also highlights that corruption remains a difficult problem to solve. Digital technologies do not prove to be a panacea in this context.

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7 Annexes

7.1 Annex I: List of variables, chapter 2

Label	Type of variable	Scale	Definition	Source
Country	Nominal	-	Country name	World Bank database
Country Code	Nominal	-	ISO 3166-1alpha 3 codes (3 letter country codes)	World Bank database
Population (2014 Est.)	Numerical	0 to ∞	Number of inhabitants	World Bank database
Internet users (per 100 people)	Numerical	%	Internet users are individuals who have used the Internet (from any location) in the last 12 months. Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.	World Bank database
Fixed broadband subscriptions (per 100 people)	Numerical	%		World Bank Database
Facebook Users (Dec 2015)	Numerical	0 to ∞	Number of Facebook users as of December 2015	Internet World Stats
% of facebook users (total population)	Numerical	%	Facebook users as share of total country population	Internet World Stats
Newspaper circulation (per 1000 people)	Numerical	0 to ∞	Total paid-for and free dailies, total average circulation (000)	World Press Trends Database

Civil Society Participation Index (avg. 2002-2012)	Interval	0 to 1		Varieties of Democracy Database
Core Civil Society Index (avg. 2002-2012)	Interval	0 to 1	The Core Civil Society Index provides a measure of how robust a nation's civil society is.	Varieties of Democracy Database
Civil Society Organizations per population	Numerical	0 to ∞	Number of civil society organizations per million inhabitants.	QoG Database
Online Connectivity Index	Numerical	1 to 10		
Control of Corruption (2015)	Interval	-2.5 to 2.5	Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Worldwide Governance Indicators
Control of Corruption (2015)	Interval	1 to 10		
GNI per capita (in 2011 PPP USD)	Numerical	0 to ∞		Human Development Report
Mean years of schooling	Numerical	0 to ∞	Average number of years of education received by people ages 25 and older	Human Development Report
Life expectancy at birth (in years)	Numerical	0 to ∞	Number of years a newborn infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant's life.	Human Development Report

7.2 Annex II: Graphical representation of the bivariate relationships, chapter 3

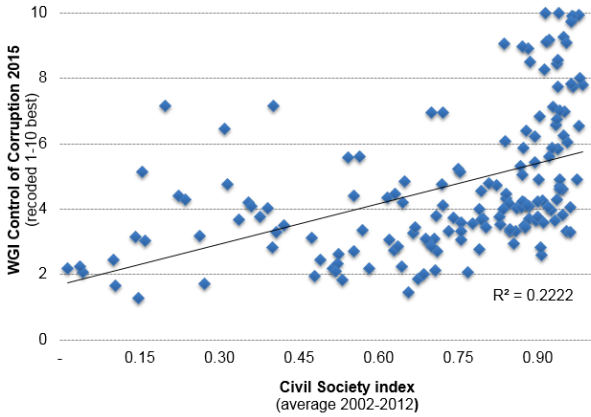


Figure 9: Correlation between the control of corruption and civil society strength, n = 161

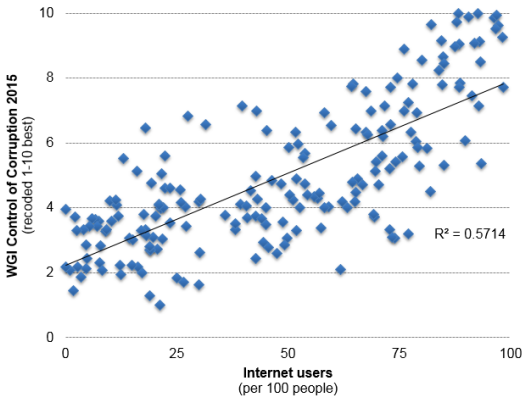


Figure 10: Correlation between the control of corruption and percentage of internet users, n = 161

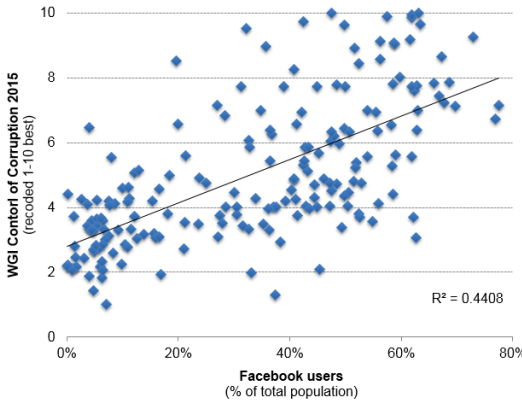


Figure 11: Correlation between the control of corruption and percentage Facebook users, n = 161

7.3 Annex III: Model specifications, chapter 4

Model 1

$$\Delta\text{Single Bidding} = \alpha + \beta_1 \text{InSub} + \beta_2 \text{EntPP} + \beta_3 \text{Urban} + \varepsilon$$

Model 2

$$\Delta\text{Single Bidding} = \alpha + \beta_1 \frac{\text{NGOs}}{\text{capita}} + \beta_2 \text{InSub} + \beta_3 \text{EntPP} + \beta_4 \text{Urban} + \varepsilon$$

Model 3

$\Delta\text{Single Bidding}$

=

$$\alpha + \beta_1 \frac{\text{NGOs}}{\text{capita}} + \beta_2 \text{InSub} + \beta_3 \text{EntPP} + \beta_4 \text{Urban} + \beta_5 \text{NGO InSub} + \varepsilon$$

Model 4

$$\Delta\text{Single Bidding} = \alpha + \beta_1 \text{InSub} + \beta_2 \log(\text{GRPPP}) + \beta_3 \text{Urban} + \varepsilon$$

Model 5

$$\Delta\text{Single Bidding} = \alpha + \beta_1 \frac{\text{NGOs}}{\text{capita}} + \beta_2 \text{InSub} + \beta_3 \log(\text{GRPPP}) + \beta_4 \text{Urban} + \varepsilon$$

Model 6

$\Delta\text{Single Bidding}$

=

$$\alpha + \beta_1 \frac{\text{NGOs}}{\text{capita}} + \beta_2 \text{InSub} + \beta_3 \log(\text{GRPPP}) + \beta_4 \text{Urban} + \beta_5 \text{NGO InSub} + \varepsilon$$

7.4 Annex IV: Robustness checks, chapter 4

Table 10: Robustness checks, alternative measure for internet access

Variable	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Internet access	-0.138	-0.14	-0.226	-0.116	-0.093	-0.185
Enterprises per 1000 (log)	0.039*	0.039	0.034			
Percentage of urban population	0.046	0.046	0.058	0.017	0.015	0.029
NGOs per 1000 citizens		0.001	-0.024		-0.009	-0.041
NGOs and Int. Subs. (log)			0.048			0.055
GRPPP in 2017 (log)				0.055***	0.061**	0.058**
Constant	-0.031	-0.03	0.07	-0.556***	-0.613**	-0.482
N	24	24	24	24	24	24
r2	0.283	0.283	0.286	0.399	0.402	0.406
legend: *p<.1; ** p<.05; *** p<.01						

Table 11: Robustness check, regression on changes in claims and complaints 2016/17 - 2018/19

Variable	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
Internet subscribers per 1000 citizens	0	0	0.002	0	0.001	0.001
Enterprises per 1000 (log)	0.089	0.14	0.321			
Percentage of urban population	-1.017**	-1.026**	-1.268**	-1.022**	-1.038**	-1.078
NGOs per 1000 citizens		-0.146	0.019		-0.068	-0.044
NGOs and Int. Subs. (log)			-0.373			-0.045
GRPPP in 2017 (log)				-0.003	0.017	0.035
Constant	0.852*	0.914**	2.062	1.022	0.882	0.859
N	24	24	24	24	24	24
r2	0.188	0.199	0.223	0.178	0.181	0.181
legend: *p<.1; ** p<.05; *** p<.01						

Table 12: Robustness check, regression on levels of single bidding in 2016/17

Variable	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
Internet Subscribers per 1000 citizens	-0.000*	-0.000*	0	-0.000*	-0.000*	0
Enterprises per 1000 (log)	0.007	0.008	0.018			
Percentage of urban population	0.122***	0.122***	0.108**	0.115***	0.114***	0.089**
NGOs per 1000 citizens		-0.002	0.008		-0.005	0.01
NGOs and Int. Subs. (log)			-0.021			-0.028
GRPPP in 2017 (log)				0.013	0.014	0.026
Constant	0.520***	0.521***	0.587***	0.398**	0.389*	0.374
N	24	24	24	24	24	24
r2	0.346	0.346	0.357	0.365	0.366	0.39

legend: *p<.1; ** p<.05; *** p<.01

7.5 Annex V: List of interviews, chapter 4

All interviews were conducted in Ukraine between January and February 2020. Interview partners were chosen to represent several types of civil society activists, from grassroots activists to leaders within large NGOs. Interviews were semi-structured and conducted in English and Russian. Names were anonymised due to the sensitive and political nature of anticorruption work:

1. Interview 1: an activist involved in the establishment of the ProZorro system.
2. Interview 2: two activists working for a regional NGO working in procurement monitoring.
3. Interview 3: an investigative TV journalist.
4. Interview 4: a local community activist.
5. Interview 5: a grassroots campaigner.
6. Interview 6: an activist working with a watchdog organisation.
7. Interview 7: a social entrepreneur active in a field related to anti-corruption.
8. Interview 8: an anti-corruption activist working with a national NGO.

7.6 Annex VI: Information on cumulative dissertation

This cumulative dissertation consists of three individual paper, presented in the following order within the text above:

- Chapter 2: Digital anti-corruption: hopes and challenges
 - Published as Kossow, Niklas. "Digital anti-corruption: hopes and challenges." In *A Research Agenda for Studies of Corruption* by Alina Mungiu-Pippidi and Paul Heywood (eds.). Cheltenham, UK: Edward Elgar Publishing, 2020.
- Chapter 3: Civil society and online connectivity: controlling corruption on the net?
 - Published as Kossow, Niklas, and Roberto Martínez Barranco Kukutschka. "Civil society and online connectivity: controlling corruption on the net?." *Crime, Law and Social Change* 68.4 (2017): 459-476.
- Chapter 4: Can the civil society-technology alliance deliver integrity? An empirical case from Ukraine.
 - Not yet published.

7.7 Annex VII: List of pre-publications

Kossow, Niklas, and Roberto Martínez Barranco Kukutschka. "Civil society and online connectivity: controlling corruption on the net?." *Crime, Law and Social Change* 68.4 (2017): 459-476.

Kossow, Niklas. "Digital anti-corruption: hopes and challenges." In *A Research Agenda for Studies of Corruption* by Alina Mungiu-Pippidi and Paul Heywood (eds.). Cheltenham, UK: Edward Elgar Publishing, 2020.