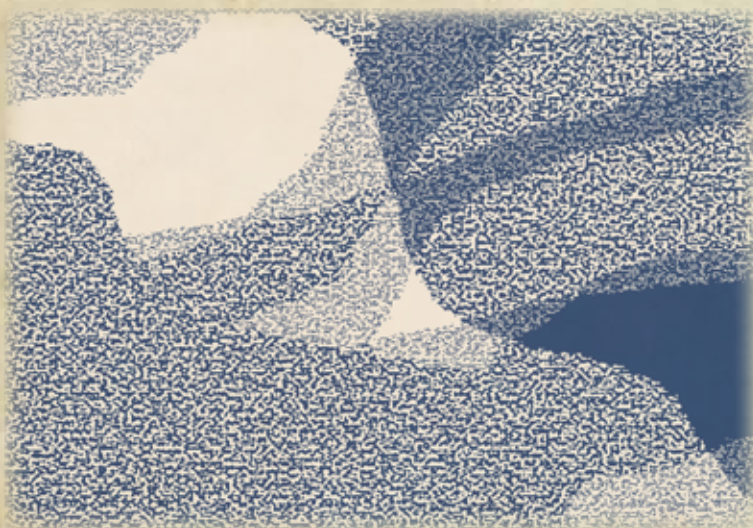


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## Devolutionary delusions? The effect of decentralization on corruption.

Ivar Kolstad, Vincent Somville and Arne Wiig



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# Devolutionary delusions? The effect of decentralization on corruption\*

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# Abstract

The effect of government decentralization on corruption is theoretically ambiguous. On the one hand, bringing government closer to the people could increase accountability and reduce corruption. On the other hand, decentralization could increase local capture and uncoordinated bribe taking across government levels. This paper estimates the effect of decentralization on experienced corruption, using individual-level bribery data from 36 countries. Crucially, we distinguish between the effect of decentralization on the frequency of contact with public officials, and its effect on the probability that a bribe is paid given contact. To identify the causal effect, we use an original instrument based on countries' climatic heterogeneity. The results show that decentralization increases contact with officials, but there is no significant effect on the propensity to pay bribes given contact. We hence find no evidence that decentralization increases accountability. Moreover, higher aggregate corruption in decentralized societies is at least partly due to greater interaction with public officials, and not necessarily due to greater local capture.

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# 1 Introduction

The effect of government decentralization on corruption is theoretically ambiguous. On the one hand, bringing government closer to the people could increase accountability and reduce corruption. On the other hand, decentralization could increase local capture and uncoordinated bribe taking across government levels. Empirical studies reach different conclusions on the effect of decentralization. Fisman and Gatti (2002) find a negative effect of fiscal decentralization on corruption, but the robustness of this result is questioned by Treisman (2002). Treisman (2000) and Kunicova and Rose-Ackerman (2005) find that political decentralization in the form of federalism increases corruption, this finding is found not to be robust in Treisman (2007). Fan et al (2009) find that corruption increases in the number of government tiers, but it is unclear whether this is due to selection bias. Enikolopov and Zhuravskaya (2007) and Lessman and Markwardt (2009) address the endogeneity of decentralization, and find that its effect on corruption is conditional on having strong political parties or a free press, but these variables are also endogenous. Albornoz and Cabrales (2013) find the effect of decentralization to depend on political competition, but do not address the endogeneity of either variable. From existing studies, it is still unclear whether, and if so how, when and why, decentralization affects corruption.

This paper estimates the effect of decentralization on corruption using individual-level bribery data from 36 countries. We make three main contributions to the literature. Firstly, we use data, taken from the Transparency International Global Corruption Barometer, which have the advantage of containing information on both contact with public officials, and bribery. This permits us to estimate the effect of decentralization on the frequency of contacts with public officials and its effect on bribery given contact with public officials. This is a fundamental distinction, without which we risk drawing wrong conclusions about the effects of decentralization. Suppose for instance that decentralization improves accountability and bribes per contact decrease. If the number of contacts increases, the total number of bribes paid in a society could in fact increase. From looking at aggregate bribe data we hence risk concluding that decentralization increases elite capture when it has actually led to more accountability. On the other hand, if decentralization increases capture, people may try to avoid contacts with public officials and the number of contacts might decrease. In that case, we could find that decentralization decreases the overall incidence of bribery, but concluding that decentralization has improved accountability would obviously be wrong. Our results show that decentralization increases the frequency of contact with public officials and at best has no significant effect on the probability of paying bribes given contact with public officials. These two effects combine to make the total effect of decentralization on corruption positive, but this is at least partly due to increased contact with public officials, which may be an intended effect of decentralization, and not necessarily due to increased local capture. We find no evidence that decentralization increases accountability.

Secondly, we propose a novel instrumental variable approach to assess the causal effect of decentralization on corruption. To address the endogeneity of decentralization, we use climatic variability in a country as the instrument, controlling for country size. We expect (and find) that more climatically heterogeneous countries are more likely to decentralize, due to a need to adapt policies and institutions to more divergent local conditions. Previous studies have used country size as an instrument for decentralization, however, country size may have been determined by political and historical processes which also influence current political structure and corruption levels (Enikolopov and Zhuravskaya, 2007). By controlling for country size, and for a given size using the heterogeneity of a country's geography as an instrument, our approach represents a clear methodological improvement. Our approach is also in contrast to most existing papers that produce estimates of the raw correlation between decentralization and corruption. More broadly, it falls within the empirical tradition attempting to estimate causal effects of institutional variables on economic and political outcomes. This includes work that employs instrumental variables to estimate effects of property

rights institutions on economic growth (Acemoglu et al, 2001), and quasi-experimental methods to assess the effect of re-election incentives on corruption (Ferraz and Finan, 2011). Our paper is methodologically closer to the former, but thematically closer to the latter in studying behaviour of public officials.

Thirdly, while previous research relies mostly on older governance measures, we make use of the most recent data, combining governance and corruption data from 2009 to 2013. We believe that providing an updated view of the links between government structure and corruption is important because countries and structures are evolving and measures of governance and of corruption practices have been refined in recent years. In our empirical approach, we are also very clear about using decentralization measures that capture agency, i.e. real devolution of power to sub-national units, rather than just a decentralized structure, where changes to decision making is more nominal. Measures of decentralized agency provide a sharper test of accountability and local capture effects of decentralization than measures of decentralized structure. Our conceptual and empirical approach is consistent with models that study whether decentralization leads to more uncoordinated bribe demands (Shleifer and Vishny, 1993). On average, our results suggest that competitive effects from decentralization cancel out any increases in bribes due to uncoordinated decision making of local officials.

The paper is structured as follows. Section 2 places the analysis in the context of previous theoretical and empirical studies of decentralization and corruption. Section 3 presents our empirical strategy and data. Our main results are presented in section 4. Section 5 concludes.

## 2 Relation to the literature

A decentralized government means that there exist levels of government below, and at a more disaggregate geographical level than, the national government. These sub-national units may have more or less power to make decisions in few or many areas of policy. Decentralization then implies creating sub-national levels of government and/or granting them greater or more extensive powers to make policy decisions. One can distinguish between a decentralized structure, where sub-national units exist to implement national government policy, but do not have much power to decide policy. This is similar to the concept of administrative decentralization.<sup>1</sup> Decentralized agency, on the other hand, entails devolution of real power to sub-national units. This may take the form of fiscal decentralization, where local governments have the power to tax citizens and firms, and to decide how to spend the tax revenue through local budgets. It can also take form of political decentralization, where subnational legislatures or executives are elected locally.

In practice, decentralization schemes across the world vary according to hierarchy and number of governmental tiers and bureaucratic layers, the extent of power granted, and the type of issues or arenas in which power is decentralised (Malesky et al 2012). In China, for instance, fiscal decentralisation is prevalent but not political decentralisation, while in India the opposite is the case (Bardhan and Mookherjee 2005). According to Blanchard and Shleifer (2001), decentralization has been more successful in China than in Russia partly due to a centralized political regime and tight control with what happens at the local level. There are also other dimensions of decentralization that characterize and differentiate government systems, such as the creation of horizontal and vertical

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<sup>1</sup> Bardhan (2002) distinguishes in a similar manner between administrative delegation and political and fiscal decentralization.

<sup>2</sup> See in particular Araujo et al. (2008) Bardhan et al. (2008), Besley et al. (2005) Galasso and Ravallion (2005)



checks and balances, for instance the power of local government to control central government and vice versa (Treisman, 2002). While such distinctions may undoubtedly be important, empirically estimating the impact of specific aspects of decentralization would be a challenging enterprise; we focus here on a broader notion of decentralization, which does not distinguish between political and fiscal aspects, or similar classifications.

Several arguments are typically made to rationalize decentralization. A more decentralized government is argued to produce a better fit between citizen preferences and government policy. Local government is believed to have superior information on local needs and costs, permitting them to tailor policy more closely to local conditions. A related argument is the classical one due to Tiebout (1956). Local governments will offer different menus of taxes and government services, allowing citizens to move to the jurisdiction whose menu best meets their preferences. In essence, the first argument assumes a given group of citizens to whom government policies are adapted, the second mobility of citizens to the most beneficial locality, but both arguments suggest that local government increases efficiency.

These types of arguments assume a benevolent government, at the national level in granting powers to local governments, and at the local level in adopting policy in the interest of their citizens. With selfish government officials comes the possibility of corruption, standardly defined as the abuse of public office for private gain, and the question of officials' incentives to implement policy that is in the public interest. Arguments have been made that decentralization increases the accountability of government officials. Moving government closer to people can make it clearer to citizens who is responsible for policies and their implementation, and may make it easier for citizens to access information on the conduct of public officials. The relative closeness of local government may also make it easier to sanction misconduct, and the smaller number of constituents present less of a collective action problem in doing so, through local elections, protests, influence, or social sanctions. The Tiebout argument also presents a basis for greater accountability, if citizens or firms can relocate to a different region or municipality with more efficient government, this will make inferior or corrupt local government practices more costly.

It seems clear that for decentralization to increase accountability in these ways there must be real devolution of power. Citizens are unlikely to hold local officials to account if they have little power and hence little perceived responsibility in the design of policy. In terms of the conceptual framework discussed above, a decentralized structure alone would not increase accountability, decentralized agency is needed. When empirically testing for accountability enhancing effects of decentralization, it therefore becomes important to use measures of decentralization that capture agency rather than simply structure. Since an important aim of this paper is to test for such effects, this guides our choice of decentralization measure, a point to which we return in the next section.

Even with devolution of power, however, it is not obvious that decentralization will increase accountability. If decentralization provides citizens with better information on government conduct, this also potentially makes it easier to identify who to bribe to get preferential access to government services or contracts (Bac, 2001, Ryvkin and Serra 2012). A decentralized political system may also be more corruptible since only a segment of the government needs to be influenced, and since it may be harder to enforce integrity in a more fragmented system. A number of studies point out the possibility of local capture in decentralized government systems. Local officials can have substantial discretionary powers, and local bureaucrats and politicians can be more subject to demands from local interest groups in matters such as taxation and spending priorities. Local capture tends to manifest itself in overprovision of services to local elites, at the expense of ordinary people. Bardhan and Mookherjee (2006) show theoretically that with greater cohesiveness of interest groups and higher levels of voter ignorance at the local level, there is a higher probability of local capture. Local capture hence increases with illiteracy, poverty and inequality, as these are factors that produce voter

ignorance at the local level (Bardhan and Mookherjee, 2000). On the other hand, to the extent that electoral competition and uncertainty are higher at the local than at the national level, this would make local capture less of a concern.

The effect of decentralization on corruption is hence theoretically ambiguous, on the one hand it may improve accountability, on the other it may increase local capture. In the discussion of how decentralization affects corruption, however, we need to make some crucial analytical distinctions. An intended consequence of decentralization can be that the number of interactions, or contacts, or encounters, between citizens and government officials increase. Bringing government closer to the people may naturally entail that there is more contact with politicians and bureaucrats, as there are potentially more of them and they are less distant. Total corruption, or the overall frequency with which citizens or firms pay bribes, will be a function of both the number of encounters with public officials and the probability of bribery in each encounter. A plausible interpretation of accountability is that it is reflected in the probability of bribery in each encounter, in the frequency with which an official interacting with a citizen takes a bribe. Looking at total corruption may then underestimate the accountability effect of decentralization, as the change in total corruption may reflect the increased number of interactions with public officials. It is for instance possible that more people pay bribes in a decentralized system, but that this is due to the greater number of contacts with officials, while each encounter is less likely to result in a bribe. To assess the effect of decentralization on accountability, we should hence distinguish between the effect of decentralization on the number of contacts with public officials, and the effect on the probability of bribe payment in each encounter. This is what we do in the empirical analysis presented in this paper.

In formal terms, we can represent this distinction as follows. Let  $P$  be the probability that an individual pays at least one bribe,  $N$  his number of encounters with public officials, and  $p$  the probability that a bribe is paid given contact with an official. If encounters with officials are independent events, and  $p$  is independent of  $N$ , the probability  $P$  that an individual pays one or more bribes is given by:

$$P = 1 - (1 - p)^N \quad (1)$$

The probability that an individual is involved in corruption hence depends positively on both the number of encounters  $N$  with public officials and the probability  $p$  that a bribe is paid given contact. Decentralization can affect both  $N$  and  $p$ . The effect on the number of contacts  $N$  is likely to be positive. But the effect on  $p$  is ambiguous, depending on whether decentralization increases accountability (reduces  $p$ ) or increases local capture (increases  $p$ ).

The distinction between the effect of decentralization on the number of contacts with public officials, and its effects on bribes given contact with an official, can also be viewed in light of the bribery model due to Shleifer and Vishny (1993). This model compares the bribery in a centralized system, where citizens interact with only one public official, with a decentralized system where they relate to two officials. In other words, decentralization by definition entails an increased number of contacts with public officials in their model. Their main result shows that a decentralized system increases bribes; since each official does not internalize the effect his bribe has on the ability of the other official to extract bribes, this results in an inoptimally high level of bribe demands. In other words, decentralization leads to uncoordinated, excessive bribe taking. This means that not only does decentralization lead to bribes being paid in more encounters with public officials; these officials have also become more corrupt in the sense of extracting higher bribes. Whether on balance uncoordinated bribe taking of this kind outweighs competitive and other effects of decentralization is in the end an empirical question, and one which we test in this paper.

Similar hypotheses can be generated from multiple corruption equilibria models such as that of Andvig and Moene (1990). In their model, officials compare costs and benefits of being corrupt, and the expected costs decrease in the proportion of officials that are corrupt, for instance due to greater probability of being caught if there are few corrupt officials. This creates the possibility of multiple equilibria; a low corruption equilibrium where the costs of becoming corrupt outweigh the benefits due to a high probability of being caught, and a high corruption equilibrium where the benefits of staying corrupt outweigh the costs due to a low probability of being caught. While the model focuses on the proportion of corrupt officials, an increase in the absolute number of officials that comes with decentralization may be thought of as decreasing the probability of being caught in corrupt acts, essentially shifting the cost curve down. This would lead to a greater basin of attraction for the high corruption equilibrium in decentralized countries, which means that *ceteris paribus* we should observe decentralized countries more frequently ending up in this equilibrium.

In estimating effects on corruption, previous studies have not made a distinction between the effect of decentralization on the number of contacts with public officials, and the effect on the probability of bribery given contact. These studies reach mixed conclusions on the effect of corruption, using different measures of corruption and decentralization, different samples of countries, and different methodologies. Most of the studies employ OLS estimation. Fisman and Gatti (2002) find a negative effect of fiscal decentralization on corruption. They show that this result holds using origin of a country's legal system as an instrument for decentralization, but this is likely to affect corruption also through other channels than decentralization and is hence not a valid instrument. The robustness of their result is questioned by Treisman (2002), who shows that the result is no longer significant when controlling for the proportion of protestants in the population. Treisman (2000) and Kunicova and Rose-Ackerman (2005) find that political decentralization in the form of federalism increases corruption, but Treisman (2007) expands the number of covariates and finds this result not to be robust. Fan et al (2009) find that corruption increases in the number of government tiers, and in contrast to the earlier studies used experiential rather than perception indices of corruption. A potential problem with this study is that since the number of tiers of government reflects decentralized structure but not necessarily decentralized agency, it may not pick up potential accountability effects of decentralization, making a positive result unsurprising and possibly not very informative in terms of key issues related to corruption.

Another strand of the empirical literature consists of micro-studies of links between local power and corruption. Evidence of elite capture now abounds. Baird et al. (2011), Bierschenk et al. (2000), Esman and Uphoff (1984), Kumar (2002) and Platteau (2009) describe how local elites in different contexts speak on behalf of the poor in attempts to capture local development projects. Other authors have provided direct evidence of capture by local authorities or local elites.<sup>2</sup> Mansuri and Rao (2012, Chap. 3) provide the most recent review of this evidence and conclude that localities that suffer from greater caste, race and gender disparities, poor literacy and geographical remoteness are the most likely to be dominated by local elites. This extensive literature provides solid grounds to fear a negative effect of decentralized governments. Devolving power to local elites may well translate into abuses of power and, as we investigate below, possibly more acute corruption.

There is an obvious challenge of selection bias to the studies using OLS estimation. Having a decentralized government system is a choice countries have made based on a number of underlying factors that may be hard to observe and control for and that may also be related to corruption. If there is a bias, it is likely that OLS underestimates the effect of decentralization of corruption, suggesting a more benign effect than is actually the case. In countries with political economy characteristics that

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<sup>2</sup> See in particular Araujo et al. (2008) Bardhan et al. (2008), Besley et al. (2005) Galasso and Ravallion (2005) Labonne and Chase (2009), Rao and Ibáñez (2005) and Rosenzweig and Foster (2003).

provide elites with large economic rents, elites will be reluctant to devolve power to lower levels as this may potentially reduce their access to these rents. This means that if centralized countries look more corrupt in descriptive statistics (which is the case in our data and some previous studies using OLS estimation), this could be due to these underlying political-economic characteristics rather than their degree of centralization. Or similarly, we might view this as a problem of reverse causality, where corruption (and the rents it entails) may make decentralization less likely.

To illustrate why it may be important to correct for an endogeneity bias, consider Nigeria and the United States of America, both of which are in our sample. Nigeria is centralized and highly corrupt (for instance, in 2013 81% of the respondents report having paid a bribe to the police). On the other hand, in the decentralized United States of America very few people report paying bribes (7% paid a bribe to the police in 2013). A comparison of countries like these results in a strong negative correlation between decentralization and corruption; decentralized countries appear less corrupt. But clearly, other elements are at play and we would argue that historical events and the political evolution of these countries are likely to explain both their centralized or decentralized structures and their levels of corruption. In a way, the problem the elite in a country faces is similar to the one modelled by Acemoglu and Robinson (2006), where they weigh benefits and costs of democratic reform. Decentralization in the form of devolution of power can in one sense be seen as a form of democratization, and possibly explained by similar variables. Some of these underlying variables, such as the mobility of elite assets, we would be able to observe and control for only with great difficulty.

Several studies have attempted to address the issue of endogeneity. Enikolopov and Zhuravskaya (2007) and Lessman and Markwardt (2009) use country size as an instrument for decentralization, positing that larger countries will have more decentralized systems of government. However, country size may have been determined by political and historical processes which also influence current political structure and corruption levels. The instrument may therefore not be valid. Both of these studies suggest that the effect of decentralization is conditional on other variables. Enikolopov and Zhuravskaya (2007) find that the effect of decentralization is conditional on having strong political parties. They argue that the reason is that a strong political party is an effective way of aligning the political incentives of local politicians with national political objectives. Stronger political parties can provide better careers opportunities to their members and politicians can place more weight on the policy preferences of their party. Lessman and Markwardt (2009) suggests that the effect of decentralization is more benign in countries with greater press freedom, where the media more effectively promotes government accountability. Both of these studies face the challenge of interacting decentralization with endogenous variables. Finally, Albornoz and Cabrales (2013) try to address endogeneity by controlling for region fixed effects, which does not really reflect the underlying challenge discussed above. They find the effect of decentralization to depend on political competition, but do not address the endogeneity of either variable.

In this paper, we present an empirical approach which represents a clear methodological improvement on earlier studies. We use climatic variability of countries as the instrument, controlling for country size. The idea is that heterogeneous countries are more likely to decentralize since they face more variety in local conditions, and that climatic heterogeneity is unlikely to have an effect on corruption through channels other than decentralization, given the observables for which control. Controlling for country size, climate variability is essentially exogenous. We present the approach in more detail below.

### 3 Empirical strategy and data

We address the endogeneity of decentralization through an instrumental variable approach, using climate variability of countries as the instrument. The instrument is based on the Köppen-Geiger climate classification. This is one of the oldest and most widely used classification of the earth climates.<sup>3</sup> Using precipitation and temperature data, Köppen-Geiger classified the earth's climate into five broad categories (tropical, arid, temperate, cold and polar) and twenty-two sub-categories. In a recent paper, Nunn and Puga (2012) constructed a tropical variable based on a 30 arc-minute grid covering the entire land area on earth.<sup>4</sup> Their variable is equal to the percentage ( $p_c$ ) of country  $c$ 's area (grid cells) that falls within the tropical climate classification. We use their variable to construct an index of climate heterogeneity within countries. We calculate climate variability of country  $c$  as:

$$\text{Climate variability}_c = p_c \cdot (1 - p_c) \quad (2)$$

This generates a variable that runs from 0 to 0.25, where higher values indicate a country whose area is more heterogeneous in terms of climate. For instance, a country that is either wholly tropical ( $p_c = 1$ ) or wholly non-tropical ( $p_c = 0$ ), scores zero on the climate variability index, while a country that is half-tropical and half non-tropical ( $p_c = 0.5$ ) attains the maximum value on the index. We expect (and find) that more climatically heterogeneous countries are more likely to decentralize. We interpret this relation as reflecting the need to adapt policies and institutions to more divergent local conditions.

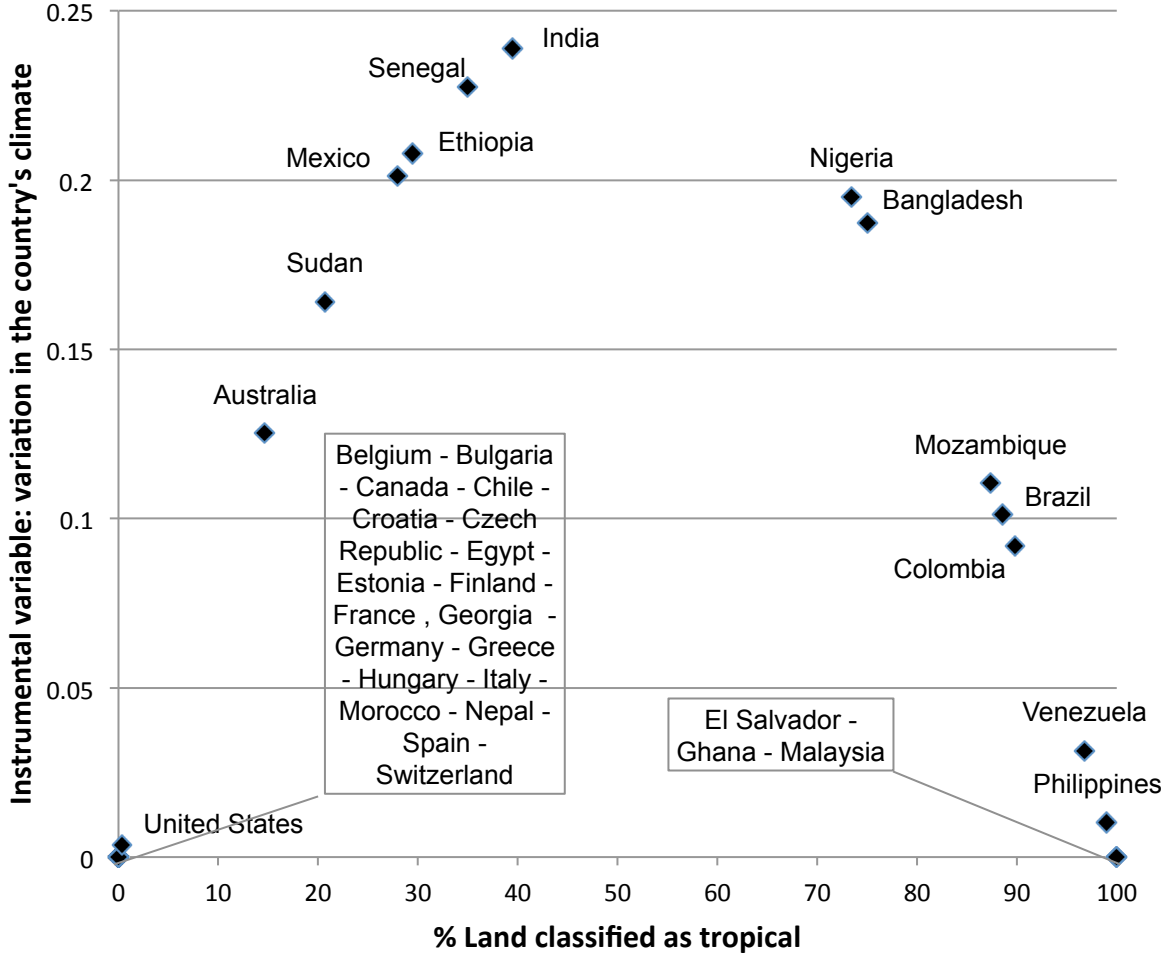
A main strength of our index is that it does not identify tropical countries, but countries composed of regions having significantly different climates. For example, France, Nepal and Malaysia have very different climates, but they score equally on our index because they have very homogeneous climates. More precisely, each of those countries is composed of 30 arc-minute cells that are similar in terms of temperature and precipitation. India on the other hand scores high on the index because it is composed of regions with very different climates.

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<sup>3</sup> See Peel *et al.* 2007 for a recent discussion of the classification.

<sup>4</sup> While the exact size in (plane) kilometres of a 30 arc-minute grid cell varies with the latitude of the cell, it roughly corresponds to a 50km\*50km square.

Figure 1: Tropical climate and variation in the country's climate



We are interested in the effect of decentralization on the frequency of contact with public officials, and the effect on bribes given contact with an official. Our empirical approach for identifying the effect of decentralization on these two dependent variables is captured by equations 3 and 4. In the first stage, decentralization in country  $c$  is regressed on the climate variability of country  $c$ . The dependent variable the number of contacts with public officials, or bribery given contact with a public official, both as reported by individual  $i$  in country  $c$  at time  $t$  is then regressed on decentralization as predicted by the first stage. We include individual covariates  $X_{it}$ , and country covariates  $X_{ct}$ , including regional and colonial dummies. Since our instrument does not vary over time, our approach is essentially cross-sectional. However, to augment the number of observations, we use all available bribery data in the period 2009-2013. Where available we take covariates from the same year as the bribery data, and we also add time dummies  $\delta_t$  indicating the year the bribery data is from.

$$\text{Decentralization}_c = \alpha_1 + \beta_{11} \cdot \text{Climate variability}_c + \gamma_{11}X_{it} + \gamma_{12}X_{ct} + \delta_t + \varepsilon_{1ict} \quad (3)$$

$$\text{Dependent variable}_{ict} = \alpha_2 + \beta_{21} \cdot \text{Decentralization(predicted)}_c + \gamma_{21}X_{it} + \gamma_{22}X_{ct} + \delta_t + \varepsilon_{2ict} \quad (4)$$



The main coefficient of interest is  $\beta_{21}$ , which captures the effect of decentralization on our dependent variables. Our identifying assumption is that climate variability does not affect bribery or contact with public officials through other channels than decentralization, when we control for country size and the other regressors. Previous studies have used country size as an instrument for decentralization, however, country size may have been determined by political and historical processes which also influence current political structure and corruption levels (Enikolopov and Zhuravskaya, 2007). By controlling for country size, and for a given size using the heterogeneity of a country's geography as an instrument, we avoid this pitfall.

In our main estimations, we cluster errors at the country level. Choosing the right level of standard errors clustering is generally not an obvious task. In our case, we believe it is natural to assume that the errors are independent across countries but correlated within countries. We are evaluating the effect of decentralization, which takes the same value for all individuals in a given country (Cameron and Miller, forthcoming). Note, however, that we have a relatively small number of clusters, as there are only 36 countries in our sample. For this reason, we prefer to not rely solely on the cluster robust results and we present results with robust standard errors in the Appendix. For our main estimations, we use standard instrumental variable estimation following the procedure described by Baum et al. (2010). As shown in the Appendix our results are robust to using IV probit estimation for the bribe variable.

The main variables used in our analyses are presented in Table 1. Our data on bribes and contact with public officials are taken from the Transparency International's Global Corruption Barometer (GCB), 2009-2013. The GCB includes individual data from a number of countries on whether in the past 12 months respondents or their household members have been in contact with an official from each of seven different government institutions; the education system, medical and health services, the police, registry and permit services, utilities, tax revenue services, and land services. Respondents that report contact are then asked whether they paid a bribe in their contact or contacts with the institution in question. We use this data to construct our two dependent variables. Firstly, the variable *Contacts* captures the number of institutions with which a respondent reports having been in contact, from zero to seven. To test the effect of decentralization on the extent of contact with public officials, we would ideally want to know the total number of encounters respondents have with public officials, but this is not available from the GCB data. We nevertheless expect the number of institutions a respondent is in contact with to be highly correlated with, and a good proxy for, the total extent of contact with public officials. Secondly, the variable *Bribe* is a dummy indicating whether, conditional on having been in contact with at least one government institution, the respondent has reported paying a bribe or not. The mean of this variable for a country would hence reflect the extent to which citizens who are in contact with public officials, pay bribes.

Table 1. Main variables

Variable	Explanation	Source
<i>Dependent variables</i>		
Contacts	From 0 to 7, number of public institutions with whom the respondent had at least one contact in the past 12 months.	Transparency International
Bribe	Conditional on having a contact with at least one institution in the past 12 months, the variable is equal to 1 if the respondent said that he/she paid a bribe, and equal to 0 otherwise.	Transparency International
<i>Independent variables</i>		
Decentralization	Equal to 1 if the state/provinces have extensive authority over taxing, spending, or legislating. Equal to 0 otherwise. Authority over “cultural affairs”, or “planning” in Communist systems does not qualify.	Database of Political Institutions - The World Bank
Male	Equal to 1 if the respondent is a man and 0 otherwise.	Transparency International
Income	In 2013: total household income before taxes. In previous years: income. [1=Low (bottom quintile); 2=Medium low (second quintile); 3=Medium (third quintile); 4=Medium high (fourth quintile); 5=High (Top quintile)]	Transparency International
Uneducated	Equal to 1 if the respondent has no education or only basic education. Equal to 0 otherwise.	Transparency International
In GDP/capita	Log of GDP per capita, PPP adjusted, constant 2005 USD (the value from 2012 is used in 2013).	World Development Indicators
In Population	Log of total population (the value from 2012 is used in 2013).	World Development Indicators
Proportion protestants	Proportion protestants in population (per cent) (value from 1980 used for all years)	Quality of Government Institute
Democracy	Polity Democracy Index (value from 2008 used for all years)	Quality of Government Institute
Freedom of Press	Freedom House freedom of press index (value from 2009 used for all years) The scale ranges from 0 (most free) to 100 (least free)	Quality of Government Institute
Country area	In millions Km squared	World Development Indicators
<i>Instrument</i>		
Climate variability	Variation in tropical climate. Using detailed temperature and precipitation data from the Climatic Research Unit of the University of East Anglia and the Global Precipitation Climatology Centre of the German Weather Service, Kottek, Grieser, Beck, Rudolf, and Rubel (2006) classify each cell on a 30 arc-minute grid covering the entire land area of the Earth into one of 31 climates in the widely-used Köppen-Geiger climate classification. Based on these data, Nunn and Puga (2012) calculated the percentage of the land surface area of each country that has any of the four Köppen-Geiger tropical climates. Denote by $p$ the percentage of the country's area that is tropical. Our variable of climate variability is equal to $p*(1-p)$ .	Constructed from Nunn and Puga (2012)

The GCB data on bribery has the advantage that it allows us to distinguish the effect decentralization has on the number of contacts with public officials (*Contacts*) and the effect it has on bribe payment given contact with public officials (*Bribe*). This is something traditional country-level corruption indices used in numerous previous empirical studies, such as the Transparency International Corruption Perceptions index or the World Bank Control of Corruption index, would not permit. In contrast to these traditional indices, the GCB data also captures experiences of corruption, rather than perceptions. Previous studies have argued that experiential indices of corruption give a more accurate picture of corruption than perceptions based indices (Treisman, 2007). This may be a particularly important point when analyzing effects of decentralization. Moving government closer to the people may change perceptions of corruption quite differently from experienced corruption, for instance by making corruption more (or less) visible to people. While perceptions of corruption may be important for many reasons, our analysis based in the GCB data avoids the problem that uncovered effects of decentralization simply reflect changes in visibility rather than real changes in corruption levels. Since the bribery data we use are based on people's interaction with bureaucrats in various public institutions, our results address the issue of bureaucratic or petty corruption, rather than political or grand corruption.

As a measure of decentralization, we use a dummy variable from the World Bank Database of Political Institutions (DPI), indicating whether “subnational governments have extensive taxing, spending or regulatory authority” (Beck et al, 2001:175). A number of different decentralization measures have been employed in previous empirical studies of decentralization. We choose the DPI measure because it captures real devolution of power and agency to sub-national levels, and not just a nominally decentralized structure. Any accountability effects of decentralization are likely to depend on devolution of power, as people are unlikely to hold institutions to account that bear little responsibility for policies enacted, and the DPI decentralization measure thus provides the sharpest available test of accountability effects of decentralization. In other words, if an accountability effect of decentralization does not show up using the DPI measure, it is unlikely to do so with other measures that put less emphasis on sub-national agency. While there are other measures of decentralization that also capture devolution of power, their disadvantage is that they tend to be dated. Notably, data on the share of subnational revenues or expenditure in total revenues or expenditure used by Fisman and Ghatti (2002) ends in 2000. We do not believe that comparing the local revenues and expenditures before 2000 with bribes paid in 2009-2013 can provide credible estimates. The DPI data on the other hand was updated in 2013.

Our individual level covariates include the gender of the respondent, an index of household income, and a dummy for whether the respondent is uneducated, all taken from the Transparency International Global Corruption Barometer data set. There is a large literature on whether men are more corrupt than women, but any uncovered effect for men in our estimation may also reflect other variables correlated with gender, such as being more susceptible to demands for bribes if you are the household head or perform other tasks outside the household, variables which the data set does not include. Households with higher income may be both more susceptible to demands for bribes or be more able to offer them (cf. Svensson, 2003). The effect of education is a priori unclear, the more educated may be more aware of their rights and hence be able to avoid paying bribes, but may also be more informed of the risks and rewards of paying bribes.

We include a set of standard controls at the country level. The level of income in a country is consistently found to be highly linked to corruption in a number of studies (Svensson, 2005). Previous studies have shown that the religious affiliations of a population affects the level of corruption, we therefore include the proportion of the population that is protestant (Treisman, 2002). Democracy and freedom of the press both affect accountability and are hence likely to reduce corruption (Kolstad and Wiig, 2013; Brunetti and Weder, 2003). Since our instrumental variable strategy does not permit the use of panel data, we cannot control for time-invariant country differences through country fixed effects, but include regional dummies to capture differences between different regions. We also control for colonial legacies of countries, found in several studies to influence corruption (Treisman, 2007). For our identification strategy, we control for country size (in million squared kilometres), and we also control for population size.

Our resulting data set consists of just over 80.000 individual observations from 36 countries and four years (2009, 2010, 2011, 2013 corresponding to the four most recent GCB waves of data collection, and the countries for which the DPI data is also available). The countries and years included are presented in Table A1 in the Appendix. Our sample includes 14 centralized and 22 decentralized countries, see Table A2 in the Appendix. Table 2 presents summary statistics for our full sample, and broken down on centralized and decentralized countries. For the full sample, the mean respondent has had contact with between two and three institutions in the last 12 months, and 23 per cent of those in contact with public officials report paying a bribe. About 60 per cent of respondents live in countries with a decentralized system of government. Half the sample is male, the average respondent is in the second to third income quintile in their respective countries, and a quarter of respondents are uneducated. The country of the average respondent has a per capita income of \$ 9300, a population size of 32.6 million of which 13 per cent are Protestants, a score of 7 on the Polity democracy scale

and 40 on the freedom of press index, an area of almost 1.5 million square kilometres, and a score of 0.06 on the climate variability index.

Table 2. Summary statistics

Variable	All sample			Centralized			Decentralized			Difference in means (t-test)
	mean	sd	N	mean	sd	N	mean	sd	N	
Contacts	2.716	1.877	80017	2.767	1.789	31915	2.683	1.932	48102	***
Bribe	0.231	0.421	67661	0.299	0.458	27854	0.183	0.387	39807	***
Decentralization	0.601	0.490	80017							
Male	0.501	0.500	80017	0.489	0.500	31915	0.510	0.500	48102	***
Income	2.715	1.269	80017	2.577	1.250	31915	2.807	1.274	48102	***
Uneducated	0.243	0.429	80017	0.310	0.463	31915	0.199	0.399	48102	***
ln GDP/capita	9.138	1.237	80017	8.694	1.089	31915	9.432	1.241	48102	***
ln Population	17.312	1.384	80017	16.913	1.350	31915	17.577	1.341	48102	***
Proportion protestants	12.886	21.242	80017	9.584	13.749	31915	15.077	24.762	48102	***
Democracy	7.292	3.018	80017	6.275	3.537	31915	7.966	2.391	48102	***
Freedom of Press	40.794	19.745	80017	41.916	14.261	31915	40.050	22.632	48102	***
Country area	1449.783	2602.980	80017	365.325	348.687	31915	2169.306	3145.211	48102	***
Climate variability	0.062	0.088	80017	0.053	0.083	31915	0.067	0.091	48102	***

\*\*\* indicates significance at the 1% level, \*\* at 5%, \* at 10%.

The right-most column of Table 2 tests for differences in means of centralized and decentralized countries. For our instrument, mean climate variability is significantly higher for decentralized countries, as expected. However, both the number of contacts with public institutions and bribes given contact are higher in centralized than decentralized countries. This is without controlling for other factors that may drive differences in corruption, and we note there are more wealthy countries among the decentralized ones, which may explain this pattern. Respondents in decentralized countries are also more educated, more likely to be Protestant, and to have a democratic government and a free press.

In estimating the effect of decentralization, we control for these differences between countries, and also for unobserved differences by using climate variability as an instrument. There is, however, a source of potential selection bias that we cannot address. This arises from the fact that the countries for which there are GCB data is a selected sample. It is, however, extremely difficult to find an additional instrument or approach to correct for this issue.

## 4 Results

We start by presenting the results for the effect of decentralization on the number of contacts reported with public officials. Results using the *Contacts* variable as the dependent variable are presented in Table 3. The first two columns present the results from the first and second stage of the IV regression using climate variability as the instrument, and the third column presents the OLS estimate for comparison. As seen in the first column, the instrument is positive and strongly significant. This confirms our expectations that more geographically heterogeneous countries are more likely to have decentralized government. Our main result for the effect of decentralization on contacts is at the top of column two. We find a significantly positive effect of decentralization on contacts, indicating that decentralization leads to more encounters between citizens and bureaucrats, or strictly speaking in the number of institutions with which people have contact. By comparison, the OLS estimate suggests that there is no significant relation between decentralization and contact with public officials.

Correcting for the endogeneity of decentralization thus suggests a more positive effect on interaction with officials than a bare comparison of centralized and decentralized countries would indicate.

**Table 3. Results, contacts with public officials**

<i>Dependent variable</i>	IV - 1st stage <i>Decentralization</i>	IV - 2d stage <i>Contacts</i>	OLS <i>Contacts</i>
Decentralization		0.738* (1.65)	0.154 (0.71)
Male	0.017* (1.86)	0.045** (2.24)	0.053*** (3.08)
Income	0.018** (2.15)	0.173*** (6.9)	0.182*** (7.4)
Uneducated	-0.037 (-0.81)	-0.362*** (-4.93)	-0.390*** (-5.57)
ln GDP/capita	0.429*** (4.17)	-0.504** (-2.17)	-0.305** (-2.04)
ln Population	0.07 (1.21)	-0.214*** (-2.74)	-0.133** (-2.23)
Protestants	0.004 (0.93)	0.002 (0.25)	0.004 (1.17)
Democracy	0.064 (1.62)	-0.137* (-1.8)	-0.093* (-1.83)
Freedom of Press	0.011 (1.43)	-0.027* (-1.9)	-0.018** (-2.24)
Country Area	0.006 (0.3)	0.002 (0.06)	0.005 (0.14)
Climate variability	1.888** (2.4)		
Regional dummies	Yes	Yes	Yes
Colonial dummies	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
Observations	80017	80017	80017
r <sup>2</sup>	0.53	0.07	0.09

*t-values in parentheses, standard errors clustered at country level. \*\*\* indicates significance at the 1% level, \*\* at 5%, \* at 10%.*

The increased frequency of contacts that comes with decentralization would result in more incidences of corruption if the probability that a bribe is paid given contact with an official stays the same or goes up. However, if there is a sufficiently strong accountability effect of decentralization, and the probability of a bribe given contact with an official is reduced, the effect of decentralization on overall corruption could be negative. The results in Table 4 shed light on this possibility. The IV regression shown in the two first columns show little sign of an accountability effect of decentralization. Decentralization has no significant effect on bribes given contact with a public official. We note that the sign of the point estimate in the IV regression has the opposite sign of the OLS estimate of the effect of decentralization. While the two estimates are not significantly different, this is loosely consistent with our expectations that OLS underestimates the effect of decentralization on corruption, due to unobservable political economy factors that make corrupt countries less likely to decentralize. In Table A3 in the appendix, we also present results using robust standard errors, i.e. without country clustering, where the positive effect of decentralization on bribes is strongly significant.

Table 4. Results, bribery given contact with public official

<i>Dependent variable</i>	IV - 1st stage <i>Decentralization</i>	IV - 2d stage <i>Bribe</i>	OLS <i>Bribe</i>
Decentralization		0.068 (0.7)	-0.056 (-1.59)
Male	0.017* (1.91)	0.034*** (4.45)	0.036*** (5.27)
Income	0.019** (2.15)	0.012** (2.54)	0.014*** (3.16)
Uneducated	-0.033 (-0.71)	-0.029** (-2.29)	-0.034*** (-3.43)
ln GDP/capita	0.422*** (3.95)	-0.117*** (-2.97)	-0.075*** (-2.94)
ln Population	0.075 (1.26)	0.027 (1.51)	0.044*** (3.55)
Protestants	0.004 (1.07)	-0.001 (-0.82)	0.000 (-0.09)
Democracy	0.063 (1.59)	-0.01 (-0.98)	-0.001 (-0.09)
Freedom of Press	0.012 (1.57)	-0.004** (-1.98)	-0.002 (-1.62)
Country Area	0.006 (0.29)	-0.013** (-2.34)	-0.012*** (-2.61)
Climate variability	1.852** (2.34)		
Regional dummies	Yes	Yes	Yes
Colonial dummies	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes
Observations	67661	67661	67661
r2	0.53	0.16	0.18

*t-values in parentheses, standard errors clustered at country level. \*\*\* indicates significance at the 1% level, \*\* at 5%, \* at 10%.*

In sum, we find little evidence to support the proposition that bringing government closer to the people leads to more accountability. Decentralization at best does not change the propensity to pay bribes given contact with a public official. It does, however, increase the number or frequency of contacts between citizens and public officials. Taken together, these two results suggest that the total incidence of corruption should be higher in decentralized societies. This is consistent with results from some previous studies using aggregate corruption data. Our results indicate, however, that at least part of this increase in aggregate corruption is due to increased interaction with public officials, which is an intended effect of decentralization. It does not entirely reflect increased local capture or uncoordinated bribe demands, as these studies argue.

These results are robust to a number of other (insignificant) covariates not included in our main specification. Results for IV probit estimations are presented in Table A4 in the Appendix; the IV probit regressions find no significant effect on bribes given contact, and while not shown this result also holds without clustered errors. Results for the covariates included in Tables 3 and 4 largely conform to expectations. Male, educated, higher income individuals are more likely to interact with



public officials and to pay bribes. Citizens of richer countries experience less corruption. For the other covariates, the results are either insignificant or not very robust.

## 5 Conclusion

This paper has attempted to take seriously important challenges in identifying effects of decentralization on corruption. We distinguish between effects on the frequency of contact with public officials, and the probability of paying bribes given contact. We present an improved empirical strategy to identify the causal effect of decentralization, using heterogeneity of climate as an instrument and controlling for country size. And we focus on decentralization of agency, choosing the decentralization measure accordingly, which theory suggests is essential to detecting potential effects on accountability. Our results provide little indication of improved accountability from decentralization, devolving power to local levels does not reduce the probability of paying a bribe given contact with a public official. The more optimistic arguments for the effect of decentralization on corruption or public sector behaviour therefore do not appear to hold.

Our results suggest that any observed increase in aggregate corruption under a decentralized system is at least partly and possibly wholly due to increased interaction with public officials. This positive effect on interaction with public officials could in principle be beneficial to citizens if it reflects better or greater access to public services. Some possible qualifications should be noted here, though. Whereas our main results suggest that decentralization does not significantly increase problems of local capture or uncoordinated bribe demands, the structure of our data presents challenges in terms of appropriate clustering of standard errors which makes these types of effects hard to rule out completely. Moreover, not just the incidence but also the size of the bribes could be affected by decentralization, an issue our data does not permit us to assess but which is an important consideration for future work.

In our approach, we focus on decentralized agency, but do not distinguish further whether the effect of decentralization on corruption is due to political or fiscal decentralization. Such questions are obviously important, as suggested by the contrasting cases of China and Russia discussed earlier. However, identifying causal effects of more disaggregate decentralization features is challenging, with an instrumental variable approach this would entail finding more instruments. A paucity of data, in particular on fiscal decentralization, also makes such a study difficult at the present time. Addressing these challenges is a matter for further research.

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# Appendix

Table A 1. Observations by country and year.

	Years				Total
	2009	2010	2011	2013	
Australia	0	832	0	1,119	1,951
Bangladesh	0	1,041	0	1,681	2,722
Belgium	0	0	0	727	727
Brazil	0	957	0	0	957
Bulgaria	795	814	0	797	2,406
Canada	1,179	821	0	843	2,843
Chile	0	999	0	989	1,988
Colombia	554	953	0	979	2,486
Croatia	716	690	0	978	2,384
Czech Republic	976	960	0	984	2,920
El Salvador	495	492	0	972	1,959
Ethiopia (1993-)	0	0	1,026	918	1,944
Estonia	0	0	0	981	981
Finland	1,125	759	0	945	2,829
France	0	750	0	0	750
Georgia	0	409	0	996	1,405
Germany	0	854	0	0	854
Ghana	809	567	0	1,854	3,230
Greece	309	935	0	972	2,216
Hungary	687	856	0	970	2,513
India	1,029	990	0	1,010	3,029
Italy	0	1,030	0	1,010	2,040
Malaysia	1,004	999	0	984	2,987
Mexico	0	942	0	1,042	1,984
Morocco	322	999	0	985	2,306
Mozambique	0	0	687	1,053	1,740
Nepal	0	0	819	992	1,811
Nigeria	3,355	767	0	962	5,084
Philippines	986	984	0	995	2,965
Senegal	1,269	899	0	1,040	3,208
Spain	557	541	0	960	2,058
Sudan	0	0	749	991	1,740
Switzerland	996	800	0	936	2,732
Egypt	0	0	0	981	981
United States	864	951	0	938	2,753
Venezuela	920	632	0	982	2,534
<b>Total</b>	<b>18,947</b>	<b>24,223</b>	<b>3,281</b>	<b>33,566</b>	<b>80,017</b>

Table A 2. Centralized and decentralized countries in sample

<b>Centralized</b>	<b>Decentralized</b>
Bangladesh	Australia
Bulgaria	Belgium
Chile	Brazil
Croatia	Canada
El Salvador	Colombia
Estonia	Czech Republic
Georgia	Ethiopia
Ghana	Finland
Greece	France
Hungary	Germany
Morocco	India
Mozambique	Italy
Nigeria	Malaysia
Egypt	Mexico
	Nepal
	Philippines
	Senegal
	Spain
	Sudan
	Switzerland
	United States
	Venezuela



Table A 3. Results with robust standard errors

<i>Dependent variable</i>	IV - 1st stage <i>Decentralization</i>	IV - 2d stage <i>Contacts</i>	IV - 1st stage <i>Decentralization</i>	IV - 2d stage <i>Bribe</i>
Decentralization		0.738*** (11.48)		0.068*** (4.18)
Male	0.017*** (6.98)	0.045*** (3.51)	0.017*** (6.66)	0.034*** (11.42)
Income	0.018*** (18.48)	0.173*** (31.79)	0.019*** (17.12)	0.012*** (9.79)
Uneducated	-0.037*** (-12.38)	-0.362*** (-23.68)	-0.033*** (-10.04)	-0.029*** (-7.38)
ln GDP/capita	0.429*** (182.46)	-0.504*** (-19.57)	0.422*** (160.79)	-0.117*** (-16.97)
ln Population	0.070*** (55.05)	-0.214*** (-18.43)	0.075*** (52.06)	0.027*** (11.62)
Protestants	0.004*** (43.97)	0.002*** (2.98)	0.004*** (47.25)	-0.001*** (-6.71)
Democracy	0.064*** (77.12)	-0.137*** (-22.03)	0.063*** (69.73)	-0.010*** (-6.32)
Freedom of Press	0.011*** (66.44)	-0.027*** (-23.25)	0.012*** (68.56)	-0.004*** (-15.03)
Country Area	0.006*** (12.21)	-0.013*** (-24.92)	0.006*** (12.21)	-0.013*** (-24.92)
Climate variability	1.888*** (115.34)		1.852*** (108.83)	
Regional dummies	Yes	Yes	Yes	Yes
Colonial dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Observations	80017	80017	67661	67661
r2	0.53	0.07	0.53	0.16

*t-values in parentheses, robust standard errors. \*\*\* indicates significance at the 1% level, \*\* at 5%, \* at 10%.*

Table A 4. IV probit results for bribery

<i>Dependent variable</i>	IV Probit - 1st stage <i>Decentralization</i>	IV probit - 2d stage <i>Bribe</i>
Decentralization		-0.078 (0.37)
Male	0.017* (1.91)	0.140*** (5.97)
Income	0.019** (2.15)	0.052*** (2.79)
Uneducated	-0.033 (-0.71)	-0.105** (-2.48)
ln GDP/capita	0.422*** (3.95)	-0.302** (-2.16)
ln Population	0.075 (1.26)	0.164** (2.13)
Protestants	0.004 (1.07)	-0.004 (-0.88)
Democracy	0.063 (1.59)	-0.006 (-0.15)
Freedom of Press	0.012 (1.57)	-0.008 (-0.93)
Country Area	0.006 (0.29)	-0.079*** (-3.18)
Climate variability	1.852** (2.34)	
Regional dummies	Yes	Yes
Colonial dummies	Yes	Yes
Time dummies	Yes	Yes
Observations	67661	67661

*t-values in parentheses, standard errors clustered at country level. \*\*\* indicates significance at the 1% level, \*\* at 5%, \* at 10%.*

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**INDEXING TERMS**

Decentralization	Accountability
Corruption	Capture
Bribery	

The effect of government decentralization on corruption is theoretically ambiguous. On the one hand, bringing government closer to the people could increase accountability and reduce corruption. On the other hand, decentralization could increase local capture and uncoordinated bribe taking across government levels. This paper estimates the effect of decentralization on experienced corruption, using individual-level bribery data from 36 countries. Crucially, we distinguish between the effect of decentralization on the frequency of contact with public officials, and its effect on the probability that a bribe is paid given contact. To identify the causal effect, we use an original instrument based on countries' climatic heterogeneity. The results show that decentralization increases contact with officials, but there is no significant effect on the propensity to pay bribes given contact. We hence find no evidence that decentralization increases accountability. Moreover, higher aggregate corruption in decentralized societies is at least partly due to greater interaction with public officials, and not necessarily due to greater local capture.