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## Effectiveness of whistleblower laws in combating corruption

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Rajeev K. Goel and Michael A. Nelson

## Effectiveness of whistleblower laws in combating corruption



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# Contents

Abstract.....	4
1 Introduction.....	5
2 Model.....	7
3 Data.....	11
4 Results .....	13
4.1 Baseline model.....	13
4.2 Whistleblower awareness and corruption .....	14
4.3 Robustness checks.....	14
4.3.1 Allowing for possible endogeneity of whistleblower awareness .....	15
4.3.2 Using a broader measure whistleblower awareness.....	15
5 Concluding remarks.....	16
References .....	18
Tables .....	20

Rajeev K. Goel and Michael A. Nelson

## Effectiveness of whistleblower laws in combating corruption

### Abstract

Whistleblower laws are becoming important governance tools in both the public and private sectors. To examine the effectiveness of whistleblower laws and their awareness, this study creates a unique internet-based measure of awareness about whistleblower laws and provisions, focusing on the United States. Placing the analysis within the larger corruption literature, our results show that greater whistleblower awareness results in more observed corruption and this holds across specifications. Internet awareness of whistleblower laws appears to be more effective at exposing corruption than the quantity and quality of whistleblower laws themselves.

**Keywords:** corruption; whistleblowers; law enforcement; internet; United States

**JEL classification:** K4; H7

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# 1 Introduction

Whistleblower (WB) laws are designed to protect and encourage voluntary policing of misconduct in public institutions by safeguarding and rewarding individuals who expose wrongdoings. In the United States, whistleblower laws have a long history and have been enacted by both the federal government and individual states. While whistle blowing has garnered worldwide attention with WikiLeaks in recent years, many nations still do not have formal WB laws. One of the first federal laws that protected whistleblowers was the 1863 United States False Claims Act. Also known as the “Lincoln Law”, the Act was designed to combat fraud by United States government suppliers during the Civil War.<sup>1</sup> In more recent times, the U.S. federal government enacted the Whistleblower Protection Act in 2007, which provides legal protections for whistle-blowing activities of federal employees.<sup>2,3</sup> In the past few years, whistleblowers have also been helpful in private-sector’s efforts to improve corporate governance.

Individual states have also enacted whistleblower laws that focus on and strengthen particular aspects of governance.<sup>4</sup> About ninety percent of U.S. states currently have their own whistleblower protection laws ([www.uslegal.com](http://www.uslegal.com)). The whistleblower laws of each state differ from federal laws and from the laws of other states in many respects. For instance, some states provide whistleblower protections to public employees only, while others extend such protections to private-sector employees as well. The scope of whistleblower activities is quite broad and not necessarily aimed at curbing just one type of white-collar crime. Further, state whistleblower provisions do not generally include the same type of compensation provision as in the federal law (see [www.uslegal.com](http://www.uslegal.com) for details). Thus, a potential whistleblower in a given state would be interested in learning the specifics of that state’s laws and how they differ from others.<sup>5</sup>

A key difference between WB provisions and other, more direct enforcement activities (e.g., police, judiciary) is that WB acts are voluntary. A whistleblower chooses whether or not to expose wrongdoing and also chooses the type of wrongdoing to expose

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<sup>1</sup> See Phillips & Cohen LLP, [http://www.all-about-qui-tam.org/fca\\_history.shtml#leg](http://www.all-about-qui-tam.org/fca_history.shtml#leg)

<sup>2</sup> See Congressional Research Service (2007): <http://www.fas.org/sgp/crs/natsec/RL33918.pdf>

<sup>3</sup> For an overview of Federal U.S. Whistleblower laws see <http://www.dol.gov/dol/compliance/comp-whistleblower.htm>.

<sup>4</sup> See National Conference of State Legislatures, <http://www.ncsl.org/issues-research/labor/state-whistleblower-laws.aspx>.

<sup>5</sup> A whistleblower “is someone who exposes wrongdoing, fraud, corruption and/or waste”, <http://www2.illinois.gov/gov/whistleblower/Pages/default.aspx>.

(corruption versus theft, etc.). In contrast, officials in direct enforcement are duty bound to bring wrongdoers to justice (although some law enforcers themselves may be corrupt!).

The WB laws encourage whistleblowers by protecting them from wrongful dismissal and in some cases by promising them some percentage of the money recovered or damages won by the government. Thus, not only is the act of blowing the whistle or exposing wrongdoing voluntary on part of the whistleblower, there are also potential monetary rewards. More formally, whistleblower laws reduce the potential costs of exposing illegal activity (by protecting whistleblowers against repercussions), while at the same time increasing the related potential benefits (by promising monetary rewards) from bringing wrongdoing to light.

While whistleblower provisions have been gaining prominence across the states, and information of their existence is increasing, thanks in part to the internet, there is as yet no formal study that examines the effect of these laws on wrongful behavior by public and private individuals. This research constitutes a first step in this direction by investigating the effects of awareness about whistleblower laws on the level of observed corruption by public officials. Our focus is on corruption in the American states over the 2000-2009 period. In recent years, there has been heightened focus on corruption control and on research on the causes and effects of corrupt activity (extensive literature surveys can be found in Aidt (2003), Jain (2001), Lambsdorff (2006), Serra (2006), and Svensson (2005)). Yet, formal research linking WB provisions to corrupt activity is virtually nonexistent, and the aim of this paper is to make some initial headway in this regard.

Besides the academic contribution, such information would be useful input in the determination of how to allocate resources for combating corruption. In particular, if voluntary initiatives like whistleblower provisions expose corruption, it may be possible to cut down on resources devoted to direct corruption exposure (e.g., vigilance departments). Further, the findings would be instructive for nations considering framing their own whistleblower provisions.

Do whistleblower laws complement or substitute for other, more direct, corruption control measures?

WB laws and other measures would be complementary if both have similar effects in exposing corruption, or they would be substitutes if the efficacy of one type of initiative is undermined by the other. An example of the latter case would be prosecution delays where agencies dealing with whistleblowers and the activities of direct enforcers dealing with corruption are uncoordinated.

A primary reason for the lack of research focusing on the efficacy of WB laws is the difficulty of finding a measure of WB intensity/prevalence that is comparable across jurisdictions. We use the internet to empower us in this regard and to open the door to undertaking such research. In the absence of any state-specific index of the strength of whistleblower awareness in the United States, we construct a unique measure of available whistleblower laws and provisions using the internet, in particular, the widely-used Google and Yahoo internet search engines (see Section 3). Below, we argue that this measure can be interpreted as capturing the diffusion of awareness about whistleblower provisions.<sup>6</sup>

While there is some research on the efficacy of direct measures for dealing with corruption (see Alt and Lassen (2008), Priks (2011)), little is known about indirect measures such as WB laws, as they are largely voluntary. This research will shed light on the effectiveness of WB laws in exposing corruption.

## 2 Model

In the absence of a direct theoretical model that enables us to link WB acts and corruption, we borrow from the broader literature on the determinants of corrupt activity and on crime and punishment (Becker (1968), La Porta et al. (1999), Priks (2011), Shleifer and Vishny (1993)). One could also consider the theoretical background in the context of the media's role in corruption, since our measure of whistleblower awareness is internet-based (Ander- sen (2009), Brunetti and Weder (2003), Di Tella and Franceschelli (2011), Freille et al. (2007), Goel et al. (2012) and Vaidya (2005)).

In this context, both participants in corrupt transactions (bribe takers and bribe givers) and whistleblowers weigh the relative costs and benefits of their actions. Greater

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<sup>6</sup> Goel et al. (2012) employed a similar approach for capturing corruption awareness across countries.



potential benefits or lower costs would encourage whistle blowing. One might consider an internet-based measure of awareness to be more democratic and somewhat more appropriate than a print-media (newspaper) measure. For instance, the internet measure potentially treats all states alike, whereas not all U.S. states are likely to have a similarly influential major print newspaper.

The empirical literature on the causes of corruption has considered numerous linkages, with some determinants turning out to be more robust than others (see Aidt (2003), Jain (2001), Lambsdorff (2006), Serra (2006) for literature surveys and Alt and Lassen (2003, 2008), Fisman and Gatti (2002), Glaeser and Saks (2006), and Goel and Nelson (2011) for studies focusing on the United States). In line with this research, we include economic prosperity (*Income*), urbanization (*URBAN*), government size (*GSPstate*) and direct law enforcement (*LawEnforce*), as determinants of state-level corrupt activity.

The internet-based awareness about whistleblower laws (*WhistleblowerAware*) is the main variable of interest and the key contribution of this work. It measures the awareness about WB laws and can be seen as capturing media freedom and the effectiveness of voluntary corruption enforcement. The nature and construction of this variable will be discussed in more detail below.

We also account for the quantity and quality of state-level whistleblower laws. As noted above, these laws differ across states in both breadth and intensity. Thus, their impacts on corruption are also likely to differ. The quantity of whistleblower laws is accounted for by including a binary variable, *Whistleblower Law*, which identifies states with their separate laws for protecting whistleblowers. Most, but not all, states currently have such laws to protect and encourage whistleblowers ([www.uslegal.com](http://www.uslegal.com)). Further, there are differences in the intensities (“teeth”) of these laws across the states that do have them on their books. To account for qualitative differences in state-level whistleblower laws, we include an index of their relative strength (*Whistleblower Law Strength*). The index (ranging from 0 to 100, with higher numbers implying greater WB law strength) is based on state level whistleblower law differences across three broad dimensions: (a) breadth of coverage of the WB law; (b) scope of WB protection; and (c) remedies for retaliation against whistleblowers (for details, see <http://www.peer.org/assets/docs/wbp2/overview.pdf>).

The formal estimated equation has the following general format (subscript  $i$  denoting a state in our cross-sectional analysis):

$$\begin{aligned} \text{CORRUPTION}_i = f(\text{WhistleblowerAware}_i, \text{Whistleblower Law}_i, \text{Whistleblower Law Strength}_i, \\ \text{LawEnforce}_i, \text{Income}_i, \text{GSPstate}_i, \text{URBAN}_i) \\ i = 1, \dots, 51 \end{aligned} \quad (1)$$

The dependent variable (*CORRUPTION*) is the total number of federal convictions in the state per million population in 2000-2009. This is a “hard” measure of state-level corrupt activity that is prosecuted at the federal level and, despite shortcomings (e.g., non-convicted not captured and state-level corruption prosecutions not recorded), it provides a reasonably clear picture of state-level corrupt activity, especially if one examines a longer time period and considering the fact that the actual level of corrupt activity is almost impossible to measure. Further, this measure has been widely used to capture corrupt activity in the United States (Fisman and Gatti (2002), Glaeser and Saks (2006), Goel and Nelson (1998)). The decade-long figure is used in order to smooth out the lumpiness whereby one large corruption case in a state in a given year might lead to a number of convictions, with few or no convictions in other years. Further, given the inherent difficulty of measuring the true level of corruption activity (perpetrators of undetected corrupt acts have little incentive to reveal their actions – see Williams and Siddique (2008)), corruption convictions are best understood as a measure of “observed” or “detected” corruption.

Given that whistleblower provisions protect and reward corruption exposure, one would expect greater awareness about WB acts to increase the amount of detected corruption, as more corrupt acts come to light. One type of potential whistleblower is a middle-man involved in facilitating an otherwise legal transaction, as noted by Lambsdorff (2002). As discussed in greater detail below, we create an internet-based measure of the number of web search hits in Google and Yahoo (*WhistleblowerAware*) for state level awareness about WB laws. Examples of search results included official publications and web postings about WB laws, newspaper articles, advertisements, opinions of law firms on the subject,

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academic references, media reports of related court cases, etc.<sup>7</sup> Thus, the resulting measure provides a good basis for comparison of awareness about WB laws, which would embolden would-be whistleblowers while at the same time might even serve to deter some potential law breakers (see Goel et al. (2012) for a cross-national construct). The empirical analysis will reveal which effect dominates, and it will answer the substitution-complementarity question posed above. Further, whereas the internet awareness about whistleblower laws (*WhistleblowerAware*) would indirectly impact corruption, the existence (*Whistleblower Law*) and quality (*Whistleblower Law Strength*) of whistleblower laws are likely have a more direct impact.

Greater economic prosperity (*Income*) increases the opportunity costs of breaking the law, although greater prosperity can also be seen as making bribes more affordable. Evidence on the (negative) effect of economic prosperity is relatively more robust across nations (Gundlach and Paldam (2009), Serra (2006)) than it is for the United States (Glaeser and Saks (2006), Goel and Nelson (2011)). Urbanization (*URBAN*) accounts for social influences on corruption, including, (1) the competition for favors; and (2) the potential “social shame” associated with the greater risk of exposure in more populated or urbanized areas (see Fisman and Gatti (2002)).

The role of government is multifaceted (La Porta et al. (1999), Rose-Ackerman (1999)), being associated with creating bureaucratic delay, which increases the opportunities to engage in corrupt behavior, but also with better checks and balances, which reduce corruption (see Goel and Nelson (1998)). We account for this by including in the model the gross state product originating in a states’s state-local sector (*GSPstate*). Finally, the number of the state’s law enforcement employees (*LawEnforce*) is included to control for the effect of direct enforcement activities on corruption (see Alt and Lassen (2003, 2008), Priks (2011)).

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<sup>7</sup> There is some recognition in the broader literature of the role of the internet in deterring various crimes (Andersen (2009), Katz and Rice (2002)). For studies linking the media and corruption, see Brunetti and Weder (2003), Di Tella and Franceschelli (2011), Freille et al (2007), Goel et al. (2012), Reinikka and Svensson (2005) and Vaidya (2005)).

### 3 Data

Corruption conviction data are from the Public Integrity Section of the U.S. Department of Justice and pertain to convictions that result from federal prosecutions. These include convictions of local, state and federal officials (e.g., members of Congress, federal judges, U.S. attorneys and FBI agents). Most of the data are from secondary sources. Table 1 provides further details, including variable definitions, summary statistics and sources.

The remainder of this section is devoted to a discussion of how the internet-based measure of awareness about U.S. state whistleblower laws and acts is constructed.<sup>8</sup> The methodology used in collecting internet search data is similar to that employed for internet corruption awareness across nations in another context (Goel et al. (2012)). In particular, we perform internet searches via two search engines, Google and Yahoo, to spot whistleblower laws across U.S. states. Our final data include results from Google and Yahoo collected in January 2012. Google and Yahoo use different algorithms to generate search results; therefore, using both strengthens the related measure. Since internet hits can change quickly, all the searches were conducted on the same day for comparability across states. We use the average of search hits from these search engines (normalized by population) as our main explanatory variable (*WhistleblowerAware*).

The primary search strategy to generate data on *WhistleblowerAware* involved using keywords: the U.S. state's name and "whistleblower law." For example, a search on Google with keywords "Illinois whistleblower law" produced more than a million and a half internet hits. Examples of what appeared at the top for that particular search included (i) A Citizen's Guide to the Illinois Whistleblower Reward and Protection Act from the Citizen Advocacy Center; (ii) general information about the history and provisions of whistleblower laws in Illinois from [www.illinois.gov](http://www.illinois.gov); and (iii) specific information about Whistleblower Act (# 740 ILCS 174/1) from the Illinois General Assembly. Thus, one can see that the internet is a useful source of information that empowers potential whistleblowers, while at the same time possibly dissuading some lawbreakers.

Given the variety of whistleblower laws in the individual states noted in the introduction, potential whistleblowers in a state would likely be interested in information about the provisions in their states, as they differ from other states and from federal laws. Internet

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<sup>8</sup> Note that given the nature of the internet searches, the data for internet hits is more current than the latest-available secondary data, albeit with a lag. However, some of the web postings generated by the searches have been available for quite some time.

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awareness about whistleblower laws would also provide information to lawmakers and enforcement officials about past legal precedents and current media debates on the subject.

The internet searches for whistleblower laws in U.S. states required some fine-tuning to control for noise or discrepancies in the data. For instance, for some U.S. states this search produced some results that were not related to the state (e.g. the search for whistleblower law in Virginia returns results for both Virginia and West Virginia).<sup>9</sup> To correct for this, we included an extra term in our search, to indicate that we were only interested in one particular state at a time. In total, there were 13 states that required additional specification in our searches. These fall into three categories: states with the same names as other states or individuals (Washington, DC; Georgia; Virginia; and Washington), states with geographic direction in their name (North Carolina; North Dakota; South Carolina; South Dakota; and West Virginia), and states with "new" in their name (New Hampshire; New Jersey; New Mexico; and New York). To correct for states with common names, we included "state" in our search term (e.g. our search phrase for Georgia would be "Georgia state whistleblower law"). To correct for directional states and "new" states, quotation marks were put around the full name of the state. For example, when searching New Mexico, we wanted to avoid hits that referred to Mexico. So, we used the search term "'New Mexico' whistleblower law". This yields only results that refer explicitly to New Mexico and removes all sites that only refer to the country Mexico. Lastly, there was the issue of Washington, DC versus Washington state. For this, we put quotation marks around Washington, DC when we wanted results for the District of Columbia. When searching for the state of Washington, we removed references of "D.C." and "Columbia" using a method that removes the words "D.C." and "Columbia" from the internet searches. Thus, the numbers collected better reflect the true number of hits that focus on the state's whistleblower laws.<sup>10</sup>

The average number of internet hits by state for whistleblower laws (across Google and Yahoo) was 0.83 hits per 1,000 population, the highest being 4.89 for the District of Columbia (4.41 for North Dakota) and the lowest being 0.03 for Virginia. As noted above, these hits can change quickly over time and might be disproportionately high for a state with a high degree of related legislative or legal activity.

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<sup>9</sup> Also, it may produce results for people named Virginia.

<sup>10</sup> As the reader will notice, technical limitations constrain the extent of refinements we can perform. For instance, there is likely to be some duplication in webpages in some cases due to cross postings at mirror sites and there seems to be no efficient way to weed them out.

## 4 Results

The estimation results are reported in Table 2. Estimating with OLS, we find that the overall fit of all the models is quite reasonable, as indicated by the  $R^2$ s and  $F$ -statistics. Alternate estimation techniques are also used below in the robustness section.

### 4.1 Baseline model

Model 1.1 examines the determinants of observed corruption, without considering whistleblower awareness. The idea here is to refer to the extant literature on the causes of U.S. corruption, using more recent data.

Results show that higher levels of economic prosperity and greater law enforcement increase corruption conviction rates, while a larger state-local governmental sector is associated with lower rates of detected corruption. Similarly, more urbanized states have lower observed corruption rates. The effect of income is consistent with the bribe-affordability aspects of corrupt behavior. It is also important to keep in mind that the phenomenon being investigated here is detected corruption, and higher-income states may be in a better position to allocate resources to uncovering such activities.

In the context of the literature, the findings for the effect of income on corruption in the case of the United States are less consistent than in a cross-national context (Glaeser and Saks (2006), Goel and Nelson (2011), Gundlach and Paldam (2009), Serra (2006)). Similarly, larger government activity may reduce corruption due to better checks and balances and more streamlined processes, as the role of the government expands (see Goel and Nelson (1998) for similar findings). The (negative) effect of urbanization is more consistent with the “social shame” argument of corruption deterrence than with the argument that a more urbanized state fosters an environment that promotes greater competition for favors.

Overall, there are no big surprises in the results, although the signs and statistical significance of some of these determinants vary somewhat in the literature depending on the period studied and the measure of corruption (see Goel and Nelson (2011)).

## 4.2 Whistleblower awareness and corruption

Models 1.2-1.5 in Table 2 add the whistleblower awareness variable to different variations of Model 1.1. The results show that greater whistleblower awareness increases the observed corruption. In particular, the coefficient of *WhistleblowerAware* is positive and statistically significant in all the models. Greater internet awareness through news reports, blog posts and legal opinions, tends to embolden potential whistleblowers to expose corruption. In terms of magnitude, the parameter estimates for this variable imply that an increase in whistleblower hits by one sample standard deviation (1.07 from Table 1) would increase total corruption convictions by nearly thirty (28.9) per million population based on the results for Model 1.2. This estimate is quite substantial given that the sample mean for the convictions variable is 43.3.

Turning to the direct measures of WB laws, both the *Whistleblower Law* and *Whistleblower Law Strength* (Models 1.4 and 1.5), have a negative effect on corruption, but their statistical significance is low. Thus, state whistleblower legislation in and of itself appears to have no deterrent effect on corruption; a wider, multi-faceted strategy is needed to create an awareness of the legislation. Moreover, internet awareness seems to be relatively more effective than the quantity and quality of WB laws themselves. To the best of our knowledge, this appears to be the first formal evidence in that regard.

The effects of other determinants are remarkably similar to what was reported for the baseline model. Finally, getting back to the question posed in the introduction, direct enforcement activities and whistleblower laws seem to be complementary in combating corruption – both *WhistleblowerAware* and *LawEnforce* have positive effects on observed corruption in Table 2.

## 4.3 Robustness checks

We perform several robustness checks on the validity of our findings. These include considering simultaneity issues and using alternative measures of whistleblower awareness.

#### 4.3.1 Allowing for possible endogeneity of whistleblower awareness

It is possible that awareness about whistleblower laws in a state is driven by corrupt activity – i.e., states with more corrupt activity are likely to have greater media buzz, academic interest and public debate (internet blog posts) about related whistleblower laws. To account for the possibility that there could be reverse feedbacks from corruption to whistleblower awareness, we re-estimated Models 1.2 and 1.3 from Table 2 by taking the *WhistleblowerAware* variable to be endogenous. For this purpose a measure of state’s digital divide – the average number of internet access computers per public library in a state (*Average State Public Library Internet Computers*) and a state’s physical size (*State Land Area*) were employed as additional instruments for *WhistleblowerAware*.<sup>11</sup> Clearly, greater diffusion of public internet access in a state will affect the level of internet activity (both consumption and production of related information on the internet) involving the whistleblower topic in that state. Also, other things equal, residents in larger states might access the internet differently to obtain information, including information on whistle blowing (compared to residents in smaller states who are likely to uniformly have access to multiple information sources). On the other hand, in smaller states it is relatively easier for whistleblower awareness to flow via means other than the internet (e.g., by word of mouth or public forums).

The corresponding results, using the two-stage least squares estimation procedure, are presented as Models 2.1 and 2.2 in Table 3. The related tests on the instruments (reported towards the bottom of Table 3) support our choice of instruments. In both cases, greater whistleblower internet awareness tends to result in greater corruption exposure. However, the statistical significance of *WhistleblowerAware* in Model 2.2 (with urbanization as an additional explanatory variable) is relatively weak. The results for the other determinants are quite similar to what is reported in Table 2.

#### 4.3.2 Using a broader measure whistleblower awareness

To address concerns that internet-based searches come with some “noise”, we used a broader measure of whistleblower internet awareness by dropping the word “Law” in the Google searches – e.g., the search for Georgia included the keywords “Georgia state whis-

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<sup>11</sup> Data for both instruments were obtained from the *Statistical Abstract of the U.S.*



tleblower”. Intuitively speaking, a potential whistleblower might seek information on the internet about episodes and resources related to whistle blowing, and not just the related laws. The resulting variable (normalized by population), *WhistleblowerBroad*, and the original variable, *WhistleblowerAware*, had a correlation coefficient of 0.61.<sup>12</sup>

The regression coefficient of *WhistleblowerBroad*, when it replaced the variable *WhistleblowerAware* in the re-estimated Model 1.2, was positive and statistically significant at better than the five percent level, with results for the other variables remaining roughly unchanged (details are available upon request). The concluding section follows.

## 5 Concluding remarks

Whistleblower provisions have been attracting the interest of both state and federal lawmakers in the United States, in their efforts to improve governance and reduce the abuse of public funds. The global prevalence of whistleblower laws, however, is somewhat limited. These laws strengthen voluntary efforts to expose corruption and graft in public sector operations. In the context of corruption, potential whistleblowers might be direct participants in corrupt transactions or outside observers (see Lambsdorff (2002)). Using recent data on observed corruption across the American states, this study uniquely examines the impact of awareness about whistleblower laws on the level of observed corrupt activity. For this purpose, a new internet-based measure of state-level search hits is constructed using the Google and Yahoo internet search engines. The resulting measure captures the awareness about whistleblower provisions for both potential whistleblowers and participants in corrupt transactions. In the context of the literature, this research can be seen as adding to the media-corruption nexus, but with a unique focus on the awareness about whistleblower laws in that context (see Andersen (2009), Brunetti and Weder (2003), Di Tella and Franceschelli (2011), Freille et al. (2007), Goel et al. (2012) and Vaidya (2005)).

Couching the empirical analysis within the extant literature on the causes of corruption (see Goel and Nelson (2011), Treisman (2000)), our results show that greater internet awareness about whistleblower laws results in more corruption coming to light and being successfully prosecuted. In terms of magnitude, an increase in whistleblower hits by

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<sup>12</sup> The fact that *WhistleblowerBroad* searches were conducted about six months after the *WhistleblowerAware* internet searches also alleviates concern about one incident at a point in time disproportionately increasing internet activity.

one sample standard deviation would increase average corruption convictions per million population by nearly thirty over a decade-long period. Interestingly, the internet awareness about corruption seems relatively more effective at exposing corruption than the quantity and quality of whistleblower laws themselves (Models 1.4 and 1.5). Further, the direct government resources allocated to controlling crime and the indirect efforts via whistleblower awareness are found to be complementary. These findings are generally robust to alternate specifications, including an allowance for potential endogeneity of whistleblower awareness (Table 3), and to broader measures of internet whistleblower awareness. The results with respect to other determinants (economic prosperity, urbanization and government size) are largely in line with the extant literature (see Fisman and Gatti (2002), Glaeser and Saks (2006), Goel and Nelson (2011)).

The results for the United States in terms of the effectiveness of whistleblower laws in exposing corruption should be of interest to policy makers everywhere, especially in other nations that do not have adequate protections for whistleblowers. As internet diffusion grows and the digital divide narrows, it would be interesting to see a further impact of whistleblower awareness and, more generally, of the internet.

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## Tables

Table 1 Variable definitions, summary statistics and data sources

Variable	Definition (Mean; Std. dev.)	Source
<i>CORRUPTION</i>	Total federal public corruption convictions per million population, 2000-2009. (43.31; 77.18)	U.S. Department of Justice (1) U.S. Census Bureau (3)
<i>WhistleblowerAware</i>	Whistleblower internet hits per 1,000 population, 2012. (0.83; 1.07)	<a href="http://www.google.com">www.google.com</a> <a href="http://www.yahoo.com">www.yahoo.com</a> See text for further details.
<i>Whistleblower Law</i>	Binary variable =1 if state has a general whistleblower statute that protects public employees, 0 otherwise. (0.88; 0.33)	<a href="http://www.uslegal.com">www.uslegal.com</a> (6)
<i>Whistleblower Law Strength</i>	Index of the coverage, usability, and strength of state whistleblower laws. Index ranges from 0 to 100 with higher values implying stronger laws, 2011. (55.67; 11.04)	Public Employees for Environmental Responsibility (7)
<i>LawEnforce</i>	Law enforcement employees (all levels of government) in a state per million population, 2010. (3,180; 835)	Federal Bureau of Investigation (4)
<i>Income</i>	Per-capita personal income, 2010. (39,648; 7,015)	U.S. Bureau of Economic Analysis (2)
<i>GSPstate</i>	Gross state product originating from the state-local public sector in a state per million population, 2010. (4,338; 665)	U.S. Bureau of Economic Analysis (2)
<i>URBAN</i>	Percentage of state population residing in urban areas, 2010. (74.10; 14.89)	U.S. Census Bureau (5)

Notes:

- (1). <http://www.justice.gov/criminal/pin/docs/arpt-2009.pdf>
- (2). <http://www.bea.gov/regional/index.htm>
- (3). <http://www.census.gov/compendia/statab/cats/population.html>
- (4). <http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2010/crime-in-the-u.s.-2010/tables/10tbl77.xls>
- (5). <http://www.census.gov/geo/www/ua/2010urbanruralclass.html>
- (6). <http://employment.uslegal.com/whistleblowers/state-whistleblower-statutes/general-state-whistleblower-statute>
- (7). <http://www.peer.org/assets/docs/wbp2/overview.pdf>

Table 2 Whistleblower laws and corruption in the U.S.A. (*Dependent variable: CORRUPTION*)

	<b>Model 1.1</b>	<b>Model 1.2</b>	<b>Model 1.3</b>	<b>Model 1.4</b>	<b>Model 1.5</b>
<i>WhistleblowerAware</i>		27.05** (3.1)	23.38** (2.8)	27.05** (3.1)	26.91** (3.0)
<i>Whistleblower Law</i>				-2.39 (0.2)	
<i>Whistleblower Law Strength</i>					-0.20 (0.4)
<i>LawEnforce</i>	0.053** (3.1)	0.045** (3.5)	0.048** (3.7)	0.045** (3.5)	0.045** (3.5)
<i>Income</i>	0.006** (2.8)	0.003** (2.5)	0.004** (3.0)	0.003** (2.5)	0.003** (2.6)
<i>GSPstate</i>	-0.024* (1.9)	-0.022** (2.2)	-0.023** (2.3)	-0.022** (2.1)	-0.022** (2.3)
<i>URBAN</i>	-1.47** (3.0)		-0.76** (2.1)		
<i>F-value</i>	2.90**	4.33**	3.87**	3.40**	3.56**
<i>R<sup>2</sup></i>	0.68	0.75	0.76	0.75	0.75
<i>N</i>	51	51	51	51	51

Note: See Table 1 for variable definitions. Constant included but not reported.

The figures in parentheses are robust t-statistics in absolute value; \*\* and \*, respectively, denote statistical significance at the 5% (or better) and 10% levels.

Table 3 Whistleblower laws and corruption in the U.S.A.: Allowing for endogeneity of whistleblower awareness. (*Dependent variable: CORRUPTION*)

	<b>Model 2.1</b>	<b>Model 2.2</b>
<i>WhistleblowerAware</i>	33.17** (3.0)	21.29 (1.6)
<i>LawEnforce</i>	0.044** (3.9)	0.049** (4.0)
<i>Income</i>	0.003** (2.6)	0.004** (3.0)
<i>GSPstate</i>	-0.022** (2.4)	-0.023** (2.4)
<i>URBAN</i>		-0.82* (1.8)
<i>F-value</i>	5.17**	3.75**
<i>R<sup>2</sup></i>	0.74	0.76
<i>F test of excluded instruments</i>	12.51**	8.40**
<i>Test of overidentifying restrictions Hansen's J statistic <math>\chi^2(1)</math> (p-value)</i>	1.60 (0.21)	2.33 (0.13)
<i>N</i>	51	51

Note: See Table 1 for variable definitions. Constant included but not reported.

The reported results are the second stage estimates of a 2SLS regression, with the *Average State Public Library Internet Computers* and the log of *State Land Area* used as instruments for *WhistleblowerAware*.

The figures in parentheses are z-statistics in absolute value; \*\* and \*, respectively, denote statistical significance at the 5% (or better) and 10% levels.

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