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# Measures of corruption and determinants of US corruption

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**Abstract** This paper contributes to the literature by examining whether conclusions from empirical models of corruption determinants are robust with respect to three alternative measures of corrupt activity for the US states. Are the determinants of US corruption sensitive to the choice of the measure of corruption? Overall, the answer to this question is that the choice of the measure of corruption matters in explaining corruption. However, some findings are robust across measures. For instance, greater educational attainment lowers corruption, while greater judicial employment adds to corruption. Southern states were found to be more corrupt, ceteris paribus. We also provide evidence that it is important to control for enforcement efforts in empirical modeling using convictions as a measure of corruption. Significant differences, however, across corruption measures occur in a number of other instances. Specifically, the effects of urbanization, economic prosperity, population size, media, government spending, and enforcement are sensitive to the measure of corruption. Further, the influences of the nation's foreign neighbors and of the location of the state relative to the nation's capital remain unclear.

**Keywords** Corruption · Convictions · Perceptions · Government · Enforcement · Location

**JEL Classification** K42 · H11 · H80

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## 1 Introduction

The empirical literature examining the causes and effects of corruption has proliferated in the last two decades (see Aidt 2003; Jain 2001; Lambsdorff 2006; Pellegrini and Gerlagh 2008; Svensson 2005, for extensive surveys).[1] These studies include country-specific and cross-national investigations, although a thorough measure of corruption remains elusive (see Donchev and Ujhelyi 2007 and Sampford et al. 2006; more broadly, see Williams and Siddique 2008). Barring a few case studies of individual nations, most of the empirical single-country studies focus on corruption in the United States.

This paper contributes to the literature by examining whether conclusions drawn from empirical models of corruption determinants are robust with respect to three alternative measures of corrupt activity for the US states. These include: (i) individual state convictions of public officials for corruption over a relatively short, five-year time horizon, (ii) convictions measured over a longer, three-decade time horizon, and (iii) perceptions of corruption across states based on survey data at a specific point in time. Of primary interest is the answer to the following question: Are the determinants of US corruption sensitive to the choice of the measure of corruption? If it turns out that the choice of the underlying measure is indeed important, then one would need to be cautious in recommending corruption control policies based on any particular measure.

The corruption literature has almost exclusively employed convictions data to study the causes and effects of corruption across US states.[2] While convictions are based on hard data, they are a truncated measure of corruption because they capture both the level of corruption and the strength of enforcement. There is also considerable variability (both across time and across jurisdictions) in this measure due to the lumpiness of corruption convictions (think about a number of convictions associated with a large corruption scandal in a state in one year). Further, most studies use data on federal corruption convictions, excluding convictions by the state-local legal system.[3]

In contrast to US studies, the cross-country corruption literature has widely employed corruption perception indices to measure corruption (see, for example, Treisman 2000). Barring the ability to measure the true level of corrupt activity, corruption perceptions surveys provide a useful measure of corruption. Surveys of corruption perceptions for the United States have been nonexistent until a recent survey by Boylan and Long (2003) of state house journalists regarding their perceptions of corruption. Based on the survey responses, they were able to create an index of corruption across states and also rank them. While the perception measure of corruption does not suffer from the problems associated with the use of convictions data, the Boylan–Long survey has been criticized on the grounds that it is only for one year (1999) and is based

[1] A widely accepted definition of corruption treats corruption as the abuse of public offices for private gains.

[2] See Goel and Rich (1989) for one of the first studies using this corruption measure and Jain (2001) for a review. See Alt and Lassen (2003, 2008) for notable exceptions using a different measure.

[3] As Glaeser and Saks (2006) point out, federal convictions are influenced by US Department of Justice priorities in allocation of enforcement resources.

**Table 1** Correlation between alternate corruption measures

| | $CORR_{9599}$ | $CORR_{7607}$ | $CORR_{perc}$ |
|---|---|---|---|
| $CORR_{9599}$ | 1.00 | 0.799** | 0.126 |
| $CORR_{7607}$ | | 1.00 | 0.276* |
| $CORR_{perc}$ | | | 1.00 |

See Table 3 for variable definitions
* Statistical significance at the 10% level, ** significance at the 5% level (or better)

on a relatively small number of responses in some states.[4] Critics of this index also point to its subjectivity, calling into question how comparable the data are from one state to the next.

The primary focus of this research is on the sensitivity of corruption determinants to alternate measures of corruption. Besides providing additional insights to the US corruption literature which almost exclusively uses a single measure pertaining to corruption convictions, our use of corruption perceptions provides a ready comparison of US results with cross-country studies using international corruption perceptions.

## 2 Alternate measures of corruption

To better motivate this study, it is useful to first examine the relative differences across corruption measures. Table 1 below shows that the correlations among the convictions-based and perceived corruption in the US states, where the former is calculated over two time periods. $CORR_{9599}$ is calculated as the average annual convictions over the 1995–1999 period normalized by average state population over the same time period. $CORR_{7607}$ is calculated the same way except that it is based on data over the longer 1976–2007 period.[5] *CORRperc* is the Boylan–Long corruption perception index (higher values imply more perceived corruption) based on a 1999 survey. While the correlation between the two conviction measures is relatively high (0.799), the correlation between the perception index and both normalized convictions is relatively low; for example, the correlation between the state perception index and the number of corruption convictions in the state over the five-year period ending in 1999 is only 0.126 and not statistically significant. This suggests that our comparison using alternate measures of corruption should provide useful insights in empirical modeling of corrupt activity. To our knowledge this exercise is unique to the relevant literature.[6]

Table 2 provides additional perspectives on the dissimilarities across the corruption measures. The rankings of least- and most-corrupt states differ across different

[4] In fact, there were no survey responses in three states—Massachusetts, New Hampshire, and New Jersey—and they are omitted in the analysis of corruption perceptions that follows.

[5] Department of Justice data on convictions goes back to 1976 and the most recent data are for 2007. For some states for some years, data on convictions were not available and the averages in these cases were based on all available data. See Table 3 for additional details.

[6] Treisman (2007) compares the survey and hard corruption data across nations and finds that there are differences in the experience-based corruptions data and corruption perceptions data.

**Table 2** Top five least and most corrupt states under alternate corruption measures

| $CORR_{9599}$ | | $CORR_{7607}$ | | $CORR_{perc}$ | |
|---|---|---|---|---|---|
| Least corrupt | Most corrupt | Least corrupt | Most corrupt | Least corrupt | Most corrupt |
| Colorado | North Dakota | Oregon | Alaska | Colorado | Rhode Island |
| New Hampshire | Louisiana | New Hampshire | Mississippi | South Dakota | Louisiana |
| Oregon | Mississippi | Minnesota | Louisiana | North Dakota | New Mexico |
| Nebraska | South Dakota | Washington | North Dakota | Maine | Delaware |
| Iowa | Illinois | Vermont | South Dakota | Oregon | Oklahoma |

Most (least) corrupt state is listed at top

measures, in some cases quite dramatically.[7] For instance, North Dakota and South Dakota are among the most corrupt states in the nation according to both conviction measures, yet are among the least corrupt when gauged by the perception index.[8] Illinois is not rated in the top five most corrupt states in two of the three corruption measures used in this analysis. This despite the widely quoted statement by the head of the FBI office in Chicago following the 2008 arrest of the then-governor Rod Blagojevich on corruption charges that if Illinois "isn't the most corrupt state in the United States it's certainly one hell of a competitor."[9] How all this variation translates into the relative effects of corruption determinants is the focus of analysis below. Our comparison across different corruption measures tests for the robustness of findings and provides useful comparisons with cross-country corruption studies that mainly use perceptions data.

Another contribution of the present research is that it uses some unique determinants to examine the causes of corruption across US states. Particularly noteworthy is our consideration of the strength of federal anti-corruption efforts, location or geographic factors, and the link between religious affiliation and corruption. Some of these factors have figured relatively more prominently in cross-national corruption research (Lambsdorff 2006), but have not received adequate attention in studies explaining corruption in the United States. Besides checking the validity of findings for the United States, our results will also provide useful comparisons with the international corruption studies.

## 3 Theoretical background and the empirical model

Given the breadth of potential influences, it is hard to be precise regarding an underlying theoretical model and to come up with a widely acceptable empirical approach.

[7] It is worth acknowledging that any measure of corruption is likely to be somewhat imperfect (for an example, see Olken 2009). What is perceived to be corrupt (and prosecutable) in a low corruption state might be quite different from what is considered corrupt in a high corruption state. Billger and Goel (2009) have shown that the level of corruption across nations might matter in controlling corruption.

[8] These differences were the focus of a recent article in the *New York Times*. See http://www.nytimes.com/2008/12/14/weekinreview/14marsh.html.

[9] http://www.usatoday.com/news/nation/2008-12-10-corruptstates_N.htm.

This sentiment is eloquently summarized by Alt and Lassen (2003, p. 342) that, "there is no commonly agreed-upon theoretical approach on which to base an empirical model of corruption, let alone to investigate the causes of corruption". Nevertheless, it seems useful to provide some relevant theoretical underpinnings to motivate the empirical structure.

From an economics perspective, corruption-influencing factors affect the incentives for engaging in corrupt acts by bribe takers and bribe givers (Becker 1968). Other things being the same, greater payoffs from engaging in corrupt practices and circumventing due processes would encourage corrupt activities, while greater costs (punishments) would have the opposite effect (Becker and Stigler 1974). The role of institutions has been shown to be important in this regard. Some of these institutions are shaped by the government's size and scope (e.g., degree of red tape), while others are affected by social (religious, ethnic background), historical (e.g., influences of past corrupt behavior in shaping current contracting/monitoring norms) and locational (e.g., some locations are more susceptible for generating rents than others) factors.[10]

Given the body of recent literature on the causes of corruption, some scholars are beginning to turn attention to the evaluation of corruption measures themselves (Sampford et al. 2006; Treisman 2007; Williams and Siddique 2008). However, the evaluation of relative corruption measures for the US considered in the present study appears novel in the literature.

There is also the issue of potential reverse causality (simultaneity) between corruption and some of its determinants. For instance, greater income prosperity might decrease incentives to engage in corrupt activities (Serra 2006). On the other hand, corrupt activities might create inequities that impact economic prosperity.[11] Furthermore, a bigger government might increase bureaucratic red tape leading to more corruption (Goel and Nelson 1998); conversely, anticipation of rent-generating potential might result in a bloated government. Finally, the level/intensity of anti-corruption efforts and enforcement might be driven by the level of corruption. Since numerous influences can potentially bear upon corruption, one faces a tough task in the choice of appropriate instruments. We address the potential simultaneity issue by using many regressors with lagged values (see Glaeser and Saks 2006 and Treisman 2007 for similar approaches). Values of regressors from earlier periods are less likely to have significant reverse feedbacks.

Our general empirical relation takes the following form, with subscripts $i$ and $j$ respectively, denoting a state and a corruption measure.[12]

$$\begin{aligned} CORR_{ij} = {} & f(Economic_i, Demographic_i, Government\ size_i, Enforcement_i, \\ & Location_i, Media_i) \\ & i = 1, \ldots, 50; \quad j = CORR_{SR}, CORR_{LR}, CORR_{perc} \end{aligned} \tag{1}$$

[10] Some of the theoretical elements surrounding corruption are formally addressed in Shleifer and Vishny (1993); see also Klitgaard (1988).

[11] In a cross-national study, Gundlach and Paldam (2009) have recently shown that the direction of causality runs from economic prosperity to corruption.

[12] In choosing the specific estimation approach to address determinants of corruption, we echo Alt and Lassen's conclusion that "other classifications are possible" (2003, p. 342).

The dependent variable is alternatively measured as an index of corruption perceptions in a US state (*CORRperc*) and as average annual convictions for the abuse of public office ($CORR_{SR}$, $CORR_{LR}$), (see Table 3). Here subscripts *SR* and *LR*, respectively, refer to the short run (average annual federal public corruption convictions over 1995–1999), and the long run (average annual federal public corruption convictions over 1976–2007). Empirical studies of US corruption have almost exclusively used the convictions measure to denote corruption. While true corruption may never be accurately measured, we argue that a combination of perceptions and convictions should provide a better understanding on the extent of corruption than a study based exclusively on any one measure. Also, as mentioned above, the use of alternative corruption measures makes US determinants more comparable to the extant cross-country literature.

Economic and demographic factors directly affect the incentives for engaging in corrupt practices. On the other hand, government actions can be seen as changing institutions that (indirectly) affect bribe takers and bribe givers. Further, locational factors can be seen as largely exogenous influences.

We employ income per-capita (*INCpc*) in a state as our primary economic factor. The literature has generally found the effect of prosperity on corrupt activities to be negative (Serra 2006), although Treisman (2007) makes an important counterpoint.

Four demographic influences are used in this study. They are the educational attainment of a state's population (*EDU*), a state's population size (*POP*), the degree of urbanization (*Urban*), and the size of Protestant population (*Protestant*). Greater urbanization likely facilitates easier formulation of corrupt relations between bribe takers and bribe givers (see Lambsdorff and Teksoz 2004 for background on corrupt contracts and Alt and Lassen 2008 for an application). Further, there are disproportionately greater rent-generating possibilities in urban areas because many government offices in charge of disbursing favors tend to be located in these areas (i.e., lower transactions costs for corrupt interactions).

Religious affiliations can dictate conduct and frame attitudes towards corrupt behavior. In particular, it has been argued that Protestant ethics and traditions serve as a deterrent to corruption because, among other reasons, of their focus on the individual and the willingness to question state authority (see La Porta et al. 1999; Paldam 2001; Pellegrini and Gerlagh 2008; Treisman 2000 for a further discussion of this and associated arguments).

Government size is related to bureaucratic red tape and to potential checks and balances against abuse of public office. The theoretical background regarding the nexus between corruption and government can be found in Rose-Ackerman (1999); see also La Porta et al. (1999). Using corruption convictions to denote corruption, Goel and Nelson (1998) showed a positive relation between government size and corruption in the US states. This relation was explored in more detail by Fisman and Gatti (2002a,b).

The size of the government and its influence on corruption is captured in the present study using a number of alternative measures. These include: Government employment (*GovtEMP*), Gross State Product (*GSPall*) originating in the public sector in a state (all levels of government), and Gross State Product originating from the federal government (*GSPfederal*) in a state. *GovtEMP* and *GSPall* can be seen as capturing the influence of government size in a state from two different perspectives. The former

**Table 3** Variable definitions, summary statistics and data sources

| Variable | Definition | Mean[a] (SD) | Source |
|---|---|---|---|
| $CORR_{SR}$ | Average annual federal public corruption convictions over the 1995–1999 period | 2.032 (1.36) | USDOJ [1] |
| $CORR_{LR}$ | Average federal public corruption convictions over the 1976–2007 period | 2.123 (1.14) | USDOJ [1] |
| $CORR_{perc}$ | Index of perceived public corruption, 1999. Index ranges from 1 (least corrupt) to 7 (most corrupt) | 1.189 (0.37) | Boylan and Long (2003) |
| $INC_{pc}$ | Per capita state personal income—1995 | 9.995 (0.14) | BEA [2] |
| *EDU* | Percent of state population aged 25 or older with a bachelor's degree—1990 | 2.966 (0.19) | Census [3] |
| *POP* | State population—1995 | 15.008 (1.01) | BEA [2] |
| *Urban* | Percentage of state population residing in urban areas—1990 | 4.238 (0.22) | Census [3] |
| *GovtEMP* | Employment in Government and Government Enterprises as Share to Total State Employment—1995 | −1.889 (0.19) | BEA [2] |
| *Enforce* | Federal investigation and enforcement officers per 100,000 population, 1993[b] | 2.310 (0.62) | USDOJ [4] |
| *GSPfederal* | Per capita Gross State Product originating in the Federal government (civilian and military) sector—1995 | 4.594 (0.48) | BEA [2] |
| *GSPall* | Per capita Gross State Product originating in all government sectors—1995 | 5.859 (0.22) | BEA [2] |
| *Protestant* | Percent of adult population identifying their religious affiliation as Protestant—2007 | 3.885 (0.36) | Pew [5] |
| *Northeast* | New England and Mid-Atlantic states | 0.180 (0.39) | Census Definition |
| *Midwest* | East North Central and West North Central states | 0.240 (0.43) | Census Definition |
| *South* | South Atlantic and East South Central and West South Central states | 0.320 (0.47) | Census Definition |
| *DCmiles* | Miles from state capital to Washington, DC, in natural logs | 6.695 (1.01) | Mapquest.com |
| *Mexico* | State borders with Mexico | 0.080 (0.27) | |
| *Media* | Daily per capita newspaper circulation by state—1995 | −1.579 (0.22) | [6] |
| *Judicial* | Judicial employment as percent of total state-local employment 1995 | 0.155 (0.28) | [7] |
| *Police* | Police employment as percent of total state-local employment 1995 | 0.692 (0.43) | [7] |
| *Corrections* | Corrections employment as percent of total state-local employment 1995 | 0.669 (0.45) | [7] |

**Table 3** continued

| Variable | Definition | Mean[a] (SD) | Source |
|---|---|---|---|
| *VCrime* | Violent crime rate per 100,000 state population—1993 | 6.168 (0.65) | [6] |
| *PCrime* | Property crime rate per 100,000 state population—1993 | 8.362 (0.24) | [6] |

Data are measured in terms of beginning-of-period values as described in text. Descriptive statistics are reported only for the latter of the two time periods considered in this analysis (i.e., 1995–1999). Statistics for right-hand-side variables used in the 1976–2007 analysis are available upon request

[a] All continuous variables are measured in natural logs, except for location dummy variables

[b] The *Enforce* variable was measured for the latest year the data are publicly available

*Data Sources:*

[1] U.S. Department of Justice, Public Integrity Section Criminal Division, Report to Congress on the Activities of the Public Integrity Section, years 1989, 1999, and 2007. Based on annual average of all available years over the relevant time period.

[2] U.S. Bureau of Economic Analysis, Regional Economic Accounts, http://www.bea.gov/regional/spi/ downloaded February 2009 (*INCpc* and *POP*), April 2009 (*GovtEMP*)

[3] U.S. Census Bureau, http://www.census.gov/population/www/socdemo/education/phct41.html, downloaded February 2009 and the 1973 Statistical Abstract of the United States, Table 19, p.19.

[4] U.S. Department of Justice, Federal Law Enforcement Officers, 1993, http://www.ojp.usdoj.gov/bjs/pub/pdf/fedlaw.pdf, downloaded June 2009.

[5] The Pew Forum on Religion and Public Life, U.S. Religious Landscape Survey, 2007, http://religions.pewforum.org/reports, downloaded 18 July 2009. Data on several states were combined and reported as one including: North and South Dakota, Vermont and New Hampshire, Montana and Wyoming, Connecticut and Wyoming, and Maryland and Washington, DC. The distribution of religious affiliation was assumed to be the same for in each pair of states.

[6] Statistical Abstract of the U.S.

[7] U.S. Census Bureau http://www.census.gov/govs/apes/historical_data_1995.html

measure focuses on government activity in both production and income redistribution activities. In contrast, the latter focuses on possible links between the production of goods and services in the public sector and corruption. Our third measure of government size, *GSPfederal,* addresses federal involvement in production of goods and services at the state level. The contractual norms and patterns of disbursement of funds are not necessarily similar at the state and federal levels.

The deterrence for corrupt activities provided by different enforcement bodies can be crucial as greater enforcement checks illegal activity and corruption is no exception (see La Porta et al. 2004; Mookherjee and Png 1995; also see Olson 2000). However, this objective might not be achieved when the enforcement agencies are themselves corrupt (Banerjee 1997; Benson 1988).[13] We use the federal investigation and enforcement officers (normalized by population) to capture the strength of enforcement (*Enforce*).[14] This is a pertinent variable for the purposes of this study since

[13] There is some research that supports a positive relation between enforcement and corruption. For instance, Priks (2010) provides some theoretical rationale for a possible positive effect of judiciary on corruption and in an earlier study, Meier and Holbrook (1992) found a positive effect of judicial employment.

[14] Included in the *Enforce* variable are Federal officers who have broad investigative authority covering more than 250 Federal crimes and include FBI agents nationwide (US Department of Justice 1994).

actual corruption is measured by federal convictions. The inclusion of this variable, to our knowledge, is unique to the empirical literature on US corruption determinants. Since conviction data are a function of both the level of corrupt activity and the degree of enforcement, adding *Enforce* to the model helps to control for the effects of the latter on state conviction rates. We also alternatively employ state level judicial (*Judicial*), corrections (*Corrections*) and police (*Police*) employment to examine their relative influences on corruption (see Goel and Nelson 2007).

Our treatment of geographic aspects can be seen along three dimensions. They are: foreign neighbor bordering states (*Canada*, *Mexico*); distance of state capital from nation's capital (*DCmiles*), and geographic regions (*Northeast*, *Midwest*, *South*).[15] States bordering foreign countries might present unique corruption opportunities in illegal trafficking—both human and otherwise. Thus, *Canada* and *Mexico* can be seen as addressing corruption in primarily customs and immigration departments.[16]

Regarding the other location variables, there might be greater potential for disbursements of out-of-turn favors in the nation's capital leading to more corruption. Potential bribe givers (lobbyists) and bribe takers (politicians) are disproportionately located near the nation's capital. Also, other things being the same, national media scrutiny surrounding corrupt acts might be greater in the region surrounding the nation's capital. *DCmiles* is included in the model to address the influence of geographic proximity to the nation's capital. It is measured by the physical distance of the state capital to the nation's capital. Further, the role of media is considered by including the newspaper circulation per capita (see Pellegrini and Gerlagh 2008). Finally, regional dummies are considered in our estimation strategy to account for other cultural, historical, and institutional factors that might influence corruption and that are not otherwise accounted for in our models.[17]

Formally, drawing on the above discussion and adding more structure to relation (1), our estimated equation takes the following form

$$\begin{aligned} &CORR_{ij} = g(INCpc_i, EDU_i, POP_i, Enforce_i, GovtEMP_i, GSP_{ik}, Urban_i, \\ &Protestant_i, Judicial_i, Corrections_i, Police_i, Media_i, Region\,dummy_m, \\ &Location_i) \\ &\quad i = 1, \ldots, 50;\ j = CORR_{SR}, CORR_{LR}, CORR_{perc};\ k = GSPall, \\ &GSPfederal;\ m = Northeast, Midwest, South; \\ &Location = Mexico, DCmiles_i. \end{aligned} \tag{2}$$

Based on the above discussion our estimation approach involves a baseline model that includes state population (*POP*), federal enforcement (*Enforce*), urbanization (*Urban*), and income per capita ($INC_{pc}$). With the exception of *Enforce*, the control variables in the base model are used in most related corruption studies (see Glaeser and Saks 2006). To this "base" set of variables we added in alternative

[15] We also ran versions of the models alternately including coastal states and colonial states as regressors. The resulting coefficients were statistically insignificant. Details are available upon request.

[16] *Canada* was insignificant in all versions and was dropped from the set of regressions that are reported.

[17] See Glaeser and Saks (2006) for a similar approach.

**Table 4** Measures of corruption and determinants of US corruption: baseline models

| Dep. Var.→ | $CORR_{perc}$ | | $CORR_{SR}$ | |
|---|---|---|---|---|
| | 4A.1 | 4A.2 | 4B.1 | 4B.2 |
| $INC_{pc}$ | −0.94** (2.2) | −0.82* (1.9) | −0.23 (0.2) | −0.57 (0.6) |
| *POP* | 0.06 (1.0) | 0.06 (1.1) | 1.22** (11.3) | 1.20** (11.4) |
| *GovtEMP* | 0.19 (0.9) | 0.34 (1.4) | 1.02* (1.8) | 0.48 (0.9) |
| *Enforce* | | −0.11 (1.3) | | 0.36** (2.0) |
| *Urban* | 0.91** (3.4) | 0.95** (3.5) | −0.40 (0.6) | −0.60 (0.9) |
| $R^2$ | 0.24 | 0.27 | 0.69 | 0.71 |
| *F* value | 5.20** | 4.20** | 38.87** | 32.48** |
| *N* | 47 | 47 | 50 | 50 |

Variable definitions are provided in Table 3. All models included a constant term. The numbers in parentheses are (absolute value) *t*-statistics based on robust standard errors
* Statistical significance at the 10% level, ** significance at the 5% level (or better)

specifications of the model: (i) some measure of government size (*GovtEMP*, *GSPall* or *GSPfederal),* (ii) locational variables (*Mexico*, *DCmiles*, or regional dummy variables), and, in the final version of the model specification considered, (iii) a demographic variable on Protestant religious affiliation (*Protestant*); and (iv) a measure of media influence (*Media*). Pellegrini and Gerlagh (2008) found that the diffusion of newspapers resulted in lower cross-national corruption.

Each model presented below is estimated in log-linear form. Details about the variables used, corresponding summary statistics and data sources are provided in Table 3. Table 8 in the Appendix presents a correlation matrix between the corruption measures, enforcement variables and other types of illegal activity. Interestingly, the corruption measures show a higher correlation with violent crime (*VCrime*) than with property crime (*PCrime*). The results section follows.

## 4 Results

Estimation of all models from (2) was performed using OLS in STATA with robust *t*-statistics reported. Overall, the fit of most models is quite reasonable as evidenced by $F$ values and $R^2$s. It seems useful to discuss results with individual corruption measures before turning to a comparison of the findings across measures.

Table 4 reports results from the baseline models comparing the findings with corruption perceptions (*CORRperc*) and corruption convictions ($CORR_{SR}$) as alternate measures of the dependent variable. The explanatory variables included are $INC_{pc}$, *POP*, *GovtEMP*, *Enforce*, and *Urban*. Most of these variables are routinely included in related studies of corruption determinants (see for example, Glaeser and Saks 2006). The results show that the measure of corruption does make a difference in terms of which influences are indentified as being significant drivers of US corruption. Consistent with the extant cross-country evidence using corruption-perceptions

indices (see Gundlach and Paldam 2009), perceived US corruption goes down with greater economic prosperity. On the other hand, greater urbanization seems to significantly increase perceived corruption—a finding consistent with the notion that information flows affecting perceptions would be greater in urban areas, ceteris paribus. None of the other determinants of corruption in the base model significantly affect perceived corruption. Using corruption convictions over 1995–1999, greater state population and greater federal enforcement both have positive and statistically significant effects on corruption. However, income and urbanization fail to show significant effects in this case. In fact, none of the determinants considered here is significant across both corruption measures. In order to shed more light on related phenomena, and to determine whether there are some common determinants across corruption measures, we consider a broader set of variables in the expanded model.

Expanded results using the perceptions measure of corruption ($CORR_{perc}$) for the survey year 1999 are reported in Table 5. Corresponding findings using annual average corruption convictions of a 1995–1999 time horizon ($CORR_{SR}$) are summarized in Table 6. A similar analysis of corruption convictions measured over a longer time period from 1976 to 2007 ($CORR_{LR}$) is reported in the Appendix.

### 4.1 Corruption measured via index of corruption perceptions ($CORR_{perc}$)[18]

Table 5 shows that corruption across US states is perceived to increase with urbanization (*Urban*) and decrease with greater economic prosperity ($INC_{pc}$) or with greater educational attainment (*EDU*). As in some other studies (Alt and Lassen 2003, 2008), greater economic prosperity ($INC_{pc}$) is shown to lower corruption perceptions.[19] These results are robust across different model specifications. The effect of population (*POP*) is mostly statistically insignificant.

The effect of federal enforcement (*Enforce*) is mainly negative, but statistically insignificant, across most models. Judicial and police employment increase perceived corruption, while corrections employment does not have a significant effect (see Goel and Nelson 2007). Corruption is perceived to be directly related to the relative importance of public-sector employment in the state's workforce (*GovtEMP*), which is significant in Model 5.6, but it is not related to the level of economic activity produced in the public sector (see *GSPall* and *GSPfederal*, Models 5.2 and 5.3).

The perceived effect of a larger Protestant population (*Protestant*) was statistically insignificant, as was the case with states bordering Mexico (*Mexico*). However, states located farther away from the nation's capital were perceived to be less corrupt (*DCmiles*). Consistent with cross-national findings (Pellegrini and Gerlagh 2008), greater diffusion of newspapers (*Media*) leads to lower perceived corruption in the United States. Of the regional variables, Northeastern and Southern states are perceived to be more corrupt, ceteris paribus, relative to states in the (omitted) Western

[18] Note that the corruption perceptions index is available only for 47 states.

[19] The correlation coefficient between educational attainment and income per capita is 0.72 making it problematic to include both variables in the same model.

**Table 5** Determinants of US corruption: measuring corruption by perceptions ($CORR_{perc}$)

| | 5.1 | 5.2 | 5.3 | 5.4 | 5.5 | 5.6 | 5.7 | 5.8 | 5.9 |
|---|---|---|---|---|---|---|---|---|---|
| $INC_{pc}$ | −1.12** (2.2) | −1.19** (2.2) | −1.11** (2.1) | −1.39** (2.3) | −1.78** (3.6) | | | −1.03* (1.9) | 0.25 (0.6) |
| *EDU* | | | | | | −1.27** (4.3) | −1.25** (3.4) | | |
| *POP* | −0.004 (0.1) | −0.02 (0.6) | −0.03 (0.8) | 0.02 (0.4) | 0.004 (0.1) | −0.01 (0.2) | −0.03 (0.8) | 0.10 (1.5) | 0.11* (1.9) |
| *Enforce* | −0.13 (1.4) | −0.10 (1.1) | −0.09 (0.9) | −0.03 (0.4) | −0.16* (1.7) | −0.08 (0.9) | −0.04 (0.5) | | −0.09 (1.0) |
| *GovtEMP* | 0.33 (1.1) | | | 0.30 (0.9) | −0.08 (0.2) | 0.71** (2.4) | | −0.07 (0.34) | 0.32 (1.2) |
| *GSPall* | | 0.07 (0.2) | | | | | 0.28 (1.2) | | |
| *GSPfederal* | | | −0.01 (0.1) | | | | | | |
| *Urban* | 1.43** (5.4) | 1.42** (5.1) | 1.42** (4.9) | 1.22** (4.5) | 1.65** (4.8) | 1.53** (5.9) | 1.40** (5.7) | | |
| *Mexico* | | | | 0.02 (0.1) | | | | | |
| *DCmiles* | | | | −0.15** (2.7) | | | | | |
| *Protestant* | | | | | 0.007 (0.03) | | | | |
| *Judicial* | | | | | | | | 0.55** (3.1) | |
| *Corrections* | | | | | | | | 0.01 (0.1) | |
| *Police* | | | | | | | | 0.57* (1.7) | |
| *Media* | | | | | | | | | −0.51** (2.5) |
| *Northeast* | 0.46** (2.9) | 0.41** (2.5) | 0.38** (2.4) | | 0.56** (3.7) | 0.51** (4.3) | 0.41** (3.3) | | |
| *Midwest* | 0.03 (0.2) | 0.01 (0.1) | 0.004 (0.02) | | 0.06 (0.3) | −0.02 (0.2) | −0.06 (0.4) | | |
| *South* | 0.37** (2.7) | 0.39** (2.8) | 0.39** (2.7) | | 0.43** (2.4) | 0.26* (2.4) | 0.29** (2.7) | | |
| $R^2$ | 0.50 | 0.49 | 0.49 | 0.40 | 0.57 | 0.55 | 0.49 | 0.29 | 0.20 |
| *F* value | 7.67** | 7.23** | 7.51** | 4.80** | 7.21** | 7.99** | 6.53** | 4.35** | 2.21* |
| *N* | 47 | 47 | 47 | 47 | 45 | 47 | 47 | 47 | 47 |

Variable definitions are provided in Table 3. All models included a constant term. The numbers in parentheses are (absolute value) *t*-statistics based on robust standard errors
* Statistical significance at the 10% level, ** significance at the 5% level (or better)

**Table 6** Determinants of US corruption: measuring corruption by average convictions ($CORR_{SR}$)

| | 6.1 | 6.2 | 6.3 | 6.4 | 6.5 | 6.6 | 6.7 | 6.8 | 6.9 |
|---|---|---|---|---|---|---|---|---|---|
| $INC_{pc}$ | −1.43 (1.2) | −1.40 (1.0) | −1.48 (1.2) | −1.77 (1.6) | −2.34 (1.8) | | | −1.49 (1.5) | −1.12 (1.3) |
| *EDU* | | | | | | −2.90** (4.9) | −3.05** (4.4) | | |
| *POP* | 1.04** (8.9) | 0.98** (8.8) | 0.99** (8.3) | 1.24** (11.4) | 1.05** (7.5) | 1.01** (9.8) | 0.98** (10.2) | 1.24** (14.0) | 1.16** (13.0) |
| *Enforce* | 0.54** (2.7) | 0.63** (3.0) | 0.61** (2.8) | 0.53** (3.0) | 0.51** (2.4) | 0.63** (5.0) | 0.68** (5.1) | | 0.33** (2.0) |
| *GovtEMP* | 0.70 (0.8) | | | 0.46 (0.8) | 0.16 (0.2) | 1.47** (2.7) | | 0.52 (1.1) | 0.45 (0.9) |
| *GSPall* | | −0.05 (0.1) | | | | | 0.83* (1.7) | | |
| *GSPfederal* | | | 0.03 (0.1) | | | | | | |
| *Urban* | 0.48 (0.7) | 0.45 (0.6) | 0.45 (0.7) | −0.03 (0.04) | 0.81 (1.0) | 1.17** (2.7) | 0.90* (1.9) | | |
| *Mexico* | | | | −0.98** (2.5) | | | | | |
| *DCmiles* | | | | −0.06 (0.4) | | | | | |
| *Protestant* | | | | | 0.01 (0.02) | | | | |
| *Judicial* | | | | | | | | 0.93** (2.6) | |
| *Corrections* | | | | | | | | −0.47 (1.2) | |
| *Police* | | | | | | | | 0.17 (0.4) | |
| *Media* | | | | | | | | | 0.12 (0.2) |
| *Northeast* | 0.79* (1.7) | 0.63 (1.3) | 0.67 (1.5) | | 0.93* (1.9) | 1.16** (3.4) | 1.03** (2.7) | | |
| *Midwest* | 0.94** (2.0) | 0.89* (1.9) | 0.91* (2.0) | | 0.99* (1.9) | 0.86** (2.4) | 0.80** (2.1) | | |
| *South* | 0.81** (2.2) | 0.85** (2.2) | 0.84** (2.2) | | 0.89* (1.9) | 0.56** (2.0) | 0.61** (2.2) | | |
| $R^2$ | 0.76 | 0.75 | 0.75 | 0.74 | 0.76 | 0.79 | 0.78 | 0.73 | 0.71 |
| *F* value | 19.01** | 17.98** | 17.97** | 23.98** | 13.44** | 24.46** | 22.73** | 44.69** | 36.25** |
| *N* | 50 | 50 | 50 | 50 | 48 | 50 | 50 | 50 | 50 |

Variable definitions are provided in Table 3. All models included a constant term. The numbers in parentheses are (absolute value) *t*-statistics based on robust standard errors
* Statistical significance at the 10% level, ** significance at the 5% level (or better)

region of the US. We turn next to verification of whether the significant determinants hold when corruption is alternately measured via convictions.

### 4.2 Corruption measured via convictions ($CORR_{SR}$)

Our corruption convictions measure—$CORR_{SR}$—denotes annual state-level average convictions for the abuse of public office during 1995–1999. This may be seen as a relatively short term measure and its robustness is checked below by employing a longer time period. The short-run conviction results are presented in Table 6.

All measures of government size, employment based (*GovtEMP*) or production based (*GSPfederal* and *GSPall*), mostly fail to significantly affect corruption when measured by convictions. Greater economic prosperity ($INC_{pc}$) generally fails to show any corruption-dampening effect. This finding is consistent with earlier findings using a similar dependent variable (Glaeser and Saks 2006).

The parameter estimates for the population variable (*POP*) are uniformly (positive and) statistically significant and consistently around unit elasticity, implying that corruption convictions in a state increase proportionately to state population. Annual corruption convictions are lower in states where the population has achieved greater educational attainment (*EDU*), a la Glaeser and Saks 2006). Thus, while education has a negative and statistically significant influence across corruption measures, economic prosperity lowers only perceived corruption.

The effects of federal enforcement (*Enforce*) and judicial employment (*Judicial*) are positive and statistically significant in all instances in Table 6. This suggests that convictions data reflect both the level of corruption in a state and the efforts on the part of law enforcement to uncover that corruption. An alternative interpretation is that the enforcement bodies do not have a strong deterrence effect and might themselves be contributing to corruption. However, corrections and police employment are statistically insignificant. Protestant religious affiliation (*Protestant*) does not seem to significantly matter in this case either. Unlike with $CORR_{perc}$ in Table 5, greater diffusion of newspapers (*Media*) fails to show a significant effect on corruption convictions.

States bordering Mexico (*Mexico*) are less corrupt, whereas there is no appreciable difference in states more distant from the nation's capital. Finally, all regions of the country experienced higher average annual corruption convictions relative to the omitted states in the Western region.

### 4.3 Robustness checks

The significant determinants of corruption from the baseline models in Table 4 hold in Tables 5 and 6. Nevertheless, we perform three robustness checks dealing alternately with (i) a longer term convictions measure, (ii) data alignment, and (iii) simultaneity issues. Regarding the former, as a check of the validity of the results presented in Table 6 using average convictions over 1995–1999 as the dependent variable, we employ average convictions over 1976–2007 ($CORR_{LR}$) as an alternative, "long run" measure of corruption.

#### 4.3.1 Long run corruption

The corresponding results with long run corruption convictions are presented in Table 7 in the Appendix. The results generally support what is reported in Table 6. In particular, greater educational attainment, lower government size and lower population all reduce corruption, whereas federal enforcement employment is positively associated with annual average corruption convictions. The coefficient on $INC_{pc}$ is negative and statistically insignificant in most instances. Further, as in Tables 5 and 6, greater judicial employment turns out to contribute to corruption over the long run. This finding about the role of judiciary is consistent with earlier findings in the literature (Goel and Nelson 2007; Meier and Holbrook 1992). Over the long run only Southern states are found to be more corrupt. None of the other geographic determinants, including *Mexico*, *DCmiles*, *Northeast* and *Midwest*, are statistically significant. This is also true of the *Protestant*, *Police*, *Corrections* and *Media* variables. In sum, there are some significant differences across the determinants of short run and long run corruption.

#### 4.3.2 Identical sample sizes

As a further check we also re-estimated all the models presented in Tables 6 and 7, excluding the states of Massachusetts, New Hampshire, and New Jersey. Corruption perception estimates for these states are unavailable due to lack of survey response. Since not all the same states are used in the above comparisons, this might have affected our analysis. However, restricting both the conviction and perceptions measures to the same 47 states (results available upon request) did not appreciably affect any of our conclusions drawn elsewhere in this paper.

#### 4.3.3 Simultaneity between corruption and enforcement

As mentioned above, there might be a two-way causality between corruption and some of its determinants. We address this aspect in three ways: (i) by using start-of-period values for most regressors. This approach is consistent with one taken by many scholars (for examples, see Glaeser and Saks 2006 and Treisman 2007); (ii) by including a correlation matrix of the relation between corruption determinants and enforcement, monitoring variables in the Appendix, Table 8; and (iii) by estimating two-stage least squares regressions (2SLS) of baseline models 4A.2 and 4B.2 from Table 4 that allow for the endogeneity of federal enforcement (*Enforce*). The correlations between the various corruption measures and the enforcement/crime variables are rather modest. Violent crime rates (*VCrime*) and property crime rates (*PCrime*) are employed as additional instruments for *Enforce* and the results are presented in Table 9 in the Appendix.

The fit of the results with the convictions measure (Model A3.2) is better than that with the perceptions measure (Model A3.1). Greater government employment turns out to be the only variable that consistently contributes to corruption across the two corruption variables. More interestingly perhaps, *Enforce* is now negative in both cases and statistically significant when $CORR_{SR}$ is the dependent variable—allowing

for potential endogeneity, federal enforcement seems effective at checking corruption convictions.

### 4.4 Comparing the findings across different corruption measures

The principal insights from the present exercise, both for the literature and for policy purposes, emerge from a comparison of the determinants of corruption across alternate measures. Comparing Tables 4, 5, 6 and 7, we see that some, but not all, of our results are robust across all three corruption measures. First, greater educational attainment reduced corruption in all instances—whether corruption is measured via perceptions or convictions. These findings are consistent with the existing empirical literature on US corruption (Alt and Lassen 2003; Glaeser and Saks 2006; Meier and Holbrook 1992). Second, more government employees (measured by share of total state workforce employed in the public sector) are generally directly related to corruption, no matter how corrupt activity is measured. Further, greater judicial employment adds to corruption. Finally, states located in the South are perceived to be more corrupt and have more annual average convictions, both in the short and long run.

While there are some similarities across the alternative corruption measures considered in this study, a number of our findings are sensitive to the choice of the measure employed in the analysis. This is important because empirical corruption studies for the United States have almost exclusively used hard convictions data to measure corruption. Some of the key differences are summarized below:

- Greater economic prosperity measured by per capita income reduces corruption perceptions, but the evidence that it has a negative effect on corruption convictions is statistically weak, especially when viewed from the perspective of a long run, three-decade, average.
- Our results with respect to state population, capturing the size of a state, show that corruption convictions (per capita) increase in a non-linear fashion with state population. In contrast, perceptions do not change with state size measured by population.[20] A plausible explanation for the differential impact of population is that corruption perceptions are not based on the number of convictions, but are based instead on other factors like the level of media exposure to high-profile corruption cases that are not highly correlated with population.
- Urbanization has strong positive influence on corruption perceptions, but there is less evidence that it affects conviction rates, especially measured over the longer period of time. It is likely to be the case that corruption perceptions are mainly based on corruption in urban areas (as corruption scandals in urban areas are more readily captured in the media), while corruption convictions are primarily based on evidence and are less likely to make distinction between urban and rural areas.
- Federal enforcement directly affects convictions, but not perceptions. Together, these results suggest that enforcement efforts affect the amount of corruption that is uncovered but not the level of corruption that takes place in a state. It also

[20] The sensitivity of the population variable to different cross-country measures of corruption perceptions was demonstrated in earlier research (Fisman and Gatti 2002a).

suggests caution in using convictions as a measure of corruption in empirical modeling without controlling for law enforcement activities to deter corruption.[21] However, *Enforce* is negative and significant when a two-way relation between corruption and enforcement is taken into account (Table 9).

- Of the judicial, police and corrections employment, only judicial employment consistently contributes to corruption across corruption measures. This finding supports findings in the literature (Goel and Nelson 2007; Meier and Holbrook 1992). Greater police employment increases perceived corruption only. In contrast, corrections employment fails to show statistical significance in any case.
- The size of the public sector can affect corruption in different ways depending upon how size and corruption are measured. In particular, while the level of public sector production in a state (contribution to state GSP) affects convictions levels, it has no statistically significant effect on corruption perceptions. In contrast, government size measured by employment in the public sector is directly related to all three measures of corruption considered in this paper.
- States with a greater share of population with Protestant affiliation are neither associated with lower perceived corruption, nor with convictions. These results regarding the negative effects of Protestant affiliation are different from cross-country findings using corruption perceptions indices to measure corruption (see, for example, Pellegrini and Gerlagh 2008).
- Greater diffusion of newspapers (*Media*) lowers perceived corruption, consistent with corresponding cross-national findings using corruption perceptions (Pellegrini and Gerlagh 2008).
- There were some interesting differences with respect to the location of states. Perceived corruption decreases when one moves away from the nation's capital. However, there seems no difference in corruption in states away from the capital when corruption is measured via convictions. Location of states next to the Mexican border decreases corruption convictions, but has no influence on perceptions. States located in the Northeast have more average convictions when measured over the 1995–1999 period, but not over the longer time period. These states are also perceived to be more corrupt. States located in the Midwest had higher average convictions during 1995–1999, but this is not so over the longer time period, nor are they considered more corrupt by survey respondents.
- It is interesting to note that while the most results across the two convictions measures across short and long terms are similar (Tables 6 and 7), there are some notable differences. Urbanization has a positive and relatively more significant effect on corruption under the short term measure ($CORR_{SR}$) than $CORR_{LR}$, while the opposite is true for government employment. Also, there were noteworthy location differences with respect to states bordering Mexico and Northeastern and Midwestern states that are detailed above.

[21] In particular, we found that excluding an enforcement variable in modeling convictions data can lead to an omitted variable bias, particularly with regard to the estimated effects of the government size variables on corruption. For example, the estimated coefficient on all government size variables in Models 6.2 through 6.4 are larger (results available on request) when an enforcement variable is excluded from consideration.

Finally, our analysis goes part of the way in explaining the lack of correlation between the conviction and perception corruption measures noted in Sect. 2 above. We concluded that enforcement efforts affected the amount of corruption uncovered, but that such activities may have little effect on the actual level of corruption that exists. To assess the implications of this further we "cleansed" the 1995–1999 annual average corruption convictions ($CORR_{SR}$) of the influence of federal enforcement activities by regressing enforcement on convictions. We then took the normalized residuals from that regression and correlated them with the corruption perceptions variable. The resulting correlation coefficient rises from 0.126 (see Table 1) to 0.31 and the direct relationship between the two becomes statistically significant.

## 5 Concluding remarks

This research employs different measures of corruption across US states to examine the determinants of corruption. Besides contributing to the literature, the present exercise has obvious policy importance. The extant literature focusing on the US has almost exclusively used federal corruption convictions to denote corruption (see for examples, Fisman and Gatti 2002b; Glaeser and Saks 2006; Goel and Nelson 2007, 1998; Goel and Rich 1989). While convictions reflect the degree of corruption, they are an imprecise measure since they are dependent on the strength of enforcement. We supplement the convictions data with another measure based on perceptions about state-level corruption. Given the potential lumpiness of corruption convictions, we also check the robustness of our findings by including both short term and long term convictions. Our choice of factors affecting corruption includes some established and some new factors. This enables us to provide comparisons with the literature and to provide new insights.

Overall, the answer to the question posed in the introduction is that the choice of the measure of corruption matters in explaining corruption. However, some findings are robust across different measures. For instance, greater educational attainment reduced corruption across different corruption measures. Greater judicial employment adds to corruption (Goel and Nelson 2007). On the other hand, greater Protestant population and corrections employment in a state failed to show statistical significance in any instance. Geographically, Southern states were found to be more corrupt, ceteris paribus. This finding is consistent with Glaeser and Saks (2006).

Significant differences across corruption measures occur in a number of other instances. Specifically, the effects of urbanization, economic prosperity, population size, media, government spending, and enforcement are sensitive to the measure of corruption (i.e., whether corruption is measured by convictions or perceptions). For instance, our results with respect to state population, capturing the size of a state, show that corruption convictions increase with state population. In contrast, corruption perceptions do not change with state population. Consistent with related cross-country findings (Gundlach and Paldam 2009; Serra 2006), greater economic prosperity is associated with lower perceived corruption. Further, the geographic influences of the nation's foreign neighbors and of the physical location of the state relative to the nation's capital remain unclear. The results also indicate that it is important to control

for enforcement efforts in empirical modeling using convictions as a measure of corruption. Our results suggest that appropriate caution should be exercised in framing corruption control policies, especially in these instances.

The main lesson learnt from the comparisons across alternate corruption measures is that how corruption is measured can be important in explaining its causes. As the quest for better corruption measures continues, we can recommend that one use various available measures and employ appropriate caution in interpreting the findings.

The present study performs a comparison of corruption determinants across three alternate corruption measures for states in the United States. Yet, due to a lack of appropriate data, we are unable to incorporate experience-based measures from the actual experiences of bribe givers and bribe takers. A recent comparison of subjective and experience-based cross-national corruption measures has recommended experience-based corruption measures (Treisman 2007; also see Olken 2009). One could also argue that states in a single country are relatively more comparable than countries that vary considerably in many respects. Nevertheless, our comparison of the determinants under different corruption measures is able to reconcile the discrepancy surrounding the effect of government spending on corruption in cross-country and US studies. While US studies using convictions data have found a positive effect of government spending on corruption (Goel and Nelson 1998; Jain 2001), similar results did not carry through to cross-country studies using perceptions data to measure corruption (Lambsdorff 2006; Serra 2006). The present study reinforces the ineffectiveness of government spending, especially with perceptions data even for the United States (Table 5).

These comparisons have particularly significant policy implications for some initiatives aimed at curbing corruption. For instance, it is not clear whether reduced government production of goods and services (as opposed to income-redistribution activities) would necessarily reduce corruption. On the other hand, policies bolstering the educational attainment of the population can be assumed with some confidence to reduce corruption. The location variables are exogenous from a policy standpoint. However, their insights can be useful in terms of allocation of government resources.

In closing, we cannot conclusively state that one corruption measure is unambiguously superior. This is especially the case here given that the perceptions measure employed is for only one year and based on a limited number of observations. Further, given the moral hazard issues involved with corrupt practices, we might never have an "ideal" measure of corruption (see Williams and Siddique 2008). Nevertheless, this study has illustrated that appropriate caution is necessary, especially when policies are based on analyses based on a single measure of corruption.

## Appendix

See Tables 7, 8, 9.

**Table 7** Determinants of US corruption: robustness checks using average convictions over 1976–2007 ($CORR_{LR}$)

| | 6.1A | 6.2A | 6.3A | 6.4A | 6.5A | 6.6A | 6.7A | 6.8A | 6.9A |
|---|---|---|---|---|---|---|---|---|---|
| $INC_{pc}$ | −0.03 (0.05) | −0.31 (0.5) | −0.07 (0.1) | −0.87 (1.4) | −0.88 (1.6) | | | −1.45** (3.1) | −0.55 (1.3) |
| *EDU* | | | | | | −1.17** (2.7) | −1.28** (3.0) | | |
| *POP* | 0.98** (11.8) | 0.96** (13.3) | 0.98** (13.4) | 1.07** (11.5) | 0.90** (11.3) | 0.96** (12.8) | 0.94** (14.3) | 1.10** (17.4) | 1.07** (13.2) |
| *Enforce* | 0.28** (2.1) | 0.29** (2.1) | 0.27** (2.1) | 0.29** (2.0) | 0.33** (2.7) | 0.32** (3.2) | 0.31** (3.0) | | 0.24* (1.8) |
| *GovtEMP* | 0.55 (1.2) | | | 0.86* (1.9) | −0.06 (0.1) | 0.83* (1.8) | | 0.80** (2.6) | 0.66 (1.4) |
| *GSPall* | | 0.38 (1.0) | | | | | 0.64* (1.8) | | |
| *GSPfederal* | | | 0.24 (1.6) | | | | | | |
| *Urban* | 0.05 (0.1) | 0.05 (0.1) | −0.08 (0.2) | 0.04 (0.1) | 0.79* (1.7) | 0.51 (1.3) | 0.35 (0.9) | | |
| *Mexico* | | | | −0.19 (1.0) | | | | | |
| *DCmiles* | | | | −0.07 (0.9) | | | | | |
| *Protestant* | | | | | 0.22 (0.9) | | | | |
| *Judicial* | | | | | | | | 0.93** (3.6) | |
| *Corrections* | | | | | | | | 0.11 (0.5) | |
| *Police* | | | | | | | | 0.05 (0.2) | |
| *Media* | | | | | | | | | −0.33 (1.0) |
| *Northeast* | 0.06 (0.3) | 0.04 (0.2) | 0.02 (0.1) | | 0.09 (0.4) | 0.05 (0.2) | −0.01 (0.0) | | |
| *Midwest* | 0.10 (0.4) | 0.10 (0.4) | 0.10 (0.4) | | 0.05 (0.2) | −0.03 (0.1) | −0.06 (0.3) | | |
| *South* | 0.54** (2.7) | 0.54** (2.7) | 0.48** (2.5) | | 0.47* (2.0) | 0.36* (1.9) | 0.37** (2.0) | | |
| $R^2$ | 0.89 | 0.89 | 0.89 | 0.87 | 0.90 | 0.89 | 0.89 | 0.87 | 0.85 |
| *F* value | 50.95** | 53.85** | 51.70** | 57.40** | 40.69** | 62.9** | 76.03** | 82.75** | 69.20** |
| *N* | 50 | 50 | 50 | 50 | 48 | 50 | 50 | 50 | 50 |

Variable definitions are provided in Table 3. All models included a constant term. The numbers in parentheses are (absolute value) *t*-statistics based on robust standard errors
* Statistical significance at the 10% level, ** significance at the 5% level (or better)

**Table 8** Correlations between measures of corruption, illegal activity, and enforcement

| | $CORR_{SR}$ | $CORR_{perc}$ | $CORR_{LR}$ | *Enforce* | *VCrime* | *PCrime* | *Judicial* | *Corrections* | *Police* |
|---|---|---|---|---|---|---|---|---|---|
| $CORR_{SR}$ | 1.00 | | | | | | | | |
| $CORR_{perc}$ | 0.37 | 1.00 | | | | | | | |
| $CORR_{LR}$ | 0.92 | 0.40 | 1.00 | | | | | | |
| *Enforce* | 0.10 | −0.06 | 0.06 | 1.00 | | | | | |
| *VCrime* | 0.49 | 0.56 | 0.61 | 0.06 | 1.00 | | | | |
| *PCrime* | 0.16 | 0.25 | 0.22 | 0.45 | 0.65 | 1.00 | | | |
| *Judicial* | 0.03 | 0.30 | −0.01 | 0.37 | 0.32 | 0.39 | 1.00 | | |
| *Corrections* | 0.41 | 0.31 | 0.47 | 0.33 | 0.70 | 0.66 | 0.31 | 1.00 | |
| *Police* | 0.44 | 0.36 | 0.52 | 0.20 | 0.61 | 0.46 | 0.32 | 0.64 | 1.00 |

Consistent with the analysis in the paper, all variables are in natural logs and $N = 47$

**Table 9** Measures of corruption and determinants of US corruption: IV regressions allowing for endogenous enforcement

| Dep. Var. → | $CORR_{perc}$ A3.1 | $CORR_{SR}$ A3.2 |
|---|---|---|
| $INC_{pc}$ | −0.17 (0.4) | 0.54 (0.5) |
| *POP* | 0.07 (1.4) | 1.27** (9.3) |
| *GovtEMP* | 0.90* (1.7) | 2.02** (2.0) |
| *Enforce* | −0.45* (1.9) | −0.67 (1.6) |
| *Urban* | 0.86** (2.1) | −0.16 (0.2) |
| *Wald Chi-square* | 6.7 | 108.45** |
| *First-Stage F value* | 6.23** | 5.06** |
| *Overidentification test (p value)* | 0.01 | 0.99 |
| *N* | 47 | 50 |

Variable definitions are provided in Table 3. *VCrime* and *PCrime* were used as instruments for *Enforce* in these 2SLS regressions. All models included a constant term. The numbers in parentheses are (absolute value) *z*-statistics based on robust standard errors

* Statistical significance at the 10% level, ** significance at the 5% level (or better)

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