Accounting and corruption: a cross-country analysis

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Abstract

Purpose – The purpose of this paper is to better understand the relationship between accounting and auditing quality and the perceived level of corruption.

Design/methodology/approach – This relationship is studied by performing a cross-country analysis using public data to measure accounting quality, audit quality, and corruption.

Findings – Consistent with the authors' predictions, the paper finds evidence that accounting and auditing quality are significantly related to the level of perceived corruption in a country.

Research limitations/implications – These findings suggest that countries with more transparent reporting have lower levels of perceived corruption and that the level of perceived corruption may be reduced in a country by improving accounting and auditing quality.

Practical implications – The findings suggest that countries can reduce the level of perceived corruption by improving the transparency of financial reporting by improving accounting and auditing standards.

Originality/value – While significant amounts of research has examined perceived corruption, this study is the first to address the impact of high-quality accounting information on the level of perceived corruption.

Keywords Corporate governance, Accounting systems, Auditing, Corruption

Paper type Research paper

1. Introduction

Organizations are portrayed financially through audited accounting information. The purpose of this information is to stakeholders about the financial status of the organization, allowing them to make informed decisions regarding the organization. Poor auditing and accounting[1] standards create a situation where there is a lack of accountability to stakeholders, where managers can act in a way that is contrary to the expectations of stakeholders without consequence, and where assets can be misused and misallocated (Jensen and Meckling, 1976).

Auditing and accounting standards seek to make financial information transparent, mitigating the risk that those with economic power act in ways that are unethical, illegal, or inappropriate. In short, one goal of accounting and auditing standards are to make it more difficult for managers of organizations to act contrary to the expectations of shareholders. When good accounting standards exist, organizations are required to disclose information in ways that create transparent, accurate, and comparable financial information. As organizations are held to higher accounting and auditing

standards, management and others within the organization are forced to be more transparent about the use of the organization's assets, making corrupt practices by management and others more difficult to commit and conceal. Indeed, as Hall and Yago (2000, p. 2) indicate, "A key reason for keeping transactions secret is to conceal corrupt practices. With transparency comes prying eyes."

Corruption has been defined as:

> [...] an exchange between two parties [...] which (i) has an influence on the allocation of resources either immediately or in the future; and (ii) involves the use or abuse of public or collective responsibility for private ends (Macrae, 1982, p. 678).

This definition is broad enough to include both political corruption, where one of the parties is a public official and uses his or her office for private gain, as well as economic corruption, where one of the parties uses economic power derived from his or her firm for private gain. By definition, corruption requires illegal practices and often has to do with illegal cash payments, misallocation of assets, and other inappropriate economically driven transactions (Husted, 1999; Treisman, 2000). Accounting seeks to make the economic transactions of an organization transparent. The role of auditing is to provide third-party assurance of that transparency. In other words, accounting information is a vehicle through which private companies demonstrate that they operate legally (i.e. that they do not participate in rent-seeking behavior), and public institutions and their managers are held accountable to the public.

In this paper, we perform a cross-country analysis using data from different countries to empirically investigate the relationship between accounting and corruption. We do not attempt to build a model that explains corruption – such models are plentiful in the literature and, given the complexity of corruption, vary widely (for a review – Andvig and Fjeldstad, 2001; Aidt, 2003). Rather, we investigate and provide evidence on the relationship between corruption and the quality of accounting and auditing present in a country. Specifically, we investigate the relationship between two measures of accounting quality and corruption and find that for these measures a relationship exists. We then construct a model for corruption using measures of accounting and auditing and a proxy for economic development, and find that two measures of accounting are significant in explaining corruption when controlling for economic development. To further test the relationship between corruption and accounting, we replicate two corruption models existent in the literature (DiRienzo *et al.*, 2007; Treisman, 2000), and find that adding proxies for accounting quality provide additional power in explaining corruption. This is an important discovery because if, as our research suggests, better accounting and auditing systems are associated with less perceived corruption, then governments may be able to decrease corruption by improving accounting and auditing standards – thus improving their business climate, encouraging investments by both nationals and foreigners, and increasing their overall productivity and GDP.

2. Literature review
Corruption has been described as a serious global problem that affects countries throughout the world (Transparency International, 2007). Furthermore, corruption reduces foreign direct investment and economic growth (Mauro, 1995; Wei, 2000; Gupta *et al.*, 2002), lowers investment in education and health (Mauro, 1997), and puts less corrupt countries at a disadvantage when seeking international contracts

(Kantor, 1996).Corruption also increases and distorts public investment and decreases public expenditures for operation and maintenance of investments (Tanzi and Davoodi, 1997). Further, corruption reduces revenue generated through taxation, contributing to the inability of some governments to function properly (Tanzi and Davoodi, 1997). Corruption has been credited with eroding trust in the political system and reducing interpersonal trust in society (Seligson, 2002). A specific example of the costs of corruption is provided by Hu (2001), who estimates the economic cost of corruption to the Chinese economy between 1995 and 1998 to be between 13.2 and 16.8 per cent of China's GDP. It is clear that corruption is a serious problem to international business, and that an understanding of the contributors (and the possible solutions) of corruption are essential.

While corruption has long been a problem, corruption has only recently been the topic of much academic research. Initially, most of the corruption literature was theoretical in nature. Two of these dominant theories include "public choice" (Rose-Ackerman, 1978) and "game theory" (Macrae, 1982). Theoretical scholars have suggested that there are three central elements to corruption (Jain, 2001). Jain explains these three elements as the follows:

> First, someone must have discretionary power [...] Second, there must be economic rents associated with this power [...] And third, the legal/judicial system must offer sufficiently low probability of detection and/or penalty for the wrongdoing (Jain, 2001, p. 77).

Since these three factors provide a basis for how corruption occurs, analyzing these three elements can prove helpful when developing strategies to combat corruption. Furthermore, as Jain (2001) indicates, these three elements of corruption can be broken into two parts – the first two requirements serve as incentives for corruption and the third requirement acts as a deterrent of corruption. The focus of this paper is on the third element of corruption – the detection of wrongdoing. If an effective accounting system is in place, the likelihood that someone can engage in corrupt acts without being discovered decreases. As a result, Jain's "probability of detection" is increased, the misallocation of assets is more readily brought to light, and less corruption should be the result. As accounting and auditing standards rise, and especially as audits become more mandatory, more frequent, and more independent, countries should experience less corruption.

Over the last 30 years, our overall knowledge of corruption has increased substantially. Along with theoretical work, various case studies and empirical work has suggested possible explanations of corruption within specific countries (Bunker and Cohen, 1983; Levin and Satarov, 2000). Unfortunately, however, past research on corruption provided mixed results regarding the degree of damage that corruption has upon society. It was uncertain whether corruption actually "greased the wheels" of economic transactions, providing economic growth in countries or if corruption was detrimental to society and limited economic growth. Theoretically, supporters of the "greasing the wheel" argument had a compelling story – corruption-facilitated economic transactions and was a seemingly efficient way to allocate political goods (Leff, 1964; Beck and Maher, 1986). However, research provided by Mauro (1995) countered this argument by providing strong empirical evidence suggesting detrimental effects of corruption on society. Recently, there is a general consensus that corruption negatively

effects organizations, economies, and society (Wei, 2000; Pierre-Guillaume and Sekkat, 2005).

While initial research on corruption attempted to determine the impact of corruption on society, more recent research is examining the causes of corruption. By understanding the determinants of corruption, society can better understand how to combat and deter corruption. Recent research has provided evidence that many factors influence levels of corruption, including the level of Protestantism, a history of British rule, level of economic development, level of imports, use of a federal system of government (Treisman, 2000), accessibility of information (DiRienzo *et al.*, 2007), inequality of income distribution and government size (Husted, 1999), Hofstede's cultural values (Husted, 1999; Davis and Ruhe, 2003; DiRienzo *et al.*, 2007), economic freedom (Goel and Nelson, 2005), and competition (Ades and Di Tella, 1999; Svensson, 2005). Indeed, many variables have been shown to influence the level of corruption.

In addition to recent research on corruption, there has also been a great deal of literature on the value of effective accounting and auditing. Research has suggested that the quality of accounting information is so important to organizations that they are actually willing to pay a premium for what the market perceives as high-quality accounting and auditing services. For example, Beatty (1989) suggests that investors are willing to pay much higher prices, yielding much lower returns, for stock in initial public offering companies that are audited by audit firms with good reputations. Other research, such as the BIG4 audit premium literature, demonstrates that markets around the world value the quality of information provided by BIG4 auditing companies so much that they are actually willing to pay premium pricing for their services. Choi *et al.* (2008), McMeeking *et al.* (2003), Francis (1984), Firth (1985), and DeFond *et al.* (2000) show a BIG4 audit premium in the UK, Australia, New Zealand, and Hong Kong, respectively.

While there exists much literature on both corruption and the value of quality accounting and auditing, there is less empirical research to suggest a relationship between the two. While Hall and Yago (2000) use a contrived measure of earnings opacity that is driven by both accounting and corruption, they provide no significant conclusive evidence to empirically link accounting and corruption. Furthermore, Di Tella and Schargrodsky (2003) suggested a link between auditing and wages with corruption and prices, however their study was limited only to one country – Argentina. Kimbro (2002) performs a cross-country analysis of corruption and finds a relationship between the number of accountants per capita and the level of corruption. As a result, there is little cross-country research that establishes a direct empirical link between accounting and corruption.

While empirical evidence that examines the relationship between accounting and corruption is scarce, there are various references to such a relationship within the literature. For example, Alam (1995, p. 430) lists "managerial and accounting skills" as possible correlates to corruption. Shleifer and Vishny (1993, p. 604) indicate that, "the first step to reduce corruption should be to create an accounting system that prevents theft from the government." Speaking of corruption in China, Sun (1999, p. 6) suggests that accounting practices have already served to lower corruption within China and that "accounting reviews and inspection campaigns have served to uncover more obvious violations and deter future ones." Kaufmann (1997, p. 130) states that "training programs in investigative journalism, accounting, and auditing" could all be used to

fight corruption in the international community. Everett *et al.* (2007, p. 515) claim "corruption is a problem and accounting can aid in its fight".

Other research also suggests a link between corruption and accounting. For example, Rose-Ackerman (1997, pp. 49-50) suggests that "creating structures within the public sector that make government actions more transparent" may deter corruption. She specifically suggests "financial management systems that audit government accounts and make financial information about the government public." Further, Tanzi and Davoodi (1997, p. 8) explain that corruption in governmental budgeting is highly likely when "some of the essential controlling or auditing institutions are not well developed." Likewise, Leiken (1997, p. 72) indicates that the USA can help control corruption in multilateral development banks by demanding that these banks "enforce their own rules on effective accounting systems, adequate internal controls, and timely audits."

As can be seen, the presence and quality of accounting systems, controls, and audits are often mentioned, though not empirically tested, in current corruption literature. Given the theoretically appealing link between accounting and corruption, we consider the lack of empirical evidence to support an accounting-corruption connection to be a major gap within the existing literature, and we seek to establish that link.

3. Variable descriptions and hypothesis development

In the following section, we discuss two different proxies that we use to measure accounting and auditing quality and our hypothesis related to each. The first of these two proxies we label BIG4, while the second proxy we label as PAQ. We now discuss these two proxies, which are defined in Table I, Panel A.

Our measure of BIG4 is a reflection of the presence of large, international accounting firms within a county (i.e. Ernst & Young, PricewaterhouseCoopers, KPMG, and Deloitte and Touche).

The auditor quality literature suggests that the market is willing to pay a premium for BIG4 auditing. This is presumably because with highly reputable auditing, one gets better-audited financial statements, resulting in more accurate and predictable information and decreased information risk. These factors all result in increases in the prices that investors are willing to pay for the stock of a company. Thus, BIG4 measures the quality of auditing as practiced within a country. It does not necessarily measure the accounting or auditing standards of a country, as large firms often hold themselves to higher standards than national standards require. As auditing becomes more efficient, any inappropriate financial transactions by companies would more likely be exposed, increasing the probability that corruption would be detected. This in turn decreases the demand for rent-seeking behavior of those entrusted with power. Based upon this logic, we present our first hypothesis:

H1. There is a negative relationship between the increased presence of BIG4 firms and perceived level of corruption in countries.

Our measure for PAQ is a reflection of the perceived quality of accounting and auditing standards based upon the survey responses of businesspeople within various countries[2]. This survey is administered annually by the World Economic Forum in their Global Competitiveness Survey, where the question is asked: "Financial auditing and reporting standards regarding company financial performance in your country are (1 – extremely weak, 7 – extremely strong – the best in the world)." These business

Panel A: variable definitions

Variable	Description [a]	Source
BIG4[b]	*BIG4.* The percentage of firms audited by BIG4 accounting firms, BIG4 equals 1 if percentages range between 0 and 25 per cent, 2 if between 25 and 50 per cent, 3 if between 50 and 75 per cent, and 4 if between 75 and 100 per cent	
PAQ	*Perceived accounting quality.* The survey results of asking business people worldwide to evaluate the strength of accounting standards using the following scale: "Financial auditing and reporting standards regarding company financial performance in your country are (1 – extremely weak, 7 – extremely strong – the best in the world)"	World Economic Forum, Executive Opinion Survey 2003
CPI	CPI for 2003	International Transparency (2003)

Panel B: descriptive statistics and correlations for corruption and test variables

	No. obs.	Mean	SD	CPI	PAQ	BIG4
CPI	128	4.28	2.30	1		
PAQ	100	4.82	0.96	0.842*	1	
BIG4	42	3.26	0.96	0.625*	0.522*	1

Notes: Significant at: $^*p < 0.01$; [a]where possible we use the description of the variable offered in the original source of the measure; [b]while we use the term BIG4, for some of the years included in this study, there were actually five major public accounting firms (BIG5) rather than four

Table I.

people who participate in the survey undoubtedly gain their perception of accounting and auditing as they see it practiced in their respective organizations. Thus, while BIG4 is a proxy for quality of auditing in that it measures the percentage of firms audited by large accounting firms, PAQ is a more subjective proxy for accounting and auditing quality. However, as with BIG4, we posit that those countries that have a higher perceived level of auditing and accounting standards will experience less corrupt behavior by those entrusted with power than countries with poorer accounting and auditing standards. Hence, our second hypothesis is:

H2. There is a negative relationship between the perceived quality of accounting in a country and perceived level of corruption.

In order to test our hypotheses, it is also necessary to have some viable measure of corruption. There have been many different proxies for corruption used in the literature, from the number of political figures convicted for abuse of power (Goel and Nelson, 1998), to management time with bureaucracy (Kaufmann and Wei, 2000), to a number of survey methods measuring corruption within a country. In recent research,

the latter form has been the preferred measure, with Transparency International's Corruption Perception Index (CPI) being one of the most popular. While discussed extensively by various researchers (Treisman, 2000; Goel and Nelson, 2005), we offer only a brief explanation of the CPI.

The CPI is a survey of surveys, taking results from many other surveys and combining them to make an index of perceived corruption. It is validated in Wilhelm (2002) and its shortcomings are discussed in Kaufmann (1998). Jain (2001) offers a review of corruption in general, and includes many of the different ways that corruption has been measured. Perhaps, the major difference between the CPI and other proxies for corruption is that the CPI is a measure of perceived corruption, not a measure of some objective phenomena related to corruption. However, even "objective" measures are not always accurately observable, and any objective proxy measures something only related to corruption and not corruption itself. Therefore, we believe the CPI to be the best available proxy for corruption.

As a first step in testing *H1* and *H2*, we examine the correlation between each measure of accounting and corruption. We expect a significant correlation between both BIG4 and PAQ with perceived corruption. Table I, panel B shows the correlation coefficients.

These correlations show support for both *H1* and *H2*. The correlations suggest that higher levels of corporate financial disclosure and practiced auditing are negatively correlated with corruption.

4. Regression analysis

While correlations are useful in establishing a relationship between accounting and corruption, they suggest only an association subject to several reservations. The first of these reservations is that there are many other factors (omitted variables) that could be driving the relationship seen in the correlations. For example, wealthier countries (those with higher GDPs) may have more resources to combat corruption. Further, because there are so many more economic transactions happening in wealthier countries, corruption would prove costlier if allowed to flourish, and there thus may be more incentive to prevent it. Further, wealthier countries are often more politically stable, more democratic and have a more sophisticated political system that prevents corruption. Given this, it might be that many variables, such as country wealth, affect both accounting and corruption, and the observed correlation is only showing the relationship between the omitted variable.

To mitigate this problem, we replicate two corruption models existent in the literature, and add accounting and auditing variables to test for significance. To find the two models, we searched the literature for corruption models that were:

- published in top journals;
- replicable;
- performed with publically accessible data; and
- substantially different from each other.

Based upon these criteria, we identified two models, provided by DiRienzo *et al.* (2007) (hereafter, DiRienzo), and Treisman (2000) (hereafter Treisman).

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Using control variables
The DiRienzo model for explaining corruption focuses around economic freedom, certain cultural factors and access to information. The research by DiRienzo seeks to demonstrate that increased access to digital information (variable DAI) will decrease corruption. The model essentially uses all other variables as control variables. While explained fully in DiRienzo *et al.* (2007), we offer a brief explanation of the control variables included in the DiRienzo model (DiRienzo *et al.*, 2007).

First, DiRienzo posits, along with Alam (1995), Rose-Ackerman (1978) and Tanzi (1998), that countries with unstable and unwieldy governments are more prone to be corrupt. This is a result of less regulation, which brings about the possibility of more corruption. Further, Ades and Di Tella (1999) and Treisman (2000) claim that more open economies are less likely to experience corruption. These references suggest the need to have a variable to measure the level of economic freedom within a country in the model. Given this, DiRienzo controls for Economic Freedom, a variable created and published in Gwartney *et al.* (2002). Along with supporting economic freedom, DiRienzo also uses a proxy for economic development (GDP per capita), which the literature also supports as being related to corruption (Husted, 1999). Along with economic freedom and development, DiRienzo suggests that corruption is very much a cultural phenomena. Supported by Husted (1999), DiRienzo also explains corruption using different cultural phenomena within a country by using four of Hofstede's cultural value indicators: power distance, individualism, masculinity, and uncertainty avoidance.

First, corruption has been suggested to be influenced by the level of power distance within a country. As power is more unequally distributed, with the persons at the top wielding a more disproportionate share of the power, people in the society are less likely to criticize and question authority. This makes it easier for persons in authority to abuse their public office for the sake of private gain. Second, the individualism of a society has been negatively linked to corruption (Husted, 1999). It is thought that this is the result of society placing a higher value on individual achievement and responsibility. In individualist societies, people are accountable for what they do, while in more collective societies, individuals are less responsible for their individual actions. Third, more masculine societies place a higher value on money and power (Adler, 2002), motivating corrupt acts that engender the growth of power and wealth. Lastly, Hofstede's cultural value of uncertainty avoidance is linked to corruption in that people in societies that avoid uncertainty are less comfortable in unpredictable situations. This leads to an unwillingness to put ones' self in uncertain situations, such as those caused by challenging and questioning authority. The variables used in DiRienzo are further described in Table II.

Like DiRienzo, we posit that cultural, economic, and information access factors may contribute to corruption. However, we also believe that the quality of a country's accounting and auditing influence the level of corruption within a country. To test this, we insert BIG4 and PAQ into the DiRienzo regression model and test whether the accounting variables are significant in explaining corruption in different countries[3] while controlling for all the other DiRienzo variables. The results of ordinary least squares estimations of these models are displayed in Table III. We start with Model 1, which is the original DiRienzo model (in the DiRienzo paper, it is Model 2). It includes the cultural and economic factors, as well as the variable of most interest in the DiRienzo study, a proxy for the access to digital information (DAI):

Variable	Description
PDI	*Power distance.* One of Hofstede's cultural values outlined in Hofstede (1980, 2001, quoted in DiRienzo *et al.*, 2007). Refers to the extent that less powerful members of society accept that power is not evenly distributed. In other words, power distance shows how followers within a society endorse inequality and power
IDV	*Individualism.* One of Hofstede's cultural values outlined in Hofstede (1980, 2001). Refers to the extent that individuals are integrated into groups. On the individualist side, ties between individuals are loose. The opposite of individualism is collectivism, where people are integrated into strong cohesive groups. The word individualism refers to the group – not to the state
MAS	*Masculinity.* One of Hofstede's cultural values outlined in Hofstede (1980, 2001). Refers to the distribution of gender roles. The opposite of masculinity is femininity. In highly masculine countries, women are more assertive and competitive, but not as much as men, so that highly masculine countries show a gap between men and women's values
UAI	*Uncertainty avoidance.* One of Hofstede's cultural values outlined in Hofstede (1980, 2001). Refers to a society's ability for tolerance of uncertainty and ambiguity. In other words, uncertainty avoidance refers to the extent that a culture helps its members to feel either uncomfortable or comfortable in situations that are uncertain and unstructured
EFW	*Economic freedom.* An index published in Gwartney *et al.* (2002) which takes into account factors such as the size of government, legal structure, security of property rights, access to sound money, freedom to exchange with foreigners, and regulation of credit
DAI	*Digital access index.* This index is represented on a scale of 0 (low access) to 1 (highest access). The overall country score is based on digital communication infrastructure, affordability of digital communication access, digital communication knowledge, quality of information communication technology, and digital information and communication technology
GDP	*Gross domestic product.* Gross domestic product is a measure of national income and output for a given country's economy. It is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources

Table II.
Description of variables
used in DiRienzo *et al.*
(2007)

Source: DiRienzo *et al.* (2007)

$$\text{Model 1}: \text{CPI} = \beta_0 - \beta_1 \text{PDI} + \beta_2 \text{IDV} + \beta_3 \text{MAS} + \beta_4 \text{UAI} + \beta_5 \text{EFW} + \beta_6 \text{GDP} + \beta_7 \text{DAI} + \varepsilon$$

We obtain substantially similar results to DiRienzo, with any differences being attributable to data availability for all countries. We then estimate the model adding the accounting variables together in Model 2, and then adding each of the two accounting variables separately in Models 3 and 4:

$$\text{Model 2}: \text{CPI} = \beta_0 - \beta_1 \text{PDI} + \beta_2 \text{IDV} + \beta_3 \text{MAS} + \beta_4 \text{UAI} + \beta_5 \text{EFW} + \beta_6 \text{GDP} + \beta_7 \text{DAI} + \beta_8 \text{PAQ} + \beta_9 \text{BIG4} + \varepsilon$$

$$\text{Model 3}: \text{CPI} = \beta_0 - \beta_1 \text{PDI} + \beta_2 \text{IDV} + \beta_3 \text{MAS} - \beta_4 \text{UAI} + \beta_5 \text{EFW} + \beta_6 \text{GDP} + \beta_7 \text{DAI} + \beta_8 \text{PAQ} + \varepsilon$$

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Constant	-2.159	1.696	-6.351^{***}	2.261	-4.695^{**}	1.74	-3.558^{*}	1.901
Test variables								
PAQ			0.72^{*}	0.352	0.778^{***}	0.25		
BIG4			0.389^{**}	0.168			0.42^{**}	0.176
Control variables-from DiRienzo et al. (2007)								
PDI	-0.012	0.008	-0.012	0.01	-0.003	0.008	-0.018^{*}	0.01
IDV	-0.005	0.008	-0.011	0.009	-0.007	0.008	-0.007	0.01
MAS	-0.016^{**}	0.007	-0.014^{*}	0.007	-0.013^{**}	0.006	-0.018^{**}	0.007
UAI	-0.007	0.005	0.000	0.006	-0.004	0.005	-0.002	0.006
EFW	0.88^{***}	0.22	0.841^{***}	0.282	0.566^{**}	0.227	1.134^{***}	0.256
GDP	0.000^{***}	0.000	0.000	0.000	0.000^{***}	0.000	0.000	0.000
DAI	4.804^{***}	1.575	4.569^{**}	1.869	4.977^{***}	1.462	3.557^{*}	1.902
No. obs.	57		37		55		37	
F	58.36^{***}		36.36^{***}		60.46^{***}		36.26^{***}	
Adjusted R^2	0.88		0.90		0.90		0.89	

Notes: Significance at: $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$; dependent variable CPI 2003; this table presents findings from regressing CPI (the perceived corruption measure) on two test variables (PAQ and BIG4) and control variables to examine the relationship between accounting quality and corruption; all variables are defined in either Tables I or II

Table III.
Regression results using DiRienzo model control variables

$$\text{Model } 4 : \text{CPI} = \beta_0 - \beta_1\text{PDI} + \beta_2\text{IDV} + \beta_3\text{MAS} - \beta_4\text{UAI} + \beta_5\text{EFW} + \beta_6\text{GDP}$$
$$+ \beta_7\text{DAI} + \beta_9\text{BIG4} + \varepsilon$$

Examining the significance of the accounting variables in Models 2-4, we find that both BIG4 and PAQ are significant at the 0.05 level, supporting *H1* and *H2*. These results suggest that after controlling for several country-specific factors, the quality of accounting information has a significant impact on the level of corruption in a country.

Using control variables
While DiRienzo offers a model of corruption that allows for significant explanation by cultural factors, DiRienzo's model places little focus on the historical economic and political factors that influence corruption. Economic freedom and economic development are very general measures and are meant to encompass all economic factors that influence corruption. However, there are no control variables for specific economic and political factors. To ensure that accounting is still significant when controlling for a number of specific economic and other variables, we replicate a portion of Treisman. Specifically, we replicate the series of nested regressions found in Treisman's Table III (Treisman, 2000, p. 417).

This nested regression tests for the influence on corruption of the legal system, colonial tradition, religious affiliation, ethno linguistic division, natural resource endowment, economic development, federalism, democracy, central government wages,

degree of state intervention and the frequency of turnover of the government leadership. Treisman accomplishes this by starting out with a baseline model for explaining corruption that contains the most exogenous and difficult to change variables: the legal system, colonial tradition, religious affiliation, ethno linguistic division and the natural resource endowments. He then includes variables to see if the extra variables add additional explanatory power to the model, and whether they are significant. Table IV describes Treisman's variables.

To test our hypotheses, while controlling for the variables used in Treisman (2000), we add both PAQ and BIG4 into the series of nested regressions, right after the base

Variable	Description	Source
CPI	CPI for 2003	Transparency International
COMMONLAW	Common law system. Company law or commercial code is English common law	La Porta *et al.* (1997)
ETHNOLING	Probability that two randomly selected inhabitants will not belong to the same ethno linguistic group	Mauro (1995)
FEDERAL	Have a federal system of government	Elzar (1995, quoted in Treisman, 2000)
BRITISH	Former British Colony or UK	Greir (1995)
RESOURCES	Fuels, minerals and metals as a share of 1993 merchandise exports	World Bank World Development Reports (1995, quoted in Treisman, 2000)
TURNOVER	*Government turnover.* Average number of government leaders per year. (number of government leaders in recent period divided by length of period in years); recent period: most countries 5 January 1980-December 1993; former USSR 5 January 1991-1994; post-comm. Europe 5 January 1990-December 1994. Must be 14 days to count. Leader is PM in parliamentary system, President or head of state in presidential or non-democracy	From Rulers Database, available at: www.geocities.com/Athens/1058/rulers.html
GOVWAGE	Average government wage relative to per capita GDP	Shiavo Campo *et al.* (1997)
IMPORTS	Imports of goods and services as a percentage of GDP, 1994	World Bank and the World Development Report
LOGGDP	Log GDP per Capita GDP, 1990	Penn World (Tables 5.6a)
NEVERCOLONY	Dummy variable indicating whether the country was ever a British colony	Fieldhouse (1982) and Grier (1995)
PROTESTANT	Percentage of population professing protestant faith	La Porta *et al.* (1999)
INTERVENTION	Index of degree to which "state interference hinders development of business."	Institute from Management Development
DEMOCRACY	Democratic in all 46 years between 1950 and 1995, using definition of democracy established by Alvarez *et al.* (1996)	Alvarez *et al.* (1996)

Table IV.
Description of variables used in Treisman

Source: Treisman (2000)

model, in Step 2 of the series of regressions. We add the variables at this point to analyze their ability to explain corruption at every stage of the nested regression sequence[4]. We display our results in a manner similar to Treisman's paper, where we start with a single model, results displayed vertically, and then estimate additional models, displaying each model with another column in the table. The results are shown in Table V.

From this series of nested regression, we see that for one stage of the series BIG4 remains significant, thus providing some evidence to support *H1*. We also find that at every stage of the nested regressions, PAQ remains highly significant, providing strong evidence in favor of *H2*. Further, examining the R^2-statistic, we also find significant reason to believe that adding PAQ and BIG4 adds explanatory power to our model.

5. Sensitivity analysis
Endogeneity
While we have demonstrated that accounting and corruption are related when controlling for many other factors, the direction of causality is not altogether clear. In other words, we must clarify if good accounting and auditing help to prevent and deter corruption, or if high levels of corruption create an environment of poor auditing and accounting systems. For example, the main asset that good audit firms have is their reputation. As a result, it is possible that as the risk of corruption increases good audit firms will be less willing to audit entities in that country, and the perception of accounting will suffer as a result. Further, it is often politicians who create laws and organizations that govern accounting standards and enforcement. Since rent-seeking public officials have the incentive to allow corruption, they may create a situation in which poor accounting and auditing occurs. This problem with endogeneity is a serious concern, and has been listed as an inherent limitation in many corruption studies (Treisman, 2000; other reference is needed). The econometric solution for endogeneity includes finding a suitable instrumental variable – something that has proved difficult in the area of corruption. As a result of these limitations, many corruption studies do not attempt to correct for endogeneity (examples).

To attempt to correct for endogeneity (econometrics reference), we find several instrumental variables and run a two-stage least squares regression, instrumenting for PAQ. This means that we use an instrumental variable and all other exogenous variables in the model to estimate PAQ, and then use the estimate of PAQ to estimate corruption[5].

No instrument fits each of these requirements perfectly. Indeed, as Treisman (2000) suggests, the lack of a suitable instrument is a difficulty faced in the corruption literature[6]. However, to ameliorate the difficulty of a lack of a perfect instrument, we select several different reasonable instruments for PAQ, and estimate the model using a two-stage approach with each instrument. Table VI describes the different instruments we use in our study. Any of these variables risks being a poor instrument. However, given that many of them are uncorrelated with each other, and they give similar results, even if they were not suitable instruments, their lack of correlation would indicate they are not suitable in different ways. The fact that they give somewhat similar coefficients for PAQ, lends credibility to their use as suitable instruments.

Our instruments for PAQ – governance transparency, disclosure, auditors per capita, and aggressive – are all highly and significantly correlated with PAQ, as can be seen in

| Variable | Model | | | | | |
	1	2	3	4	5	6
Common law system	0.658	−1.446	−0.729	−1.034	−0.916	−1.365
Former British colony or UK	0.643	0.197	0.195	0.431	0.435	0.577
Never a colony	−1.258	0.498	0.803**	0.852**	0.884**	0.612
Protestant (%)	0.042***	0.008	0.011*	0.009	0.011	0.002
Ethno linguistic division	−0.028***	−0.016	−0.004	0.002	−0.003	−0.008
Fuel metal and mineral exports	−0.02**	−0.004	−0.002	0.002	−0.001	0.014
BIG4		0.497*	0.189	0.169	0.184	0.239
PAQ		2.619***	1.47***	1.449***	1.265**	2.057***
Log GDP per capita			3.837***	4.141***	3.963***	1.902
Federal				−0.561	−0.429	−0.016
Uninterrupted democracy				0.016	0.116	−0.527
Imports/GDP (%)					0.009	0.002
State intervention						0.896**
Government wage						−0.098
Government turnover						1.012
Constant	6.00***	−9.041***	−17.707***	−18.725***	−17.425***	−16.515**
Adjusted R^2	0.50	0.88	0.88	0.88	0.879	0.893
n	72	42	42	42	39	32

Notes: Significance at: $^*p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$; this table presents results of regressing CPI (a perceived corruption measure) on two test variables (PAQ and BIG4) as well as control variables to examine the relationship between accounting quality and corruption; variables are defined in either Tables I or IV
Source: Treisman (2000)

Table V.
Series of regressions using Treisman's control variables

Table VII. Further, as can be seen in Table VII, many of them are uncorrelated with each other. In untabulated results, many of these instruments are also uncorrelated with the control variables of each of the two models we estimate.

Using these instruments, we estimate both the DiRienzo model and the Treisman model using the two-stage least squares approach, and report the results in Table VIII. Panel A presents results using the DiRienzo control variables, and Panel B presents results from using the Treisman control variables.

We find that when using aggressive, governance transparency and disclosure as instruments, PAQ is significant at the 0.01, 0.05 and 0.10 levels, respectively. We also find that the coefficients are all quite similar. Additionally, we find significance at the 0.10 level using governance transparency and auditors per capita using the DiRienzo model. While the results from each of the instruments are not the same, there are significant similarities between the estimations using different instruments. While our

Instrument	Description	Source	Correlation with PAQ
Disclosure (DISC)	Average ranking of the way firms in different countries disclose a variety of financial issues, including R&D, capital expenditures, subsidiaries, segment-product, segment-geographic and accounting policy	Bushman *et al.* (2004), constructed using the International Accounting and Auditing Trends data	0.717^{***}
Aggressiveness	Scaled accruals by lagged total assets for each firm, determine its median in the cross-section of firms per country per year, and then average across time to obtain the "earnings aggressiveness" variable per country	Bhattacharya *et al.* (2003)	-0.492^{***}
Auditors per capita	The number of auditors per 100,000 population	Saudagaran and Diga (1997, Table 6, p. 51) constructed using data from the International Federation of Accountants secretariat	0.729^{***}
Governance (governance transparency)	Developed in Bushman *et al.* (2004) using factor analysis on many different variables that are being used to describe corporate financial transparency. "A relative measure of the availability of information for outside investors to hold officers and directors accountable." (Bushman *et al.*, 2004, p. 220)	Developed using factor analysis in Bushman *et al.* (2004), also referred to as Factor 2	0.492^{***}

Note: Significance at: $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$

Table VI.
Description of instrumental variables

lack of a perfect instrument is a limitation in our study, we have provided some evidence for the significance of accounting and auditing standards in explaining the level of corruption in a country even when considering endogeneity.

6. Discussion and conclusions
The purpose of this research is to empirically examine the relationship between accounting and corruption. With this aim, we perform a cross-country analysis using data from 57 countries to investigate the relationship between levels of accounting and auditing quality and perceived corruption. Through correlation analysis and regression, while controlling for variables found in DiRienzo *et al.* (2007) and Treisman (2000), we find evidence to support the hypothesis that (*H1*): there is a negative relationship between the increased presence of BIG4 firms and perceived level of corruption in countries, and (*H2*): there is a negative relationship between the perceived

	CPI	PAQ	DISC	BIG4	Agressiveness	Auditorspercap	Governance
CPI	1						
PAQ	0.841***	1					
DISC	0.619***	0.717***	1				
BIG4	0.625***	0.522***	0.445***	1			
Agressiveness	−0.494***	−0.492***	0.308*	−0.256	1		
Auditorspercap	0.675***	0.729***	0.597***	0.62***	−0.318*	1	
Governance	0.423***	0.492***	0.521***	0.463***	0.055	0.371*	1

Notes: Significance at: $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$; this table presents correlations between accounting quality variables; corruption, and proposed instruments; instrumental variables are defined in Table VI, and test variables are defined in Table I

Table VII.
Correlations

		Instrument used in place of accounting perception			
		Aggressiveness	Governance transparency	DISC	Auditors per capita
Panel A: using DiRienzo control variables					
DiRienzo model	PAQ	− 0.152	1.291*	1.109	2.493*
	PDI	− 0.018	− 0.007	− 0.009	0.007
	IDV	− 0.001	− 0.018*	− 0.017*	− 0.033
	MAS	− 0.031**	− 0.012*	− 0.013*	− 0.004
	UAI	0.006	0.001	0.000	− 0.002
	EFW	2.107**	0.685*	0.761**	0.189
	GDP	0.000	0.000	0.000	0.000*
	DAI	1.755	6.359***	6.157***	6.187*
	Constant	− 7.785***	− 8.324***	− 7.66**	− 12.177***
Panel B: using Triesman control variables					
Triesman model	PAQ	2.246**	2.65***	2.692*	− 3.673
	Common law system	− 1.498	− 0.916	− 0.998	1.398
	Former British colony or UK	0.375	− 0.340	− 0.306	2.028
	Never a colony	0.782*	1.079***	1.06***	0.097
	Protestant (%)	0.007	0.006	0.005	0.042
	Ethno linguistic division	0.003	− 0.004	− 0.003	− 0.008
	Fuel metal and mineral exports	0.009	0.011	0.011	0.027
	Log GDP per capita	3.311***	3.304***	3.312**	8.398
	Federal	− 0.668*	− 0.400	− 0.417	− 0.451
	Uninterrupted democracy	− 0.352	− 0.442	− 0.490	1.714
	Constant	− 18.914***	− 21.081***	− 21.3***	− 9.351

Notes: Significance at: *$p < 0.10$, **$p < 0.05$, and ***$p < 0.01$; dependent variable CPI 2003; this table presents results of two-stage least squares regressions with CPI (a measure of perceived corruption) as the dependent variable and instrumental variables control variables as independent variables. the instrumental variables are aggressiveness, governance transparency, DISC, and auditor per capita; the coefficient for these instruments is indicated next to the PAQ label; control variables come from two separate models (the DiRienzo model and the Triesman model); regression results from the two-stage least squares estimation using DiRienzo control variables are presented in Panel A, and results using the Triesmann control variables are presented in Panel B

Table VIII.
Two stage least squares using instrumental variables

quality of accounting in a country and perceived level of corruption in countries. Considering the limitations of suitable instruments, we address endogeneity concerns by running a two-stage least squares analysis using four different instrumental variables. Results are robust to controlling for endogeneity for *H2*. Through using different models with uncorrelated variables, and through using two-stage least squares and a set of instruments, we address the problems of omitted variable bias and endogeneity, respectively. These findings strongly supporting our overall hypothesis that better accounting and auditing is related to reduced corruption.

The magnitude of the coefficients related to the PAQ in our models demonstrates that perceived accounting quality is not only statistically correlated with perceived

corruption, but economically significant. Given this, along with our demonstration through two-stage least squares regression that better accounting decreases corruption, these finding have significance for countries desiring to fight corruption: by improving accounting and auditing quality, countries may be able to lower corruption.

These findings, which show that better auditing and accounting standards are associated with corruption, are significant and important. Corruption keeps both countries and organizations from progressing. This inability to progress is caused by two factors. First, corruption siphons funds away which could be reinvested in the economy to help the economy grow. Resources that are misallocated as a result of corruption mean that resources are not effectively invested in productive assets, exploration or other ways to improve a standard of living. While other countries are increasing their GDP and improving their competitive positions, countries with high corruption are continually trailing, just trying to get to where they could have been without the corruption. The second damaging effect of corruption is probably even more important. Foreign organizations and individuals are reticent to invest in countries when they do not believe their investments will be safe or where they perceive corruption to be high. The negative impact of perceived corruption in inhibiting investment in economies is likely more significant than the economic catch-up game being played by the economies themselves. The double negatives of decreased investments by foreigners and spinning economic wheels to make up for misallocated resources can be devastating to an economy.

In today's global environment, economies compete not only against each other but against their own previous performance. A growing economy is a healthy economy, and a stale or declining economy is not only stagnant but failing. Countries that desire to develop economically should do everything possible to decrease corruption. This paper suggests a relationship between accounting and corruption, and thus suggests that countries may be able to decrease corruption by improving the quality of their accounting and auditing.

Notes

1. Throughout the paper, we refer to both accounting and auditing quality and accounting and auditing standards. Accounting is the process wherein financial information is summarized and transmitted to the public. Auditing is the process wherein accounting information is verified. They are both part of the same process, working together to create transparent and accurate financial information.

2. Unlike BIG4, PAQ has not been used much in the empirical literature. For two cases in which PAQ has been used in the literature, see Cornelius (2005a, b).

3. An example of the countries examined is found in the Appendix. As a result of data availability, our sample size, and the resultant number of countries, varied from model to model. DiRienzo model 2 was one of our more restricted samples, and so the countries listed in the Appendix represent the 37 countries used in DiRienzo Model 2.

4. One difficulty arises in replicating Treisman with the accounting variables. While BIG4 was actually created back in the mid-1990s (obviously, at that time, it was BIG5), and thus fits in the same time frame as the Treisman data, the PAQ variable has only been measured since 2002, which places it several years ahead of any of the Treisman variables. However, in the original Treisman data, there are variables spanning two decades, so, we feel comfortable using the accounting perception variable.

5. A suitable instrument must meet several different requirements. First, it must be highly correlated to the independent variable we are instrumenting for, in this case, PAQ. Second, it must be correlated only with the instrumental variable, and only affect the dependant variable through the instrumental variable (something which can only really be determined theoretically). Third, it must be uncorrelated to the error term. Unfortunately, correlations with the error term are not directly observable, as the error term is a function of which controls are included in the model. However, non-correlation with the existing control variables will give us some assurance that the instrument is uncorrelated to the unobservable error term. As a final condition, it must be theoretically appealing. That is, it should make sense that PAQ and the instrument are related.

6. Treisman (2000, p. 408) states, in discussing the problem of solving endogeneity, "This, however, requires the identification of suitable instruments [. . .]. Only in one case – the link between economic development and corruption – was I able to find a reasonably convincing instrument to test for the direction of causation. A large question mark, therefore, remains over the impact of some of the other key variables."

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Appendix. Countries used in DiRienzo Model 2

Countries
- Australia
- Austria
- Belgium
- Brazil
- Canada
- Chile
- Colombia
- Denmark
- Finland
- France
- Germany
- Greece
- India
- Ireland
- Israel
- Italy
- Japan
- South Korea
- Luxembourg
- Mexico
- The Netherlands
- New Zealand

- Norway
- Pakistan
- The Philippines
- Portugal
- Singapore
- South Africa
- Spain
- Sweden
- Switzerland
- Thailand
- Turkey
- The UK
- The USA
- Uruguay
- Venezuela

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