Women in Power and the Fight Against Corruption: Evidence from COVID-19 Pandemic in Italy

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Abstract

In this paper, I explore the relationship between gender representation in political leadership and corruption risk in the exceptional context of the COVID-19 pandemic. The urgency of the crisis may have overshadowed the focus on fair competition and transparency, with the result that men and women in leadership positions may have responded differently to increased corruption incentives. Previous research concludes that a higher share of women in power decreases corruption. Using Italian public procurement data, I construct a Corruption Risk Index (CRI) which is used as a proxy of corruption and reflects the degree of competition in public contracting in non-health sectors during the pandemic. The restricted competition is indicated by factors such as non-open procedures (with direct assignment or prior negotiation), short bidding periods or bunching below the European thresholds. Contracts awarded without any competitive bidding process, often due to emergency situations or alleged lack of competition, can signal heightened corruption risk. I confirm that increased incentives for illicit behaviour during a crisis may lead to an escalation of corruption risks and that the response to these incentives may differ by the gender of the politicians: if a municipality is led by women, the CRI score is lower by 1 percentage point.

JEL classification: H10; J16
Key words: women's representation; corruption; public procurement; COVID-19; Italy

Contents

1 Introduction

Corruption undermines democratic processes, impedes economic development, exacerbates inequality and weakens institutions. By diverting resources away from the provision of essential public services such as infrastructure, health and education, corruption stifles economic growth (Ferraz et al., 2012; Aidt et al., 2008; Olken, 2007). It distorts the economic landscape by creating an environment that encourages rent-seeking behaviour, also hinders healthy competition and discourages investment affecting all sectors of the economy (Aidt, 2011; Wei, 2000; Mauro, 1995). Politically, corruption can harm democratic regimes by allowing unscrupulous individuals to manipulate political outcomes in their favour, it destabilizes the government, undermines public trust and promotes political apathy among citizens (Richey, 2010).

In this paper, I study whether the representation of women in government impacts the level of corruption. However, detecting and measuring corruption is challenging due to the secretive nature of such practices—bribery, fraud, or vote-buying are unobservable and difficult to estimate. Most empirical studies have relied on subjective corruption perception indicators, which can be problematic because perception-based measurements are by their nature dependent on opinions, influenced by external factors, and generally do not provide a detailed picture of different forms of corruption at the local or sector-specific level, reflecting only overall conditions in a society. Also, the relationship between perceptions of corruption and its actual occurrence can be ambiguous, especially in the short term. Researchers, recognising the limitations of the subjective approach, started conducting lab, natural and field experiments (Frank and Schulze, 2000; Olken, 2007). The drawbacks of these experiments are that they are context-specific, cover only short-term periods and address a narrow area of corrupt economic activity, which limits their generalisation.

Although corruption is difficult to detect, numerous studies show that it is widely prevalent in public procurement (Colonnelli and Prem, 2022; Campos et al., 2019; Olken, 2007; Di Tella and Schargrodsky, 2003). Following Fazekas and Kocsis (2020) and Abdou et al. (2021), I rely on the fact that more discretionary and less competitive public procurement generates graft opportunities. Italy serves as a compelling location for the research given its struggle with corruption, which varies significantly across provinces and municipalities.[1] To estimate the corruption proxy, I calculate several indicators obtained from procurement data: the share of contracts awarded through restricted competition, the proportionate value of these contracts in relation to the total value of all contracts, instances of short bidding periods and the share of contracts concentrated below the EU

[1]Italy is consistently considered one of the most corrupt countries in the European Union. According to the Transparency International's 2022 Corruption Perceptions Index, Italy received a score of 56, with 0 representing "highly corrupt" and 100 indicating "very clean".

thresholds. These indicators serve as proxies for possible violations or deviations from standard procurement practices that may indicate an increased propensity for corruption.

While the negative consequences of corruption are widely recognized, there is no clear consensus on the most effective methods to combat it. For instance, although anti-corruption measures can deter politicians from rent-seeking behaviour, they can also incentivise them to develop new strategies to avoid detection (Fisman and Golden, 2017). Moreover, it is important not only to establish strong monitoring and enforcement measures but also to create a public belief that corruption is not profitable (Golden, 2018). At the same time, the resources and time required to obtain information about corruption and accurately determine who is responsible for it do not always justify the benefits of electorally penalising corrupt politicians. This is especially true in contexts where corruption is widespread, resulting in votes being given to corrupt candidates anyway (De Vries and Solaz, 2017). One area that has received increasing attention in the literature in terms of fighting corruption is the importance of political institutions in deterring rent-seeking, in particular the role of elections in selecting and disciplining politicians (Ashworth, 2012; Ferraz and Finan, 2011). Another strand of the research has instead concentrated on the effectiveness of a country's judicial and prosecuting institutions: if they are severe enough, the legal consequences of rent-seeking should also prevent politicians from corrupt behaviour (Becker and Stigler, 1974).

Against the backdrop of these traditional strategies, a less explored area of research is the potential link between higher female representation in governance and lower levels of corruption. Even though the number of women in government structures is increasing, they remain underrepresented. As of February 2023, women held only 26.5% of seats in national parliaments worldwide (IPU Parline). As suggested by Casas-Arce and Saiz (2015), there could be several factors contributing to this phenomenon—women may be reluctant to pursue high-ranking positions in the public area, choosing roles with better work-life balance, or parties may be concerned about losing votes by fielding female candidates due to gender stereotypes.

At the same time, there is evidence that female politicians may lead to lower levels of corruption or be perceived by society as less corrupt. Women tend to be more risk-averse than men (e.g. Eckel and Grossman (2008); Croson and Gneezy (2009)), which also prevents them from pursuing high-ranking positions, and makes them less likely to be corrupt when they are held accountable. Also, research has shown that the presence of women in legislatures has resulted in more policies related to women's issues, e.g. laws related to child support, domestic violence, and family leave (Bratton and Ray, 2002; Weldon, 2002a,b; Kittilson, 2008; Dahlerup and Freidenvall, 2010), while governments that pass more laws concerning women's issues are often perceived as less corrupt than those that do not (Schwindt-Bayer, 2010). However, there is also the opposite effect:

higher levels of corruption lead to lower representation of women in politics (Esarey and Valdes, 2021).

To address this issue, investigating the relationship between women in the Italian government and corruption, I focus on the period that includes the COVID-19 pandemic, relying on several key assumptions. The COVID-19 pandemic, as an exogenous crisis, is not expected to have a direct impact on the socio-political conditions and institutional structures (e.g. the current male-dominated political elite or the spread of the mafia) that typically determine women's access to power. These conditions, which can both favour and restrict women's political participation, are largely defined by regional institutional configurations. At the same time, the extreme nature of the pandemic required governments to respond immediately and often radically. Such swift actions, combined with the potential lack of comprehensive oversight due to the crisis, may lead to increased opportunities and thus incentives to engage in corrupt activities. Thus, this period provides a unique opportunity to compare how female and male politicians respond to these increased incentives and explore potential differences in levels of corruption, without the confounding effect of corruption on both the gender composition within the political elite and the likelihood of attaining positions of power.

In general, the COVID-19 pandemic has placed unprecedented demands on governments, necessitating trade-offs to find the balance between responding urgently to the crisis and respecting the principles of transparency, accountability, and equitable resource allocation. The need for rapid response may conflict with the requirements for thorough transparency and oversight, potentially opening doors to corruption. According to Steingrüber et al. (2020), corruption risks have increased during the pandemic due to emergency procurement, price gouging, and pilfering of available supplies, which are then sold on the grey and black markets. Similarly, the urgency of decisions may conflict with considerations of long-term fiscal stability, requiring difficult choices between immediate expenditures and the future state of the economy. In addition, decisions to allocate funds for urgent health needs, as opposed to broader economic stimulus measures, reflect another level of complexity in policy decision-making.

I aim to investigate whether Italian municipalities with female leadership demonstrated a lower risk of corruption in public procurement during the COVID-19 pandemic. The results show that if the mayor of a municipality is a woman, the Corruption Risk Indicator during the COVID-19 crisis will be 1 percentage point lower compared to municipalities in which men were mayors during the pandemic.

The rest of the paper is organized as follows. Section 2 reviews relevant literature. Section 3 gives an overview of the background of mayoral elections and public procurement in Italy. The data is described in Section 4. The empirical strategy is discussed in Section 5. Section 6 reports the estimation results, robustness checks are shown in Section 7.

Finally, Section 8 offers some concluding remarks and discusses the limitations of the study.

2 Literature review

This section reviews the literature on the relationship between corruption, gender and the COVID-19 pandemic. First, I discuss the challenge of corruption detection and measurement, including corruption in public procurement. Second, I focus on the COVID-19 pandemic period and the use of public procurement data during this crisis as the proxy for corruption. Third, I present evidence on the relationship between corruption levels and the presence of women in the government.

2.1 Corruption estimation approaches

Corruption is by its very nature a hidden and clandestine activity, which makes its detection and measurement a significant challenge. The corruption assessment methodologies presented in the literature can be categorised into several different approaches: perception measurement, which is based on subjective assessments (Olken, 2009; Banerjee and Pande, 2007; Mauro, 1995); comparative analysis, where two different measurements of the same quantity are compared (Olken, 2007; Hsieh and Moretti, 2006; Reinikka and Svensson, 2004); direct measurement, which involves direct corruption monitoring, surveying bribe payers or using government audits (Avis et al., 2018; Sequeira and Djankov, 2014; Ferraz and Finan, 2011; Olken and Barron, 2009; Svensson, 2003); and indirect methods, which use proxy indicators to assess the level of corruption (Fazekas and Kocsis, 2020; Fazekas et al., 2016). Each of these strategies provides different insights into corruption and corrupt behaviour but also has its own limitations and complexities.

Data from perception surveys is often used to estimate corruption because they provide a relatively easy and straightforward way to gather data on people's experiences and perceptions of corruption. This data is then used in constructing comprehensive corruption measurements like the Transparency International's Annual Corruption Perceptions Index (TI CPI) and the World Bank's Governance Indicators Control of Corruption Index (WBGI). These surveys typically include questions regarding personal encounters with bribery, the perceived prevalence of corruption within various governmental sectors, and the overall trust in anti-corruption efforts. Perception-based measures are mainly used for cross-country comparisons, which can be useful for identifying patterns and trends in levels of corruption across countries. For example, in one of the first empirical works on corruption, Mauro (1995) uses a subjective index of corruption in a cross-country analysis, where he finds that corruption lowers investment, thereby lowering economic growth.

However, survey-based measures have a number of drawbacks.[2] First, this data may not necessarily reflect the actual levels of corruption, as respondents may not be willing or able to report corruption accurately also because of fear of retribution or social stigma, which may lead to an underestimation of the actual level of corruption. Respondents that are involved in corrupt activities may have incentives to conceal the actual situation, and those not involved typically lack accurate information. Second, the answers might be influenced by recent media coverage of high-profile corruption cases, political climate, or other external factors that can skew perceptions in the short term. Third, such kind of data does not provide a detailed picture of specific forms of corruption at the local level and often contains only low-frequency data, usually on an annual basis, which may not be responsive enough to capture sudden shifts or emerging patterns in corruption.

Olken (2009) shows that citizens' perceptions of corruption may not match the reality because people do not have accurate information about corrupt activities. Olken, using the case of road construction projects in Indonesian villages, gathers data on villagers' perceptions about the likelihood of corruption in such projects. The corruption is estimated with a more objective indicator of "missing expenditures" in the project, which is measured by comparing the officially reported amount spent on a road with an independent engineering estimate of the actual cost of building it. Comparing these two different measures of corruption, Olen finds that while villagers' perceptions correspond to some extent to the actual level of corruption in a road project, the correlation is relatively weak: increasing the actual missing expenditures in the road project by 10% increases the probability a villager reports any corruption in the road project by just 0.8%. The possible explanation for this is that officials can strategically hide corruption by inflating quantities, thereby making it challenging for villagers to observe illicit activities as they can only observe prices.

While corruption is typically concealed, there are cases where it can be observed directly. Olken and Barron (2009) conducted an experiment where they monitored truck drivers and recorded instances of bribes being given to police during their trips. Svensson (2003) gathered data on corruption by surveying Ugandan firms about corruption and bribery practices. Recognizing the sensitive nature of these topics, the survey was carefully designed to ask questions indirectly, while also establishing trust with respondents. However, such data collection is labour-intensive, requiring field experiments and manual collection. Furthermore, the specific nature of this data limits its applicability to other situations.

The success of anti-corruption policies is closely linked to the ability of the government to detect and uncover corrupt activities. In response to this challenge, a number of countries have implemented audit programs specifically designed to detect the misuse of

[2]See Fazekas and Kocsis (2020), Andersson and Heywood (2009) and Golden and Picci (2005) for the discussion of the limitations.

public resources. These initiatives not only strengthen detection mechanisms but also create unique opportunities to use this data to measure corruption in a more accurate and in-depth manner. Ferraz and Finan (2011) and Avis et al. (2018) use data on official audits of municipal governments in Brazil and Di Tella and Schargrodsky (2003) study anti-corruption crackdowns in public hospitals in Buenos Aires to identify instances of corruption. However, the challenge of this approach lies in the very nature of audit data: it reflects not only actual instances of corruption but also the failure to conceal this activity from auditors. The interpretation of such data, therefore, requires careful thought, as they may reflect both corruption itself and the varying effectiveness of concealment strategies.

2.2 Measuring corruption in public procurement

Corruption in public procurement is characterised by deliberate manipulation of contract allocation, violation of the principles of open and fair competition to the benefit of specific participants, often to the detriment of others. In other words, the aim of such corruption is to steer the contract to the favoured bidder without detection by avoiding or biasing competition through, for example, unjustified sole-sourcing or direct contracting awards in order to favour a certain bidder. Government officials often occupy key positions in corrupt transactions because they have the ability to dictate the allocation of contracts, control the payment of invoices, and issue licences and permits (World Bank, 2014). Direct detection and measurement of corruption in public procurement can be difficult. Therefore, some studies have developed indirect approaches that use various proxies to derive indicators that fit this definition of corruption.

Fazekas et al. (2016) develop a measure of corruption in public procurement which is based on a clear understanding of how corruption works, uses only objective data, allows for comparisons over time and between countries, and can be replicated for many countries. The logic behind it is the following. Corruption in public procurement often involves the pre-selection of a contractor who then benefits from inflated prices for the services or goods provided. Such a scheme ensures a constant, institutionalised flow of illicit profits. Such actions are not spontaneous acts of dishonesty, but a deliberate attempt to secure higher profits. Although information on prices and quantities is publicly available, it is difficult to make accurate comparisons, especially without detailed analyses. Quality assessment is even more complex and often requires the involvement of experts. Corrupt practices are mainly about skewing competition in favour of a pre-selected company. Such manipulation can occur at different stages of procurement: (1) limiting the number of bidders, (2) biased evaluation of bidders, and (3) changing the terms and conditions after contract award. While different corruption strategies can be combined, unnecessary further manipulation after the desired outcome is achieved only increases the risk of exposure without additional benefits. For example, if a pre-selected company

is the only valid bidder, three is no reason for changing the terms of the contract later to increase the value. Based on this, Fazekas et al. (2016) constructed a measurement model to assess the risk of corruption, emphasizing distinct contract characteristics across various phases of procurement. The authors identify the output and input aspects of the corruption process. The output side is characterised by a limited number of bidders for public contracts, while the input side is defined by the manipulation of procedural rules in order to restrict competition. It is important to note that these proxies of corruption reflect the potential for corruption rather than actual corruption. Thus, they are assumed to have a correlation with corrupt behaviour but may not exactly coincide with it. As for the results, based on Hungarian public procurement data, it was found that non-open procedures pose a greater corruption risk than open procedures, with exceptional procedures showing the highest risk, increasing the winner's share by 2.9% compared to open procedures. Additionally, an abnormally short submission period that exploits weekends significantly impacts corruption risk. Specifically, it raises the winner's share by 7.6% and the likelihood of receiving a single valid bid by around 20%.

In (Fazekas and Kocsis, 2020), the authors refined the methodology, introducing the Corruption Risk Indicator which in addition to single bidding includes other "red flags": tenders being manipulated by not publishing the call for tenders in the official public procurement journals; the use of less transparent procedures like invitation tenders; short advertisement periods disadvantaging non-connected bidders, with excessively prolonged ones hinting at corruption risks; subjective evaluation criteria or those predominantly price-based are more susceptible to manipulation; and finally, the evaluation time for bids, whether exceptionally short or long, may also indicate potential corruption.

In public procurement, corrupt organisations often avoid competitive bidding. As evidenced by (Auriol et al., 2016), corrupt public entities tend to allocate a significant portion of their budget to contracts awarded without actual competition. This is consistent with the results of the (Decarolis et al., 2020) study, which emphasises that public officials suspected of corruption are prone to certain types of discretionary auctions. In particular, such officials are 2.9 percentage points more likely to choose auctions with discretionary criteria or auctions with an insufficient number of bidders. Interestingly, municipalities categorised as "suspected of corruption" behave in the opposite way: they are 1.9 percentage points less likely to use discretionary auctions.

2.3 Corruption during the COVID-19 pandemic

The COVID-19 pandemic has not only impacted health systems and economies around the world, but it has also created a global corruption crisis. The pandemic has led to emergency purchases of essential medical supplies and equipment, allocation of funds for care, and a shift to remote management, all of which create opportunities for illicit behaviour.

This has raised concerns about the misuse of resources, deception in public agreements, mismanagement of funds, fraud, and other forms of corrupt practices worldwide.

The government's role in the COVID-19 vaccine's development and distribution has created opportunities for corrupt activities. Like any innovation, the development of the coronavirus vaccines introduces opportunities for potential rent-seeking. Given the uncertainty about the number of vaccines required and the details of purchasing contracts, including price, there exists a vulnerability to corrupt practices (Goel et al., 2021). Goel et al. (2021) claim that there is a possible conflicting relationship between corrupt behaviour and the tension that arises from the importance of speed and scale of vaccine rollout. The accomplishment of both goals, vaccinating as many people as possible quickly, while also making the vaccine available to all citizens who want it, requires extra vigilance for politicians to curb corruption. Vaccine development and spreading are associated with bureaucratic red tape and greater issues for potential rent-seeking, both leading to corruption occurrence. For example, the agent may pay speed money to reduce the amount of red tape before the information is produced, or bureaucrats may increase the level of the red tape to have a greater chance of receiving the bribe (Guriev, 2004). However, Goel et al. (2021) also mention that corrupt networks and collusions between bribe takers and bribe givers may not have enough time to emerge when the rollout is fast, which potentially reduces corruption.

Contract-level data has become a significant tool for assessing increased corruption risks during the pandemic. Gallego et al. (2021) studied the effects of rising public spending in Colombian municipalities. The authors identified municipalities traditionally more vulnerable to corruption using a machine learning algorithm based on prior corruption prosecutions. Their findings show that corruption-prone municipalities responded to the pandemic by allocating a larger share of discretionary non-competitive contracts, which are typically more susceptible to corruption, and by increasing the average cost of these contracts, especially for goods and services related to the COVID-19 crisis.

Abdou et al. (2021) study the case of Romania. On March 16, 2020, in response to the unfolding crisis, the Romanian government declared a state of emergency, which led to the simplification of the procurement of emergency goods. This allowed contracting authorities to directly acquire materials and equipment essential for dealing with the COVID-19 pandemic. While a flexible regulatory approach and greater autonomy for contracting authorities can improve efficiency during emergencies and contribute to quicker supply systems, they also increase the risk of corrupt practices. As a result, relaxing regulations during emergencies may undermine the integrity of public procurement. Abdou et al. (2021), using the Corruption Risk Indicator based on the methodology developed by (Fazekas and Kocsis, 2020) and a difference-in-differences identification method, show that both health-sector products and products entirely unrelated to the pandemic in-

creased their risks to a comparable level, which points to market-wide corruption risk spillovers. The Corruption Risk Indicator used in this paper consists of 11 characteristics which are divided into 3 risk category types. In particular, contracts with the highest risk are those that have only one bid submitted, use procedures like negotiated without publication (or missing), have a 2 to 33-day submission period and a 0 to 31-day (or missing) decision period, and do not publish a call for tenders.

2.4 Gender and corruption

2.4.1 The effect of women's representation on corruption

Gender stereotypes are prevalent in politics and often manifest in the form of commonly held beliefs by voters. These beliefs can shape how people perceive and evaluate political candidates and leaders, as well as how they interact and participate in political processes. For example, women are perceived to be more liberal and better equipped to deal with issues related to education and health care, while men are considered more competent to deal with issues related to national security and terrorism (Dolan, 2010). In addition to shaping voters' perceptions of candidate competence, gender stereotypes are also evident in the fact that voters prefer to choose candidates of their own gender (Plutzer and Zipp, 1996). Gender beliefs can also influence the policies and practices of political parties, organizations, and institutions, affecting women's representation and inclusion in political decision-making.

Behavioural surveys and experiments have shown that women tend to demonstrate more moral and altruistic behaviours, as well as public-spirited attitudes, compared to men. Specifically, women have been found to be perceived as more trustworthy (Buchan et al., 2008), exhibit more generosity when making economic decisions (Eckel and Grossman, 1998), prioritise social issues when voting (Goertzel, 1983), obtain higher scores on integrity tests (Ones and Viswesvaran, 1998), take stronger positions on ethical behaviour (Glover et al., 1997; Reiss and Mitra, 1998) and show great concern for the common good (Dollar et al., 2001).

The present literature suggests that gender differences may also exist with regard to a tolerance of corruption. For example, Torgler and Valev (2010), using data from the World Values Survey (WVS) and the European Values Survey (EVS), show that women are significantly less likely to justify illegal or dishonest behaviour such as corruption and tax evasion. However, it should be noted that elected female politicians or appointed ministers may not necessarily be representative of the women surveyed on an individual level and that politicians of either gender may not consistently demonstrate ethical behaviour in accordance with their public statements (Treisman, 2007).

On a cross-national level, some findings indicate that countries with higher levels of women's representation in government tend to have lower levels of corruption (Swamy et al., 2001; Dollar et al., 2001; Watson and Moreland, 2014). However, Sung (2003) argues that the relationship between female political participation and lower corruption levels may be attributed to the confounding effect of liberal democracy. Specifically, liberal democracies encourage greater participation of women in public affairs and support free and fair elections, creating additional incentives for competing political parties to scrutinize and expose any instances of corruption by their opponents. At the same time, democratic institutions, such as an independent judiciary and free media, can help deter corruption by increasing the costs of corrupt behaviour. Thus, democracies tend to culturally and institutionally stigmatize corruption, and often impose more severe punishments for those caught engaging in it. As a result, there is a negative correlation between female participation and corruption in these societies; when bribery is not risk-free, women are less likely to engage in it as they are aware that they may be caught and punished (Esarey and Chirillo, 2013). In fact, Schulze and Frank (2003) and Armantier and Boly (2008) show that in situations where bribery is closely monitored and detection is likely, women exhibit significantly lower levels of corruption compared to men. On the other hand, when bribery is risk-free, there are no significant gender differences in corruption levels. Therefore, in autocracies, where bribery and favouritism are perceived as a normal part of the hierarchical system of personal authority or even expected, Esarey and Chirillo (2013) find that female participation in government is unrelated to corruption.

These findings can be explained by the fact that women are generally more risk-averse (Jianakoplos and Bernasek, 1998; Swamy et al., 2001; Eckel and Grossman, 2008; Croson and Gneezy, 2009), and therefore are less likely to violate political norms, as gender discrimination, as well as higher standards for women in politics, make it riskier for them to violate institutional norms and be engaged in unethical behaviour compared to men. This is compounded by the fact that women politicians face more scrutiny and are more likely to face consequences for any unethical behaviour. According to Esarey and Schwindt-Bayer (2018) and Eggers et al. (2018), voters are more likely to punish women politicians for misconduct, which puts additional pressure on women in positions of power to adhere to ethical standards. This effect is especially pronounced in democracies, where institutions increase the likelihood of corruption detection and voters hold officials individually accountable for corruption by punishing them at the elections. These factors indicate that if society discourages corruption, women are less likely to engage in corrupt activities because they anticipate facing harsher consequences than male politicians. This suggests that the threat of punishment plays an important role in deterring corruption and that in societies where this threat is minimal or nonexistent, corruption may be more prevalent across genders.

There are other reasons why women are associated with lower levels of corruption. First, they may have limited access to networks involved in corrupt activities and lack knowledge on how to engage in such practices (Swamy et al., 2001; Goetz, 2007). However, as women's descriptive representation rises and more women officials are integrated into political parties or institutions, opportunities for corrupt behaviour may change. Perceptions of women in government may change as they occupy higher government positions and increase in number to levels that threaten traditional male-dominated power structures (Watson and Moreland, 2014). Second, women tend to work in sectors that are less prone to corruption and rent-seeking behaviour compared to male-dominated sectors like road contracting or business. Consequently, women may have less opportunity to derive rents from politics through corrupt activities (Pande, 2007).

2.4.2 The effect of corruption on women's representation

While the previous discussion has focused on the impact of the presence of women in government on the level of corruption, recent research shows that there is an inverse relationship: higher levels of corruption may be associated with a lower share of women in politics. The main explanation for this effect is that women are deliberately excluded from corrupt networks, so a male-dominated political elite will protect their own interests and prevent outside interference in their corrupt practices.

According to Stockemer (2011), corruption has a negative impact on women's chances of being elected, as it reinforces gender inequality and impedes women's access to the resources needed to buy support and enter corrupt political networks. Sundström and Wängnerud (2016) also found that women face greater difficulties in political recruitment in corrupt and clientelistic societies due to their exclusion from male-dominated networks from which candidates are selected. Esarey and Schwindt-Bayer (2019), using ethnolinguistic fractionalization and political stability as instrumental variables, show that greater corruption indeed causes a lower representation of women in government.

As for the gender quotas and the issue of reverse causality, Esarey and Valdes (2021) find that countries with lower GDP per capita were more likely to adopt gender quotas as a tool to reduce corruption. Such countries are particularly sensitive to international pressure because they may depend on foreign resources. They are also more likely to face domestic political pressures related to corruption because of dissatisfaction created by poverty. Therefore, the introduction of gender quotas can serve as a response to both international and domestic political pressures related to corruption.

3 Background

3.1 Italian municipal governments

Italy is divided into 20 regions, 110 provinces, and 7,901 municipalities.[3] Municipal elections follow a fixed cycle, typically occurring every five years, but they are not held simultaneously for all municipalities. Instead, different groups of municipalities hold elections in separate years. In addition, the electoral system used in Italian municipalities depends on the size of the population. In municipalities with less than 15,000 inhabitants, the mayor (and local council) is elected by first-pass-the-post system in a single ballot, while above this threshold, a "run-off" system is used, where the two candidates with the most votes in the first round compete in a second round. Mayoral wages also depend on the population size, ranging from 1,290 euros for municipalities below 1,000 inhabitants to 7,800 euros for those exceeding 500,000 inhabitants.

There are no specific gender quotas for mayoral elections in Italy. Mayoral elections are heavily influenced by local political dynamics and candidate selection processes of individual parties. As a result, the representation of women in mayoral positions across Italy's municipalities varies widely. Table A.1 shows the number of women elected in each electoral cycle, as well as the total number of municipalities and the number of elections held on each date (Figure A.1 illustrates the number of women as a percentage of the total number of mayors elected in each electoral cycle). Since 2016, there has been a noticeable and gradual increase in the proportion of female mayors, rising from 11.5% to 15.3% by the end of 2022.

3.2 Public procurement in Italy

The primary legislation governing public procurement in Italy is the Code of Public Contracts (Legislative decree n. 50/2016), hereinafter the "Procurement Code". This legislation harmonizes Italian law with European Union directives on public procurement, establishing a standardized set of rules for procurement procedures. The EU sets thresholds for contracts value below which national rules apply. The Procurement Code delineates the procedures for awarding contracts, including public tenders, competitive dialogue, and negotiated procedures.

There are also norms that are set on the EU level to regulate and standardize the procurement process across the European Union. National rules apply to contracts with values below the EU thresholds which vary for different types of contracts: public works, public goods, and services. Also, the thresholds depend on whether the contract belongs

[3]The information provided is based on data as of January 2023. The figures for provinces and municipalities are subject to change over time due to mergers and divisions of administrative units.

to the ordinary or special (energy, water, transportation, and postal services) sector and are revised every two years.

The contracting authorities are free to choose between an open (art. 60 of the Procurement Code) and a restricted procedure (art. 61 of the Procurement Code). In an open procedure, any interested economic operator can submit a tender directly in response to a call for competition. This procedure is typically associated with a minimum time limit of 35 days for the receipt of tenders from the date the contract notice was sent, offering equal opportunity to a wide pool of applicants. The restricted procedure follows a two-step process. Initially, any economic operator can request to participate by providing the information requested by the contracting authority for qualitative selection. Following this, based on the contracting authority's assessment of the provided information, only those operators who are invited may submit a tender. From the moment the contracting authority publishes the tender announcement, a minimum period of 30 days is set for the receipt of applications for participation in the competition. In certain situations specified in the Procurement Code, they may choose one of four "negotiated" procedures. These include a competitive procedure with negotiation (a procedure with negotiation with a prior call for tenders), a competitive dialogue, an innovative partnership and a procedure with negotiation without prior publication of a contract notice.

Moreover, when the value of the public procurement contract is below the European thresholds, contracting authorities are also allowed to choose the direct assignment. This is essentially similar to a private agreement since the contracting authorities are not required to provide reasoning for the choice of the contractors to whom they award the tender. However, for some services, there is a possibility of reserved contracts even when the value exceeds the threshold. In this case, a public authority reserves the right to award to certain types of organizations, typically those that serve public interest goals or contribute to social policies. The purpose of reserving contracts is to promote certain social or policy objectives, such as the provision of health and social services to vulnerable populations or the promotion of employee ownership and participation in organizations. Such contracts are subject to a lighter regime than the typical procurement process to facilitate their award to these kinds of organisations.

Italy made several changes to its public procurement legislation in response to the COVID-19 pandemic. They were aimed at simplifying and speeding up the tender procedures and ensuring the timely procurement of necessary goods and services. Specifically, for contracts that exceed the EU thresholds, contracting authorities have been given greater flexibility in crucial for the country's recovery from the crisis sectors[4]. They were allowed to bypass many of the standard rules and regulations governing public procure-

[4]These strategic sectors include school, university, healthcare, judicial and penitentiary building; road, railway, port, airport, reservoirs and water infrastructure and other transport; infrastructure for scientific research activity and public security.

ment. In particular, contracting authorities have been given the opportunity to shorten the timeframe within which companies may submit bids or express interest in participating in both open and restricted tendering procedures. Another significant change was the authorisation of advance payments to suppliers equal to the full value of the contract, so suppliers could receive their payment before delivering goods or services.

4 Data

The dataset on Italian municipalities gathers information at the local level from 2016 to 2022. Table 4.1 reports the main sources of data used in this paper.

Table 4.1: Data sources

Data	Source
Mayoral characteristics	*Anagrafe degli amministratori locali e regionali* (by Ministry of the Interior)
Public procurement	ANAC (*Autorità Nazionale Anticorruzione*)
Data on municipalities	ISTAT (*Istituto Nazionale di Statistica*), Ministry of Economics and Finance (Ausloos et al., 2018)

4.1 Mayoral characteristics

The data from *Anagrafe degli amministratori locali e regionali* provided by the Ministry of the Interior contains information on elected mayors' characteristics, including their gender, birth date, self-reported education level and previous occupation, political affiliation, and duration of service. The dataset, which was created by merging files from 2016 to 2022, was then cleaned by removing duplicates and ensuring consistency in the gender variable across different yearly files. If the gender associated with a name did not align with the mayor's actual gender, the variable was manually adjusted. This was performed after first verifying the gender using available Internet resources.

Furthermore, potential duplicate entries due to variations in name representation were corrected. To systematically detect these duplicates, a mayor's tenure was calculated, defined as the difference between their starting date and their ending date or the starting date of the succeeding mayor in the same municipality. Cases with a tenure value of zero were flagged as potential duplicates. Additionally, instances where the same election date occurred multiple times for one municipality were identified. These flagged cases were manually checked to verify the information about mayors and delete duplicates.

I create a panel dataset that contains monthly data on each municipality's current mayor from 2016 to 2022. If there is a change of mayor within a particular month, the dataset retains information about the outgoing mayor as there is usually a transition period and potential lag before a new mayor fully assumes a new role. The dataset for Italian mayors includes both election and nomination dates. Given that these dates may differ, especially if a mayor resigns before the start of the next election cycle, the nomination date is used as the official start date and the end date is marked as the day preceding the nomination of the next mayor.

4.2 Public procurement and corruption risk

Data on procurement contracts is sourced from the ANAC (*Autorità Nazionale Anticorruzione*). Having become fully operational in 2014, this administrative authority oversees areas such as anti-corruption, transparency, public employee integrity, whistleblowing, and public procurement. Its primary goal is to safeguard the public sector from corruption and prevent the misuse of public resources. The dataset from ANAC contains information at the tender level for projects with a value equal to or exceeding 40,000 euros. The dataset provides such details as the tender's value, the number of lots into which it is divided, the value assigned to each specific lot, the contract type (such as public work, provision, or service), the contract procedure employed, geographical variables from regions to municipalities, publication dates, offer submission deadlines, and years and months of publication.

All contracts related to the healthcare sector, identified through the Common Procurement Vocabulary (CPV) codes[5], are excluded due to their distinct characteristics during the COVID-19 pandemic, such as heightened urgency, specific dynamics, and inflated prices. The healthcare sector faced unparalleled demand and urgency during the pandemic, necessitating rapid responses and emergency actions that often led to the bypassing of standard procurement processes (Abdou et al., 2021). This deviation could potentially distort an accurate evaluation of corruption risk. Moreover, the unique dynamics of the healthcare sector during such a crisis are drastically different from other sectors. Phenomena such as the increase in single-source contracts or short bidding periods, typically viewed as signs of corruption risk, might in this context represent necessary measures to address urgent healthcare needs. Additionally, the healthcare sector experienced inflated prices due to high demand and lack of suppliers during the pandemic, further affecting bidding behaviour and potentially skewing the corruption index.

Also, given that the corruption proxy indicators signal corruption only if competition is expected in the absence of corruption, I exclude sectors that are naturally non-

[5]I exclude "Health and social work services" and "Medical equipments, pharmaceuticals and personal care products" which are covered by CPV codes 85000000 and 33000000 respectively.

competitive and predominantly use direct contracts or non-open procedures. For instance, for "Electricity, heating, solar and nuclear energy" the share of direct contracts is 83% and "Public utilities" has the rate of 79%.[6] Then, in the dataset, the distribution of procurement methods is as follows: 14.3% of tenders are conducted through open procedures, 1.5% through restricted procedures, 40.3% through negotiated procedures, and 40.8% through direct assignments (Figure A.2 shows the share of open and non-open tenders for each year).

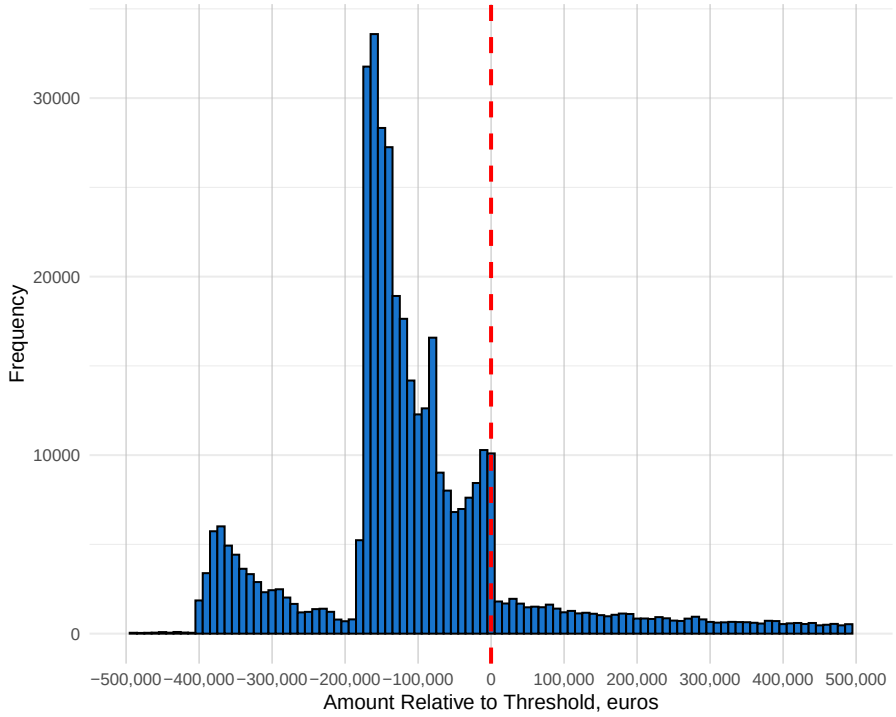
Between 2016 and 2022, approximately 85% of Italian public tenders had total values below the relevant European thresholds. Figure 4.1 displays a close-up view of the distribution of the difference between tender values and the EU thresholds (the entire histogram is shown in Figure A.3). Most contracts are centred around 0 or near the peaks that result from contracts' values that are close to the minimum of 40,000. For example, the peak of -150,000 is related to the threshold which varies between 209,000 and 221,000 across different years, so the difference between these figures is just over 40,000. At the same time, there is a significant drop in the number of contracts whose value exceeds the EU threshold, indicating evidence of bunching. A similar pattern is evident in Figure 4.2, which shows the distribution of the difference between contract values and threshold levels, represented as a percentage of the threshold value. Notably, the most frequent occurrence is slightly above -100%, corresponding to contracts valued around 40,000 with thresholds ranging from 5,225,000 to 5,548,000. Furthermore, Figure 4.3 shows the distribution of the bidding periods, with peaks around 0, 7, 14 and 21 days. Notably, 95% of tenders with a bidding period of 0 days are characterized as either direct or negotiated without a preceding publication or call for competition.

To estimate corruption proxies, I calculate procurement risk indicators showing the degree of unjustified restriction of competition for every municipality on a monthly basis. This data is then merged with a panel dataset created for mayors.

1. **Non-open procedures:** This indicator is the ratio of non-open contracts, such as negotiation procedures with or without prior publication of the contract award notice, direct contracts and piece-rate contracts, to the total number of contracts. Although these methods are authorised by current legislation and are not inherently illegal, the high proportion of contracts awarded through less competitive procedures may indicate potential corruption risks (Abdou et al., 2021; Fazekas and Kocsis, 2020; Fazekas et al., 2016; Auriol et al., 2016; Decarolis et al., 2020).
2. **Value of non-open procedures:** Similar to the previous indicator, it represents the share of value associated with non-open procedures.
3. **Short bidding periods:** This indicator highlights potential corruption risks by identifying contracts that are awarded with deliberately short bidding periods. If

[6] I also exclude "Military vehicles and associated parts", "Warships and associated parts", "Administration, defence and social security services" and "Postal services".

Figure 4.1: Distribution of Tender Values Relative to Thresholds



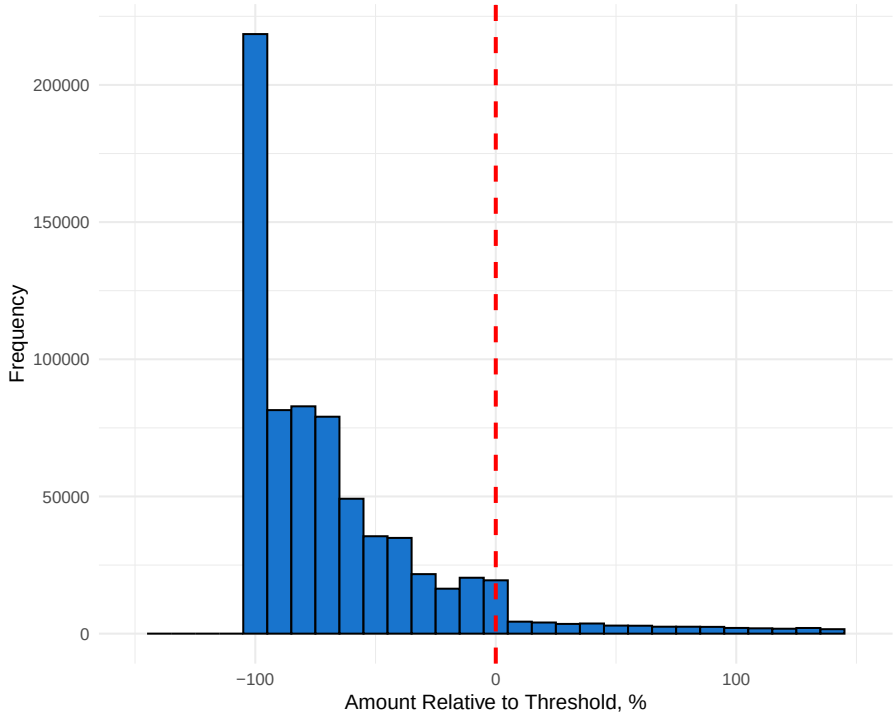
Note: The graph shows the distribution of deviations in contract values from their respective EU thresholds.

contracts are awarded rapidly without a thorough competitive bidding process, whether justified by extraordinary circumstances or lack of competitors, this may signal corruption risk. Quick decisions in such cases may bypass standard oversight and transparency measures, which may facilitate illegal activities or favouritism.

4. **EU threshold bunching:** This indicator measures the concentration of contracts just below the thresholds set by the EU. This bunching may indicate a deliberate effort not to exceed these thresholds in order to avoid increased competition and stricter oversight mechanisms. In particular, it is calculated as the ratio of the number of contracts where the difference between the EU threshold and the contract value is below 20,000 euros to the number of contracts where the value exceeds the threshold.

The indices range from 0 to 1 and are weighted to form a composite Corruption Risk Indicator (CRI). Each of these four factors highlights a specific aspect of potentially corrupt activities. This means that all weights are scaled compared to likely corruption outcomes. The comparison of the CRI scores for 2019 and 2021 is shown in Figure A.4: no specific regions stand out with noticeably higher or lower CRI levels, the index increase is nationwide. Although such indicators as single-bidding or contracts awarded repeatedly to the same company also signal corruption risk and are widely used in the literature, this data is not publicly available for Italy.

Figure 4.2: Distribution of Tender Values Relative to Thresholds, %

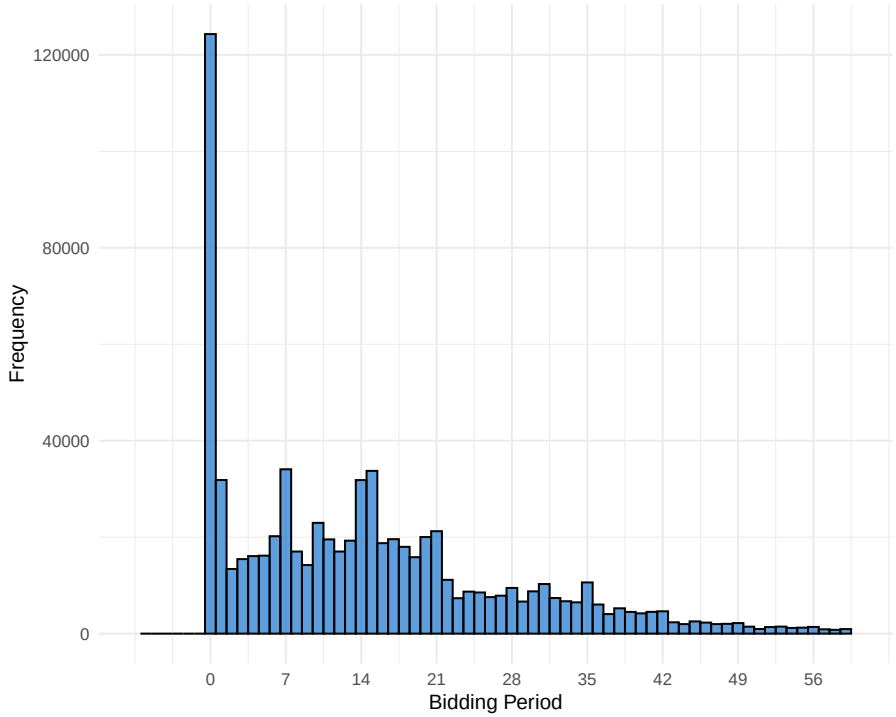


Note: The graph shows the distribution of deviations in contract values from their respective EU thresholds, expressed as a percentage of the threshold value.

4.3 Descriptive statistics

Descriptive statistics of state characteristics are provided in Table 4.2. Notably, the proportion of female mayors remains consistent, suggesting that electoral preferences towards gender did not undergo any significant shift. However, there are some differences in observable characteristics before and after the pandemic. Specifically, there is a rise in the average share of non-open procedures, contracts with short bidding periods, and contracts with values that are concentrated just below the EU thresholds. These patterns indicate the immediate effects of the pandemic on procurement processes. The prevalence of non-open contracts and the tendency for their value to concentrate below EU thresholds hints at a strategic bypassing of competitive practices. This can be interpreted as a reflection of increased opportunities for corruption during the pandemic, highlighting the potential vulnerabilities in the public procurement system. Therefore, restricting competition, whether deliberately or as a by-product of the crisis, raises concerns about the transparency and fairness of the allocation of public contracts.

Figure 4.3: Distribution of Bidding Periods



Note: The graph illustrates the distribution of bidding periods, measured in days.

Table 4.2: Descriptive Statistics: Pre-COVID vs. Post-COVID

Statistic	Pre-COVID Mean	Post-COVID Mean	Difference
WomanMayor	0.14	0.14	0.00
Age	49.93	51.05	1.12
Tenure	4.95	3.71	-1.24
Number of contracts	3.13	3.30	0.17
Non-open share	0.25	0.38	0.13
Non-open value share	0.24	0.37	0.13
Short bidding share	0.05	0.12	0.07
Bunching	0.26	0.37	0.11
CRI	0.21	0.33	0.12

Note: The sample consists of municipalities with a population from 1,000 to 500,000 inhabitants. The variable *WomanMayor* is binary, indicating whether the municipality's mayor is female. *Age* captures the age of the mayor at the time of an election, expressed in years. *Tenure* indicates the duration, in years, of the mayor's tenure. *Number of contracts* shows the number of contracts in a municipality per month. *Non-open share* represents the monthly share of non-open contracts within a given municipality, while *Non-open value share* is the share of the value of such contracts. The variable *Short bidding share* represents the fraction of contracts with a bidding period of less than 5 days. *Bunching* identifies the prevalence of contracts concentrated just below the EU thresholds. Finally, *CRI* reflects the Corruption Risk Index. For a more detailed description of the variables, refer to Section 5.

5 Methodology

Using the subindex m to denote municipalities and t to denote months, I estimate the following model:

$$y_{mt} = \beta_1 WomanMayor_{mt} + \beta_2 WomanMayor_{mt} \times Covid_t + \beta_3 Covid_t + \gamma_t X_m + \mu_m + \lambda_t + \varepsilon_{mt} \quad (5.1)$$

where y_{mt} are different measures of public procurement corruption proxies in the municipality m in period t; $Covid_t$ is a dummy that takes the value of 1 starting from February 2020; $WomanMayor_{mt}$ is a binary variable for the municipalities with a female mayor in the period t; X_m is a vector of municipality-level characteristics that include logarithm of annual aggregated income taxes per capita and logarithm of the population measured during the most recent census in 2011. These characteristics are interacted with the time-fixed effects, γ_t, to allow for differential flexible trends parametrized by these municipality features. Additional to the time-fixed effects, I include municipality-fixed effects μ_m, that control for any observed or unobserved municipal-level time-invariant heterogeneity. In turn, the non-interacted month dummies control for any time shock that affects simultaneously all the municipalities during the same period. Additionally, I control for mayoral characteristics, such as the education level, age at the time of election, and number of years in office. Finally, ε_{mt} is the error term.

Both coefficients β_2 and β_3 show the impact of the pandemic on the corruption measures, yet the effect is heterogeneous depending on the gender of the mayor. The interaction term $WomanMayor \times Covid$ isolates the difference in the effect of female leadership during the pandemic. In other words, the coefficient of interest, β_2, represents how the relationship between COVID-19 and the measure of corruption changes when the mayor of a municipality is a woman.

The potential issue of reverse causality, where more corruption could lead to fewer women in power, would primarily affect the $WomanMayor$ term. However, the interaction term $WomanMayor \times Covid$ is less likely to be influenced by this issue. The unforeseen and exogenous nature of the COVID-19 crisis implies it would unlikely directly alter the socio-political landscapes and institutional frameworks that traditionally shape women's pathway to leadership. Thus, the main assumption is that the conditions to access power for women were stable and dependent only on regional institutional designs captured by municipality-fixed effects.

Population size acts as an important control variable, primarily because of its effect on the mayor's wage. Salaries are closely related to population thresholds and, according to (D'Andrea, 2019), this relationship has an impact on specific procurement outcomes. For example, an increase in the mayor's salary corresponds to an increase in the number

of admitted offers and an increase in the final discounts from the reserve price. Also, the likelihood of the same organisation being awarded a contract repeatedly decreases. In addition to salary considerations, municipalities with large populations often face additional bureaucratic complexities which potentially increase the opportunities for corruption.

6 Results

In Table 6.1, I present the results of the estimation of the Equation 5.1. First, I use components of the CRI as outcome variables for Models (1)-(4). The coefficient for $WomanMayor \times Covid$ is significant and negative in all regressions except for the regression for short bidding. In particular, during the pandemic, the proportion of non-open procurement procedures and their corresponding values in the total contract values were lower in municipalities under the leadership of female mayors in comparison with municipalities with male mayors during the pandemic, suggesting a more transparent and competitive tendering process. Similarly, these municipalities were also less likely to have contracts that avoided EU oversight by setting the contract value just below the threshold, which is often associated with strategic underpricing to bypass increased regulation or use less competitive procurement procedures. However, I do not find evidence of such differences in the share of contracts with very short bidding periods, whether the threshold is set at 5, 10 days, or even just 1 day.

In model (5), the outcome variable is the CRI calculated using equal weights for each of its components. Importantly, the pandemic is associated with higher corruption risks, increasing the CRI by 0.43. However, for women, this effect was lower—the coefficient of interest is negative confirming the hypothesis that during the COVID-19 crisis female-led municipalities had a comparatively lower corruption risk in public procurement. As for the general effect of female mayors on corruption, the coefficient is most likely to be biased, so it cannot be interpreted. For the robustness check, I use principal component analysis (PCA) to determine the appropriate weights for the components, which is discussed in Section 7. This supports the hypothesis of a higher level of fairness in female-led municipalities during the pandemic and also highlights the potential benefits of diversified leadership, especially in times of crisis.

The observed positive correlation between tenure and corruption indicators suggests that the longer mayors are in politics the more opportunities they have to create a dense network of connections that can potentially facilitate corrupt behaviour. By being in office for a long time, such mayors gain not only more political power but also knowledge of the bureaucratic system, which allows them to use its nuances more effectively. Conversely, the age of the mayor at the time of election is negatively associated with corruption indicators. Older mayors, perhaps due to generational values or accumulated life

experience, might be more resistant to corrupt activities or perhaps value their reputation more, thereby avoiding illicit practices.

Table 6.1: The Effect of Female Mayor on Procurement Corruption Indicators

	Dependent variable:				
	Non-open	Value of non-open	Short bidding	Bunching	CRI
	(1)	(2)	(3)	(4)	(5)
WomanMayor	0.009**	0.009*	0.003	0.007	0.007*
	(0.005)	(0.005)	(0.003)	(0.005)	(0.004)
WomanMayor×Covid	−0.014***	−0.013***	0.001	−0.012**	−0.009**
	(0.005)	(0.005)	(0.003)	(0.005)	(0.004)
Covid	0.326***	0.590***	−0.054	0.870***	0.433***
	(0.062)	(0.067)	(0.038)	(0.073)	(0.052)
Age	−0.0004***	−0.0004***	−0.0001	−0.0004***	−0.0003***
	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Tenure	0.021***	0.020***	0.001	0.022***	0.016***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
Municipality FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	473,754	473,754	473,754	473,754	473,754
R^2	0.062	0.055	0.045	0.047	0.064
Adjusted R^2	0.049	0.042	0.033	0.034	0.051
F Statistic (df = 183; 467521)	167.515***	148.829***	121.057***	125.119***	174.074***

Note: The sample consists of municipalities with a population from 1,000 to 500,000 inhabitants. *Age* represents the age of the mayor at the time of election. *Tenure* denotes the logarithm of the mayors' years in office. All regressions include dummy variables for the mayor's education level, municipality control variables and municipality- and time-fixed effects. Robust standard errors clustered at the municipality level are in parentheses. Levels of statistical significance: *p<0.1; **p<0.05; ***p<0.01.

7 Robustness check

The Corruption Risk Index (CRI) can be calculated using various methodologies. The first approach is to assign equal weights to all parameters, assuming that each parameter contributes equally to the overall corruption risk. However, some parameters may have a more significant impact on the dynamics of corruption risks than others. An alternative method is principal component analysis (PCA). By analysing the correlation

between parameters, PCA allows the assignment of weights that more accurately reflect the contribution of each parameter to the overall corruption risk.

Table 7.1 presents regressions with the CRI constructed using different approaches. The first regression is the same as was shown before, where the CRI is calculated with equal weights. The second regression uses weights derived from PCA, assigning the lowest weight to the short bidding parameter and comparable weights to the other three components. The results of both regressions are similar.

Table 7.1: Comparison of CRI

	Dependent variable:	
	CRI	CRI_PCA
	(5)	(6)
WomanMayor	0.007*	0.007*
	(0.004)	(0.004)
WomanMayor×Covid	−0.009**	−0.010**
	(0.004)	(0.004)
Covid	0.433***	0.475***
	(0.052)	(0.055)
Age	−0.0003***	−0.0004***
	(0.0001)	(0.0001)
Tenure	0.016***	0.017***
	(0.002)	(0.002)
Municipality FE	Yes	Yes
Time FE	Yes	Yes
Observations	473,754	473,754
R^2	0.064	0.062
Adjusted R^2	0.051	0.050
F Statistic	174.074***	169.386***
(df = 183; 467521)		

Note: The sample consists of municipalities with a population from 1,000 to 500,000 inhabitants. *Age* represents the age of the mayor at the time of election. *Tenure* denotes the logarithm of the mayors' years in office. All regressions include dummy variables for the mayor's education level, municipality control variables and municipality- and time-fixed effects. Robust standard errors clustered at the municipality level are in parentheses. Levels of statistical significance: *p<0.1; **p<0.05; ***p<0.01.

8 Conclusion and Discussion

The COVID-19 pandemic, eliminating confounding factors and drawing close attention to government response mechanisms, has created a unique context for studying the complex relationship between women's representation in government on the level of corruption. This study contributes to the literature by answering the question of when women's representation changes corruption. The evidence from the crisis shows that the Corruption Risk Indicator, built using public procurement data, on average increased for municipalities in Italy. This implies that the COVID-19 pandemic not only led to a decrease in competition within public procurement due to relaxed legislative measures and the pressing urgency of addressing pandemic-related concerns, but it also heightened the risk of corruption. The lower transparency, combined with limited resources to monitor and counteract illicit activities, likely exacerbated the vulnerability of the procurement process to corrupt practices during this period. I also find that in municipalities headed by women, the level of corruption was lower compared to municipalities run by male mayors. Thus, I confirm that men and women have responded differently to the crisis and incentives it created by exhibiting different behaviours in public procurement.

However, this study has certain limitations. While addressing the challenge of quantifying corruption, the CRI is used as a corruption proxy. This indicator tracks limited competition, price and bid period manipulations. Nonetheless, it does not necessarily signify actual corruption levels. Furthermore, due to constraints in data acquisition, the CRI does not include all potential indicators. Specifically, single bidding, a significant marker of corruption within public procurement, is not accounted for. Moreover, the research does not delve into potential differences in how voters perceive and evaluate male and female politicians during the pandemic. Voters might penalize political figures for poor health crisis management, which could stem from resource mismanagement. Lastly, it is essential to note that there could be other variables correlating with the presence of a female mayor that influence corruption in public procurement.

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A Appendix

Table A.1: Statistics on Municipal Elections

Election date	Total number of municipalities	Number of elections	Women elected	Share of female mayors
2016-05-08	7999	20	0	11.50
2016-05-15	7999	1	0	11.50
2016-06-05	7999	1331	183	11.93
2016-10-23	7998	4	2	13.79
2016-11-06	7998	4	0	13.80
2016-11-13	7998	2	0	13.82
2016-11-27	7998	2	0	13.82
2017-05-07	7978	5	1	13.70
2017-06-11	7978	986	114	13.91
2017-11-05	7978	2	0	13.79
2017-11-19	7978	2	1	13.78
2017-11-26	7978	1	0	13.79
2018-04-29	7954	19	4	13.60
2018-05-20	7954	1	0	13.60
2018-05-27	7954	2	0	13.60
2018-06-10	7954	746	83	13.75
2018-07-29	7954	1	1	13.69
2018-10-21	7954	3	0	13.69
2018-11-11	7954	1	0	13.69
2018-11-25	7954	2	0	13.69
2019-03-10	7915	1	0	13.72
2019-04-28	7915	34	3	13.72
2019-05-26	7914	3745	632	14.53
2019-06-16	7914	28	4	14.33
2019-06-23	7914	1	0	14.33
2019-07-07	7914	1	0	14.34
2019-07-14	7914	1	0	14.34
2019-11-10	7914	7	1	14.34
2019-11-17	7914	2	0	14.34
2019-11-24	7914	1	0	14.33
2020-09-20	7903	945	142	14.36
2020-10-04	7903	60	5	14.84
2020-10-25	7903	154	24	14.93
2020-11-08	7903	1	0	14.91
2021-03-14	7904	1	0	14.92
2021-09-19	7904	1	0	14.92
2021-10-03	7904	1187	166	14.95
2021-10-10	7904	145	17	15.09
2021-10-24	7904	2	0	15.03
2021-11-07	7904	6	1	15.01
2022-05-15	7904	3	0	14.99
2022-06-12	7904	960	139	15.19
2022-11-13	7904	5	1	15.32
2022-11-27	7904	3	0	15.33

Notes: This table shows the number of municipalities that had elections, the number of women elected, and the percentage of female mayors in the country at each election date.

Figure A.1: Percentage of Elected Women on Each Election Date

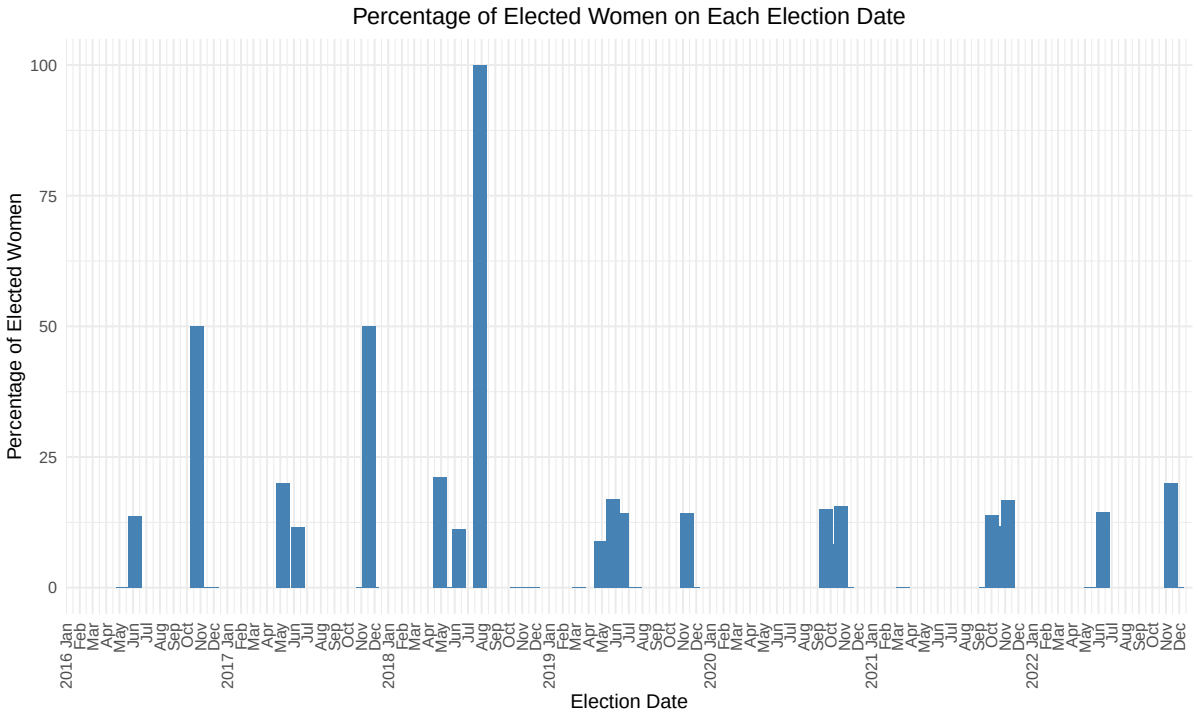
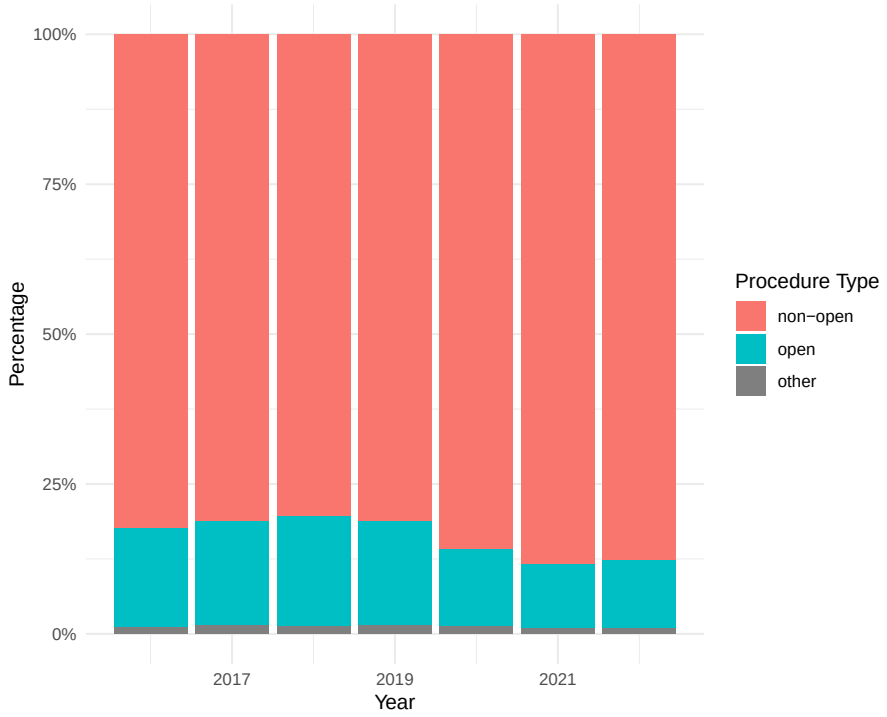


Figure A.2: Share of Non-open and Open Procedures per Year



Note: The graph displays the proportions of open and non-open procedures in all contracts. The non-open tenders include direct, restricted, and negotiated procedures, as well as competitive dialogue, innovative partnerships, and framework agreements.

Figure A.3: Full Distribution of Tender Values Relative to EU Thresholds

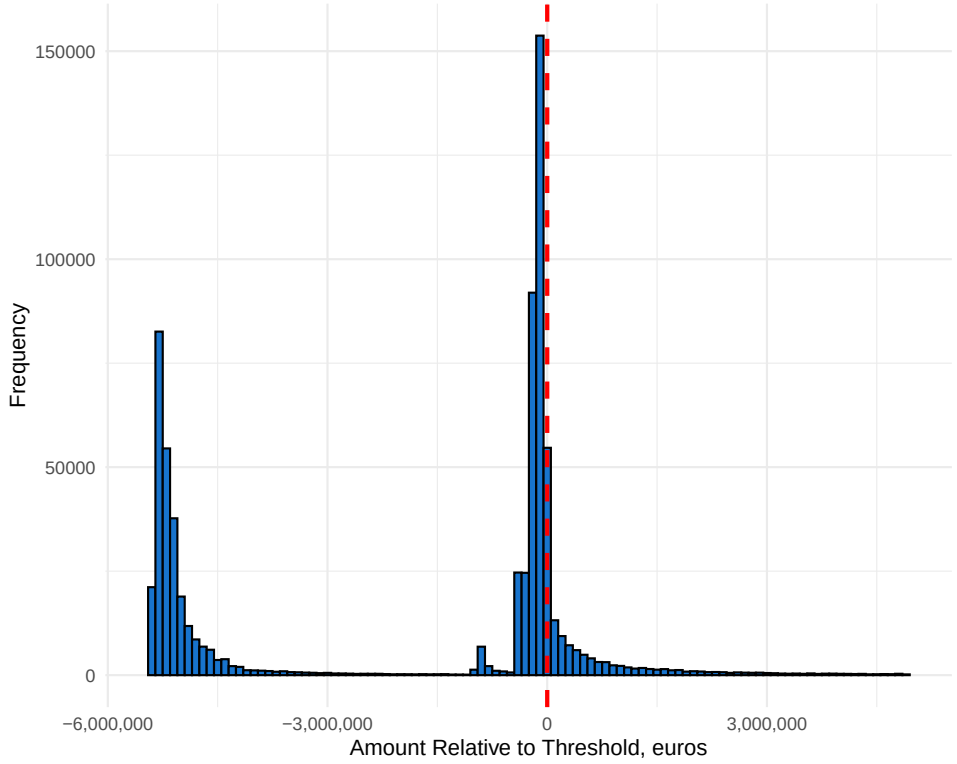
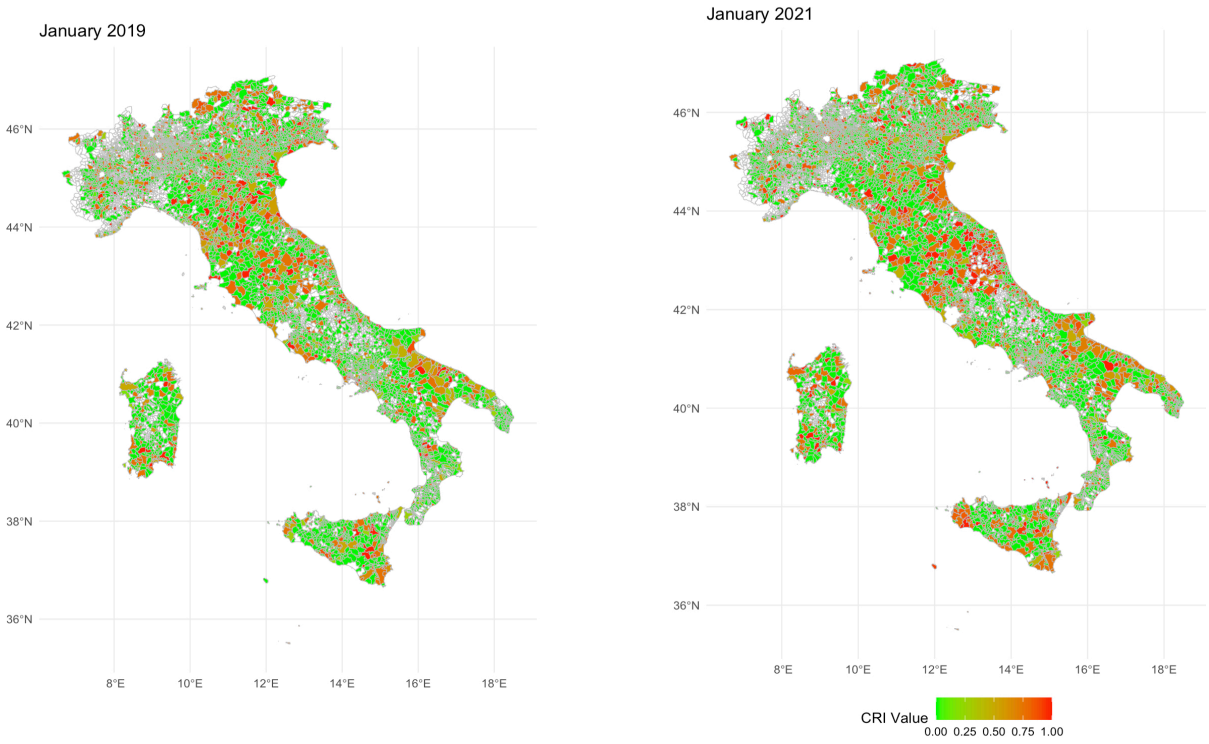


Figure A.4: Corruption Risk Indicator for 2019 and 2020 by Municipality



Note: The graphs show the values of the Corruption Risk Indicator for Italian municipalities in January 2019 and January 2020. The CRI has a scale from 0, indicating the lowest potential for corruption, to 1, indicating the highest risk. Data are for municipalities with a population between 1,000 and 500,000 inhabitants.