

Electoral Competition, Accountability and Corruption: Theory and Evidence from India.*

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May 15, 2021

*Afridi thanks the Department of Rural Development, Government of Andhra Pradesh, particularly R. Subrahmanyam and Sowmya Kidambi, for giving access to the audit reports. Toke Aidt and Girish Bahal gave valuable inputs on earlier drafts. Swati Sharma provided excellent research assistance. The authors acknowledge financial support of PPRU at the ISI (Delhi), IGC-India Central and NOPOOR (Afridi) and the Israel Science Foundation, grant #323/13 and #217/17 (Solan). This project is part of the Global Integrity Anti-Corruption Evidence (GI-ACE) programme, funded with UK aid from the UK government.

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Abstract

In developing countries with weak enforcement institutions, there is implicitly a large reliance on electoral incentives to reduce corruption. However electoral discipline works well only under some conditions. In this paper we study the effect of electoral competition on corruption when uncertainty in elections is high (or accountability is low), as in many developing countries . Our theory focuses on the case of high uncertainty and shows that in this case there is a U-shaped relationship between electoral competition and corruption. We illustrate the predictions of the model with village level data on audit detected irregularities and electoral competition from India.

KEYWORDS: Corruption, Electoral Competition, Uncertainty, Audit, Accountability.

JEL CLASSIFICATION: D72, D82, H75, O43, C72.

1 Introduction

How does the corruption of elected representatives respond to electoral incentives in a developing country context? We investigate this question in a context where legal and judicial sanctions for punishing the corrupt are weak¹ despite the existence of mandated exposure of corruption through audits of public expenditures. We capture the institutional environment by a parameter which measures uncertainty in elections. We show that, in this setting, higher competition may lead to higher corruption when uncertainty is high—generating a U-shaped relationship between competition and corruption.

We build on a standard model of agency in elections (e.g., Persson and Tabellini (2000), Besley et al. (2010)), which incorporates uncertainty. The literature defines *electoral uncertainty* (see, e.g., Persson and Tabellini (2000) Ch.4, p.73, Polo (1998)) as a parameter measuring the extent to which the corruption level chosen by a party reduces the probability of winning. The larger is this parameter, the lower the responsiveness of voters to corruption. Thus electoral uncertainty reduces the degree of accountability of political leaders.² We capture the difference between strong institutions (in developed countries) and weaker institutions (in developing countries) by differences in the level of accountability. While scholars have focused on only the interior solution in this model, we study the full range of the parameter space and characterize the equilibria across different regions.

In our model, there are two parties each of which runs on a platform that commits to a certain level of corruption (so voter information is not a friction). One party has an electoral advantage stemming from a relatively higher valence, or ex-ante preference. We follow the literature in interpreting more competitive elections as lower valence or preference advantage for one party. Candidates have ego rents from office while voters care about corruption and valence. Corruption refers to the use of public funds for personal gain and includes bribes, false invoicing and favouritism in contracting when they lead directly or indirectly to an

¹See e.g. Afridi and Iversen (2014) for evidence on the absence of legal punishments for corruption in our setting.

²We will use the term electoral uncertainty or simply uncertainty, synonymously with *accountability* (in the opposite direction of course).

increase in personal wealth.

While Besley et al. (2010), Persson and Tabellini (2000), Svaleryd and Vlachos (2009) consider the special case where uncertainty is low and ego rents are high, we focus instead on the region with high uncertainty and low ego rents which may correspond more closely to the setting in developing countries. In this setting we find that very high levels of competition are as bad for corruption as very low levels of competition. When competition is too low, the result replicates what has been studied before. However, when competition is very stiff, corruption increases, in contrast to what has been emphasized in the literature. Our contribution is to highlight this counter intuitive interaction between uncertainty and competition.

The intuition for this result is that politicians trade off the increase in utility from higher corruption to the decrease in the probability of winning. In a setting where electoral uncertainty in the environment relative to ego rents is low then this is precisely the situation. A marginal reduction in valence advantage then induces the leading candidate to reduce corruption, which in turn forces the lagging candidate to also engage in less corruption in order to stay competitive. However, when uncertainty is sufficiently high relative to ego rents the voters are not responsive to changes in corruption to the same extent. In this case, for high enough competition, the two candidates are almost symmetric and both choose maximal corruption. When valence advantage increases for the leading candidate, the corruption level of the advantaged candidate stays high but the disadvantaged candidate must reduce corruption to ensure a positive probability of winning. As a result, it is possible that when accountability is weak, average corruption may increase with an increase in competitiveness. It turns out that this perverse effect exists only for moderate valence differences, leading to an overall U-shaped relationship between competitiveness and corruption.

We show that the U-shaped relationship between competition and corruption predicted by the model is consistent with empirical evidence on corruption in one of the largest public programs in India: the National Rural Employment Guarantee Act (NREGA) - a rights based program that aims to guarantee 100 days of annual work to rural households willing

to volunteer adult labor to rural public works. As is true with most public programs in developing countries, NREGA has also been besieged with apprehensions about theft and leakage of public funds (Afridi and Iversen (2014)). India is typical of a developing country with weak institutions, thus it offers an appropriate setting for the theory.³ However, a major concern that plagues most studies on malfeasance in public programs is the lack of objective measures of corruption. A novel feature of the NREGA is mandatory audits of projects implemented under the program.

We construct village level panel data on irregularities reported in audit reports in the state of Andhra Pradesh (AP), during 2006-10. Data on objective measures of corruption in the NREGA from almost 300 village councils are paired with information on prior election to the position of village council headships in 2006 for a five year term. These village councils are responsible for planning and the subsequent execution of at least 50 percent of all NREGA works. Using the margin of victory between the top two candidates in the 2006 elections as our measure of electoral competition, we show that the regularities in our data strongly support the theoretical predictions - corruption responds non-monotonically to higher competition. At intermediate levels of competition we estimate that the number of irregularities decline to half the average number of total irregularities, while at high levels of competition, the number of irregularities double relative to the average.

Ideally, we would have some variation in accountability across constituencies, to be able to test the theory directly. In the absence of such data, we use variation in the accountability for different types of goods provided to voters by the program. Assuming that (as shown in Broilo (2008)), when corruption does not take away their private benefits, voters are less responsive to allegations of corruption - we can plausibly proxy our concept of accountability with the type of theft so that there is lower accountability in public goods than in private

³Surprisingly the Indian state is quite small on a per capita basis, yet beset by problems of over bureaucratization. The absolute size of the elite administrative cadres that run the country have dropped despite the large growth in population, the judicial system has a backlog of 31 million cases some of which have been pending for at least a decade. India ranks 130th out of 189 countries on the World Bank's "Ease of doing business" index, 178th in "enforcing contracts" 183rd in "ease of getting a construction permit." (<https://carnegieendowment.org/2017/05/15/weak-public-institutions-behind-india-s-low-state-capacity-pub-69971>.)

goods.⁴ Consistently with our theory that accountability mediates the relationship between competition and corruption, we find that pilferage from the public goods provided by the program (e.g., over reporting the expenditure on materials used for road construction) is not just 15 times higher on average but is also less responsive to competition than the private goods component (the U-shape becomes flatter, as predicted by the model).

The relationship between various economic outcomes and competition has been analysed theoretically and empirically in various settings. Besley et al. (2010) study the effects of electoral competition on growth in US municipalities and finds positive effects of competition on growth. Svaleryd and Vlachos (2009) show that rents are decreasing both as voter information increases and as competition increases in Swedish municipalities.⁵ Banerjee and Pande (2009) demonstrate how limited electoral competition (having a dominant caste group in the constituency) can have adverse consequences on the quality of candidates in the majority party in a state in India.⁶

An emerging empirical literature (see De Vries and Solaz (2017) for an excellent survey) studies the incentives of voters to punish corrupt politicians. For example, lack of credible information on corruption, partisan confirmatory bias, lack of ability to attribute corruption, the trade offs between other dimensions on which to vote, the non availability of viable alternatives may all break the chain of voter response. Brollo (2008) show that voters punish corrupt politicians only when there is a threat of losing benefits, while Avis et al. (2018) show that non-electoral punishment has a much bigger effect on reducing corruption after an audit. Moreover, voters may not be able to coordinate on sanctioning corrupt politicians. In turn, the question of how politicians respond to such anticipated sanctioning

⁴Since audit information is supposed to be available at village meetings, we suggest that villagers have higher incentives to take action against corruption that affects them personally (wage payments) rather than via quality of roads etc. which might suffer from free riding problems.

⁵Ferraz and Finan (2011) find that corruption is lower in Brazilian municipalities when incumbents have re-election incentives (first term mayors) compared to when they do not (last term mayors). To support the mechanism by which incumbents respond to threat of electoral punishment, Ferraz and Finan (2008) provide evidence that incumbents exposed as corrupt were punished in the subsequent election especially in municipalities where media could help in publicising the audits. However they do not investigate the effects of competition explicitly.

⁶Banerjee and Pande (2009) is a similar setting to ours but they do not consider the role of uncertainty as a mediating influence on the relationship between competition and corruption and do not find higher corruption with higher ethnic fragmentation.

failures by voters behaviour has not received much attention (De Vries and Solaz (2017)). This is what we focus on in this paper.

We claim that uncertainty is high in the Indian electoral environment at least partly because the high poverty levels of village voters (average rural monthly per capita income was less than INR 1600 in AP during 2011-12 (Tendulkar Committee estimates)) imply that they mainly respond to personalised benefits rather than corruption as an abstract concept. E.g., Witsoe (2011) in an ethnographic study of villages in Bihar, North India, documents the way voters view electoral participation as a way to garner resources for their kin. Goyal (2019) is a large scale study of how Indian voters fail to reward public goods provision by politicians, and fail to punish poor performance or corruption.

Second, in contrast to developed countries, ego rents/wages for political leaders in Indian villages are extremely low-akin to minimum wages in most urban areas. For instance, even after doubling of salaries in Andhra Pradesh in 2015 the head of the village council receives only INR 3000⁷ per month, and for the period of our study this was INR 1000.⁸ Indeed in some villages in neighboring states, the council head does not receive a salary, only a small expense account. Governors of US states who are the subject of the Besley et al. (2010) study earn a minimum of \$70,000 in 2019.⁹ On the other hand, potential rents from office are a multiple of this - our data puts this number at INR 16,329 per irregularity as discovered by audits.¹⁰

Our paper contributes to the emerging view that in democracies with weak enforcement institutions (see, e.g., Sukhtankar and Vaishnav (2015) for the case of India), too high a level of electoral competition creates perverse incentives, not only in the selection of worse politicians (Aidt et al. (2013)) but also in creating worse incentives while in office. Chatterjee (2018) uses the case study of electricity provision in India (West Bengal) to show that too high a level of party political competition led to a failure of an important

⁷The exchange rate in 2015 was 1 USD= Rs. 65.

⁸<https://timesofindia.indiatimes.com/city/hyderabad/AP-government-hikes-local-body-representatives-salaries/articleshow/48862534.cms>.

⁹From https://ballotpedia.org/Comparison_of_gubernatorial_salaries.

¹⁰High levels of corruption in village politics in Andhra Pradesh have been documented in a qualitative study of 18 villages by Powiss (2007).

reform. Gottlieb and Kosec (2019) use four decades of data from 164 countries to see how competitive elections affect policymaking and public services provision. They find that while in mature democracies, highly contested races lead to more responsive governments, in young democracies such as Mali, Pakistan and Guatemala governments become less effective when elections are cut throat. Heggedal et al. (2018) study the effects of wages and uncertainty on rent seeking in a lab experiment, and show that higher uncertainty or lower wages lead to higher rent seeking. The difference from our study is that we focus specifically on the interaction of uncertainty and competition on rent seeking and our interest is on the perverse effects of high electoral competition in an environment of high uncertainty.

Our results have some key policy implications. First, the analysis highlights the need for enhancing the credibility of an audit process through strict enforcement of legal penalties on the corrupt, rather than relying on elections to provide discipline, as shown in Avis et al. (2018).

Second, the results point to the importance of improving voter responsiveness to the potential leakages in the public goods provided by government programs. In our context, the magnitude of the irregularities is almost three times larger in this component of the program we study relative to the private goods component. However, interventions aimed at reducing theft in the public component of welfare programs in low income democracies have typically not been implemented at scale, even though such policies may have a large impact on total welfare loss to citizens.

The remainder of the paper is organized as follows: Section (2) describes the model and its predictions. Section (3) presents the institutional background of the NREGA, Section (4) presents the data and methodology, while Section (5) presents and Section (6) discusses the empirical findings. We conclude in Section (7).

2 Theoretical Model

2.1 The set up

In this section we present a very simple and stylistic (standard) model of electoral competition, close to Besley et al. (2010). In the model, there are two candidates (or parties) L and R and an infinite number of voters. We have a one shot game where each candidate $j \in \{L, R\}$ proposes a corruption level $x_j \in [0, 1]$ and commits to it. The candidate with the higher vote share wins and gets an office payoff $w > 0$ in addition to the benefit from corruption.¹¹ We assume that there is a maximum limit to corruption which we normalize to 1, and that a candidate cannot engage in negative corruption to increase winning probability. While it may be a strong assumption to consider commitment to a level of corruption in a one-shot election, what we really have in mind is a stationary equilibrium in a repeated election where each player j develops a reputation for a level of corruption x_j .¹²

We assume that while the electoral outcome is uncertain, candidate L has a valence advantage. Formally, we consider that representative voter utility is driven by two factors: corruption and valence.¹³ We normalize the valence factor of L to 0. The utility from valence for R is $\beta + \eta$, where β is a commonly known parameter and η is a random variable measuring noise. WLOG, we take $\beta < 0$, i.e., the competitive advantage lies with L . We assume that η is uniformly distributed in $[-\varepsilon, \varepsilon]$. The parameter ε is best thought of as accountability or uncertainty- we use these terms interchangeably in the rest of the paper.¹⁴ Accountability is lower or uncertainty higher when voting decisions are made on factors other than factors that enter into the voter's utility functions- corruption and valence.

Therefore, the utility for a voter from L is $-x_L$ and that from R is $-x_R + \beta + \eta$.

¹¹The benefits from winning office can be of two possible kinds. Some of the benefits come at the cost of the voters (e.g., kickbacks from contracts) and some do not directly hurt the voters (e.g, perks, ego rents). We term the former as corruption and the latter as rents from office. We treat the extent of corruption as a strategic variable and the rent from office as exogenous.

¹²It is easy to construct a repeated game where commitment is not assumed but arrived at endogenously. The proof is available on request.

¹³Note that the model can be interpreted as one with swing voters and partisan voters as well.

¹⁴This is the interpretation used by Persson and Tabellini (2000).

Candidate L wins if

$$\begin{aligned} -x_L &\geq -x_R + \beta + \eta, \\ \text{or } \eta &\leq x_R - x_L - \beta. \end{aligned}$$

Thus, the winning probability of L given a pair of actions $x = \{x_L, x_R\}$ is

$$p_L(x) = \begin{cases} 1, & \text{if } x_R - x_L - \beta \geq \varepsilon, \\ 0, & \text{if } x_R - x_L - \beta \leq -\varepsilon, \\ \frac{1}{2} + \frac{x_R - x_L - \beta}{2\varepsilon}, & \text{o/w.} \end{cases}$$

and that of R is $p_R(x) = 1 - p_L(x)$. The winning candidate $w(x) \in \{L, R\}$ obtains a payoff of $w + x_{w(x)}$ while the other candidate obtains 0. The parameters of our model are $w > 0$, $\varepsilon > 0$, and $\beta < 0$. Based on these parameters, each candidate sets his corruption platform to maximize the expected payoff.

At this point, it is important to comment on the interpretation of the parameters of the model. The valence advantage β is the extent to which the candidate has a higher likelihood of winning even if both engage in the same level of corruption. This can arise from the composition of the electorate in terms of primitive preference for the candidates or information about their perceived ability. A higher absolute value of β is interpreted as a less competitive electorate. The term ε is best thought of as capturing the extent of accountability (in the inverse). A lower value of ε induces a larger reduction in winning probability for the same increase in corruption. Alternately, large values of ε reduce the value of reducing corruption to win elections. This reflects the strength of the electoral institution in disciplining the candidates. An alternative interpretation, one that was used in Besley et al. (2010), is that ε captures the extent of uncertainty or variance in voter preferences when viewed from the candidates' perspective. Our model is essentially the same as that in Besley et al. (2010), in order to facilitate comparison with their results.¹⁵

¹⁵A more elaborate way of capturing competitive advantage has been followed in Besley et al. (2010). In their formulation, σ is the share of non-partisan voters. Of the remaining $1 - \sigma$, $\frac{1+\lambda}{2}$ support L and

Another key assumption for our results is that rents are bounded. This is a plausible assumption based on our setting where village chiefs get a budget based on the demand for jobs, which itself is limited by the budget constraints of the government.¹⁶ Besides the fact that with unbounded rents, the model becomes uninteresting as it does not capture the trade off between electoral victory in future vs higher rents now, it is also a standard assumption in the literature (e.g., Persson and Tabellini (2000), Svaleryd and Vlachos (2009)).

2.2 Choice of corruption levels

There are three drivers of corruption in our model. A higher rent from office w intensifies the competition for office and forces both to reduce corruption. A lower accountability (higher ε), on the other hand, makes it less beneficial to reduce corruption. Since w and ε work in opposite directions, we henceforth shall consider the composite parameter $z = \varepsilon - w$ which reflect uncertainty relative to ego rent. A higher competitive advantage of valence gap in favour of L raises the corruption level of L and reduces the corruption level of R.

First, we study the Nash equilibria that are interior points. From the reaction functions, it is easy to see that corruption has the property of strategic complementarity.

$$x_L(x_R) = \frac{1}{2}[x_R + z - \beta], \quad (1)$$

$$x_R(x_L) = \frac{1}{2}[x_L + z + \beta]. \quad (2)$$

Interior solutions are given by

$$\begin{aligned} x_L &= z - \frac{\beta}{3} \equiv \hat{x}_L, \\ x_R &= z + \frac{\beta}{3} \equiv \hat{x}_R. \end{aligned}$$

¹⁶ $\frac{1-\lambda}{2}$ support R . Each nonpartisan voter's net utility from R given platforms x is $x_L - x_R + \omega + \eta$, where ω is an idiosyncratic shock distributed $U\left[-\frac{1}{2\varphi}, \frac{1}{2\varphi}\right]$ and η is a common shock distributed $U[-\varepsilon, \varepsilon]$. While choosing their platforms, candidates do not know the realization of the common shock. This gives us the same structure, with $\beta = -\frac{1-\sigma}{\sigma} \frac{\lambda}{2\varphi}$.

¹⁶See, e.g., Sukhtankar (2017) for evidence on rationing of jobs in NREGA, the programme from which we get our data.

In the interior equilibrium we have (i) $\hat{x}_L > \hat{x}_R$ since we assume $\beta < 0$, and (ii) \hat{x}_L is increasing while \hat{x}_R is decreasing in $-\beta$. Observed corruption is decreasing in the degree of competitiveness of the electorate, as the more corrupt candidate (L) wins with a higher probability. This is the result in Besley et al. (2010).¹⁷ The next proposition presents the Nash equilibrium characterization. There are eight different regions, and in order to avoid clutter we express sometimes the equilibrium values in terms of best responses with the expressions $x_J(x_{-J})$ from equations (1) and (2).

Proposition 1 *The Nash equilibrium quantities (x_L, x_R, p_L) are as follows.*

(1.1) *When $-\beta \geq 1 + \varepsilon$, $x_L = 1$, $p_L = 1$, and x_R takes any value in $[0, 1]$.*

(1.2) *When $-\beta \in (\max\{\varepsilon, 3\varepsilon - w\}, 1 + \varepsilon)$, $x_L = -\beta - \varepsilon$, $x_R = 0$, and $p_L = 1$.*

(2.0) *When $-\beta \leq \min\{3(\varepsilon - w), 3(1 - (\varepsilon - w))\}$, $x_L = \hat{x}_L$, $x_R = \hat{x}_R$, and $p_L = \frac{1}{2} - \frac{\beta}{6\varepsilon}$.*

(2.1) *When $-\beta \leq \varepsilon - w - 1$, $x_L = x_R = 1$, and $p_L = \frac{1}{2} - \frac{\beta}{2\varepsilon}$.*

(2.2) *When $-\beta \leq \min\{\varepsilon, w - \varepsilon\}$, $x_L = x_R = 0$, and $p_L = \frac{1}{2} - \frac{\beta}{2\varepsilon}$.*

(2.3) *When $-\beta \in (\max\{2 + w - \varepsilon, \varepsilon - w + 1\}, 1 + \varepsilon)$, $x_L = 1$, $x_R = 0$, and $p_L = \frac{1}{2} - \frac{1 + \beta}{2\varepsilon}$.*

(2.4) *When $-\beta \in (\max\{3(1 - (\varepsilon - w)), \varepsilon - w - 1\}, \varepsilon - w + 1]$, $x_L = 1$, $x_R = \frac{1}{2}(1 + \varepsilon - w + \beta)$ and $p_L = \frac{1}{2} - \frac{1 + \beta + w - \varepsilon}{4\varepsilon}$.*

(2.5) *When $-\beta \in (\max\{w - \varepsilon, 3(\varepsilon - w)\}, \min\{3\varepsilon - w, 2 + w - \varepsilon\}]$, $x_L = \frac{1}{2}(\varepsilon - w - \beta)$, $x_R = 0$, and $p_L = \frac{1}{2} - \frac{\beta - (w - \varepsilon)}{4\varepsilon}$.*

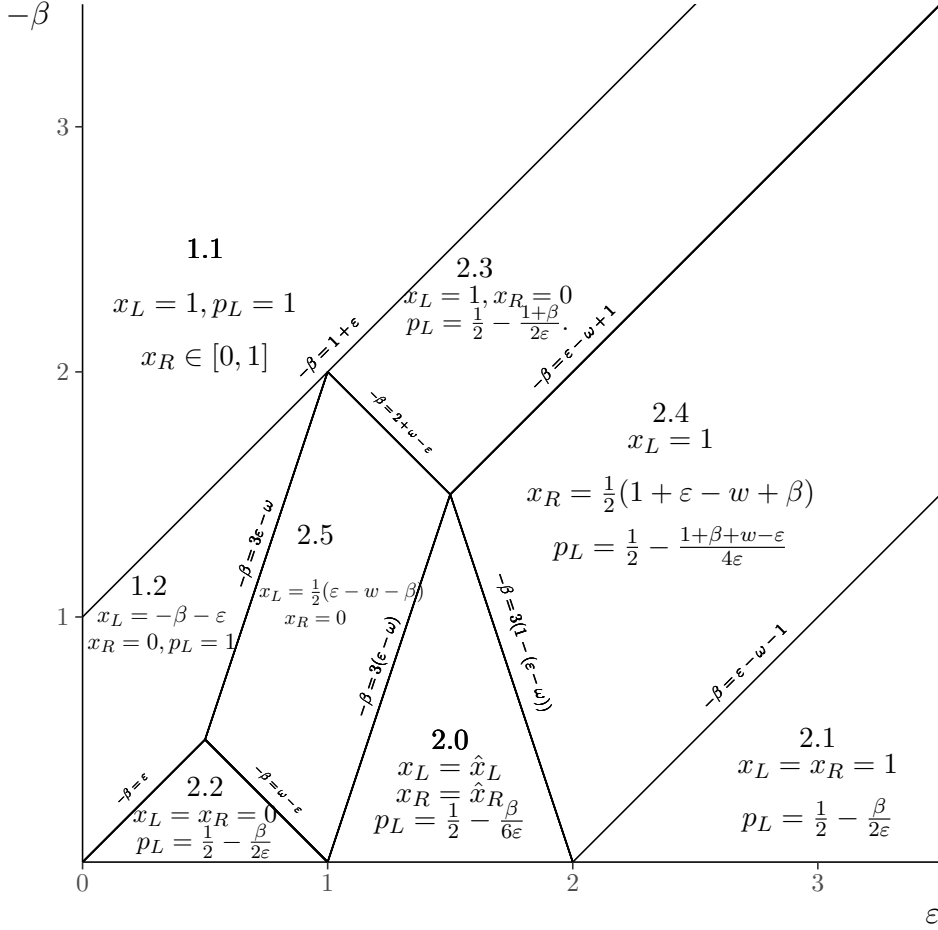
The Nash equilibrium (x_L, x_R) quantities are continuous in (β, ε, w) .

The proof is in the Appendix.

Figure 1 below illustrates the Nash equilibrium on the (β, ε) plane for a fixed value of w .

¹⁷They do mention, however, that there may be non-monotonicities in corner cases.

Figure 1: Regions in Proposition 1



It is important to note that while there are several regimes, there are some regularities: x_L is weakly increasing and x_R is weakly decreasing in L's competitive advantage $-\beta$, and p_L is greater than $\frac{1}{2}$ and strictly increasing in $-\beta$ until it reaches 1.

2.3 Observed corruption

Proposition 1 characterizes the equilibrium actions of candidates across all possible values of the parameters. However, the equilibrium actions are not observable in the data.

We only observe the corruption choice of the winner in our data. Hence, we concentrate on the expected corruption by the winner in Nash equilibrium, which is

$$X = x_L p_L + x_R (1 - p_L). \quad (3)$$

This quantity is, in fact, our object of interest.

The general conclusion from Proposition 1 and the detailed discussion in the Appendix is that a more competitive electorate leads to less corruption only if accountability is high enough relative to ego rents. Let $z = \varepsilon - w$. Proposition A.1 describes in full detail how expected corruption by the incumbent changes with competitiveness of the electorate for different levels of z .

We highlight here the main features of Proposition A.1 using the following two claims:

Claim 1 *Suppose $-\beta \leq \min(3z, 3(1 - z))$, which implies that $z \in [0, 1]$. Then the Nash equilibrium is the interior solution $x_L = z - \frac{\beta}{3}$, $x_R = z + \frac{\beta}{3}$. The quantity x_L is increasing and x_R is decreasing in $-\beta$ and $p_L > \frac{1}{2}$. Moreover, $X(-\beta) = p_L x_L + (1 - p_L) x_R$ is increasing in $-\beta$, the competitive advantage of L.*

This claim follows from Proposition 1 and corresponds to region (2.0) of the proposition. This is the region that most of the literature (e.g., Besley et al. (2010) and Svaleryd and Vlachos (2009)) has focused on, leading to the result that competition is inversely related to corruption. In this region, we have the interior solution: an increase in valence advantage of L allows it to raise its level of corruption. There are two opposite effects on R: the direct effect reduces its corruption, but the strategic effect increases corruption due to strategic complementarity. Overall, the direct effect dominates and the corruption level of R goes down with $-\beta$. It is important to note that $p_L > \frac{1}{2}$ and it increases fast enough that X is increasing in L's competitive advantage.

In contrast, consider what happens when z is not in the interval $[0, 1]$. Below we focus on the case $z > 1$, corresponding to the case in developing countries that we are particularly interested in.

Claim 2 *Suppose $z > 1$. Then in the Nash Equilibrium, $x_L = 1$ and*

$$x_R = \begin{cases} 1, & \text{if } -\beta \leq z - 1, \\ \frac{1}{2}(1 + z + \beta), & \text{if } -\beta \in (z - 1, z + 1), \\ 0, & \text{if } -\beta \geq z + 1. \end{cases}$$

$X(-\beta)$ is initially constant at 1, then it has a U-shaped segment until it reaches 1 again.

Claim 2 illustrates the key point we want to highlight: high levels of electoral competition, measured as the systematic preference gap between parties, may have perverse effects in institutional settings characterised by high z .

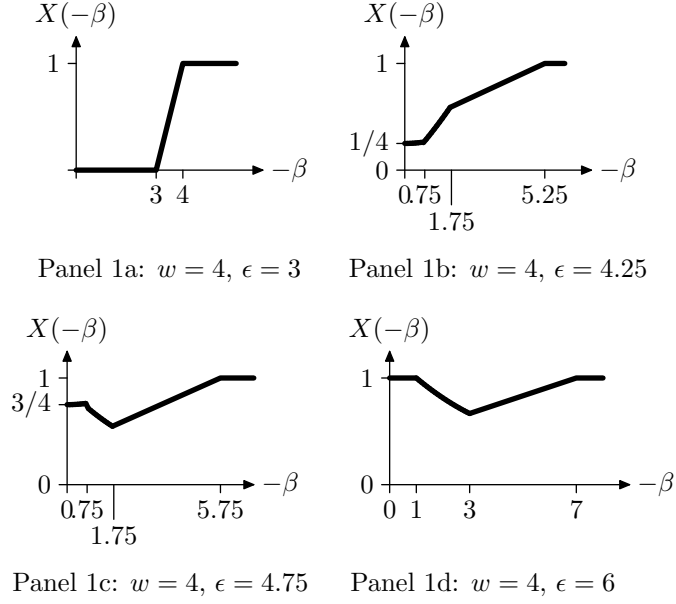
When $z > 1$, accountability is low enough that the candidate with advantage (i.e., L) always engages in maximal corruption. When the electorate is competitive, this allows the disadvantaged candidate (i.e., R) to mimic L and then both are maximally corrupt, implying $X = 1$ (region 2.1). When the valence advantage for L crosses a threshold, R is forced to reduce corruption in order to stay competitive (zone 2.4), leading to a drop in X with the increase in $-\beta$. When $-\beta$ is large enough however, X starts increasing as L wins with sufficiently high (and increasing) probability.

The above two claims contrast the shape of $X(-\beta)$ for two specific parameter sets. Proposition A.1 presented in the appendix presents in detail how the expected incumbent corruption X behaves as a function of competitiveness of the electorate $-\beta$ for all possible values of z . The general lesson is that there is some threshold value $z_0 \in (0, 1)$ of z below which $X(-\beta)$ is (weakly) increasing.¹⁸ Above z_0 , $X(-\beta)$ is non-monotonic, and in particular, it is U-shaped if $z > 1$.

Figure 2 below, based on Proposition A.1, illustrates the function $X(-\beta)$ for several different values of ε ., fixing $w = 4$. In particular, panel 1b in Figure 2 presents the special case of moderate/high accountability ($0 \leq z \leq z_0$). Here, for smaller values of $-\beta$ we are in the interior solution regime (region 2.0), and for larger values we have $x_L = 1$ and $x_R = 0$ (region 2.3), with X increasing in $-\beta$ throughout. By contrast, Panel 1d in Figure

¹⁸This cut-off z_0 is given by $\max\{\frac{3-w}{4}, \frac{1}{2}\}$

Figure 2: Regions in Proposition A.1



2 illustrates the function X corresponding to low accountability, i.e., $z > 1$ as presented in claim 2.

It is illustrative to study how the level of corruption changes with accountability when the electorate is highly competitive, i.e., $-\beta$ is close to zero. Proposition A.1 shows the value of X for $|\beta| \rightarrow 0$ is 0 when $z \leq 0$ (zone 2.2), positive when $0 < z < 1$ (zone 2.0), and 1 when $z \geq 1$ (zone 2.1). The intuition for this result is the following: Party j 's utility is given by: $U_j = (x_j + w)P_j$. If $P_j \in (0, 1)$, then $\frac{\partial U_j}{\partial x_j} = P_j + (x_j + w)\frac{\partial P_j}{\partial x_j} = P_j - (x_j + w)\frac{1}{2\epsilon}$. Parties trade off the increase in utility from corruption to the decrease in the probability of winning when corruption increases. Assume now that $|\beta| \rightarrow 0$. Then the game becomes symmetric between the two parties, $x_L \approx x_R = x$ and $P_j \rightarrow \frac{1}{2}$. Thus, $\frac{\partial U_j}{\partial x_j} \approx \frac{1}{2} - \frac{x}{2\epsilon} - \frac{w}{2\epsilon}$. When $z = \epsilon - w < 0$, we have $\frac{\partial U_j}{\partial x_j} < 0$ for all x , implying that $X(|\beta|) = 0$. When $z > 0$ and sufficiently large ($z > 1$), we have $\frac{\partial U_j}{\partial x_j} > 0$ even for $x = 1$, implying that $X(|\beta|) = 1$.

While Besley et al. (2010) focus on the beneficial effects of competition on governance, we use a similar simplified model and focus on a different region of the parameter space. Note that there is no reason to focus only on one region of the parameter space - which

region to focus on should be guided by the interpretation of ε . Our main contribution is to apply the model to the region $z > 1$ in Proposition A.1, which more closely resembles the the institutional constraints in developing countries. Assuming that there is some maximum bound to corruption allows us to show that the relationship between competition and corruption may be U-shaped when uncertainty in voting is high and/or rent from office is comparatively low. We do not claim that these results are universally applicable. The point is to use the model as a conceptual framework to examine some of the drivers of the negative effects of very stiff electoral competition- a situation that is pervasive in many developing democracies (Gottlieb and Kosec (2019)).

Remark 1 *While the theoretical model measures competition using $|\beta|$, a preference parameter of the population, the empirical results are based on the Margin of Victory. We only observe margin of victory of the incumbent. Proposition A.2 in the Appendix shows that the expected value of the margin of victory is strictly increasing in $|\beta|$.*

In the next section we illustrate our results using data from a large employment guarantee program (NREGA) in India.

3 Context: The National Rural Employment Guarantee Act (NREGA)

Our context for empirically testing the theoretical propositions above is the National Rural Employment Guarantee Act, which (Ministry of Rural Development, Government of India (2005)) mandates the provision of 100 days of manual work on publicly funded projects to rural households in India. As of 2011-12, when our data were collected, the Act provided employment to almost 40 million households at an annual expenditure of more than \$8 billion, making it one of the most ambitious poverty alleviation programs in India to date. Niehaus and Sukhtankar (2013) document high levels of corruption in NREGA- in the order of 75-80% of the reported expenditures with the vast majority coming from over reporting

of expenditure on public works. Underpayment of wages increased after a statutory increase in wages from 2007.

While the primary objective of the program is social protection through the provision of employment, it also aims to create durable assets for the community, as a whole, and for socio-economically disadvantaged individuals (e.g., irrigation canals, ponds for water conservation, development of land for cultivation by socially disadvantaged groups and other rural infrastructure). Thus, unlike the typical government transfer programs which either provide public goods (e.g., road construction) or private goods (e.g., subsidized foodgrains and school meals), the NREGA is unique in delivering both types of goods, thus providing some variation in voter responsiveness and accountability. The leader of the village council or Gram Panchayat (GP), the *sarpanch*, is directly elected by its adult residents and holds the overall responsibility for decisions made by the GP. At least 50 percent of the NREGA projects have to be implemented by the GP (and the remainder by the upper two tiers of the panchayat), who therefore has both power and discretion in the use of funds.

Another novel feature of the NREGA, unlike all other public programs in India, is mandated audits of program expenditures at the village level.

3.1 NREGA in Andhra Pradesh

We use data from the southern state of Andhra Pradesh (AP) for the period 2006-10.¹⁹ As of 2011, AP was India's fifth largest state in terms of population (Ministry of Home Affairs, Government of India (2015)) and among the leading states in NREGA implementation due to consistently high generation of NREGA employment. The rural literacy rate in the state was 61% according to the Census of 2011. 11% of the rural population was below the poverty line and the average monthly per capita expenditure (MPCE) was Rs. 1563 in 2011-12.²⁰

The GP maintained a crucial role in managing and executing NREGA projects during

¹⁹In 2014 Andhra Pradesh was bifurcated into two separate states - Andhra Pradesh and Telangana.

²⁰See the Tendulkar Committee poverty estimates: <https://niti.gov.in/sites/default/files/2020-05/press-note-poverty-2011-12-23-08-16.pdf>. In rural India the literacy rate was higher at 69% with 26% of population below poverty line and an MPCE of Rs. 1287.

the period of our study in AP.²¹ First, the Field Assistant (FA), a resident of the GP who represents the direct interface of beneficiary households with the program, e.g., maintaining labor records at worksites, assists the village council in NREGA implementation and is appointed on the recommendation of the village council. Second, the *sarpanch* selected suppliers of the material inputs to projects implemented under the program and was therefore well positioned to fudge material expenditures in connivance with the technical staff (viz., Assistant Engineers, Technical Assistants, and/or the suppliers) as suggested by anecdotal evidence from the field. The village council and its leader, thus, are accountable for program implementation and the labor and material expenditures on the NREGA projects. While the potential magnitude of pilferage from public funds²² rose dramatically with the introduction of the NREGA, the wages of the *sarpanch* remain very low and have not kept pace.²³

Our model assumes that corruption is observed by voters- this would not be the case if audits were politically motivated. However, evidence suggests that audits are mostly independent from political influence and are honest in our case study. AP has vested the audit responsibility within an autonomous arm of its Department of Rural Development, viz., the Society for Social Audits, Accountability and Transparency (SSAAT). Headed by a non-partisan social activist, the SSAAT has conducted regular and systematic audits of NREGA projects since the inception of NREGA in 2006. The state claims to maintain high levels of accountability and transparency in program implementation Aiyar et al. (2013).²⁴

The audit process combines a top-down approach with grassroots, beneficiary participation (Aiyar and Kapoor Mehta (2015)). A single audit covers all GPs in the sub-district (*mandal*) and is followed by a mandal level public hearing to discuss the findings with mandatory attendance by all stakeholders. A decision taken report pins the responsibility

²¹(www.rd.ap.gov.in).

²²Powiss (2007) documents how local leaders help constituents to get access to development funds in return for a share of the wages. Some of the funds so obtained are used for campaigning but ultimately there are rewards in terms of lucrative contracts down the line.

²³The latest salary revision puts wages at INR 3000 in AP from 2015 onwards and for the period of our study, wages were considerably lower at INR 1000. <https://timesofindia.indiatimes.com/city/hyderabad/AP-government-hikes-local-body-representatives-salaries/articleshow/48862534.cms>

²⁴The SSAAT has created checks and balances within the audit process such that the auditors do not get corrupted, e.g., the membership of the audit team is deliberately varied across audit rounds in each mandal and GP to prevent auditors from developing biases or getting entrenched.

of each irregularity on one or multiple program functionaries, although evidence suggests that punishment is weak.²⁵ Systematic and standardized audits were carried out in all 23 districts of the erstwhile state with an average of over two rounds of audits completed per GP between 2006 and 2010. We combine audit data with elections to GP headships in July 2006 for a five year tenure.

4 Data and methodology

4.1 Data

We use two main sources of data in this paper. First, official and original audit reports for 100 randomly sampled mandals across 8 districts of AP were obtained from the state auditor.²⁶ In each randomly chosen mandal, three GPs were selected based on the following criteria: the GP which was the administrative headquarter of the mandal, one GP randomly selected from all GPs reserved for a woman sarpanch and one randomly selected from GPs not reserved for a woman sarpanch in that mandal in 2006.²⁷ We, thus, randomly sampled 300 GPs across the 100 mandals. We extracted data from the first round of audits that began in 2006 and until mid-2010. Panel data of audit report findings were constructed for each sampled GP with an average of over two reports per GP for this period.²⁸ The second data source is a primary survey we conducted in all 300 sampled GPs in 2011-12 to collect information on GP and sarpanch characteristics. Retrospective data on the elections to the village council (votes received by each contestant in the sarpanch election and their party

²⁵Afridi and Iversen (2014) point out that while the audits were successful in detecting irregularities they were per se unable to reduce thefts as "less than 1% of irregularities for which one or multiple program functionaries were held responsible ended in termination/dismissal/removal from service or criminal action".

²⁶These eight districts were Mahbubnagar, Medak, Nizamabad, Warangal, and Khammam (north or Telangana region, now part of Telangana state), Anantpur and Kurnool (south or Rayalseema region), and Guntur (west or coastal region). NREGA was implemented in February 2006 in all these districts, except Kurnool and Guntur, which implemented the program from April, 2007 onwards. Even though the program was officially rolled out in February 2006, implementation gathered steam in the latter half of the calendar year and in the new financial year which began in April, 2006.

²⁷At least third of all village council seats are randomly reserved for a woman sarpanch in AP and across all states in India (viz., Afridi et al. (2017)).

²⁸Information in the audit reports were coded as follows: each complaint was first classified into labor, material, or worksite facilities related. The former two were further categorized by type.

affiliation) in July 2006 were gathered from the elected sarpanch.²⁹

Table 1, Panel 1 describes the GP characteristics. In Panel 2, we show the individual characteristics of the *sarpanch* chosen in the 2006 village council elections. The two main political parties during the 2006 elections were INC and TDP - 44.5 percent of the elected candidates were affiliated with the INC while 35.8 were affiliated with the TDP party.³⁰ The summary statistics on the retrospective *sarpanch* election data are in Panel 3 of Table 1. The number of contestants in the *sarpanch* election was a little under 3, on average. The winning candidate received 20.9 percent more votes, of total votes polled, than her closest contestant.³¹

Panel 1 of Table 2 shows the summary statistics for the audit data for 2006-10, i.e., over the tenure of the *sarpanch* elected in a GP in 2006. The total number of audits conducted during this period was 711 or 2.37 audits per GP. We use the number of irregularities as a proxy for the level of corruption because data on rupee amounts of irregularities are missing for many complaints. The relationship between the number of irregularities and the amount of corruption increases monotonically, suggesting that the former is a reliable measure of amount of theft of NREGA funds. The average number of registered irregularities was 5.823, the majority (86.9%) of which were related to the private goods from the NREGA-program benefits that either the electorate is likely to care deeply about or that do not suffer from collective action problems in monitoring. To give the reader an idea of the possible extent of leakage we summarize the data on the reported irregularity amount per irregularities for which an amount was reported. This is considerable - Rs. 16,329 in real terms, and much larger for the public goods provided in the program, benefits that voters are less

²⁹The retrospective election data were corroborated with three other respondents in each GP - the closest losing contestant in terms of proportion of total votes received, a worker of the losing political party, and the GP secretary. The correlation between the margin of victory reported by the elected sarpanch and each of the other three respondents in our survey data varies between 0.95 and 0.97.

³⁰Although GP level elections do not require formal party affiliation, candidates typically represent a political party.

³¹It is possible that the corruption of candidates in the previous election affected the margin of victory so that it captures not just the distribution of voters who would a priori vote for the incumbent or the challenger but also captures the previous period's corruption of the candidates. Note however that the introduction of the NREGA coincided with or was after the GP elections in 2006. So at least corruption on this program could not have affected the margin of victory in the first period. It is still possible that the candidates were corrupt in other contexts, which may affect the margin of victory.

likely to care about, than the private goods. We provide more details on our private/public classification in the next section. NREGA expenditures and employment at the GP level are shown for 2006-07 to 2011-12 in Panel 2 in Table 2.³²

4.2 Methodology

Our main measure of corruption is the number of irregularities registered across all audits for each GP over the period 2006-10. Our empirical specification, utilizing the panel structure, is given by:

$$\begin{aligned} Irregularity_{jklmt} = & \beta_0 + \beta_1 competition_{jkl} + \beta_2 competition_{jkl}^2 + \beta_3 \mathbf{X}_{jkl} + \beta_t Year_t \\ & + \delta_{lt}(D_l * Year_t) + \delta_m Audit_m + \delta_{k0} D_k + \epsilon_{jklmt} \end{aligned} \quad (4)$$

where the number of irregularities in GP j in mandal k in district l in audit round m at time t ($Irregularity_{jklmt}$) is a function of electoral competition ($competition_{jkl}$) prior to any audits and other factors. The variable $competition_{jkl}$ is defined as 1 less the margin of victory in the *sarpanch* elections in 2006 (before the audits were conducted). The margin of victory is the difference between the percentage of votes polled in favor of the winning candidate and her closest rival in the election.³³ Hence, if the candidate is unanimously elected, the margin of victory is 1 and the competition variable equals 0. Electoral competition is, therefore, increasing as the magnitude of this variable rises. The square of this variable accounts for any non-linear impact of electoral competition on our measure of corruption. \mathbf{X}_{jkl} is a vector of GP level characteristics that includes the characteristics of the *sarpanch* elected in 2006 (for a five year term). D_k is a dummy for mandal k to account for mandal level variation in program implementation. In addition, there may exist secular time trends

³²The project costs were substantial, with an average cost of over Rs. 1.5 million. The majority of the projects were on water conservation (32.4%) and on land development. 11.2% of the projects were on road construction. The NREGA also generated substantial employment per year, almost 1700 million person-days or about 25.12 days of employment per person.

³³Current electoral competition is a reasonable indicator of future competition in Indian elections. Although we do not have data on multiple GP elections in AP, using publicly available data on assembly constituency elections across states of India between 1998 and 2007, we find the correlations in our measure of electoral competition to be significant at the 5 percent level.

($Year_t$) and district specific time trends ($D_l * Year_t$) that affect the level of corruption in a GP. Furthermore, we include audit round fixed effects ($Audit_m$) to account for unobservables such as auditor’s capacity to detect malfeasance, which may improve with successive audit rounds and depend on the local bureaucrat’s and politician’s propensity to be corrupt or hide irregularities.

Our theoretical model suggests a U-shaped relationship between electoral competition and malfeasance in program expenditures. We should, therefore, expect a negative coefficient (β_1) on $competition_{jkl}$, which would signify that when electoral competition is low, the number of program irregularities are low as well. A positive coefficient (β_2) on $competition_{jkl}^2$, would indicate that as electoral competition increases irregularities related to program implementation also rise. A negative coefficient on the $competition$ variable and a positive one on $competition^2$, along with the extreme point being within the range of the data, would together indicate a U-shaped relationship between electoral competition and corruption.

Since we measure electoral competition in 2006 and program irregularities are audited (for the first time ever) post the GP elections in 2006, we circumvent some of the concern that both electoral competition and corruption are determined simultaneously.³⁴ But to the extent that our empirical analyses are confounded by extant GP level unobservables that impact both electoral competition and NREGA implementation, we cannot claim a causal link between electoral competition and corruption in the program. Rather our objective is to test whether the regularities in the data are consistent with the theoretical predictions.

5 Results

We first conduct the analysis at the GP-audit level across all GPs and report the results in Table 3. In column 1 we conduct mandal fixed effects analysis (and include audit round fixed effects). In column 2 we include year dummies and district specific trends. The

³⁴The public program NREGA also started in AP in 2006, so there was little opportunity for voters to observe corruption before this date.

point estimates are as expected in columns 1 and 2 and not significantly different across specifications, suggesting that secular or district specific trends were not correlated with electoral competition and did not play a significant role in uncovering program related malfeasance over time.

In order to generalise our findings and estimate the average relationship between corruption and electoral competition we collapse the yearly data to the GP level and estimate the relationship across GPs within a mandal over the entire period 2006-10 in Table 4. To ensure that our outcome variable is not influenced by the variation in the number of audits across GPs in a mandal, we balance (i.e., use the common) number and round of audits across GPs within each sampled mandal.³⁵ We obtain a sample of 279 GPs for which we were able to obtain data for the full set of controls used in the previous specification.

In column 1 of Table 4 we model a linear relationship between electoral competition and reported irregularities while in column 2 we add the square of electoral competition to compare the estimates with those in Table 3. The coefficient on electoral competition is positive and insignificant in column 1. When we introduce the square term for electoral competition, we obtain a negative coefficient on electoral competition and a positive coefficient on the squared electoral competition term, in column 2. Overall, the direction of the coefficients suggests that electoral competition at low levels is accompanied by lower reported program irregularities, and as electoral competition rises there is an increase in the number of irregularities. Indeed, Table 4 coefficients show that the number of irregularities halve relative to the average (computed from Table 2) when competition is low and double relative to the average when competition is very stiff. The U-shape test results indicate that the U-shape relationship holds at 1% significance level. This result is in line with our theoretical prediction that there exists a U-shape relationship between electoral competition and corruption, driven by corruption in the public provision of private goods.

³⁵Balancing the number and rounds of audits at the mandal level reduces the sample to 257 GPs and gives similar results.

5.1 Corruption in public goods vs private goods

As shown by Brollo (2008) it is likely that voters respond more when they are directly affected by corruption (so ε is lower) - e.g. underpayments of wages or when they have to bribe officials to get work than when it takes the form of malfeasance in procurement contracts (so ε is higher). Then we should expect that corruption is higher with the latter and the latter responds less to competitive pressures.³⁶ In both Tables 3 and 4 we classify all reported irregularities into two groups: corruption in publicly provided private goods (columns 3-4) and in public goods (columns 5-6). Irregularities related to the private goods provided by the NREGA relate to those that personally affect the potential beneficiary because they are related to compensation for own labor, e.g., impersonation of worker for wage payment, fudged or incorrect own labor records, non-payment or delay in payment of own wages, bribes paid for obtaining wages due; affect own income, e.g., non-provision of work demanded; and affect private returns from program benefits, e.g., poor quality of NREGA asset (viz., inadequate development of land owned by targeted beneficiary to enable cultivation). The irregularities in public goods refer to discrepancy in materials payments/receipts, ghost projects, and missing expenditure records related to both labor and materials expenses, i.e., program leakages that are in the nature of public goods. Our estimates are significant for private but not public goods in both Tables 3 and 4. The U-shaped relationship between electoral competition and corruption holds in the private goods delivered by the NREGA but is marginally insignificant as indicated by p-values of the U-shape test in the lower panel. These test statistics are reported for the stricter specification in columns 4 and 6 in Tables 3 and 4.

The significant effects in columns 3-4 (in Tables 3 and 4) suggest that U shape becomes flatter as ε increases as suggested by the theory.³⁷

³⁶In zone 2.4, the derivative of X with respect to β is $\frac{1}{4} + \frac{\beta}{4\varepsilon}$, which means that for larger ε , the slope is flatter (both in the increasing and decreasing sections). For β large enough, we enter zone 2.3 eventually where X is rising. Here, $\frac{\partial X}{\partial \beta} = -\frac{1}{2\varepsilon}$, which again means that it is flatter for larger ε .

³⁷The channel we highlight is that accountability is lower for public goods. This may arise either because voters care less for the pilferage in public goods or because as in Olken (2007) voters are more efficient at monitoring corruption in the publicly provided private goods they receive than from the public goods delivered by a social program.

Figure 1 plots the estimates obtained in columns 2, 4 and 6 of Table 4 showing the U-shaped relationship between electoral competition and total irregularities across GPs in all irregularities (Figure 1a), publicly provided private goods (Figure 1b) and public goods (Figure 1c). Figure 1c shows that corruption in public goods is flatter compared with the U shape of the private goods component of corruption. Moreover, Table 2 shows that the corruption in the public component is approximately 15 times larger on average than corruption in the private goods component. This provides some suggestive evidence that uncertainty impacts the relationship between corruption and competition.

6 Discussion

One possible concern with our results is that the number of irregularities may not represent the magnitude of theft of public funds. For instance, we may conclude that there is higher corruption in the more competitive constituencies because we observe greater number of irregularities even though in fact average amount per irregularity is lower in the high as opposed to the low competition constituencies. Although data on the misappropriated amount is incomplete, using the information available we do not find any systematic differences in the theft per irregularity between GPs with higher and lower than median victory margin. Moreover, there is a monotonic relationship between amounts and number of irregularities: as the number of irregularities increases, the amount of theft also increases.

A related, and more fundamental, confound is the presence of a systematic relationship between detection of program irregularities (viz., more oversight) and electoral competition. This can be due to political pressure from the state incumbent party, in which case we should expect villages with a different party than the ruling state government getting higher scrutiny in general and especially in more competitive elections, while those which are aligned (with the state government) would not get scrutinized, i.e., that auditor bias or scrutiny could vary systematically by political affiliation of the incumbent. For the U-shape to hold, however, it would imply that political affiliation of incumbents varies systematically

between high and low competitive constituencies, which we do not find in our sample. The proportion of *sarpanches* who are affiliated with the INC in 2006 (the ruling party in AP was the INC from 2004-14) is not significantly different between GPs with higher and lower than median victory margin. Second, the incentives of the village incumbent to bribe the auditors goes up in more competitive elections - but then we should observe, if anything, lower corruption in the competitive elections. We do not observe this in the data.

Finally, irregularities in the public goods provided by the NREGA program may be harder to detect than in the private goods because technical expertise is required to identify malpractices in the materials component. This may show up as unresponsiveness of corruption in public goods to electoral competition. We allay these concerns by focusing on irregularities reported by professional auditors who are trained to detect materials related irregularities. Moreover, our results do not suggest that the irregularities in the public goods are unresponsive, rather, they do not show any systematic response to electoral competition.

Our theoretical model is predicated on corruption interpreted as theft rather than campaign funds that can be used for vote buying. While we do not have data to support the way funds are used³⁸, we check whether there are systematic patterns between irregularities and timing of elections (electoral cycles). If vote buying or clientelism is a significant factor in explaining the U-shape we should expect to see higher irregularities just before or just after elections. Since we account for year and audit round fixed effects (and elections were held across all GPs in 2006) in our panel data, the results are not driven by electoral cycles. Indeed Powiss (2007) shows that even when funds are used to help in winning elections, the ultimate objective is still personal enrichment with awards of future contracts.

7 Conclusions

In this paper we build on a standard probabilistic voting model to capture the effect of electoral competition on corruption when wages and accountability are very low. Our main

³⁸However see Powiss (2007) for an ethnographic study of village level politics and corruption in Andhra Pradesh over the same period.

result is to show that corruption has a U- shaped relationship with electoral competition when accountability in elections is low. An implication of the result is that lower levels of accountability lead to the U shape becoming flatter.

We illustrate the model's predictions using official data on mandated audits of the NREGA projects implemented by village councils in Andhra Pradesh during 2006-10 and data on the elections to the headship of these same village councils in 2006. Our results largely confirm the U-shaped relationship between electoral competition and corruption, for the case of India which has low electoral accountability. We also show that electoral competition is more effective in reducing corruption in the publicly provided private goods. The size estimates are quite substantial, indicating that the number of irregularities halve relative to the average when competition is low and double relative to the average when competition is very stiff.

Our findings suggest that policies that increase awareness of how theft from infrastructure projects affect their welfare may help to direct politicians attention to controlling corruption in the public goods delivered by social programs. Moreover, increasing the non electoral costs of corruption might help to reduce corruption.

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Table 1: GP, sarpanch and election characteristics (2006)

Variable	N	Mean	Standard Deviation
GP characteristics			
Proportion of irrigated area	294	0.243	0.233
Population density (per sq. km.)	296	3.431	3.727
Distance from town (km)	296	30.372	20.158
Medical facility	294	0.830	0.376
Communication facility	294	0.918	0.274
Bank facility	294	0.374	0.485
Middle school	296	0.709	0.455
Paved road	294	0.864	0.343
Main GP of mandal	300	0.280	0.500
Sarpanch seat reserved for woman*	300	0.427	0.495
Sarpanch seat reserved for SC/ST*	300	0.306	0.460
Sarpanch seat reserved for OBC*	300	0.370	0.484
Sarpanch characteristics			
Age	299	44.686	9.957
Male	299	0.532	0.500
Illiterate	299	0.110	0.314
Secondary schooling complete	299	0.100	0.310
Graduate or above degree	299	0.107	0.310
Belonging to INC	299	0.445	0.498
Belonging to TDP	299	0.358	0.480
Have own prior political experience	297	0.195	0.397
Prior terms in political office	296	0.226	0.643
Relative in panchayat	300	0.450	0.498
GP election characteristics			
Number of contestants	299	2.916	1.767
Proportions of votes polled out of total voters	297	0.757	0.260
Proportions of votes received by winning candidate	297	0.566	0.173
Margin of victory in election	297	0.209	0.275

Notes: GP characteristics from Census, 2001; *reservation data from the State Election Commission; SC/ST - Scheduled Caste/Scheduled Tribe; OBC- Other Backward Castes; INC - Indian National Congress; TDP - Telegu Desam Party; prior political experience is a dummy variable that equals 1 if a prior leadership position was held by the current sarpanch; 'prior terms in political office' is the number of terms held previously in any political office; relative in panchayat equals 1 if the elected sarpanch has a relative who has ever held office in the panchayat; proportion of votes polled is 0 for a unanimously elected sarpanch; votes received by winning candidate and the margin of victory reported as a proportion of total votes polled.

Table 2: NREGA audit, expenditure and employment characteristics at GP level, by year (2006-10)

Variable	N	Mean	Std. Dev. Deviation
Audit characteristics			
Total number of irregularities	711	5.823	5.299
Private component	711	5.062	4.594
Public component	711	0.684	1.520
Total amount per irregularity (Rs.)	581	16,329.420	52,862.71
Private component	555	7,920.136	19,500.840
Public component	173	119,062.0	488,958.20
Program characteristics			
Total expenditure (Rs., millions)	1416	1.531	1.699
Proportion of expd. on water conservation	1396	0.324	0.305
Proportion of expenditure on rural connectivity	1416	0.112	0.201
Total employment (person-days, millions)	1418	1699.256	2082.414
Employment as proportion of GP population	1388	7.174	20.554
Employment as proportion of GP demand	1371	25.117	14.178

Notes: Audit data from official audit reports; amounts are reported per irregularity for which the rupee amount was mentioned in the audit; data on program characteristics from the Ministry of Rural Development (MoRD), Government of India for financial years 2006-07 to 2010-11; amounts and expenditures are in 2006 rupees.

Table 3: Electoral competition and NREGA irregularities (GP-audit level, 2006-10)

	Total irregularities		Irregularities in private good		Irregularities in public good	
	(1)	(2)	(3)	(4)	(5)	(6)
Electoral competition	-6.760**	-6.546*	-5.609**	-5.489**	-1.151	-1.057
	(3.369)	(3.456)	(2.547)	(2.656)	(1.531)	(1.556)
Electoral competition ²	4.137*	4.011*	3.278**	3.214*	0.858	0.798
	(2.194)	(2.243)	(1.600)	(1.662)	(1.047)	(1.064)
U-shape test[Overall <i>p</i> -value]	[0.112]		[0.137]		[0.249]	
Mandal FE	✓	✓	✓	✓	✓	✓
Audit Round FE	✓	✓	✓	✓	✓	✓
Year FE		✓		✓		✓
District x Year FE		✓		✓		✓
N	635		635		635	
R ²	0.421		0.267		0.317	

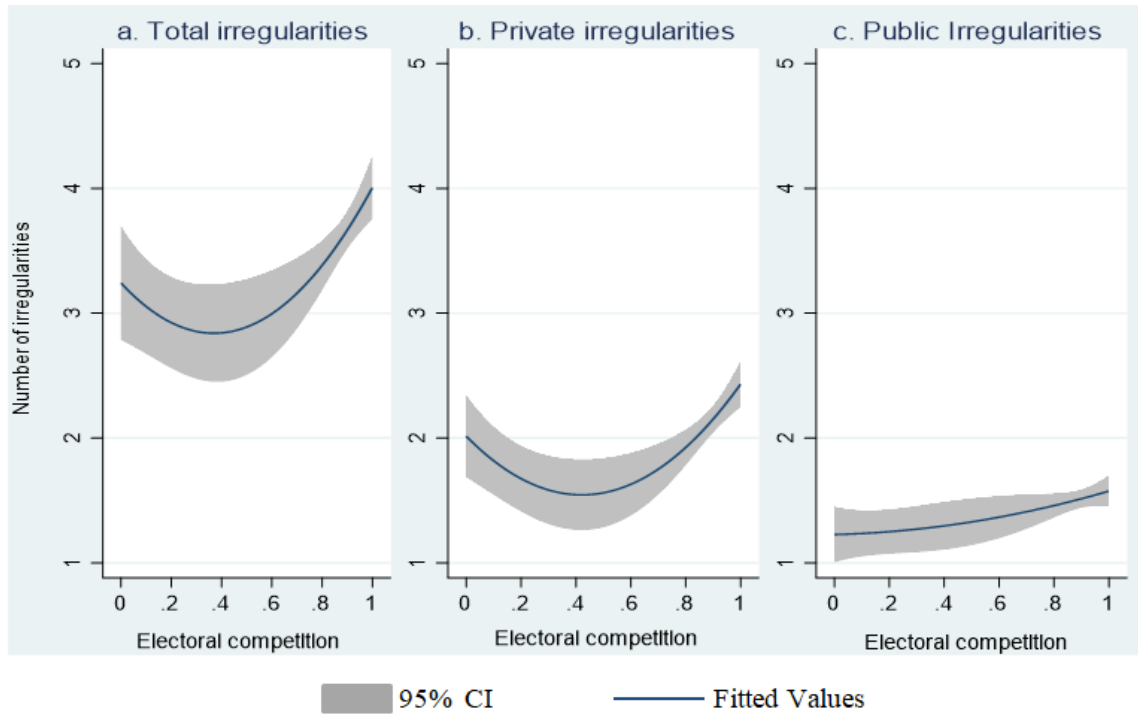
Notes: The dependent variable is the number of irregularities in each GP in an audit. Controls include sarpanch characteristics (age, age square, dummy for secondary education completed, dummy for graduate and above education; dummy for prior political experience, affiliated to INC) GP characteristics (main GP of mandal, medical, communication, banking, paved road, middle school in GP, distance from town, proportion of cultivated area which is irrigated, population density, dummy for SC, ST, OBC, woman reserved sarpanch candidate, sarpanch elected unanimously), mandal, audit round, year fixed effects and district specific trends. U-shape test for columns (2), (4) and (6). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

Table 4: Electoral competition and NREGA irregularities (GP level, 2006-10)

	Total irregularities		Irregularities in private good		Irregularities in public good	
	(1)	(2)	(3)	(4)	(5)	(6)
Electoral competition	0.327 (1.722)	-26.67*** (8.301)	0.453 (1.380)	-19.40*** (6.250)	-0.126 (0.967)	-7.271 (4.599)
Electoral competition ²		17.68*** (5.599)		13.00*** (4.143)		4.678 (3.191)
U-shape test[Overall <i>p</i> -value]		[0.006]		[0.005]		[0.157]
Mandal FE	✓	✓	✓	✓	✓	✓
N	279	279	279	279	279	279
R ²	0.646	0.661	0.565	0.583	0.635	0.638

Notes: Controls as elucidated in Table 3, excluding, audit round, year and district specific trends. U-shape test for columns (2), (4) and (6). Standard errors in parentheses. Significant at *10%, **5% and ***1%.

Figure 3: Electoral competition and NREGA irregularities



Note: Fitted values and 95% confidence interval corresponding to estimates in Table 4 (columns 2,4 and 6).

A ONLINE APPENDIX: NOT FOR PUBLICATION

Proof of Proposition 1

Proof. Observe that, for $p_L \in (0, 1)$, we have $\frac{\partial p_L}{\partial x_L} = -\frac{1}{2\varepsilon}$, $\frac{\partial p_L}{\partial x_R} = -\frac{1}{2\varepsilon}$ and

$$\begin{aligned}\frac{\partial U_L}{\partial x_L} &= p_L - (x_L + w)\frac{1}{2\varepsilon}, \\ \frac{\partial U_R}{\partial x_R} &= (1 - p_L) - (x_R + w)\frac{1}{2\varepsilon}.\end{aligned}$$

Also, if $p_L = 0$ then $\frac{\partial U_L}{\partial x_L} = 0$ and $\frac{\partial U_R}{\partial x_R} = 1$, and if $p_L = 1$, then $\frac{\partial U_L}{\partial x_L} = 1$ and $\frac{\partial U_R}{\partial x_R} = 0$.

Now, we examine whether different combinations of (x_L, x_R, p_L) can be equilibria. We proceed on a case by case basis. Each case considers a possible combination of values of (x_L, x_R, p_L) and considers whether it can be an equilibrium for some parameters.

Case 1: Equilibria with $p_L = 1$

We divide this into two possibilities: (1.1) $x_L = 1, x_R = 0$, and (1.2) $x_L \in [0, 1), x_R = 0$

Case 1.1 Equilibria with $p_L = 1, x_L = 1, x_R \in [0, 1]$

If $x_L = 1$, and $x_R - x_L - \beta \geq \varepsilon \Rightarrow x_R - 1 - \beta \geq \varepsilon$, or $x_R \geq \varepsilon + 1 + \beta$

If we have $\varepsilon + 1 + \beta \leq 0$ or $-\beta \geq 1 + \varepsilon$, then eqm is $x_R \in [0, 1], x_L = 1, p_L = 1$

If we have $0 \leq \varepsilon + 1 + \beta \leq 1$, i.e., $-\beta \in [\varepsilon, 1 + \varepsilon]$, then R can win positive payoff by setting x_R just below $\varepsilon + 1 + \beta$.

This is an equilibrium only for $-\beta \geq 1 + \varepsilon$

Case 1.2: Equilibria with $p_L = 1, x_L \in [0, 1), x_R = 0$

If $x_L < 1$ and $p_L = 1$, Then it must be the case that $x_R - x_L - \beta = \varepsilon$. If $x_R - x_L - \beta > \varepsilon$, then L could raise x_L and increase payoff.

Then, it also must be the case that $x_R = 0$. If $x_R > 0$, R can reduce x_R and gain a positive payoff by setting $x_R - x_L - \beta < \varepsilon$, and thereby $p_R > 0$.

Thus, we must have $-x_L - \beta = \varepsilon$, i.e., $x_L = -\beta - \varepsilon$.

Now, $x_L = -\beta - \varepsilon \in [0, 1)$ implies $-\beta \in [\varepsilon, 1 + \varepsilon)$.

L does not gain by reducing x_L as p_L is already 1. For any reduction in x_L by δ , payoff will reduce by δ .

To see if L gains by increasing x_L , we can consider $p_L \in (0, 1)$. In this region, for $x_L = -\beta - \varepsilon$ and $x_R = 0$,

$$\frac{\partial U_L}{\partial x_L} \leq 0 \Rightarrow -2(-\beta - \varepsilon) + \varepsilon - w - \beta \leq 0 \Rightarrow -\beta \geq 3\varepsilon - w.$$

Therefore, this is an equilibrium for $-\beta \in [\varepsilon, 1 + \varepsilon) \cap [3\varepsilon - w, \infty)$.

Case 1.3: Equilibria with $p_L = 0$

We must have $x_R = 1$, and $x_L \in [0, 1]$ as long as $x_R - x_L - \beta \leq -\varepsilon \Rightarrow 1 - x_L - \beta \leq -\varepsilon$, or $-x_L \leq -\varepsilon - 1 + \beta$, or $x_L \geq \varepsilon + 1 - \beta > 1$. Therefore, there is no combination of parameters for which this is possible in equilibrium.

Case 2: Equilibria with $p_L \in (0, 1)$

For this case, we start with a Lemma.

Lemma 1 *For any equilibrium, we must have $x_L \geq x_R$.*

Proof. Notice that this result is already true for $p_L \in \{0, 1\}$. So, we need to show that $x_L \geq x_R$ for any equilibrium with $p_L \in (0, 1)$. We can write

$$\begin{aligned} \frac{\partial U_L}{\partial x_L} &= p_L - (x_L + w) \frac{1}{2\varepsilon} = \frac{1}{2\varepsilon} (-2x_L + x_R + \varepsilon - w - \beta), \\ \frac{\partial U_R}{\partial x_R} &= (1 - p_L) - (x_R + w) \frac{1}{2\varepsilon} = \frac{1}{2\varepsilon} (-2x_R + x_L + \varepsilon - w + \beta). \end{aligned}$$

Therefore,

$$\begin{aligned} \frac{\partial U_L}{\partial x_L} - \frac{\partial U_R}{\partial x_R} &= 2p_L - 1 + (x_R - x_L) \frac{1}{2\varepsilon} \\ &= \frac{1}{2\varepsilon} (3x_R - 3x_L - 2\beta). \end{aligned}$$

Now, if $x_R \geq x_L$, then $\frac{\partial U_L}{\partial x_L} > \frac{\partial U_R}{\partial x_R}$. Then, we can only have $x_R = x_L = 1$ ($\frac{\partial U_L}{\partial x_L} > \frac{\partial U_R}{\partial x_R} \geq 0$) or $x_R = x_L = 0$ ($0 \geq \frac{\partial U_L}{\partial x_L} > \frac{\partial U_R}{\partial x_R}$). Hence, for any equilibrium, $x_R \leq x_L$. ■

With $p_L \in (0, 1)$, we have the following possibilities

$$(2.0) \quad 0 < x_R < x_L < 1,$$

$$(2.1) \quad x_R = x_L = 1,$$

$$(2.2) \quad x_R = x_L = 0,$$

$$(2.3) \quad x_L = 1, x_R = 0,$$

$$(2.4) \quad x_L = 1, x_R \in (0, 1),$$

$$(2.5) \quad x_L \in (0, 1), x_R = 0.$$

We now provide the parameter ranges for which each of the above combinations is an equilibrium.

Case 2.0: If $0 < x_R < x_L < 1$, then we must have “interior solution”

$$\begin{aligned} \hat{x}_L &= (\varepsilon - w) - \frac{\beta}{3}, \\ \hat{x}_R &= (\varepsilon - w) + \frac{\beta}{3}, \end{aligned}$$

which requires $\hat{x}_R \geq 0$ and $\hat{x}_L \leq 1$, i.e., $-\beta \leq 3(\varepsilon - w)$ and $-\beta \leq 3(1 - (\varepsilon - w))$. In this equilibrium, $p_L = \frac{1}{2} + \frac{x_R - x_L - \beta}{2\varepsilon} = \frac{1}{2} - \frac{\beta}{6\varepsilon}$ and

$$X = \left(\frac{1}{2} - \frac{\beta}{6\varepsilon}\right) \left[(\varepsilon - w) - \frac{\beta}{3}\right] + \left(\frac{1}{2} + \frac{\beta}{6\varepsilon}\right) \left[(\varepsilon - w) + \frac{\beta}{3}\right] = (\varepsilon - w) + \frac{\beta^2}{9\varepsilon},$$

which is increasing in $-\beta$.

Case 2.1: $x_R = x_L = 1$, $p_L \in (0, 1)$

In this case, $x_R - x_L - \beta = -\beta \in (-\varepsilon, \varepsilon)$, hence $-\beta \in (0, \varepsilon)$. We have

$$\frac{\partial U_R}{\partial x_R} = \frac{1}{2\varepsilon} (-2x_R + x_L + \varepsilon - w + \beta) = \frac{1}{2\varepsilon} (-1 + \varepsilon - w + \beta) \geq 0 \Rightarrow -\beta \leq \varepsilon - w - 1.$$

This requires $-\beta \leq (0, \varepsilon - w - 1)$, which does not hold if $\varepsilon < w + 1$. In this equilibrium, $p_L = \frac{1}{2} - \frac{\beta}{2\varepsilon}$ and $X = 1$.

Case 2.2: $x_R = x_L = 0, p_L \in (0, 1)$

In this case, $x_R - x_L - \beta = -\beta \in (-\varepsilon, \varepsilon)$, hence $-\beta \in (0, \varepsilon)$. It follows that

$$\frac{\partial U_L}{\partial x_L} = \frac{1}{2\varepsilon} (-2x_L + x_R + \varepsilon - w - \beta) = \frac{1}{2\varepsilon} (\varepsilon - w - \beta) \leq 0 \Rightarrow -\beta \leq -\varepsilon + w.$$

This requires that $-\beta \leq (0, \min\{\varepsilon, w - \varepsilon\})$, which does not hold for $\varepsilon > w$. In this equilibrium, $p_L = \frac{1}{2} - \frac{\beta}{2\varepsilon}$ and $X = 0$.

Case 2.3: $x_L = 1, x_R = 0, p_L \in (0, 1)$

In this case, $x_R - x_L - \beta = -1 - \beta \in (-\varepsilon, \varepsilon)$, hence $-\beta \in (1 - \varepsilon, 1 + \varepsilon)$. We have

$$\begin{aligned} \left[\frac{\partial U_L}{\partial x_L} \right] &= \frac{1}{2\varepsilon} (-2x_L + x_R + \varepsilon - w - \beta) = \frac{1}{2\varepsilon} (-2 + \varepsilon - w - \beta) \geq 0 \Rightarrow -\beta \geq 2 + w - \varepsilon, \\ \frac{\partial U_R}{\partial x_R} &= \frac{1}{2\varepsilon} (-2x_R + x_L + \varepsilon - w + \beta) = \frac{1}{2\varepsilon} (1 + \varepsilon - w + \beta) \leq 0 \Rightarrow -\beta \geq \varepsilon - w + 1. \end{aligned}$$

We then must have $-\beta \in (1 - \varepsilon, 1 + \varepsilon)$ as well as $-\beta \geq \max\{2 + w - \varepsilon, \varepsilon - w + 1\}$. We know that $2 + w - \varepsilon > 1 - \varepsilon$. Hence, this equilibrium holds for $-\beta \in (\max\{2 + w - \varepsilon, \varepsilon - w + 1\}, 1 + \varepsilon)$. In this equilibrium, $p_L = \frac{1}{2} - \frac{1 + \beta}{2\varepsilon}$ and $X = \frac{1}{2} - \frac{1 + \beta}{2\varepsilon}$, which is increasing in $-\beta$.

Case 2.4: $x_L = 1, x_R \in (0, 1)$

In this case,

$$\frac{\partial U_R}{\partial x_R} = \frac{1}{2\varepsilon} (-2x_R + x_L + \varepsilon - w + \beta) = 0 \Rightarrow x_R(x_L) = \frac{1}{2} [x_L + (\varepsilon - w) + \beta] = \frac{1}{2} [1 + (\varepsilon - w) + \beta].$$

The assumption $x_R \in (0, 1)$ implies (1) $1 + (\varepsilon - w) + \beta \geq 0$ or $-\beta \leq 1 + (\varepsilon - w)$ and (2) $1 + (\varepsilon - w) + \beta \leq 2$, or $-\beta \geq \varepsilon - w - 1$. It follows that

$$\frac{\partial U_L}{\partial x_L} = \frac{1}{2\varepsilon} (-2x_L + x_R + \varepsilon - w - \beta) = -2 + \frac{1}{2} [1 + (\varepsilon - w) + \beta] + \varepsilon - w - \beta = -\frac{3}{2} + \frac{3}{2} \left[(\varepsilon - w) - \frac{\beta}{3} \right] = \frac{3}{2} \left[(\varepsilon - w) - \frac{\beta}{3} \right]$$

Hence,

$$\frac{\partial U_L}{\partial x_L} \geq 0 \Rightarrow (\varepsilon - w) - \frac{\beta}{3} - 1 \geq 0 \Rightarrow -\beta \geq 3[1 - (\varepsilon - w)].$$

Also,

$$x_R - x_L - \beta = \frac{1}{2} [1 + (\varepsilon - w) + \beta] - 1 - \beta = \frac{1}{2} [-1 + (\varepsilon - w) - \beta] \in (-\varepsilon, \varepsilon).$$

Therefore, $-1 + (\varepsilon - w) - \beta > -2\varepsilon$, i.e., $-\beta > 1 + w - 3\varepsilon$. But since $3[1 - (\varepsilon - w)] = 3(1 + w) - 3\varepsilon > 1 + w - 3\varepsilon$, we have already taken care of $-\beta > 1 + w - 3\varepsilon$.

Next, $-1 + (\varepsilon - w) - \beta \leq 2\varepsilon$, i.e., $-\beta \leq 1 + w + \varepsilon$. But we already have $-\beta \leq 1 - w + \varepsilon < 1 + w + \varepsilon$. Hence, this equilibrium holds if $-\beta \in (\min\{3[1 - (\varepsilon - w)], \varepsilon - w - 1\}, 1 - w + \varepsilon)$. In this equilibrium, $p_L = \frac{1}{2} + \frac{1}{4\varepsilon} [-1 + (\varepsilon - w) - \beta] = \frac{1}{2} + \frac{1}{4\varepsilon} [-1 + (\varepsilon - w) - \beta]$, and X is given by

$$\begin{aligned} X^* &= \left(\frac{1}{2} + \frac{-1 + \varepsilon - w - \beta}{4\varepsilon} \right) \\ &\quad + \frac{1}{2} [1 + (\varepsilon - w) + \beta] \left(\frac{1}{2} - \frac{-1 + \varepsilon - w - \beta}{4\varepsilon} \right) \\ &= \left(\frac{-1 + 3\varepsilon - w - \beta}{4\varepsilon} \right) + [1 + \varepsilon - w + \beta] \left(\frac{\varepsilon + 1 + w + \beta}{8\varepsilon} \right) \\ &= \left(\frac{-1 + 3\varepsilon - w - \beta}{4\varepsilon} \right) + \left(\frac{(1 + \varepsilon + \beta)^2 - w^2}{8\varepsilon} \right) \\ &= \frac{1}{8\varepsilon} [-2 + 6\varepsilon - 2w - 2\beta + (1 + \varepsilon + \beta)^2 - w^2]. \end{aligned}$$

In this range, X^* is U-shaped in $-\beta$. To see that, notice that $\frac{dX}{d\beta} = \frac{1}{4\varepsilon}[\varepsilon + \beta]$. The minimum occurs at $\widehat{-\beta} = \varepsilon$ (provided $\widehat{-\beta} = \varepsilon$ is in this region) and the minimum value of X^* is $\widehat{X} = 1 - \frac{(1+w)^2}{8\varepsilon}$.

Case 2.5: $x_R = 0$, $x_L \in (0, 1)$

In this case,

$$\begin{aligned}\frac{\partial U_L}{\partial x_L} &= 0 \Rightarrow x_L(x_R) = \frac{1}{2} [x_R + (\varepsilon - w) - \beta] = \frac{1}{2} [(\varepsilon - w) - \beta], \\ \frac{\partial U_R}{\partial x_R} &= \frac{1}{2\varepsilon} \left(\frac{1}{2} [(\varepsilon - w) - \beta] + \varepsilon - w + \beta \right) = \frac{1}{2\varepsilon} \cdot \frac{3}{2} \left[(\varepsilon - w) + \frac{\beta}{3} \right] \leq 0 \Rightarrow -\beta \geq 3(\varepsilon - w).\end{aligned}$$

Also,

$$\begin{aligned}x_R - x_L - \beta &= -\frac{1}{2} [(\varepsilon - w) - \beta] - \beta = -\frac{1}{2} (\varepsilon - w) - \frac{\beta}{2} \in (-\varepsilon, \varepsilon), \\ -\frac{1}{2} (\varepsilon - w) - \frac{\beta}{2} &> -\varepsilon \Rightarrow -\beta > -2\varepsilon + \varepsilon - w = -\varepsilon - w,\end{aligned}$$

which is always satisfied, and

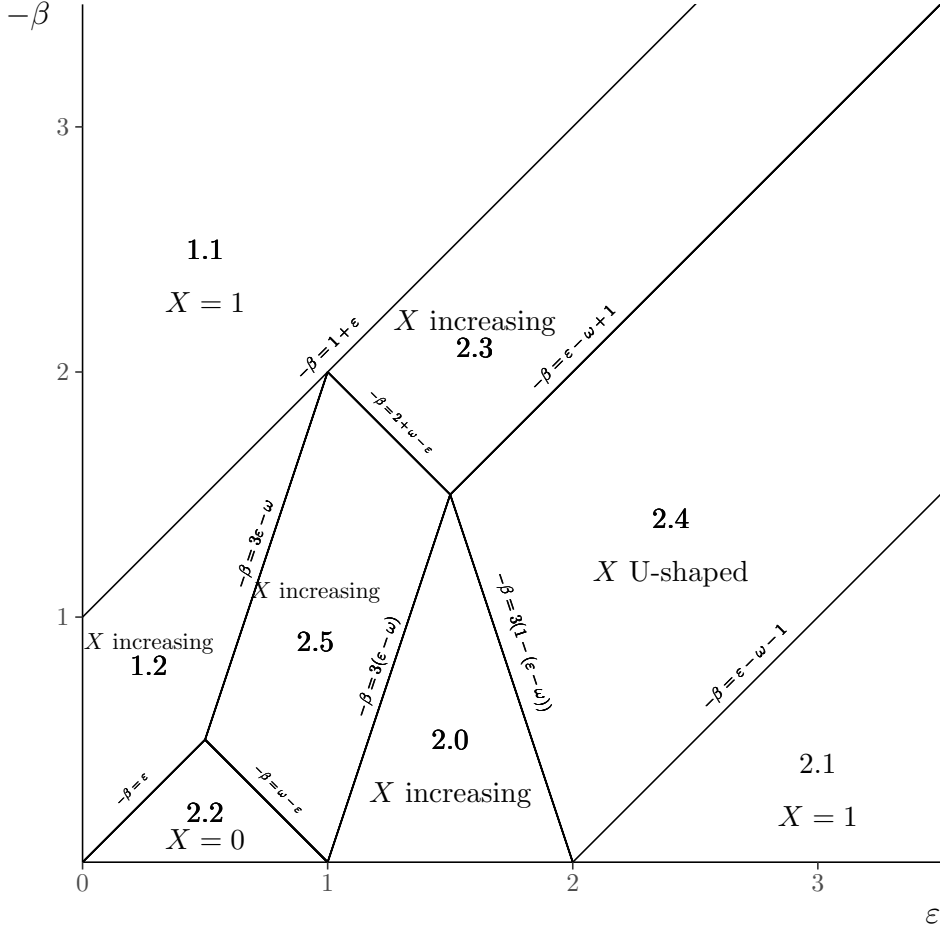
$$-\frac{1}{2} (\varepsilon - w) - \frac{\beta}{2} < \varepsilon \Rightarrow -\beta < 2\varepsilon + \varepsilon - w = 3\varepsilon - w.$$

Moreover, $x_L \in (0, 1)$ implies $(\varepsilon - w) - \beta > 0$, i.e., $-\beta > -(\varepsilon - w) = w - \varepsilon$ and $\frac{1}{2} [(\varepsilon - w) - \beta] < 1$, i.e., $-\beta < 2 + w - \varepsilon$. Hence, this equilibrium holds if $-\beta \in (3(\varepsilon - w), 3\varepsilon - w) \cap (w - \varepsilon, 2 + w - \varepsilon)$. In this equilibrium, $p_L = \frac{1}{2} - \frac{(\varepsilon - w) + \beta}{4\varepsilon}$ and

$$\begin{aligned}X &= \frac{1}{2} [(\varepsilon - w) - \beta] \left[\frac{1}{2} - \frac{(\varepsilon - w) + \beta}{4\varepsilon} \right] = \frac{1}{4} [(\varepsilon - w) - \beta] \left[1 - \frac{(\varepsilon - w) + \beta}{2\varepsilon} \right] \\ &= \frac{1}{4} [(\varepsilon - w) - \beta] \left[\frac{\varepsilon + w - \beta}{2\varepsilon} \right] = \frac{1}{8\varepsilon} [(\varepsilon - w) - \beta] [(\varepsilon + w) - \beta] = \frac{1}{8\varepsilon} [(\varepsilon - \beta)^2 - w^2],\end{aligned}$$

which is increasing in $-\beta$ ■

Figure 1 illustrates the Nash equilibrium on the (β, ε) plane for a fixed value of w .



We now provide a brief description of each of the regimes that arise in equilibrium. We shall denote $z \equiv \varepsilon - w$.

In zone 1.1, the valence gap in favor of L is so high that L wins for sure even while engaging in maximal corruption, irrespective of what R does. This is the only zone where we have multiple equilibria in the sense that any value of x_R is consistent with equilibrium, but the outcome is the same in all equilibria.

We first turn to the three zones by and large to the left. Zone 2.2 describes a scenario where accountability is very high ($z \leq 0$) and the electorate is highly competitive. This forces both L and R to reduce corruption to zero. In zone 1.2, accountability is still very high

but L has a competitive advantage. Here, R engages in zero corruption and in response, L chooses the highest level of corruption which allows it to win for sure. In zone 2.5, accountability is somewhat lower but L still has a competitive advantage. The combination of these two forces R to have zero corruption, but L trades off win probability with increased corruption. Here, we have an interior solution for x_L . Note that both in zone 2.5 and 1.2, an increase in the valence gap raises the corruption level of L .

In zone 2.0, accountability is moderate ($0 \leq z \leq 1$) but the electorate is competitive. This allows for positive corruption levels for both candidates and we have the interior solution. In this zone, an increase in the competitive advantage of L raises its corruption level and reduces the rival's corruption. Since L wins with a large enough probability that is increasing in its competitive advantage, the average corruption X is also increasing in the valence gap. This is the zone that the literature (Besley et al 2010 etc) has typically focussed on.

Now we turn to the zone with low accountability, which is also the parameter zone that is important for our purposes. In zones 2.1, 2.4 and 2.3, accountability is low enough in relation to the electoral advantage in favour of L . This forces L to maximize its corruption level ($x_L = 1$), and the response of R varies over the zones. In zone 2.1, the electorate is competitive enough that R is also maximally corrupt. In zone 2.4, the valence gap is large enough that R has to reduce corruption to stay competitive: so x_R has an interior solution decreasing in $-\beta$. Finally, in zone 2.3, the competitive advantage for L is large enough that R engages in zero corruption. Here, despite $x_L = 1$ and $x_R = 0$, L wins with a probability larger than $\frac{1}{2}$.

Finally, it is important to examine how the average incumbent corruption behaves over the low accountability zones 2.1 ($z \geq 1$), 2.4 and 2.3. In particular, as $z \geq 1$, we move across these zones as the valence advantage moves progressively in favour of L . In zone 2.1, $X = 1$ since both candidates are maximally corrupt. In region 2.4, x_R decreases from 1 to 0 as $-\beta$ increases and $x_L = 1$. There are two opposing effects on X . With increasing competitive advantage for L , the probability of the candidate with maximal corruption

winning increases but the corruption by the other decreases. The former effect is weaker for low $-\beta$ and the latter for high $-\beta$. To see that, note that since $x_L = 1$,

$$X' = p'_L(1 - x_R) - x'_R(1 - p_L)$$

For low $-\beta$ x_R is close to 1 and for high $-\beta$ p_L is large in this region, leading to a U-shape for $X(-\beta)$ in this region. However, there is an additional constraint: if x_R hits 0, we enter region (2.3) where X is increasing. Formally, if $w < 1$, then $X(-\beta)$ is U-shaped in region (2.4). The minimum of $X(-\beta)$ occurs at $-\beta = \varepsilon$ and has value $X^* = 1 - \frac{(1+w)^2}{8\varepsilon}$. On the other hand, if $w > 1$, then $X(-\beta)$ is strictly decreasing in region (2.4). In either case, two features are clear. First, we have a region where the extent of observed corruption decreases as competitiveness of the election goes down. Second, for $z \geq 1$ the overall shape of $X(-\beta)$ is as follows: it is initially constant at 1, then decreasing and then again increasing before becoming constant at 1.

Proposition A.1 below describes the relationship between *observed* corruption competition and accountability.

Proposition A.1 *X is continuous in β and ε . For $-\beta \geq 1 + \varepsilon$, $X = 1$. The following describes the function $X(-\beta)$ in $-\beta \in (0, 1 + \varepsilon)$.*

(i) *If $\varepsilon \leq w$, X is initially flat at zero and then strictly increasing.*

(ii) *If $w \leq \varepsilon \leq \max\{\frac{3}{4}(1+w), w + \frac{1}{2}\}$, X is strictly increasing starting from a positive value.*

(iii) *If $\max\{\frac{3}{4}(1+w), w + \frac{1}{2}\} < \varepsilon \leq 1+w$, X is strictly increasing starting from a positive value, then decreasing and again increasing.*

(iv) *If $1+w < \varepsilon$, X is initially flat at 1, then decreasing and again increasing.*

Proof. The proof follows from studying the following cases.

(1) If $\varepsilon \leq \frac{w}{2}$, then as $-\beta$ increases, we first pass through region (2.2) ($X = 0$) and then through region (1.2) (X increasing).

(2) If $\frac{w}{2} < \varepsilon \leq \min\{w, \frac{1+w}{2}\}$, then as $-\beta$ increases, we first pass through region (2.2) ($X = 0$), region (2.5) (X increasing) and then through region (1.2) (X increasing)

(3) Suppose $w > \frac{1+w}{2}$, i.e., $w > 1$. Then if $w < \varepsilon \leq \frac{1+w}{2}$ as $-\beta$ increases, we first pass through region (2.2) ($X = 0$), region (2.5) (X increasing) and then through region (2.3) (X increasing).

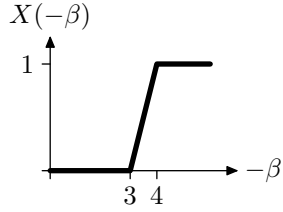
(4) Suppose $w < \frac{1+w}{2}$, i.e., $w < 1$. Then if $\frac{1+w}{2} < \varepsilon \leq w$ as $-\beta$ increases, we first pass through region (2.0), then through region (2.5) and finally through region (2.3). X is increasing in each region, and $X(0^+) > 0$ in region (2.0).

(5) If $\max\{w, \frac{1+w}{2}\} \leq \varepsilon \leq w + \frac{1}{2}$, then as $-\beta$ increases, we first pass through region (2.0), then through region (2.5) and finally through region (2.3). X is increasing everywhere starting positive.

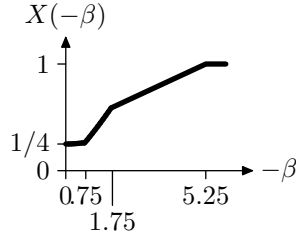
(6) Now, consider $w + \frac{1}{2} \leq \varepsilon \leq 1 + w$. Here, as $-\beta$ increases, we first pass through region (2.0), then through region (2.4) and finally through region (2.3). We know X starts positive and is increasing in regions (2.0) and (2.3). Denote the function $X(-\beta)$ by X^* in region (2.4). We know $X^*(-\beta)$ is potentially U-shaped, with the minimum occurring at $-\beta = \varepsilon$. We have to check that, for any ε in $(w + \frac{1}{2}, 1 + w)$, whether $-\beta = \varepsilon$ occurs in region (2.0) or region (2.4). In the former case, the relevant portion of $X^*(-\beta)$ is increasing while in the latter case, the relevant portion first goes down before going up again. Since $\varepsilon > 3(1 - (\varepsilon - w)) \Leftrightarrow \varepsilon > \frac{3}{4}(1 + w)$, $X(-\beta)$ consists of a falling segment if $\varepsilon \in (w + \frac{1}{2}, \frac{3}{4}(1 + w))$.

(7) If $\varepsilon \geq 1 + w$, then as $-\beta$ increases, we first pass through region (2.1) ($X = 1$), then region (2.4) and finally region (2.3) (X increasing). If $w < 1$, then $-\beta = \varepsilon$ is in region (2.3). In this case, X is downward sloping in region (2.4) and upward sloping in region (2.3). If $w > 1$ then $-\beta = \varepsilon$ is in region (2.4). In this case, X is U-shaped in region (2.4) and upward sloping in region (2.3). In either case, $X(-\beta)$ is initially flat at 1, then decreases and then increases again. ■

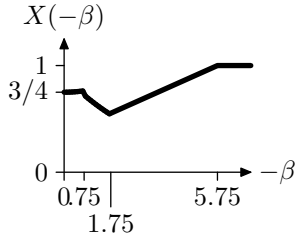
Figure 2 illustrates the function $X(-\beta)$ for several different values of ε .



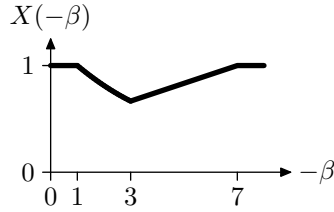
Panel 1a: $w = 4, \epsilon = 3$



Panel 1b: $w = 4, \epsilon = 4.25$



Panel 1c: $w = 4, \epsilon = 4.75$



Panel 1d: $w = 4, \epsilon = 6$

The basic idea of the proposition is that there is some threshold value of accountability such that above that threshold, political competition (weakly) reduces corruption, but below that threshold the relationship is non-monotonic. In particular, for low enough accountability, the relationship is U-shaped, i.e., when competition is high an increase in competitiveness may actually increase corruption.

We provide a brief intuition of the proposition for the case $w < 1$.

Consider first the situation with high accountability ($\epsilon \leq w$). Here, for low competitive advantage ($-\beta$ close to 0), we are in region (2.2), i.e., $x_L = x_R = X = 0$. Hence, $X(-\beta)$ is flat at zero before increasing and reaching 1 eventually, when the advantage for L is high enough that it wins for sure even with maximum corruption.

At the other extreme, consider the situation with low accountability ($\epsilon \geq w + 1$). Here, x_L is constant at the maximum value of 1, while x_R weakly decreases as the rival's advantage increases: in particular, x_R equals 1 initially (region (2.1)), then decreases (region (2.4)) and then falls to zero (region (2.3)). Thus, when the electorate is very competitive, we have maximal corruption, i.e., $X = 1$ in region (2.1). Following this, X is U-shaped in region (2.4) and finally increasing in region (2.4). Thus, following the flat region, X is U-shaped in competitive advantage, before being flat at 1 again. The important result is that, for low

accountability, we have maximal corruption initially and a positive relationship between political competition and corruption. For high enough competitive advantage however, we again have the familiar decreasing relationship between corruption and competition.

Finally, to see the contrast, we return to moderate values of accountability, i.e, $w \leq \varepsilon \leq w + 1$. This comprises of case (i) and (ii) in the above proposition. Here, for low values of competitive advantage, we are in region (2.0) or the interior equilibrium. *Within* this region, $X(-\beta)$ is positive even when β tends to zero, and is increasing thereafter. As long as $\varepsilon \leq w + \frac{1}{2}$, $X(-\beta)$ is strictly increasing starting positive since we enter region (2.3) from region (2.0) as β increases. If $1 + w \geq \varepsilon \geq w + \frac{1}{2}$, we pass from region (2.0) to region (2.4) and then to region (2.3). Since X is U-shaped in region (2.4), there are two possibilities. For low enough ε in this range, we do not encounter the falling segment of X in region (2.4): therefore, $X(-\beta)$ is strictly increasing starting positive. Here, we have the "standard" result that corruption is negatively correlated with competitiveness of elections. However, for large values of ε in this range, we encounter the falling portion of X in region (2.4): so $X(-\beta)$ first increases, then goes down before finally increasing and reaching 1.

A.1 The relationship between the theoretical measure of competition $|\beta|$ and the expected margin of victory

Our main theoretical result is that if $\varepsilon - w$ is large enough, then observed corruption is U-shaped in the "preference gap" in favour of the candidate with advantage. Formally, we say that X is U-shaped in $|\beta|$, where β is the valence advantage of R .

In our exercise, we analyze the case where $\beta < 0$. The argument for $\beta > 0$ is symmetric.

We do not observe β or $|\beta|$. We only observe margin of victory of the incumbent. We establish here that the expected value of the margin of victory is strictly increasing in $|\beta|$.

Proposition A.2 *Equilibrium expected margin of victory (EMV) is strictly increasing in $|\beta|$.*

Proof. Let $y = x_R - x_L - \beta$. The margin of victory is $|\eta - y|$, and L wins iff $\eta < y$, where the distribution of η is uniform on $[-\varepsilon, \varepsilon]$. Therefore,

$$EMV \text{ if } L \text{ wins} = E(y - \eta | \eta < y) = y - E(\eta | \eta < y) = \frac{y + \varepsilon}{2}.$$

Similarly,

$$EMV \text{ if } R \text{ wins} = E(\eta - y | \eta > y) = E(\eta | \eta > y) - y = \frac{\varepsilon - y}{2}.$$

We do not know if L or R wins. Hence,

$$\begin{aligned} EMV &= \Pr(L \text{ wins}) \frac{y + \varepsilon}{2} + \Pr(R \text{ wins}) \frac{\varepsilon - y}{2} \\ &= \Pr(\eta < y) \frac{y + \varepsilon}{2} + \Pr(\eta > y) \frac{\varepsilon - y}{2} \\ &= \left(\frac{y + \varepsilon}{2\varepsilon} \right) \left(\frac{y + \varepsilon}{2} \right) + \left(1 - \frac{y + \varepsilon}{2\varepsilon} \right) \left(\frac{\varepsilon - y}{2} \right) \\ &= \frac{(y + \varepsilon)^2}{4\varepsilon} + \frac{(\varepsilon - y)^2}{4\varepsilon} = \frac{2\varepsilon^2 + y^2}{4\varepsilon}. \end{aligned}$$

Thus, EMV is increasing in $|y|$.

We now establish that $|y|$ is increasing in $|\beta|$ in equilibrium. There are two cases. First, suppose that $\beta < 0$. We now need to show that if β goes down then $|y|$ increases. Notice that if $\beta < 0$, then $p_L = \frac{1}{2} + \frac{y}{2} > \frac{1}{2}$ in equilibrium, implying that $y > 0$. Since y is decreasing in β , a reduction in β raises y . As $y > 0$, a drop in β raises $|y|$.

Next, suppose that $\beta > 0$. Then $p_L < \frac{1}{2}$, i.e., $y < 0$. An increase in β now leads to a reduction in y , i.e., an increase in $|y|$.

Therefore, EMV is a proxy for $|\beta|$ in equilibrium. ■