Electoral Competition, Electoral Uncertainty and Corruption: Theory and Evidence from India*

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Abstract

In this paper we study the effect of electoral competition on corruption when uncertainty in elections is high, as is the case many developing countries. Our theory shows that in such a context high levels of electoral competition may have perverse effects on corruption. We illustrate the predictions of the model with village level data on audit-detected irregularities and electoral competition from India. Our results imply that accountability can be weak in such contexts, despite high electoral competition.

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 competitiveness of the electorate? The literature (e.g. Besley et al. (2010), Svaleryd and Vlachos (2009), Persson and Tabellini (2000)) shows that more competitive electorates lead to lower corruption and provide supporting evidence from Western democracies. We demonstrate that this relationship crucially depends on *electoral uncertainty*, which reflects the sensitivity of re-election probability to corruption. Electoral uncertainty is interpreted as unanticipated changes to economic or political conditions. Our paper shows that when uncertainty is low, higher electoral competition always reduces incumbent corruption, consistent with the literature. However when uncertainty is sufficiently high, we show that higher electoral competition may perversely lead to *higher* corruption by the incumbent politicians. In particular, we demonstrate that, when uncertainty is high, incumbent corruption is U-shaped in the extent of competitiveness of the electorate. In other words, corruption is highest when competitiveness is either very high or very low. The U-shaped relationship between competition and corruption is consistent with empirical evidence on corruption in one of the largest public programs in India – the National Rural Employment Guarantee Act (NREGA).

We first build a simple model based on Besley et al. (2010) and Persson and Tabellini (2000) with two candidates (or parties), each committing to a certain level of corruption. Corruption is defined as theft of public money that benefits the respective candidate at the cost of voters. One candidate has an electoral advantage stemming from a relatively higher valence, or ex-ante voter preference stemming from ethnic identification, candidate features or reputation. We follow the literature in interpreting more competitive elections as those with lower valence advantage for any one candidate.

We incorporate uncertainty through a common shock to voter utilities which realizes after the candidates commit to corruption levels. This shock could be due to unanticipated changes in economic or political conditions that are orthogonal to corruption or valence, such as floods, crop failures, and other weather related shocks. This shock represents all factors that voters care about, but are unknown to candidates while deciding on the level of corruption, creating uncertainty in the electoral outcome. The variance of this shock (range of the uniform distribution, following the standard model - see, e.g., Persson and Tabellini (2000) Ch.4, p.73, Polo (1998)) measures the extent of uncertainty, and is a crucial parameter in our model.

Formally, we have a probabilistic voting model where the candidates choose corruption levels subject to a maximum and voters determine the electoral outcome based on corruption platforms, valence and the common shock. The winning candidate obtains the committed corruption payoff and ego rent. We provide a characterization of the electoral equilibria for the full range of values of the uncertainty, valence and ego rent parameters. We then study the expected corruption of the winning candidate as a function of the valence advantage.

For the case of low uncertainty relative to ego rents, we find that expected corruption by the incumbent decreases with increased competition, replicating the result in Besley et al. (2010), Persson and Tabellini (2000), Svaleryd and Vlachos (2009). Our main focus, however, is on the environment with high uncertainty and low ego rents which may correspond more closely to developing countries. In this setting, we find that very high levels of competition are as bad for corruption as very low levels of competition. In particular, for highly competitive electorates, an increase in competition leads to an increase in expected incumbent corruption. Our first contribution is to highlight theoretically this counter-intuitive interaction between uncertainty and competition. Below we provide some intuition for this result.

The central trade-off faced by politicians is between an increase in utility from higher corruption and the consequent decrease in the probability of winning. A marginal reduction in valence advantage induces the leading candidate to reduce corruption, to increase the probability of winning. This, in turn, forces the lagging candidate to also engage in less corruption in order to stay competitive. This is why in the "standard case" of low uncertainty, increased competitiveness reduces corruption.

When uncertainty is sufficiently high, voters are significantly less responsive to corruption, allowing the leading candidate to choose maximal corruption. When valence advantage increases for the leading candidate, the corruption level of the advantaged candidate stays maximal but the disadvantaged candidate must reduce corruption to ensure a positive probability of winning. As a result, it is possible that when uncertainty is high (relative to ego rents), *expected incumbent corruption* may decrease with a decrease in competitiveness. When the valence advantage of the leading candidate is large enough, expected incumbent corruption again goes up simply because of the vastly increased winning probability of the maximally corrupt candidate. Therefore, the perverse effect exists only for low valence differences, leading to an overall U-shaped relationship between competitiveness and corruption.

Our perverse result is not driven by the artifact of a maximal corruption threshold. What is needed is that marginal gain from corruption drops disproportionately fast for high levels of corruption. When voter responsiveness to corruption is low, it is possible that the leading candidate's corruption is high enough that an increase in valence advantage induces a very small increase in corruption. For the lagging candidate, there are two opposite effects: an increase in valence disadvantage inducing a reduction in corruption (direct effect) and an increase in corruption by the rival inducing an increase (strategic effect). As long as the increase in the leading candidate's corruption is small enough, the direct effect dominates. In the simplified model when the leading candidate's corruption is at the maximal level, the strategic effect is zero.[1] Moreover, in the empirical context it is reasonable to expect there to be a maximal amount of theft that can take place.

Our second contribution is to 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)[2] - a rights based program that aims to guarantee 100 days of annual work

[1] In an extension of the model, we consider an example where the candidates' utility from corruption follows Increasing Absolute Risk Aversion (IARA). The non-smooth case studied in the main paper can be obtained as a limit of the IARA utility. We obtain the U-shaped relationship between corruption and competitiveness in the example for a certain parameter constellation.

[2] We do not claim that our explanation is the only one possible – we discuss alternate mechanisms later

to rural households willing to volunteer adult labor to rural public works. We focus on the state of Andhra Pradesh.

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 randomly sampled 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. We estimate that the number of irregularities rise by almost 150% (relative to the average) when electoral competition rises by 1 pp at above median levels of competition. On the other hand, program irregularities fall by over 32%, relative to the average, as competition increases by 1 pp at below median levels. Our results are robust to another, arguably exogenous, measure of competition based on caste demographics - the difference between the population shares of the top two sub-castes (*jatis*) in the village. Additionally, the empirical results are consistent with another theoretical prediction that (when uncertainty is high) the high valence candidate's corruption level does not respond to competition while the low valence candidate's corruption is increasing in competition.

Finally, we check the effect of higher uncertainty on the relationship between corruption and competition. While we do not have a direct measure of electoral uncertainty, it is reasonable to believe that electoral uncertainty is higher when voting decisions are made on factors other than predicted corruption and valence, as this increases the extent of variance in voter preferences as perceived by candidates (Besley et al. (2010)). Assuming that low information about policies, candidate features or valence may also raise the relative weight that voters place on other factors orthogonal to corruption and valence and raise uncertainty

in the paper.

(see Ashworth (2012) and Healy et al. (2010)) we propose a different measure of uncertainty. In our context audit results are exposed in public meetings held at the block or mandal HQ so that information on corruption flows differentially to those voters who are closer to the towns and those who live further. We interpret lower information on corruption (higher distance from block HQ) as being correlated with higher uncertainty and show that indeed the U-shape is driven by higher uncertainty (villages further from the block HQ).

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 find 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.[3] 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. Similar to our theory of uncertainty, in their setting ethnicity introduces another dimension which voters care about so that corruption matters less than the caste group in voting. In terms of our model they show that higher valence, i.e. lower competition (dominant caste group), is worse for performance.[4]

Our paper contributes to the emerging view that in developing countries, 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 reform. Gottlieb and Kosec (2019) use four decades of data from 164 countries to see how

[3]Ferraz 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.

[4]Banerjee and Pande (2009) is a similar setting to ours but they do not focus on 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.

competitive elections affect policy making 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. In contrast, 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 also highlight 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).

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 program in India. Section (4) describes the data and empirical methodology, and the results are in Section (5). Section (6) discusses the empirical findings in the context of the theoretical model. We conclude in Section (7).

2 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.[5] The candidate with the higher vote share wins and gets an office payoff $w > 0$ in addition to the benefit from corruption.[6] We assume that there is a maximum limit to corruption which we normalize

[5]It is straightforward to construct a repeated game where commitment is not assumed but arrived at endogenously.

[6]The 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).

to 1, and that a candidate cannot engage in negative corruption to increase winning probability. The maximal limit to corruption is supposed to be a shortcut for the fact that above a threshold, corruption becomes too costly to the candidates due to extra-electoral reasons, such as, legal penalties, reputational cost for the party and so on.[7]

In our model, there is a single representative voter who votes for the candidate giving her the higher utility. The utility from either candidate is based on two factors: corruption and valence. Importantly, corruption is endogenous and valence is taken to be exogenous in our model. We normalize the valence factor of L to 0, and denote the valence of R by β, which is a parameter of the model. We assume $\beta < 0$, i.e., L has a valence advantage. There is also a noise term in the utility function, taken to be zero for candidate L and the random variable η for candidate R, where η is uniformly distributed in $[-\varepsilon, \varepsilon]$. This variable η captures everything that the voters care about other than valence and corruption, and the exact realization of it is assumed to be unknown to the candidates. If two candidates engage in the same level of corruption, the expected utility difference between the two is equal to the parameter β, which we call the measure of competitive advantage of L.

Given our specification, the utility for a voter from L is $-x_L$ and that from R is $-x_R + \beta + \eta$. 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 (corruption levels) $x =$

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.

[7]While the “hard cap” on corruption is important for our results, we can obtain similar results with candidates having Increasing Absolute Risk Aversion over the sum of ego rents and corruption. What really drives our results is that corruption becomes disproportionately costly for the candidate as it increases (in the sense of marginal gain vanishing fast).

$\{x_L, x_R\}$ is

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

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 her corruption platform to maximize the expected payoff.

The parameter ε captures the extent of electoral uncertainty.[8] Uncertainty is higher when voting decisions are made on factors other than those that determine corruption and valence. A lower value of ε induces a larger reduction in winning probability for the same increase in corruption. 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.

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.[9]

A key assumption for our results is that rents from corruption are bounded, though as discussed earlier this assumption can be weakened considerably. This is a plausible assumption based on our setting where village chiefs get a budget based on the demand for jobs

[8] This is the interpretation used by Persson and Tabellini (2000).

[9] A 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 $\frac{1-\lambda}{2}$ 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 $U\left[-\varepsilon, \varepsilon\right]$. While choosing their platforms, candidates do not know the realization of the common shock. This gives us the same structure, with $\beta = -\frac{1-\sigma}{\sigma}\frac{\lambda}{2\varphi}$.

via public programs, which itself is limited by the budget constraints of the government.[10]

2.2 Choice of corruption levels

Both candidates in our model are opportunistic – they balance the gain from corruption with the reduction in probability of winning. 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 higher level of uncertainty, 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 reflects uncertainty relative to ego rent. A higher competitive advantage or valence gap in favour of L raises the corruption level of L and reduces the corruption level of R.

The reaction functions demonstrate that corruption has the property of strategic complementarity, i.e., a candidate engaging in higher corruption raises the incentive for the rival to enhance corruption as well.

$$x_L(x_R) = \frac{1}{2}\left[x_R + z - \beta\right], \tag{1}$$
$$x_R(x_L) = \frac{1}{2}\left[x_L + z + \beta\right]. \tag{2}$$

Interior Nash equilibria are given by the unconstrained solution to the reaction functions:

$$x_L = z - \frac{\beta}{3} \equiv \widehat{x}_L,$$
$$x_R = z + \frac{\beta}{3} \equiv \widehat{x}_R.$$

In the interior equilibrium we have (i) $\widehat{x}_L > \widehat{x}_R$, and (ii) $\widehat{x}_L$ is increasing while $\widehat{x}_R$ is decreasing in the valence gap $-\beta$.

While the literature has focused on the interior equilibrium, it is only true under certain combinations of β and z. Several other economically interesting cases may arise for other

[10]See, e.g., Sukhtankar (2017) for evidence on rationing of jobs in NREGA in India - the context for our empirical analysis.

parameter combinations.

Recall that x_L and x_R must lie in $[0, 1]$. Simple inspection reveals that the interior equilibrium holds only if $z \in [0, 1]$, i.e., when uncertainty is moderate. In addition, the valence gap must be low enough. When $z > 1$, i.e. uncertainty is high (or ego rents low), we must have $x_L = 1$, i.e., the advantaged candidate is already at maximal corruption. We believe that this case is better reflective of our less developed country setting.[11]

Proposition A.1 in Appendix A presents the Nash equilibrium characterization. There are eight different regimes for different parameter sets, and candidate behavior is different in each regime. Figure A1 in Appendix A plots the different regimes on the (β, ε) plane for $w = 1$. It is important to note that across these regimes there are some regularities: x_L is weakly increasing and x_R is weakly decreasing in L's competitive advantage $-\beta$ (recall we assumed $\beta < 0$ reflecting a valence advantage for L). Also, L's winning probability p_L is greater than $\frac{1}{2}$ and increases in $-\beta$ until it reaches 1.

2.3 Observed corruption

Notice that the equilibrium corruption choices x_L and x_R are never simultaneously observable. 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

$$X = x_L p_L + x_R(1 - p_L). \tag{3}$$

We are interested in studying the relationship between expected incumbent corruption X and competitiveness or valence advantage $-\beta$ and how it depends on the parameters of the model. Proposition A.2 in Appendix A describes in full detail how the function $X(-\beta)$ behaves for different parameter values. The general conclusion from Proposition A.2 and the detailed discussion in Appendix A is that a more competitive electorate leads to less

[11] When $z < 0$, i.e. the uncertainty parameter ε is lower than the ego rent parameter w, we must have $x_R = 0$, i.e., the disadvantaged candidate is pinned at zero corruption.

corruption only if uncertainty is low enough relative to ego rents.

Here, we provide a pair of claims that contrast the shape of the function $X(-\beta)$ for two different levels of uncertainty: moderate ($z \in [0,1]$) and high ($z > 1$).

Claim 1 *Suppose that $z \in [0,1]$ and $-\beta \leq \min(3z, 3(1-z))$. 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.*

$X(-\beta)$ is the expected corruption when the valence advantage is given by $-\beta$, so as $-\beta$ increases, electoral competition decreases. This is the parameter 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 (valence disadvantage is increasing) reduces its corruption, but the strategic effect (L increases corruption, so R can afford to increase corruption) 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 p_L increases fast enough that X is increasing in L's competitive advantage, despite R's corruption level going down.[12]

In contrast, consider what happens when $z > 1$, i.e., uncertainty is sufficiently high or ego rents are low. The leading candidate now engages in maximal corruption. Any increase in competitive advantage of L would reduce the corruption of R via the direct effect alone. As long as the winning probability of R is large enough, the expected incumbent corruption goes down. This gives rise to the possibility of a *positive* relationship between competitiveness and corruption.

[12]Besley et al. (2010) do mention, however, that there may be non-monotonicities in corner cases.

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

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

$X(-\beta)$ 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 (i.e., corruption $X(-\beta)$ is highest when competition is too low (very high valence advantage) or when competition is too high (very low valence advantage).

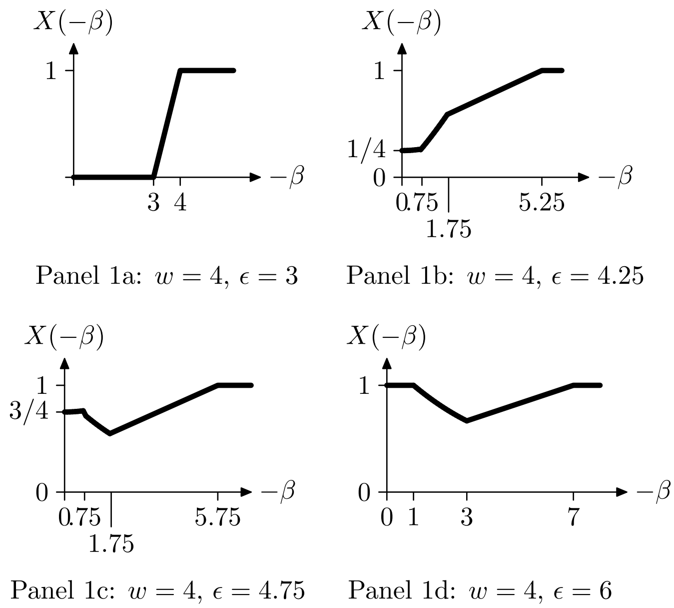
The intuition for this result is very simple. When $z > 1$, uncertainty is high enough that the candidate with advantage (i.e., L) always engages in maximal corruption. When the electorate is competitive, this allows the disadvantaged candidate (i.e., R) to mimic L and then both are maximally corrupt, implying $X = 1$. When the valence advantage for L crosses a threshold, R is forced to reduce corruption in order to stay competitive, 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. A more formal result, which covers all values of z is that there is some threshold value $z_0 \in (0, 1)$ of z below which $X(-\beta)$ is (weakly) increasing.[13] Above z_0, $X(-\beta)$ is non-monotonic, and in particular, it is U-shaped if $z > 1$.

Figure 1 below, based on Proposition A.2 in the Appendix, illustrates the function $X(-\beta)$ for several different values of ε, fixing $w = 4$. In particular, Panel 1a and 1b in presents the case of low/moderate uncertainty ($0 < z < z_0$). In panel 1c, we have ($z_0 < z < 1$) and in Panel 1d we have high uncertainty ($z > 1$).

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

Figure 1: Regions in Proposition A.2, with $w = 4$



While Besley et al. (2010) focus on the beneficial effects of competition on governance, we use a similar simplified model and demonstrate that competition may be bad for governance when uncertainty is high. Our main contribution is to apply the model to the region $z > 1$ in Proposition A.2, which more closely resembles the setting in developing countries. comparatively low.

It is worth mentioning here that we use the "linear-capped" utility function for the candidates only for continuity with the literature and tractability purposes. We can also obtain the U-shape with smooth utility functions, as we show in Appendix A. What we really need is that gains from additional corruption be significantly lower for high absolute levels of corruption compared to lower absolute levels. Alternatively, very high levels of corruption should be disproportionately costly for candidates, for instance, for legal or reputational reasons. Under these circumstances, while a valence increase will still raise the leader's corruption and decrease the lagging candidate's corruption, the latter will be dominate the former, leading to an overall reduction in expected incumbent corruption.

We end this section with a remark connecting valence advantage to the expected margin of victory, which will be especially useful for our empirical analysis.

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.3 in Appendix A 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 and underpayment of wages, which worsened following a statutory increase in wages from 2007 onwards.

While the primary objective of the program is social protection against weather induced uncertainties in agricultural production 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. 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% 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.[14] 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 INR 1563 in 2011-12.[15]

The GP maintained a crucial role in managing and executing NREGA projects during the period of our study in AP.[16] 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

[14] In 2014 Andhra Pradesh was bifurcated into two separate states - Andhra Pradesh and Telangana.

[15] See 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 INR 1287.

[16] `www.rd.ap.gov.in`

potential magnitude of pilferage from public funds[17] rose dramatically with the introduction of the NREGA, the wages of the *sarpanch* remain very low and have not kept pace.[18]

Our model assumes that audits are accurate and independent. 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)).[19]

The audit process combines a top-down approach with grassroots, beneficiary participation (Aiyar and Kapoor Mehta (2015)). A single audit team covers all GPs in the sub-district (*mandal*) and is followed by a mandal level public hearing conducted at its HQ (typically the only town in the mandal) to discuss the findings with mandatory attendance by all stakeholders. A decision taken report pins the responsibility of each irregularity on one or multiple program functionaries, although evidence suggests that punishment is weak.[20] 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.

[17]Powiss (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.

[18]The 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`

[19]The 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.

[20]Afridi 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".

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.[21] 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. [22] 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. [23] 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 affiliation) in July 2006 were gathered from the elected *sarpanch*.[24]

Table 1, Panel 1 describes the GP level 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% of the elected candidates were affiliated with the INC while 35.8% were affiliated with the TDP party.[25]

[21]These 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.

[22]At 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)).

[23]Information 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.

[24]The 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.

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

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 just under 3, on average. The typical winning candidate received 21% more votes, of the total votes polled, than her closest contestant. Hence the average electoral competition (1 - margin of victory) is 79%.[26]

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 program provides both private as well as public benefits to the participants. Corruption, therefore, can be classified into irregularities in the private (viz. those that directly affect program particpants' private returns or wages) and public component (viz. program benefits that are public in nature) of the program to better elucidate the nature of malfeasance.[27] 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 the voters would experience directly, such as wages from jobs that they can demand. 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 - about INR 16,329 in real terms, and

[26]It 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. However in Section 5 we also show robustness with a different (arguably exogenous) measure of electoral competition.

[27]Irregularities related to the private goods provided by the NREGA relate to those that directly 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.

much larger for the public goods provided in the program, benefits that voters receive only indirectly, such as roads or water conservation. NREGA expenditures and employment at the GP level are shown for 2006-07 to 2011-12 in Panel 2 in Table 2.[28]

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:

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

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 proportion of votes polled in favor of the winning candidate and her closest rival in the election.[29] 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

[28] The project costs were substantial, with an average cost of over INR 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.

[29] Current 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 5% 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. Standard errors are clustered at the GP level.[30]

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, corruption is decreasing in electoral competition. A positive coefficient (β_2) on $competition^2_{jkl}$, would indicate that when electoral competition is high irregularities related to program implementation 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.

Our theoretical model uses $1 - |\beta|$ as the measure of competition and assumes there are two parties on opposite sides of the ideological spectrum. In our empirical setting, there are indeed two main parties (INC and TDP) and approximately 80% of the incumbents in the sample belong to one of these two. In the theory, $|\beta|$ is exogenously given. The theory therefore predicts that there is a causal relationship between competition and corruption. Since we do not have a measure of valence in the data we proxy it with the margin of victory between the two largest political parties in a GP.

Since we measure electoral competition in 2006 and program irregularities are audited (for the first time since NREGA inception) post the GP elections in 2006, we circumvent some of the concern that both electoral competition and corruption are determined simultaneously.[31]But to the extent that our empirical analyses are confounded by extant GP level unobservables that impact both electoral competition and NREGA implementation,

[30]To allay any concerns regarding the validity of findings, throughout our analysis we restrict the data to irregularities reported by professional auditors who are unlikely to be influenced politically and are trained to detect NREGA irregularities.

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

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. However, we also check the robustness of our findings with historically determined 'caste competition' (1 less the difference in the proportion of population that belongs to the largest and second largest *jati* in the GP), as a proxy for electoral competition (see e.g. Banerjee and Pande (2009) and Munshi and Rosenzweig (2015) for similar measures based on caste shares). Population shares of caste groups within villages are usually quite sticky in India, for instance due to exceptionally low rates of internal migration (Munshi and Rosenzweig (2016)). Simply put, it is reasonable to assume in the context of rural India that voters' preferences for candidates are based on *jati* affiliation. Assume each *jati* puts up one candidate. Then, the winner in an election would be the candidate belonging to the largest *jati* group (by population size) and the runner up would be the candidate belonging to the second largest *jati* group. The difference in the proportion of votes polled by the candidates based on *jati* affiliation then has the same interpretation as our measure of the electoral margin of victory, in that the difference between the top two castes represents the valence advantage of the leading candidate. For some further results, we also interpret the incumbent *sarpanch* as a candidate in the *previous* election who was either a high valence (if he belongs to the dominant *jati*) or low valence candidate (if he belongs to the second largest *jati*).

5 Results

In order to generalize our findings and estimate the average relationship between corruption and electoral competition we first show the estimates from the collapsed GP level data and estimate the relationship across GPs within a mandal over the entire period 2006-10 in columns (1) and (2) of Table 3. 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.[32] We thus have a sample of 279 GPs for which we were able to obtain data for the full set of controls.

In column (1) of Table 3 we model a linear relationship between electoral competition and reported irregularities while in column (2) we add the square of electoral competition. 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 irregularities are a decreasing function of competition at low levels of competition, while irregularities are increasing with electoral competition at high levels. The U-shape test results indicate that the U-shape relationship holds at 1% significance level.

Next we conduct the analysis at the GP-audit level across all GPs and report the results in columns (3) and (4) of Table 3. In column 3 we estimate a linear model while column (4) includes the square term of electoral competition. In both regressions we include mandal, audit round, and year fixed effects as well as district specific trends. The point estimates are comparable to 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.

We check that our results are not driven by outliers by estimating a linear specification at the two ends of the distribution of electoral competition in Table 4 - below median electoral competition and median or higher electoral competition. In line with the findings in Table 3, the coefficient on electoral competition is positive and significant for high competition (columns (1) and (2)) and negative at low levels of competition (columns (3) and (4)). The latter estimates are significant when we drop outlier GPs where electoral competition was 0, i.e. the sarpanch was unanimously elected. Indeed, the coefficients reported in column (2) vs. (6) show that the number of irregularities fall by over 32% relative to the average

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

(5.8 average total irregularities reported in Table 2) when competition increases (by 1 pp) at below median levels. On the other hand, total irregularities increase by almost 150% relative to the average when competition rises (by 1 pp) at above median level.

Since our measure of electoral competition may be influenced by unobservable GP level characteristics that affect both voting behavior and corruption, we use a proxy measure of electoral competition determined by the caste (i.e. *jati*) composition of the population of GPs, as discussed previously. We, thus, replace electoral competition with this (arguably) exogenous measure of caste competition in a GP, i.e. 1 - (difference in population share of largest and second largest *jati* in GP). We re-estimate the linear specification at below and above median caste competition in Table 5. We obtain similar results to Table 4 - a negative coefficient on low caste competition and a positive coefficient on high caste competition.[33]

The results are, thus, in line with our theoretical prediction that there exists a U-shape relationship between electoral competition and corruption.[34] Figure 2 plots the estimates obtained in column (2) of Table 3 showing the U-shaped relationship between electoral competition and total irregularities across GPs for the period 2006 -10.

While the results above pertain to average incumbent corruption across high valence and low valence winners, a further test of the theory is provided by Claim (2), which differentiates between high valence and low valence incumbents: according to Claim (2), the U-shape is driven by the combination of the low valence (disadvantaged) candidate who increases corruption with competition while the high valence (advantaged) candidate is maximally corrupt. In our context, we measure valence by self-perceived probability of re-election in the next *sarpanch* election in the GP. This is measured by elected *sarpanch*'s response to a survey question.[35] Self-perceived probability is defined as low if the current

[33]Table B1 in Appendix B reproduces Table 3 for caste competition. The correlation between electoral and caste competition is positive (0.02), but statistically insignificant in our sample.

[34]Note that electoral competition may affect both program malfeasance and the quality of NREGA implementation. Indeed, we find that the total number of projects, total program expenditure, person days of employment generated and the proportion of completed projects is positively correlated with the margin of victory in a GP. Our findings, thus, are unchanged when our outcome measure is the number of irregularities per NREGA project.

[35]The survey question asked: Please rank the chances of your being re-elected in the next *sarpanch* elections in this Gram Panchayat on a scale of 0 to 5: (0) No chance of re-election; (1) Very low; (2) Low; (3) Moderate; (4) High; (5) Almost certain to be re-elected. The average rank (excluding 12 non-responses)

sarpanch perceives her chance of re-election in upcoming *sarpanch* election as "no chance" to "moderate chance", while high probability implies "high" or "certain" chance of re-election. We consider an incumbent who reports high probability of re-election as akin to the advantaged or high valence candidate from theory and an incumbent who reports low probability of re-election as akin to the and low valence or disadvantaged candidate in the model.

Table 6 shows that there is a U-shaped relationship between electoral competition and corruption for the low valence candidate, which is driven by the significant increase in the number of irregularities at high levels of electoral competition (as also in Table B2 in Appendix B). The coefficient on competition-squared indicates a strong positive effect on corruption at high values of electoral competition for the low valence currently elected *sarpanch*, i.e. who perceives their chances of re-elections as poor, in columns (1) and (2) of Table 6. In contrast, the high valence (high chance of re-election) candidate's corruption is mostly insensitive to electoral competition, as theory predicts. Further, Table B2 in Appendix B corroborates that the low valence candidate's corruption increases with competition as shown by the marginally positive coefficient on electoral competition (columns (1) - (2)) while the high valence candidate's corruption is unresponsive to electoral competition (columns (3) - (4)).

5.1 The effect of electoral uncertainty

The main message of the paper is that electoral uncertainty mediates the relationship between competition and corruption: when uncertainty is high then higher competition may lead to higher corruption. In this section we provide a third test of the theory using a proxy for the uncertainty variable.

Audit results are exposed in public meetings held at the block or mandal HQ. These meetings are held at the mandal level, in which local residents of the audited GPs, officials of the local government both at the mandal level and GP office bearers are invited to

was 3.83 and 3.69 in unreserved and reserved GPs, respectively.

attend. We conjecture that travel costs (explicit as well as opportunity cost of time) rise with the distance to be travelled. Thus residents of villages that are farther away from the mandal HQ are less likely to attend these meetings and therefore have less information about irregularities exposed by the social audit than those residing in villages closer to the mandal HQ. When information on corruption is harder to obtain, then, presumably, voters will place less weight on corruption in their decision and more on factors other than corruption and valence. We interpret this lack of information as equivalent to higher uncertainty, suggesting that villages that are at a higher distance from the mandal HQ will be subject to more uncertainty and therefore that the U-shape would be driven by such villages. Table 7 shows that, indeed for villages that are closer to the nearest town (which is also the mandal HQ for a typical village) (low uncertainty), the relationship between electoral competition and NREGA irregularities is not significant while those which are further from the nearest town (high uncertainty) show a U-shaped relationship. Table B3 in Appendix B further indicates that corruption is significantly lower in GPs which are closer to the mandal HQ.

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 unavailable for 18% of the observations (see audit characteristics in Table 2), using the information available we do not find a significant difference in the theft amount per irregularity between GPs with higher and lower than median electoral competition (p-value = 0.583). Moreover, there is a monotonic relationship between theft amounts and the number of irregularities – as the number of irregularities increases, the amount of theft also increases (coefficient of correlation of 0.19, $p<0.05$).

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 electoral competition (p-value = 0.224). 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.

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 detect the way funds are used,[36] our analysis accounts for 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 include year and audit round fixed effects (and elections were held across all GPs in 2006) in our panel data analyses, our results are unlikely to be driven 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.

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

7 Conclusions

In this paper we build on a standard probabilistic voting model to capture the effect of electoral competition on corruption when electoral uncertainty is high and incumbent wages are very low. Our main result is to show that corruption has a U- shaped relationship with electoral competition when uncertainty is sufficiently high.

We illustrate the model's predictions using administrative data on mandated audits of projects under the NREGA program 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 our case study set in India. Our findings, thus, suggest that in a developing country context, when uncertainty is high, electoral competition might create perverse incentives for politicians.

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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
Electoral competition	296	0.709	0.455
Paved road	294	0.864	0.343
Main GP of mandal	300	0.280	0.450
Proportion of population of largest jati[1]	282	0.413	0.145
Proportion of population of second-largest jati[1]	280	0.208	0.068
Sarpanch seat reserved for woman[2]	300	0.427	0.495
Sarpanch seat reserved for SC/ST[2]	300	0.307	0.462
Sarpanch seat reserved for OBC[2]	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	0.301
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
Self-perceived re-election probability	287	3.770	1.442
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
Electoral competition (1 - margin of victory)	297	0.790	0.275

Notes: GP characteristics from Census, 2001; [1]survey data; [2]reservation data from the AP 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.
Audit characteristics			
Total number of irregularities	711	5.823	5.299
Private component	711	4.789	4.426
Public component	711	0.605	1.506
Total amount per irregularity (Rs.)	581	16329.42	52862.71
Private component	555	7920.14	19500.84
Public component	173	119062.00	488958.20
NREGA 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	20.55
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. The difference between the total and the sum of public and private irregularities is accounted for by other (miscellaneous) type of irregularities.

Table 3: Electoral competition and NREGA irregularities (2006-10)

	GP-level		GP-audit level	
	(1)	(2)	(3)	(4)
Electoral competition	0.327	-26.67***	-0.372	-6.546*
	(1.722)	(8.301)	(0.560)	(3.456)
Electoral competition^2		17.68***		4.011*
		(5.599)		(2.243)
U-shape test [Overall p-value]		[0.006]		[0.112]
N	279	279	635	635
R^2	0.646	0.661	0.322	0.325
Mandal FE	✓	✓	✓	✓
Audit Round FE			✓	✓
Year FE			✓	✓
District x Year FE			✓	✓

Notes: The dependent variable is the total number of irregularities in each GP in an audit. Columns (1) and (2) based on data collapsed at the GP level, while columns (3) and (4) pool data at GP-audit level for the period 2006-10. All regressions control for 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). U-shape test reported for estimates in columns (2) and (4). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

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

	At or above median electoral competition		**Below median electoral competition**			
	All elections		All elections		Excluding unanimous elections	
	(1)	(2)	(3)	(4)	(5)	(6)
Electoral competition	8.620**	8.619**	-0.767	-0.622	-1.961***	-1.871**
	(4.134)	(4.324)	(0.822)	(0.884)	(0.645)	(0.718)
N	319	319	316	316	268	268
R^2	0.409	0.454	0.387	0.458	0.425	0.523
Mandal FE	✓	✓	✓	✓	✓	✓
Audit Round FE	✓	✓	✓	✓	✓	✓
Year FE		✓		✓		✓
District x Year FE		✓		✓		✓

Notes: The dependent variable is the total number of irregularities in each GP in an audit. Median electoral competition is 0.89. Columns (1) - (4) include the full sample. Columns (5) and (6) exclude GPs where the sarpanch was unanimously elected in 2006, i.e. electoral competition was 0. All regressions control for 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). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

Table 5: Caste competition and NREGA irregularities (GP-audit level, 2006-10)

	At or above median caste competition		**Below median caste competition**	
	(1)	(2)	(3)	(4)
Caste competition	3.745	3.864	-1.729**	-2.115**
	(3.497)	(3.569)	(0.821)	(0.847)
N	315	315	279	279
R^2	0.323	0.405	0.514	0.620
Mandal FE	✓	✓	✓	✓
Audit Round FE	✓	✓	✓	✓
Year FE		✓		✓
District x Year FE		✓		✓

Notes: The dependent variable is the total number of irregularities in each GP in an audit. Caste competition is defined as 1 − (difference in the proportion of GP population belonging to largest and second largest *jati*). Median caste competition is 0.90. All regressions control for 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). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

Table 6: Electoral competition and NREGA irregularities by self-perception of re-election probability (GP-audit level, 2006-10)

	Low self-perceived probability of re-election		**High self-perceived probability of re-election**	
	(1)	(2)	(3)	(4)
Electoral competition	-87.54***	-88.51***	-14.15**	-14.30**
	(33.16)	(30.91)	(6.751)	(6.931)
Electoral competition^2	50.76***	51.31***	8.269*	8.403*
	(18.83)	(17.91)	(4.367)	(4.482)
U-shape test [Overall p-value]		[0.003]		[0.126]
N	189	189	424	424
R^2	0.498	0.622	0.359	0.410
Mandal FE	✓	✓	✓	✓
Audit Round FE	✓	✓	✓	✓
Year FE		✓		✓
District x Year FE		✓		✓

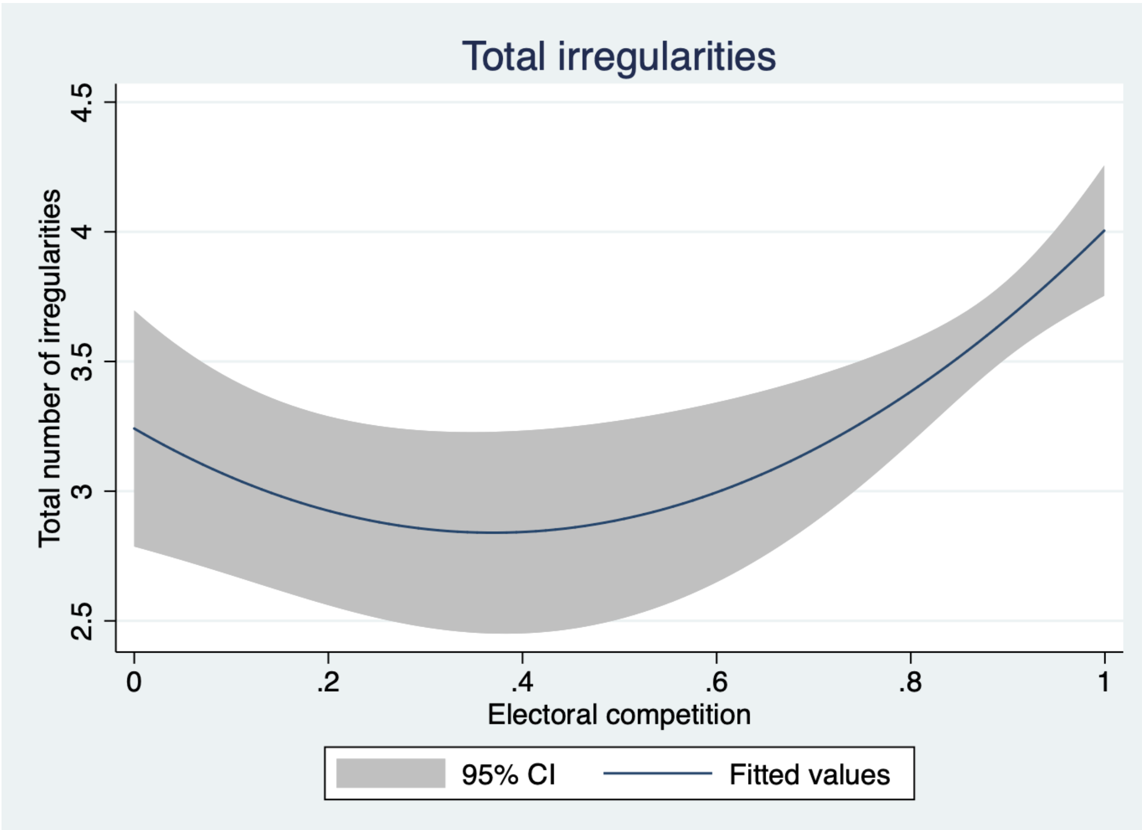
Notes: The dependent variable is the total number of irregularities in each GP in an audit. Low self-perceived probability is defined as current sarpanch perceiving her chance of re-election in upcoming sarpanch election as: 'none', 'very low', 'low' or 'moderate'; High self-perceived probability implies chance of re-election is perceived as either 'high' or 'certain to be re-elected'. All regressions control for 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). U-shape test reported for estimates in columns (2) and (4). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

Table 7: Electoral competition and NREGA irregularities by distance to nearest town (GP-audit level, 2006-10)

	At or above median distance to nearest town		Below median distance to nearest town	
	(1)	(2)	(3)	(4)
Electoral competition	-7.162*	-7.189*	-9.483	-8.785
	(3.684)	(3.917)	(6.981)	(7.385)
Electoral competition^2	5.769**	5.869**	4.688	4.247
	(2.731)	(2.895)	(4.491)	(4.748)
U-shape test [Overall p-value]		[0.034]		[.]
N	323	323	312	312
R^2	0.307	0.345	0.433	0.506
Mandal FE	✓	✓	✓	✓
Audit Round FE	✓	✓	✓	✓
Year FE		✓		✓
District x Year FE		✓		✓

Notes: The dependent variable is the total number of irregularities in each GP in an audit. Median distance to nearest town is 29 km. All regressions control for 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). U-shape test reported for estimates in columns (2) and (4). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

Figure 2: Electoral competition and NREGA irregularities



Note: Fitted values and 95% confidence interval corresponding to estimates in Table 3 (column 2).

ONLINE APPENDIX

A Theory Model

Proposition A.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 $-\beta \leq \min\{3(\varepsilon - w), 3(1-(\varepsilon - w))\}$, $x_L = \widehat{x}_L$, $x_R = \widehat{x}_R$, *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* $p_L = \frac{1}{2} - \frac{\beta}{2\varepsilon}$.

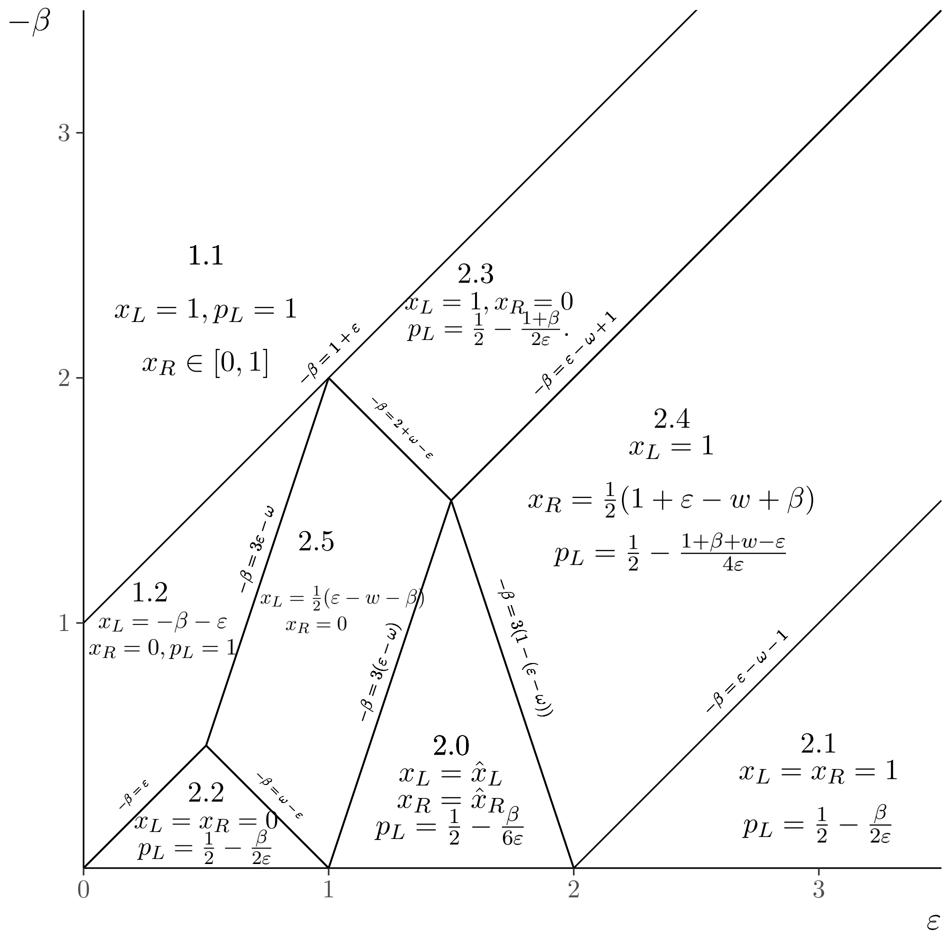
(2.3) When $-\beta \in (\max\{2+w-\varepsilon, \varepsilon - w + 1\}, 1+\varepsilon), x_L = 1$, $x_R = 0$, *and* $p_L = \frac{1}{2} - \frac{1+\beta}{2\varepsilon}$.

(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).

Figure A1: Regions in Proposition A.1



Proof of Proposition A.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 $x_R = 0$,

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

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

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

Therefore,

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

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) $0 < x_R < x_L < 1$,

(2.1) $x_R = x_L = 1$,

(2.2) $x_R = x_L = 0$,

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

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

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

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"

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

which requires $\widehat{x}_R \geq 0$ and $\widehat{x}_L \leq 1$, 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

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

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

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

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, $p_L = \frac{1}{2} + \frac{1}{4\varepsilon}\left[-1 + (\varepsilon - w) - \beta\right] = \frac{1}{2} + \frac{1}{4\varepsilon}\left[-1 + (\varepsilon - w) - \beta\right]$, and X is given by

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

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,

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

Also,

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

$$-\frac{1}{2}(\varepsilon - w) - \frac{\beta}{2} > -\varepsilon \Rightarrow -\beta > -2\varepsilon + \varepsilon - w = -\varepsilon - w,$$

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

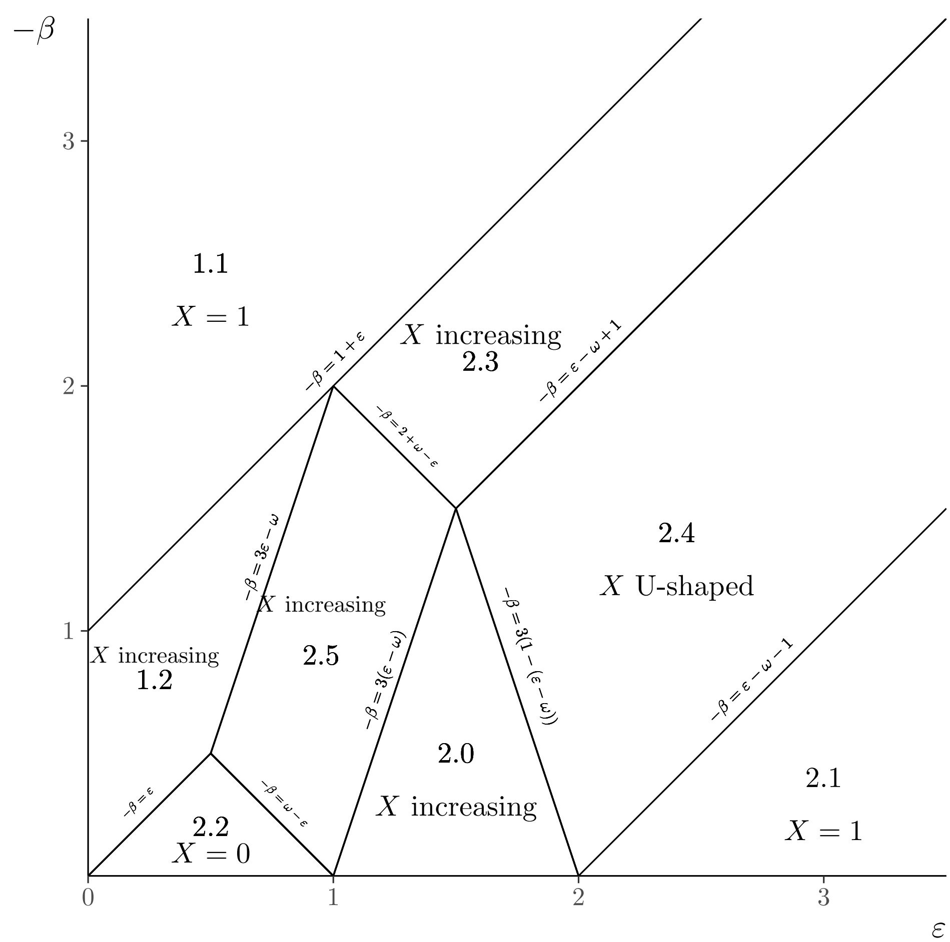
$\frac{1}{2}[(\varepsilon - w) - \beta] < 1$, i.e., $-\beta < 2 + w - \varepsilon$. Hence, this equilibrium holds if $-\beta \in (3(\varepsilon - w), 3\varepsilon - w) \cap (w - \varepsilon, 2 + w - \varepsilon)$. In this equilibrium, $p_L = \frac{1}{2} - \frac{(\varepsilon - w) + \beta}{4\varepsilon}$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

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

which is increasing in $-\beta$ ■

Figure A2 illustrates the Nash equilibrium on the (β, ε) plane for a fixed value of w.

Figure A2: Regions in Proposition A.2



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.2 below describes the relationship between *observed* corruption competition and accountability.

Proposition A.2 *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)

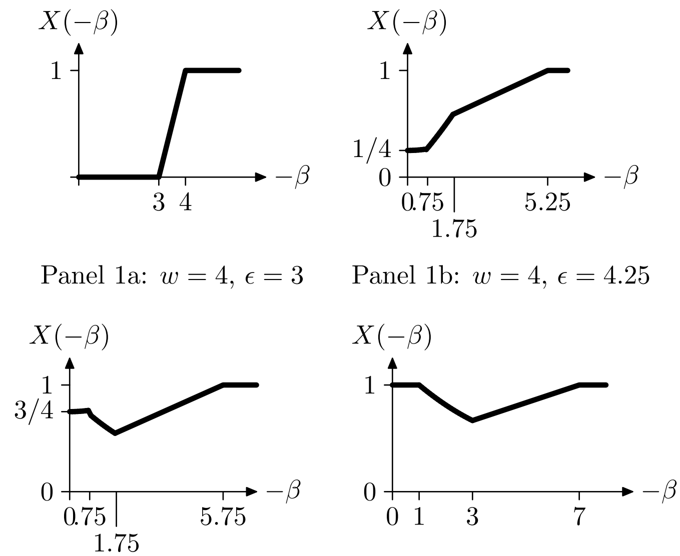
(3) Suppose $w > \frac{1+w}{2}$, i.e., $w > 1$. Then if $w < \varepsilon \leq \frac{1+w}{2}$ as $-\beta$ increases , we first pass through region (2.2) ($X = 0$), region (2.5) (X increasing) and then through region (2.3) (X increasing).

(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 $\left(w + \frac{1}{2}, 1 + w\right)$, 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 $\varepsilon \in \left(w + \frac{1}{2}, \frac{3}{4}(1 + w)\right)$.

Figure A3: Regions in Proposition A.2, with $w = 4$



Panel 1a: $w = 4$, $\epsilon = 3$ Panel 1b: $w = 4$, $\epsilon = 4.25$

Panel 1c: $w = 4$, $\epsilon = 4.75$ Panel 1d: $w = 4$, $\epsilon = 6$

(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 A3 above illustrates the function $X(-\beta)$ for several different values of ε.

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 ($\varepsilon \leq w$). 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 ($\varepsilon \geq w+1$). 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 us 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.3 *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. ■

A.2 A Smooth Utility function

In our set-up, there is a "hard cap" on corruption for both parties. One may worry that our result (the U-shape) fails to hold if we remove the cap and use a smooth utility function instead. We provide here an example of a smooth utility function close enough to the original linear-capped specification that delivers the U-shape. We have used an IARA specification to mimic the idea that the marginal benefit to corruption diminishes disproportionately for high levels of corruption.

Specifically, we employ a utility function with the functional form $u(z) = z - cz^{\alpha}$ for candidates, where $z = x + w$. Thus, candidate utility is a concave and IARA function of corruption x and ego rent w. The parameters in this utility function are $c > 0$ and $\alpha > 1$. Letting c to be small and α large, we can approximate a linear utility function with non-positive benefit above a threshold. We provide an example considering $c = 0.001$ and $\alpha = 7$. Under these utility parameters, uncertainty parameter $\varepsilon = 3$ and ego rent $w = 1$, the average corruption function $X(-\beta)$ is U-shaped for valence parameter $-\beta$ lying in the range $(2, 3)$.

Figure A4 below plots the average corruption on the Y-axis against should be minus beta?β on the X-axis, while **Figure A5** shows how respective candidate corruption and win probabilities (Y-axis) vary with should be minus beta?β on the X-axis. We see that in this range, the corruption of the leading candidate increases at a very slow pace with increasing valence advantage, the corruption of the lagging candidate decreases fast. Win probability of the leader also increases, but slow enough that the average corruption initially decreases before finally increasing. This is exactly the same intuition that is present in the original model, with the only difference being that the corruption level of the leading candidate is constant at the maximum.

Figure A4: Average Corruption

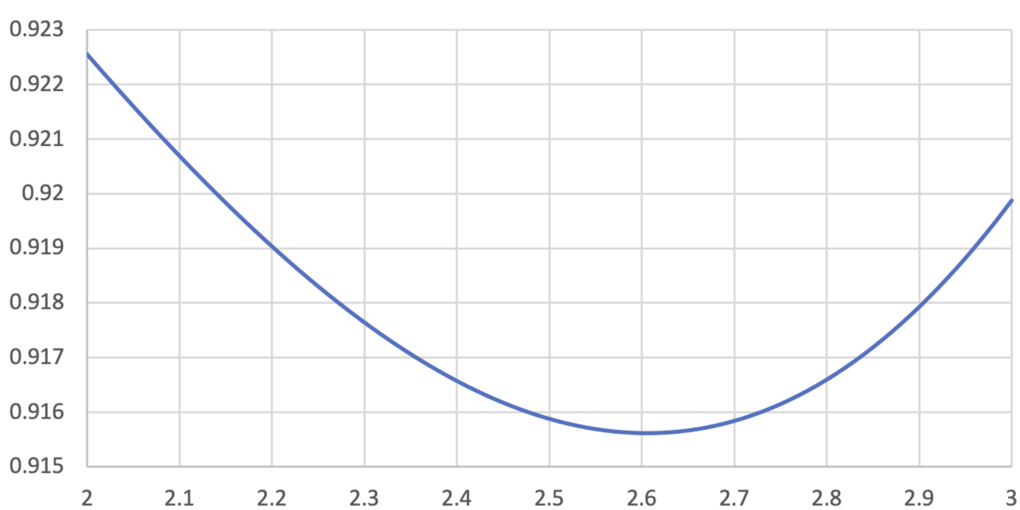
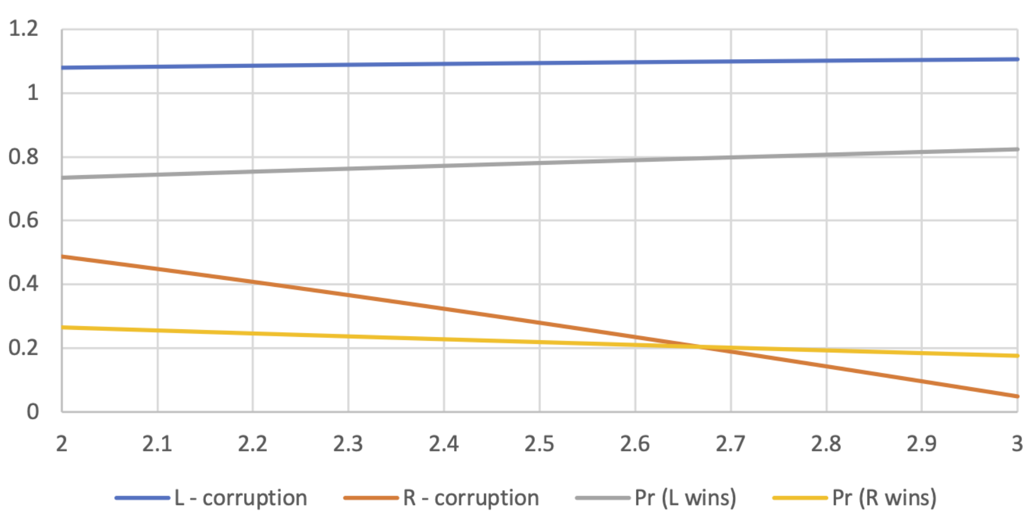


Figure A5: Candidate corruption and win probabilities



B Additional Tables

Table B1: Caste competition and NREGA irregularities (2006-10)

	GP-level		GP-audit level	
	(1)	(2)	(3)	(4)
Caste competition	-1.357	-0.772	-0.981	-3.724
	(1.803)	(8.168)	(0.621)	(3.166)
Caste competition^2		-0.412		1.925
		(5.836)		(2.237)
U-shape test [Overall p-value]		[.]		[0.466]
N	264	264	594	594
R^2	0.693	0.693	0.360	0.360
Mandal FE	✓	✓	✓	✓
Audit Round FE			✓	✓
Year FE			✓	✓
District x Year FE			✓	✓

Notes: The dependent variable is the total number of irregularities in each GP in an audit. Caste competition is defined as 1 − (difference in the proportion of GP population belonging to largest and second largest *jati*). All regressions control for 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). U-shape test reported for eastimates in columns (2) and (4). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

Table B2: Electoral competition and NREGA irregularities by self-perception of re-election probability (GP-audit level, 2006-10)

	Low self-perceived probability of re-election		High self-perceived probability of re-election	
	(1)	(2)	(3)	(4)
Electoral competition	1.698*	1.676*	-0.931	-0.875
	(0.889)	(0.984)	(0.749)	(0.781)
N	189	189	424	424
R^2	0.497	0.621	0.355	0.406
Mandal FE	✓	✓	✓	✓
Audit Round FE	✓	✓	✓	✓
Year FE		✓		✓
District x Year FE		✓		✓

Notes: The dependent variable is the total number of irregularities in each GP in an audit. Low self-perceived probability is defined as current sarpanch perceiving her chance of re-election in upcoming sarpanch election as: 'none', 'very low', 'low' or 'moderate'; High self-perceived probability implies chance of re-election is perceived as either 'high' or 'certain to be re-elected'. All regressions control for 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). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.

Table B3: Electoral competition and NREGA irregularities by distance to nearest town (GP-audit level, 2006-10)

	At or above median distance to nearest town		**Below median distance to nearest town**	
	(1)	(2)	(3)	(4)
Electoral competition	1.201	1.315	-1.979***	-1.987***
	(0.850)	(0.900)	(0.640)	(0.663)
N	323	323	312	312
R^2	0.301	0.339	0.432	0.505
Mandal FE	✓	✓	✓	✓
Audit Round FE	✓	✓	✓	✓
Year FE		✓		✓
District x Year FE		✓		✓

Notes: The dependent variable is the total number of irregularities in each GP in an audit. Median distance to the nearest town is 29 km. All regressions control for 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). Standard errors, clustered at the GP level, reported in parentheses. Significant at *10%, **5% and ***1%.