A Firm-Centered Analysis of Corruption and Reform:

Evidence from Indonesia

Paul D. Kenny

Australian Catholic University

Eve Warburton

National University of Singapore

ABSTRACT

This paper theorizes a significant industry effect on the intensity and frequency of corruption experienced by business, irrespective of both firm-level and administrative-unit characteristics. The argument of this paper builds on the problems created by *informational asymmetries* between firm insiders and outsiders, which generate both supply and demand pressures that concentrate corruption at the sectoral level. Because both firms and state agents risk prosecution if they cannot disguise their illicit transactions, it is the potential to either under-report revenue or to over-report costs—or in other words, to generate *hidden profits*—, which should be positively related to bribery and extortion. Industries characterized by concentrated, bespoke, and uncertain costs and revenues are most amenable to the generation of hidden profits. We test our theory against data from a primary survey of 672 firm managers and business owners in Indonesia. We find that being in the construction and extractive sectors makes firms substantially more likely to report being *asked* for bribes by state officials and to report *paying* such bribes. Moving to the causal mechanism, we show that these sectors are not the most profitable in Indonesia, nor are they especially uncompetitive when compared to other sectors. We do find, however, that firms in the mineral extraction and construction sectors are the most likely to report preparing financial statements that do not reflect reality—or in other words, they are the most likely to hide revenue or costs. Original qualitative evidence elaborates on the proposed mechanisms.

INTRODUCTION

Corruption remains a major global challenge. Recent estimates put the cost of corruption at more than 5 percent of global GDP (US$ 2.6 trillion) annually (United Nations 2018). Corruption reduces economic productivity, deepens inequality, and may harm human health (Holmes 2015, Fisman and Golden 2017). Even narrowing the focus to corruption in the business sector, as we do in this paper, the cost of corruption appears to be substantial. Although particular firms may find that corruption "greases the wheels" of commerce (Mendoza, Lim et al. 2015), empirical research generally concurs that, on aggregate, corruption in the business sector is a substantial drag on investment, innovation, and growth (Méon and Sekkat 2005, Fisman and Svensson 2007, Mironov and Zhuravskaya 2016, Nurtegin and Jakee 2020). The burden of corruption borne by business is, of course, distributed unevenly. The majority of comparative research to date has focused on cross-national and, more recently, sub-national variation in the level and type of corruption that businesses experience (La Porta, Lopez-De-Silanes et al. 1999, Batra, Kaufmann et al. 2003, Treisman 2005, Chen, Yaşar et al. 2008, Dong and Torgler 2013, Knutsen, Kotsadam et al. 2017). By design, such research has sought explanations in geographic or administrative unit heterogeneity, with proposed causal factors including culture, demography, contemporary and historical institutions, and resource endowments among others (for a review, see Pellegrini and Gerlagh 2006). However, other research, often in the form of single country studies, suggests that even within territorial units, corruption is especially problematic in some industries (Venard and Hanafi 2008, Kenny 2009, Vicente 2010, Donadelli, Fasan et al. 2014). Geographically delimited factors, whatever their nature, cannot be a straightforward cause of such variation. To date, however, there has been relatively limited cross-sectoral comparative research on corruption. This paper addresses this gap, developing a model of

sectoral variation in corruption and assembling a new industry-representative dataset to test it.

One reason for the lack of comparative research of the extent and type of corruption across sectors or industries is the difficulty of obtaining suitable firm-level data. Although some public sources of data can be used creatively to make inferences about firm-level variation in corruption (Fisman 2001, Braguinsky, Mityakov et al. 2014), typically this kind of investigation requires either private firm-level financial data (Mironov 2013, O'Donovan, Wagner et al. 2019), data stemming from state investigations (Cheung, Rau et al. 2012), or targeted micro-surveys (Reinikka and Svensson 2006). Since the publication of a number of World Bank survey-based studies in the late 1990s (Svensson 1999, Wei and Kaufmann 1999), research on corruption in the business sector has gradually expanded (Martin, Cullen et al. 2007, Collins, Uhlenbruck et al. 2009, Mendoza, Lim et al. 2015). The World Bank's Enterprise Surveys have now been conducted regularly since 2005. However, even though the sample sizes are typically large, many key sectors are underrepresented or omitted (Kenny 2009). In the most recent World Bank Enterprise Survey conducted in Indonesia (2015) for example, only 35 out of the 1,320 firms surveyed were in the construction sector, while none at all were in the mining sector. These omissions are likely to be very consequential as sector-specific studies frequently point to the prevalence of bribery and extortion in the mining, construction, and utilities sectors. This renders the Enterprise Surveys of limited use for cross-sectoral comparisons.

Sector-specific studies are suggestive of causal mechanisms that could account for variation in bribery and extortion across sectors. An expansive literature on rent-seeking and corruption in extractive industries emphasises the effect of monopoly rents and high profit margins on incentivising extortion (Petermann, Guzmán et al. 2007, Kolstad and Søreide

2009, Brollo, Nannicini et al. 2013, Ross 2015, Knutsen, Kotsadam et al. 2017, Zhan 2017, Asher and Novosad 2019). Studies of the construction sector argue that complex contracting systems and heavy state-involvement in the industry (e.g., through public works contracting) make it especially prone to corrupt behaviour (Stansbury 2005, Kenny 2009, Mironov and Zhuravskaya 2016, Chan and Owusu 2017, Lehne, Shapiro et al. 2018). In the utilities sector, research points to the efficiency and profitability of firms themselves, and especially state-owned firms, as predictors of corruption (Clarke and Xu 2004, Dal Bó and Rossi 2007, Gulati and Rao 2007). Problematically, although these various studies provide plausible accounts of variation in specific sectors, they do not yield a generalizable framework of sector-specific corruption.

Of the limited number of studies that do compare corruption across sectors, most argue that different degrees of state involvement and regulatory restrictiveness explain why some sectors are more prone to bribery than others (Zhu and Wu 2014, Malesky, Gueorguiev et al. 2015). Such regulatory burdens may well be correlated with the frequency and intensity of corruption (Acemoglu and Verdier 2000, Holcombe and Boudreaux 2015, Mendoza, Lim et al. 2015), but they cannot be easily interpreted as causes. The extent of red tape in a given sector is endogenous, as state agents may set regulations in part in order to extort actors in the private sector. Some sectors may even attract regulators (whether appointed or elected) who are explicitly motivated by the potential for extortion {Asher, 2019 #11115;Wade, 1985 #7950}. In Indonesia, for example, bureaucrats seek out and pay more in illicit "entry fees" for positions in particular government sectors, like public works, where it is understood there are more opportunities for "informal income-generation" (Kristiansen and Ramli 2006). To the extent that explanations are sought at the level of regulation, one would therefore have to

account for why state agents target some sectors (like construction) over others for heavy regulation, and relatedly, why some sectors attract potentially more corrupt regulators.

The theoretical argument of this paper builds on the idea that corruption should be greatest where economic rents are larger and more easily captured by government agents (Krueger 1974). We focus in particular on the problems created by *informational asymmetries* between firm insiders (i.e., owners and managers) and outsiders (i.e., regulators, administrators, politicians), which generates both supply and demand pressures that concentrate corruption at the sectoral level. Although the magnitude of the rent pool is related to the intensity of corruption, it does not follow that the most *profitable* industries should be the most corrupt (Buchanan, Tollison et al. 1980). Rather, because corruption is illegal and extortion inherently risky, we argue that it is the potential to either under-report revenue or to over-report costs—or in other words, to generate *hidden profits*—, which should be positively related to bribery and extortion. Both firms and state agents risk prosecution (whether altruistically or maliciously motivated) if they cannot disguise their illicit transactions. We argue that industries characterized by concentrated, bespoke, and uncertain costs and revenues are most amenable to the generation of hidden profits. In contrast, profits are more difficult to conceal in industries characterized by the delivery of high volume, standardized products and services. Although state agents ideally would precisely target firms with the highest hidden profits, they do not have systematic access to such private information. At the same time, firms in sectors with higher hidden profits are more likely to pay bribes, thereby generating substantial pressures on competitors within their sector to follow suit. These characteristics mean that it is more efficient for state agents to target sectors, rather than individual firms, for extortion. As a result, we expect a significant industry effect on the

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intensity and frequency of corruption experienced by business, irrespective of both firm-level and administrative-unit characteristics.

We test our theory against data from a primary survey of 672 firm managers and business owners in Indonesia. Our dataset is rare in its design of deliberately sampling close to 100 firms from the seven largest sectors in the Indonesian economy. Indonesia is an intrinsically important state in which to conduct this kind of research. It has the world's fourth largest population and is the world's sixteenth largest economy. Just as importantly, it is representative of many developing and lower-middle income countries in terms of its economic dependence on the primary sector and, pertinently, in the pervasiveness of corruption experienced by business. Indonesia's transition to democracy at the end of the late 1990s was accompanied by strong public demands for greater transparency and accountability, culminating in the establishment of the Corruption Eradication Commission (*Komisi Pemberantasan Korupsi*; hereafter KPK) in 2003. Indonesia has improved steadily on Transparency International's Corruption Perceptions index, moving up from 137th place in the world in 2005 to 85th in 2019. However, in-depth studies and cross-national surveys both emphasise the continued ubiquity of illicit fees and bribery across the public and private sectors in Indonesia (Henderson and Kuncoro 2004, Kuncoro 2006, Olken 2007, Olken and Barron 2009, Aspinall and Van Klinken 2011).

We find that being in the construction and extractive sectors makes firms substantially more likely to report being *asked* for bribes by state officials and to report *paying* such bribes. We also find these firms report a higher proportional cost of illicit payments than businesses in other sectors. Moving to the causal mechanism, we show that these sectors are not the most profitable in Indonesia, nor are they especially uncompetitive when compared to other sectors. We do find, however, that firms in the extraction and construction sectors are the

most likely to report preparing financial statements that do not reflect reality—or in other words, they are the most likely to hide revenue or costs. Drawing on investigations conducted by the KPK and the Audit Board of Indonesia (*Badan Pemeriksa Keuangan*; hereafter BPK), we find qualitative evidence that the construction sector and extractive industries are highly conducive to generating hidden profits than other sectors, by virtue of the relative ease with which firms can inflate the cost of inputs and conceal the true volume of production and sales.

Our paper makes two principal contributions to research on the causes of corruption in the business sector. First, our substantive focus on variation on the industry side of the corrupt exchange provides an important complement to studies of the regulatory state. Certainly, some administrations are more deeply afflicted with corruption than others. Cross-national and subnational variation in corruption is real. At the same time, individual firms vary in their propensity to make illegal payments. However, firms operate within sectors that generate distinct opportunities and incentives to engage in corrupt exchanges with government. We identify and theorise the shared features of sectors where corruption is pervasive. Second, our theoretical emphasis on the implications of information asymmetries is also novel. Specifically, our theoretical model combines supply- and demand-side factors in the presence of asymmetrical access to information on hidden profits to explain the development of varied sectoral equilibria levels of corruption. We show empirically that firms most vulnerable to state extortion come from sectors where hidden revenues can be generated with greater ease, and company managers can make back the money they have lost through corrupt exchanges with the state.

CONCEPTUAL AND THEORETICAL FRAMEWORK

Defining Corruption

Corruption potentially includes a wide set of actions, ranging from the illegal to the immoral (Johnston 2005, Rothstein and Varraich 2017). As different forms of corruption are likely to have different causes, for the purposes of our investigation, we focus on a subset of economic corruption, more specifically: bribery and extortion over the concession of rents in the business sector (Khan and Jomo 2000, Ross 2001, Cheung, Rau et al. 2012). Rents refer to the above-market profits/benefits earned by individuals or corporations due to government action (e.g., import quotas, mining licenses, government construction contracts, etc.) (Tullock 2005). In a purely subsistence economy, for instance, there is no surplus production, no rent to be captured due to regulation, and hence, by our definition, no corruption (Murphy, Shleifer et al. 1993). Corruption is a phenomenon created by government intervention in the market. It excludes actions, however illegal, that do not involve at least one party acting in an official capacity (Holmes 2015). Public agents—appointed bureaucrats and elected politicians—use their discretion with respect to the implementation of regulation to extort extra-legal payments from agents in the private sector. Corruption for our purposes entails the *use of informal exchanges over the allocation of rents between businesses and bureaucrats in lieu of formal exchanges through the fiscal and regulatory state*. Corruption is almost always therefore illegal.

Theory

Given this definition of corruption, agents of the state should be willing to extort a firm to the extent that the illicit payment is greater than the risk of being caught and punished, for their part, to the extent that the cost of an informal fee plus the risk of being caught and punished is lower than the expected added value of more quickly obtaining a licence or winning a

contract, we should expect a firm to be willing to pay a bribe. Although corruption can be a mutually beneficial exchange for both firms and regulators (if not society), there are nevertheless constraints on the degree to which extortion and bribery will reach their theoretical maximum. Importantly, state agents not only compete with private agents (i.e., firm managers and owners) for the control of rents, but also with one another. Ministers, mayors, bureaucrats, police offers, and soldiers, among others, each aim to capture a share of the rent. Moreover, corruption is illegal. Even if socially acceptable and tacitly approved within the state apparatus, its illicit nature leaves any individual engaging in such activity subject to prosecution. We need not assume that the motivations of monitoring agents are purely ethical or professional for this to be an important restraint. For instance, even if the recent anti-corruption drive of President of China Xi Jinping has some political motivations, the end result has been to restrain corrupt (as well as clean) economic activity (Wang 2020). Logically, then, every state agent cannot extort every firm in every instance to the greatest degree. The behaviour of any individual state agent would, by definition, leave others with little or no rent to extract and provide strong motivation, and likely plenty of evidence, for a denunciation and selective prosecution. Nor should we expect every firm to offer bribes in every instance in which the expected value of a contract or licence exceeds the cost of the bribe. The risk of detection and punishment is itself a critical hidden cost. Thus, even where corruption is widely practiced and socially acceptable, neither public nor private sector agents want to leave direct evidence of such exchanges.

An implication of this is that public agents must target firms selectively. Public sector agents would ideally target those individual firms with the greatest ability to pay. However, information about the *hidden profits* of any given firm is by nature private. Thus, asymmetric information problems pervade the relationship between state and private agents (Cadot 1987).

State agents, such as safety inspectors, for instance, may cultivate an ongoing relationship with a particular firm or set of firms in the hope of gaining and using such information. However, extortion by politicians, regulators, or enforcement agents is likely to be considerably less targeted than this, not least because firms have strong incentives to conceal surplus profits, which in turn would demand considerable investigatory powers on the part of the extorting agent. We thus expect that it is more efficient for public agents to target on a sectoral basis. Critically, this sectoral targeting does not depend on regulators having access to information about sectoral characteristics. Although unlikely to be true, we can assume that regulators do not have access to any such information and still obtain the result of sectoral variation in extortion and bribery. Indeed, cross-sector variation is theoretically likely precisely because of asymmetrical information about hidden profits. This result emerges because of firms' incentives.

Consider a simple scenario with a two-sector (X, Y) economy. Assume that one of these sectors (X) can generate higher hidden profits (π), than the other, such that $\pi_X > \pi_Y$. Each firm i in sector t is likely to pay a bribe with probability θ_{it}. This probability is conditional on random firm-level characteristics (ε) and its hidden profits, which are partly derived from sectoral characteristics. Therefore, $\theta_{it} = \pi_{it} + \varepsilon$. However, the regulator does not know which firms or sectors can or do generate such hidden profits. Initially, therefore, a regulator randomly targets n firms for extortion, equally split between each sector (i.e., $n/2$ firms in each sector). Holding firm-level characteristics constant, because $\pi_X > \pi_Y$ the probability that a firm in sector X will pay a bribe is greater than the probability that a firm in sector Y will do so ($\theta_{iX} > \theta_{iY}$). Once the regulator has found a firm willing to pay a bribe, she will continue to extort that firm in subsequent periods. With some positive probability, $\theta_{iX} - \theta_{iY}$, the regulator then extorts ($n/2$)+1 firms from sector X and ($n/2$)-1 firms from sector Y. This process could

gradually continue to the point where the proportion of firms in sector *X* both being asked for a bribe is significantly higher than of firms in sector *Y*. An additional process is, however, likely to exacerbate this dynamic. For their part, firms in the face a chronic collective action problem. Although every firm would prefer not to pay a bribe in order to access a market, no firm wants to be the ethical sucker that refuses while its competitors pay up. As a result, once some firms in a given sector pay bribes, there is a strong incentive for other firms to do so. Regulators would then be likely to learn that some sectors are more amenable to extortion than others. The demand for, and payment of, bribes would vary by sector.

This result rests on the assumption that hidden profits in fact vary by sector. Hidden profits arise where the true revenue of a firm can be under-reported or its costs over-reported. As we noted, public sector agents are unlikely to know in advance which *specific* firms in particular are engaging in such illegal practices, but some sectors are structurally more amenable to them. We theorise that certain sectors are characterised by greater *informational asymmetry* between insiders and outsiders (i.e., regulators), and thus provide more opportunities for firms to generate hidden profits. At least two industry-specific characteristics stand out: the degree to which a firm's cost and revenue base is bespoke (e.g., infrastructure) rather than standardized (e.g., automobile or mobile phone manufacturing); the degree to which the magnitude of a firm's output is subject to natural variability and not easily determined by outsiders (e.g., coal mining, oil palm processing). Two examples will give a sense of how these mechanisms operate.

Most construction projects are unique, and as such involve bespoke inputs that cannot be compared systematically across projects (Stansbury, 2005: 37). The frequent underestimation, and less frequent overestimation, of the budget for large scale construction projects attest to this feature of the industry. Additionally, in construction inputs can be physically hidden or

lower quality inputs substituted for more expensive alternatives (Olken 2007). As Stansbury (2005: 38) explains, "steal may be concealed by concrete, brickwork by plaster, engineering components by casings, and roof structures by cladding", which makes it immensely difficult for external agents to evaluate and certify the either the quality or amount of inputs. Although shoddy construction may lead to damage, and even the catastrophic loss of human life, the shelf-life of even poorly built structures is long. As a result, firms are less likely to be concerned about reputational damage than would be the case in industries such as consumer goods manufacturing. In the latter, neither contractors nor their end customers are likely to be fooled for long by such behaviour. Physical and structural features of the construction sector, thus, provide many opportunities to conceal illicit revenue.

Other issues arise with respect to ambiguity over true revenue. When it comes to commercial cash crops such as oil palm, for example, there is much uncertainty about expected production. Say a firm in this sector plants 1,000 hectares of oil palm trees. It may have an expected yield of 20 tonnes of fresh fruit bunches (FFBs) per hectare, which translates into 4,000 tonnes of crude palm oil for the market. However, the FFB yield is highly variable, ranging from 15 to 25 tonnes per hectare. If a firm falsely claims that it was struck by bad weather and that its yield was 15 tonnes per hectare when the real output was 25 tonnes, some 40 percent of its production could be directed to the black market, albeit at a discount on the prevailing market price. That firm has now produced a substantial hidden profit, which does not have to be declared. Opportunities to generate these sorts of hidden profits mean firms in such a sector can compensate — or potentially *more* than compensate — for the losses incurred from extortion, which in turn makes these firms especially attractive targets. In contrast to an oil palm firm, a manufacturing firm which receives all components parts from other suppliers and sells the finished product on to a wholesaler has much less scope to claim

that inputs were not received, or to produce additional saleable products without declaring the value of its inputs correctly. Each firm down the chain would have to falsify its production records, going back right to the producers of the raw materials. We suggest that the hidden profits have been extracted by the time it gets to the end processers. Extortion in turn will follow those hidden profits.

EMPIRICAL STRATEGY

Survey Design

In collaboration with the Indonesian Survey Institute (*Lembaga Survei Indonesia*, LSI), we administered a face-to-face survey of business representatives between July 2019 and February 2020. The sample frame was designed to reflect the structure of the Indonesian economy in terms of sectoral contributions, the geographic spread of economic activity, and the size of the firms operating in each sector. Our original target was to sample 700 large and medium-sized firms operating in nine provinces (DKI Jakarta, East Java, West Java, Central Java, Riau, East Kalimantan, North Sumatra, Banten and South Sumatra) in the country's largest economic sectors. Our original sample included 100 firms from each of the following seven sectors, which together contribute to over 70 percent of Indonesia's GDP: agriculture (12.8 percent), mining including oil and gas (8.1 percent), processing (19.9 percent), construction (10.5 percent), wholesale and retail trade (13 percent), logistics (5.4 percent), and financial services (4 percent). The population of firms by sector and province is shown in Table A1 in the Appendix. Within agriculture, plantation crops constitute the largest subsector, and within this subsector, oil palm plantations dominate. Crude petroleum, natural gas and coal contribute most to the mining sector. These primary commodities account for approximately one third of Indonesia's export revenue and makeup the backbone of the

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export economy. The food and beverage manufacturing subsector is the largest component of the processing sector. Logistics includes a range of transport subsectors and warehousing.

Samples of companies in each sector, except the agriculture sector, were randomly selected from the list of companies in the results of the 2016 economic census. Samples of companies in the agricultural sector were selected from the list of agriculture companies published by Indonesia's Central Statistics Agency (*Badan Pusat Statistik*; hereafter BPS): Agriculture Companies Directory 2013, 2016, and 2017. Of the 700 companies that were originally selected, exactly 500 companies were successfully interviewed. An additional 172 firms were surveyed through repeated random substitution. This left us with a nominal non-response rate of 4 percent (28 firms) and a minimum response of between 90 and 100 percent per sector. However, in several cases, we exhausted the universe of firms matching the specified sector, scale, and province criteria. For example, in South Sumatra we surveyed all large firms in the mining and excavation sector before we reached the target sample size. In other cases, we faced sharply diminishing returns, with the final unit in a given target category failing to be replaced after up to 10 substitutions. Responses are weighted to be proportional to the population of firms in a given sector according to BPS data. The breakdown of the sample and weighted sample by sector and province are given in Tables A2 and A3 in the Appendix respectively. The weighted sample is closely representative of the population in terms of both sectoral and provincial distribution (see Table A4 in the Appendix).

In our sample, 37 percent of interviewees were owners, 6.4 percent were chief executive officers, 56 percent were company directors, and less than 1 percent had other positions. We asked these firm representatives a large number of questions pertaining to the business and regulatory environment, including questions on the frequency of bribery, the types of bribes that respondents report their firm experiencing. We also asked respondents to provide various

details about their firms, including the number of employees, revenue, and profits. Questions are detailed in the results section and a full list of the survey items used in the following analysis can be found in the Appendix.

Model Specification

We are interested in how operating in a specific sector of the economy affects a firm's experience/perception of corruption. Although the data is observational in nature, as indicated in Figure 1, a number of features of the study design mitigate concerns over confounding. First, it is implausible that the experience of *corruption* determines the *sector* in which a firm operates. The choice of sector is not analogous to the choice of jurisdiction, for example, which may be endogenous to the business environment. Rather, it must be the case that the sector in which a firm operates determines the degree to which it experiences corruption. However, the relationship between sector and corruption could be confounded by other factors. Most importantly, both sector and corruption could be affected by various factors coincident with territory. For instance, a lightly populated frontier region may be both more likely to attract mining activity and to have a weak, or unsupervised, administrative structure. Thus, in all empirical models we include *province* fixed effects.

To better isolate the causal mechanism, in additional models we control for a number of firm-level characteristics. These are firm size, estimated by the number of employees (*employees)*, firm revenue (*revenue*), whether a firm is state-owned (*state-owned*), whether a firm is publicly listed (*listed*), whether a firm is diversified into other industries (*diversified*), and whether or not a firm exports its products or services (*exports*). Strictly, these characteristics should be viewed as mediators rather than confounders. That is, any relationship between sector and revenue, for example, must go from the former to the latter, not the other way

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around. It is implausible, we argue, that revenue or the other characteristics noted above should *cause* a firm to operate in a given sector of the economy. However, as we are interested in estimating the effect of sector on corruption through the mechanism of hidden profits, controlling for these additional firm-level features allows us to rule out alternative mechanisms. That is, to the extent that a positive relationship between a given sector and corruption remains after control for revenue, state ownership, or other factors, we know that these are not the mechanism underlying the effect. Models with controls therefore provide an estimate of the direct partial effect of sector on corruption; to the extent that sector influences corruption through these other factors, these estimates should be interpreted as being on the conservative side.

Our main models take the form:

$$y_i = \alpha + \beta sector_i + \gamma province_i + \omega_i + \varepsilon_i$$

Where y_i is a measure of corruption experience/perception, *sector* is a categorical variable which indicates the industry of a firm, *province$_i$* is a categorical variable indicating a firm's primary location, ω_i is a vector of firm-level control variables, and ε_i is a stochastic error term.

Most response variables take the form of orders of magnitude or frequency (see Appendix B). For instance firms are asked the frequency with which they are asked to pay bribes, with possible responses ranging from 0 to 5: never (0), very rarely (1), rarely (2), often (3), very often (4). As we note below, responses are highly skewed, the majority being 0. Our preferred approach is to convert all non-zero, non-missing responses to 1, and to use the probit estimator. We run additional models using the ordered probit as a robustness check. Results do not change (available on request).

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Descriptive Analysis

Table 1 Percentages of Firms Experiencing Corruption by Sector

	Asked for bribe (E_5)	Paid bribe (E_6)	Bribery present in sector (E_1)	Alter financial reports (E_2_D)	Willing to pay for reform (E_12)	Pay over 2.5 % in bribes (E_8_2)
	(1)	(2)	(3)	(4)	(5)	(6)
Agriculture	28.9	26.7	30.0	8.9	27.8	7.8
Extraction	47.9	42.7	53.1	15.6	41.7	5.2
Processing	32.7	27.6	36.7	8.2	24.5	5.1
Construction	49.5	44.2	51.6	16.8	39.0	11.6
Trade	25.0	23.0	25.0	5.0	24.0	2.0
Logistics	31.3	30.3	31.3	12.1	33.3	7.1
Finance	17.0	16.0	22.3	2.1	36.2	1.1
Total	33.2	30.1	35.7	9.8	32.3	5.7

We first examine firms' responses regarding their experience of corruption, and their perception of the prevalence of corruption in their sector. Specifically, we ask respondents (1) how frequently their firm has been asked to pay illicit fees or bribes, (2) how frequently they have paid illicit fees or bribes; and (3) how common it is for firms in their sector to pay illicit fees or bribes. Table 1 reports the proportion of firms in each sector reporting that these activities have occurred. Variable codes are given in parentheses with the full question wording provided in Appendix B. Proportions include non-responses (1.9, 3.1, and 2.7 percent respectively). Missing values for all variables are reported in Table A1. Overall, some 33.2 percent of firms report that they have been asked to pay fees outside the official requirements (i.e., extortion, facilitation, or security money), 30.6 percent report having paid such fees, 35.7 percent believe such illicit fees are commonly paid by businesses in their sector. These figures are marginally higher than results reported in the World Bank's Enterprise Survey from 2015, where 30 percent of Indonesian firms (in the manufacturing,

service and retail sectors) stated they had experienced at least one bribe payment request. Notably, in our survey, responses vary significantly by industry. The highest proportions of firms reporting being extorted, paying bribes, and believing the practice is common in their sector are found in the extractive industries (47.9, 42.7, 53.1 percent) and in construction (49.5, 44.2, and 51.6 percent), while the lowest proportion of firms is in the financial sector (17.0, 16.0, and 22.3 percent). It is worth noting that in most cases (trade and logistics being the exceptions), the perceived incidence of corruption is higher than the reported experience of corruption.

To estimate the magnitude of the corruption problem, we also asked firms to estimate the percentage of their revenues that is taken up by illicit fees and costs. The proportion of missing responses was higher (7.4 percent) than for the question that simply asked for the frequency of firms making such payments (3.1 percent).[1] The responses are highly skewed with most firms responding that they paid nothing in such costs. Table A5 in Appendix A reports the percentage of firms by sector paying 0, 0-1, 1-2.5, 2.5-5, 5-10, and over 10 percent of their revenues in unofficial payments. The majority of firms in all sectors reported paying no unofficial fees or costs, but 5.7 percent reported paying more than 2.5 percent of their revenue in illicit costs. Firms in the construction are again much more likely to report paying over 2.5 percent of their revenue in bribes (11.6 percent) than firms in other sectors.

We next asked respondents whether firms in their sector ever manipulate financial reports, a question which gets closest to measuring the practice of hiding profits (4). Very few companies responded that such practices were commonplace (9.8 percent overall, with a non-

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[1] We recoded N/A responses as 0 if respondents answered "never" to the question of how frequently they had made illicit payments (column 2 in Table 1).

response rate of 4.0 percent). Again, however, variation across sectors is revealing. Responses ranged from highs of 16.8 percent in the construction sector and 15.6 percent in the extractive sector to a low of 2.1 percent in the financial sector.

Last, as an alternative way getting at the problem of corruption facing the business sector, and moving towards question of policy reform, we asked how much firms would be willing to pay in extra taxes for a set of reforms jointly implemented by the much-trusted KPK and the World Bank, which "experts" estimated would be highly effective in lowering extra-legal costs (5). The non-response rate to this question was 14.9 percent. 32.3 percent of firms reported a willingness to pay some additional taxes to reduce corruption, while 52.8 were unwilling to pay anything. 14.3 percent were willing to pay less than 1 percent more, 7.4 percent were willing to pay between 1 and 2.5 percent more, and 10.6 percent were willing to pay more than 2.5 percent. There is some variation by sector. In Table 1, we convert the willingness to pay for reform into a binary variable, with any value above 0 reclassified as 1 (column 5). Firms in the extraction (41.7 percent) and construction sectors (39.0 percent) are the most willing to pay some additional taxes towards reform. Notably, however, firms in the financial sector are also more likely to respond positively to this question (36.2 percent) even though they are the least likely to experience extortion in the first place.

Table 2 Percentages of Firms Reporting Regulatory/Security Difficulties by Sector

	Regulations difficult (C_2)	Rule implementation inconsistent (C_3)	Insecure (C_4)
	(7)	(8)	(9)
Agriculture	35.6	30.0	11.1
Extraction	31.3	36.5	9.4
Processing	35.7	32.7	6.1
Construction	43.2	32.6	23.2
Trade	29.0	20.0	7.0
Logistics	30.3	21.2	6.1
Finance	20.2	8.5	2.1
Total	32.1	25.9	9.2

To get a sense of the regulatory burdens and other operational challenges experienced by firms in Indonesia, we asked respondents whether they thought that the rules and regulations related to their line of business make their firm's operations difficult (7), whether they thought that the implementation of rules in their sector is consistent (8), and whether or the security conditions in their sector are safe (9). We found that 32.1 precent of firms report that regulations make their operations difficult, 25.9 percent that rules are applied inconsistently, and 9.2 percent that security is a problem for their business (only 3.6, 3.4, and 0.3 percent of responses were missing). Again, however, responses differ substantially across sectors. Firms in the construction sector are much more likely than average to report difficulties due to regulation (43.2 percent) and insecurity (23.2 percent). There is less variation in perceptions of rule implementation, although firms in the financial sector are less likely to report issues than those in other sectors (8.5 percent).

Econometric Results

Table 3 Firm Experience of Bribery (Predicted Probabilities of Sector)

	Asked for bribe (E_5)		Paid bribe (E_6)		Sector bribe (E_1)	
	(1)	(2)	(3)	(4)	(5)	(6)
Agriculture	0.303	0.379	0.265	0.338	0.298	0.312
	(0.0487)	(0.0633)	(0.0639)	(0.0688)	(0.0300)	(0.0653)
Extraction	0.485	0.488	0.480	0.469	0.536	0.537
	(0.0956)	(0.0695)	(0.0784)	(0.0963)	(0.105)	(0.0973)
Processing	0.340	0.371	0.297	0.324	0.399	0.389
	(0.0761)	(0.0743)	(0.0574)	(0.0567)	(0.0968)	(0.0955)
Construction	0.497	0.485	0.456	0.452	0.495	0.487
	(0.0316)	(0.0542)	(0.0447)	(0.0643)	(0.0347)	(0.0354)
Trade	0.266	0.272	0.245	0.222	0.255	0.275
	(0.0221)	(0.0141)	(0.0149)	(0.0169)	(0.0222)	(0.0234)
Logistics	0.324	0.370	0.321	0.356	0.318	0.357
	(0.0396)	(0.0418)	(0.0452)	(0.0412)	(0.0404)	(0.0354)
Finance	0.179	0.191	0.177	0.240	0.229	0.263
	(0.0484)	(0.0693)	(0.0458)	(0.0850)	(0.0457)	(0.0758)
Additional Controls	No	Yes	No	Yes	No	Yes
Observations	659	535	651	531	654	535

Standard errors in parentheses; all models include *Province* fixed effects; *Additional Controls* are: *employees, revenue, state-owned, listed, diversified, and exports*.

We now turn to the multivariate regression results. Following probit estimations, Table 3 reports the predicted probability that being in a given sector has on a firm being asked for a bribe (models 1 and 2), paying a bribe (models 3 and 4), or believing bribes occur in its sector (models 5 and 6). Models 1, 3 and 5 include province dummies only, while models 2, 4, and 6 include a vector of firm-level control variables (*employees*, *revenue*, *state-owned*, *listed*, *diversified*, and *exports*). The probability that a firm will be asked to pay a bribe or to pay a bribe are highest for the extraction sector and the construction sector. In the baseline model (1), the probability of being asked to pay a bribe is almost exactly 1 in 2 for firms in both sectors. When additional controls are included the probability remains the same for extraction

and drops only marginally for construction. By comparison, the predicted probability of a firm in the financial sector being asked for a bribe is only 0.18. The predicted probabilities of actually paying a bribe are similar without (0.48 for extraction, 0.46 for construction) or with controls for firm-level characteristics (0.47 for extraction, 0.45 for construction). For all other sectors, the predicted probability of paying a bribe never rises above 1 in 3. The predicted probability of a firm reporting that bribes occur in its sector are similar, ranging from a high of 0.54 in extractive industries to a low of 0.23 in finance (without controls).

Table 4 Illicit Costs as a Proportion of Revenue by Sector

	(1)	(2)
Agriculture	0.139	0.318
	(0.148)	(0.142)
Extraction	0.352*	0.467**
	(0.109)	(0.105)
Processing	0.250	0.359*
	(0.145)	(0.155)
Construction	0.521**	0.569*
	(0.150)	(0.203)
Logistics	0.277	0.402**
	(0.135)	(0.100)
Finance	-0.171	0.0114
	(0.0940)	(0.138)
Additional Controls	No	Yes
Observations	616	510
Adjusted R^2	0.041	0.045

Outcome is coded based on question E_8_2; clustered standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; all models include *Province* fixed effects; *Additional Controls* are: *employees, revenue, state-owned, listed, diversified, and exports*.

The magnitude of illicit costs faced by firms again varies substantially by sector, as Table 4 shows. Here we present the results of OLS regressions with the level of cost as a proportion of revenue as the dependent variable (0, 0-1, 1-2.5, 2.5-5, 5-10, and over 10 percent of their revenues in unofficial payments). Although the coefficients cannot be interpreted substantively (i.e., in terms of a percentage effect), we do find that the coefficients are largest for the construction and extraction sectors both with and without firm-level controls.

Table 5 Regulatory/Security Burdens by Sector

	Regulations difficult (C_2)		Rule implementation inconsistent (C_3)		Insecure (C_4)	
	(1)	(2)	(3)	(4)	(5)	(6)
Agriculture	0.393	0.406	0.325	0.325	0.133	0.105
	(0.0603)	(0.0789)	(0.0516)	(0.0636)	(0.0410)	(0.0537)
Extraction	0.394	0.395	0.451	0.424	0.0661	0.0763
	(0.0701)	(0.0750)	(0.0859)	(0.0799)	(0.0354)	(0.0486)
Processing	0.388	0.405	0.394	0.385	0.0638	0.0583
	(0.0767)	(0.0496)	(0.0655)	(0.0476)	(0.0186)	(0.0160)
Construction	0.473	0.462	0.327	0.304	0.214	0.232
	(0.0373)	(0.0410)	(0.0810)	(0.0979)	(0.0459)	(0.0446)
Trade	0.300	0.299	0.220	0.205	0.0674	0.0420
	(0.0126)	(0.0115)	(0.0300)	(0.0246)	(0.0145)	(0.0129)
Logistics	0.329	0.334	0.219	0.224	0.0570	0.0659
	(0.0564)	(0.0425)	(0.0545)	(0.0353)	(0.0278)	(0.0367)
Finance	0.197	0.244	0.0880	0.118	0.0179	0.0236
	(0.0326)	(0.0317)	(0.0335)	(0.0387)	(0.0171)	(0.0228)
Additional Controls	No	Yes	No	Yes	No	Yes
Observations	648	529	649	529	670	546

Standard errors in parentheses; all models include *Province* fixed effects; *Additional Controls* are: *employees, revenue, state-owned, listed, diversified, and exports.*

Next, we present predicted probabilities of reporting regulatory and security difficulties by sector (again following probit regressions in which responses have been converted into binary variables). Table 6 presents evidence that regulatory burdens differ somewhat by sector. As shown in model 1, firms in the construction sector (0.47) are indeed marginally higher to report that regulations are "inconvenient" than firms in other sectors. However, firms in extractive industries (0.39) are no more likely than firms in processing (0.39) or agriculture (0.39) to answer in this way. These results are robust to introducing controls (model 2). Firms in extractive industries (0.45) have a higher probability of reporting that rules are

"inconsistently" implemented. Firms in the construction sector again have a substantially higher probability of reporting security problems in their sector without (0.21) or with firm-level controls (0.23). Notably, we find no relationships between firm perceptions of any of these forms of regulatory and security burden and reported experience of corruption. These results challenge the assumption that regulatory difficulties per se are the primary cause of corruption.

Table 6 Manipulating Reports and Support for Reform

	Manipulate Reports (E_2_D)		Willing to Pay for Reform (E_12)	
	(1)	(2)	(3)	(4)
Agriculture	0.0582	0.0631	0.311	0.324
	(0.0410)	(0.0494)	(0.0886)	(0.0960)
Extraction	0.161	0.244	0.397	0.387
	(0.107)	(0.0999)	(0.0740)	(0.0680)
Processing	0.0778	0.0956	0.292	0.342
	(0.0208)	(0.0289)	(0.0518)	(0.0529)
Construction	0.190	0.198	0.385	0.383
	(0.0307)	(0.0375)	(0.0328)	(0.0245)
Trade	0.0511	0.0537	0.294	0.296
	(0.0118)	(0.00915)	(0.0280)	(0.0329)
Logistics	0.128	0.145	0.406	0.394
	(0.0359)	(0.0447)	(0.0506)	(0.0630)
Finance	0.0194	0.0117	0.431	0.316
	(0.0208)	(0.00772)	(0.0839)	(0.0838)
Additional Controls	No	Yes	No	Yes
Observations	645	531	572	479

Standard errors in parentheses; all models include *Province* fixed effects; *Additional Controls* are: *employees, revenue, state-owned, listed, diversified, and exports*.

Turning next to the role of hidden profits (models 1 and 2 in Table 6), we find that firms in the construction (0.19) and extractive (0.16) sectors have the highest predicted probability of

misrepresenting their financial positions. Adding controls for firm-level characteristics (model 2), the predicted probabilities rise to 0.20 and 0.24 respectively. The predicted probability is lowest for firms in the financial sector with (0.02) or without (0.01) controls. In other words, the sectors that experience the most extortion are also the ones where firms are more likely to be manipulating their reports and concealing the true value of their inputs and outputs.

Moving finally to the question of reform, table 6 also reports firms' reported willingness to pay for reforms via higher taxes. Although firms experiencing the most corruption, those in construction (0.39) and extraction (0.40), have among the higher predicted probabilities of being willing to pay higher taxes, in the absence of firm-level controls, marginally higher probabilities are found in firms in the finance (0.43) and logistics (0.41) sectors. When we introduce controls, the predicted probabilities remain similar for extraction (0.39), construction (0.38) and logistics (0.39), but fall significantly for finance (0.32). These results suggest that although some firms undoubtedly gain from corrupt transactions, on aggregate this is a second-best outcome. A surprising proportion of firms expressed a willingness to fund reforms through higher corporate taxes.

DISCUSSION

In this section, we further substantiate our survey results and elaborate the mechanisms behind our theory of hidden profits. We find little evidence that corruption is concentrated in those sectors with the highest levels of profitability or competitiveness. Table 7 (columns 1 and 2) indicates that that the leading firms in construction and extraction are profitable, but not extraordinarily so. Notably, finance, the most profitable sector, is also the least corrupt. Market competitiveness likewise appears to have little relationship with corruption. We

calculated Herfindahl-Hirschman Index (HHI) scores for the top-30 firms in each sector (column 3). The most concentrated sectors are agriculture and logistics, both of which fall in the middle of the distribution in terms of corruption. Last, we examine barriers to foreign direct investment (FDI) as another proxy for industry competitiveness. Although these restrictions are particularly high in the case of the mineral extraction sector, they are notably low in the case of corruption. Nominal sectoral characteristics such as these thus provide little explanatory leverage.

Table 7 Sectoral Characteristics

Sector	Profitability		Competitiveness	
	Ratio of Expenses to Revenue*	Average profit margin (percent) of top ten listed firms (by revenue) between 2010-2019**	Market concentration (HHI) percent (2016) ‡	Barriers to entry (FDI restrictiveness)^
	(1)	(2)	(3)	(4)
Agriculture	-	13	18.9†	0.35
Extraction	0.40	11	7.6	0.60
Processing	0.62	15	9.0	0.07
Construction	0.56	16	11.4	0.21
Trade (wholesale & retail)	0.82	4	9.3	0.19 & 0.54
Logistics	0.51	6	19.0	0.43
Finance	0.41	34	6.8	0.17

*Sources: *Economic Census (2016) Indonesian Statistics Agency; **Orbis; ^OECD FDI Restrictiveness Index (2018); ‡HHI, authors' calculation based on top-30 firms in sector from Orbis data; † top 20 firms only, note: indices are only marginally substantially change using top-20 firms only in other sectors.*

Recall that we argue hidden profits can be generated either via the misreporting of 1.) inputs (firms can artificially inflate the costs of the goods and services they procure), and/or 2.) outputs (firms can under-report the volume of production and sales). Drawing on findings from KPK and BPK investigations in Indonesia, we demonstrate how the construction sector and natural resource industries are characterised by concentrated, bespoke and uncertain inputs and outputs, which in turn make hiding profits common and extortion ubiquitous.

The construction sector

As we noted above, much existing research has demonstrated high levels of corruption in Indonesia's construction industry (Olken 2007, Aspinall and Van Klinken 2011). Of the hundreds of cases prosecuted by the KPK since 2004, a majority are linked to public works and construction projects. One former commissioner estimated that around 70 percent of the 238 private sector actors arrested by the KPK come from firms in the construction industry.[2]

The KPK's case summaries reveal a kind of template for how corrupt exchanges in this sector work.[3] Typically, Indonesian construction pay "arranger fees" to the state officials on a project tendering committee, and to other individuals that can influence the tendering process, like local government leaders, parliamentarians and senior members of political parties. Then, in order to "*menutup biaya*" or "make back" the losses associated with those illicit fees, firm managers will collude to inflate the costs of construction material, services from subcontractors, equipment and the like. Also common is the reporting of "*pekerjaan fiktif*" or "fictitious work", where a construction company pays subcontractors for incomplete or substandard work, or for the procurement of goods that were never used or were used in a smaller volume. An investigator with the KPK noted that monitoring and uncovering cost inflation for substandard work or incorrect volumes of concrete and other inputs is immensely difficult. Detecting fictitious work is more feasible, but the practice so common it is almost impossible to police effectively across the sector.[4]

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[2] Interview with former KPK commissioner, 16 August 2020.

[3] Summaries of KPK cases can be accessed via: https://acch.kpk.go.id/id/jejak-kasus

[4] Interview with former KPK commissioner, 16 August 2020.

In one illustrative case, the KPK found that a local construction firm had paid arranger fees of approximately US$150,000 to consultants and bureaucrats from the Ministry of Transportation in order to secure a tender. [5] The KPK revealed the firm then colluded with a Ministry official to manipulate financial reports, leading to illicit profits of over US$1.3 million. In another case, state-owned construction firm PT Nindya Karya and its private sector partner, PT Tuah Sejati colluded with subcontractors to artificially inflate the cost of services and products procured for a project to build a port facility, producing illicit profits of approximately US$6.5 million (Agus 2018, Taher 2018). Even among smaller firms, these practices are common. In his study of over 600 village road projects in Indonesia, for example, Olken (2007) found an average difference of 24 percent between the true costs of building these roads, and the costs reportedly paid by village governments to the construction firms.

Extractive Sectors

Our survey results also confirm the findings of both international research and Indonesia-focused studies that show natural resource extraction is particularly prone to state extortion (Ross 2001, McCarthy 2011, Burgess, Hansen et al. 2012)). Natural monopolies, such as in petroleum oil and mineral extraction or timber logging, provide immense opportunity for rent extraction on the part of government agents. As the Indonesian case demonstrates, these sectors are also characterised by significant informational asymmetries when it comes to inputs and outputs, which provides firms with opportunities to make back what they lose in bribes.

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[5] Special Court for Corruption Crimes, Decision No: 119/PID.SUS/TPK/2015/PN.JKT.PST

Like in the construction sector, mining inputs are often bespoke. Each mineral, oil or coal deposit is different, such that estimating and monitoring the real costs of constructing a mine in a given location is immensely difficult, making this phase of an extractive project ripe for financial manipulation (McPherson and MacSearraigh 2007). In Indonesia, government audits have shown oil and gas firms routinely overreport their inputs (Hubert 2017). As part of the Indonesian industry's (now defunct) cost recovery system, for example, firms claimed certain costs incurred during the early phase of a project to be reimbursed by the government once commercial production begins. But the government had no way of systematically validating every company's hundreds of claims each year, and instead relied on intermittent audits. In 2016, BPK audited eight major oil companies, both foreign and local, and found all had claimed expenses that were either ineligible under the scheme, had been inflated, or were for items and services never procured (Nasution 2016). The Indonesian government became convinced the system was rife with fraudulent claims. Without a feasible way of monitoring real costs across the industry, the government decided in 2017 to instead do away with cost recovery altogether.

The output of firms in the natural resource sectors is also manipulable. The volume of oil a company lifts each day, or the precise tonnage of coal that a mining company digs up, is subject to natural variability (McPherson and MacSearraigh 2005). This makes underreporting of production volumes and sales relatively easy here compared to other sectors. Unreported production can then be diverted onto the black market beyond the purview of tax collectors. Such illicit production is difficult to uncover, but the Indonesian government estimates some 30 to 40 million tons of unreported coal gets exported from the country's shores each year (Indonesia Investments 2014). The physical isolation of many resource projects makes concealing true outputs more feasible too. Mines tend to be located

far from bureaucratic centres and, in Indonesia, sending experts out at regular intervals to check firms' production reports is a costly exercise.[6]

Financial sector

We look briefly now at a negative case – the finance sector. Firms in financial services stood out in our survey as the *least* likely to be targeted for state extortion, to report burdensome regulations, and to believe that manipulating financial reports is common in their sector. We argue that this is because generating hidden profits in this sector is much more difficult. If we take the banking sector, for example, there are few informational asymmetries when it comes to inputs. Aside from the operational costs of running a banking business (like labour and assets), firms' other major input is the interest paid on deposits and bonds. Interest rates are not only standardised, they must be known to banks' clients and reported (indeed advertised) publicly.

There a more opportunities for corruption in banking outputs. A bank can, for example, issue loans to firms that may either have paid bribes to senior bank managers, or may enjoy connections to influential political figures or bureaucrats who have pressured the bank to issue a loan they would otherwise be unlikely to grant. But there are strong incentives for both banks and state agents to exercise restraint and to prevent the corrupt distribution of loans from becoming systemic. Specifically, corrupt loan allocations produce a greater number of nonperforming loans, which are not only difficult to conceal but also reduce banks' asset quality and overall performance (Park 2012, Bougatef 2016). Bribery thus has a more direct and negative affect on firms' assets and profit margins. State managers also have

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[6] Interview with former KPK Commissioner, 16 August 2020.

an incentive to monitor this mode of corruption — and the industry more broadly — given the potential knock-on effects that widespread misallocation of loans can have for levels of private investment and economic growth across *all* sectors of the economy (Son, Liem et al. 2020). Indeed, when corruption becomes entrenched in a banking sector, as it was in Indonesia during the 1980s and 1990s, the results can be devastating — bad loans were a major catalyst for the Asian financial crisis which devastated Indonesia's economy in 1998. The international repercussions of financial crises also means the sector is "heavily scrutinised and regulated globally" in a way that most other sectors are not (PwC 2014: 4).

This is not to say that in a country such as Indonesia, the banking sector is corruption-free. Indonesia's infamous Bank Century scandal of 2008, for example, revealed the bank's owner had bribed officials at the central bank, and had also issued US$200 million in fraudulent loans; senior managers at other state-owned and private Indonesian banks have, over the years, been found guilty of approving loans to fictional clients and embezzling their clients' money for personal enrichment (Indonesia Investments 2016). But the sector is less systematically targeted by the state for extortion compared to other sectors of the Indonesian economy, in part due to the risk that hidden profits carry for firms themselves, and in part because of the incentives that states have to monitor such behaviour.

<center>CONCLUSION</center>

This paper extends existing theories of rent seeking and corruption to develop a new explanation for why bribery and extortion vary in frequency and intensity by industry sector. We begin with the assumption that asymmetries of information between firms and regulators make it difficult for principles to monitor agents and thereby induce corrupt behaviour (Krueger 1974). Additionally, we argue that due to the illegal nature of corruption and the

potential for punishment, corrupt regulators will be selective in the firms they target for extortion. They should target firms that can more readily conceal information about their true inputs and outputs. For this to occur, regulators do not need a priori access to information on firms' hidden profits; rather, firms themselves face a collective action problem that will result in sector-level equilibrium levels of corruption even if regulators initially extort firms randomly.

We test our theory of sectoral variation in the frequency and intensity of corruption by leveraging a survey of business owners and managers from across all major sectors of the Indonesian economy. The results reveal that, as in many parts of the world, Indonesia's construction and extractive sectors are especially prone to bribery requests from state officials. Importantly, firms in these sectors were also more likely to manipulate their financial reports and hide their true costs and profits. Qualitative evidence of how corrupt transactions operate in these sectors of Indonesia's economy substantiates our theorized mechanisms. We show how business in each sector is characterised by bespoke inputs and uncertain outputs, which are difficult to measure and monitor. As a result Indonesian firms in these sectors can and do routinely manipulate and conceal what they spend and what they produce. Certainly, companies in other industries can and do inflate their the costs, or try to avoid taxation by hiding portions of their profits. Even in Indonesia's financial sector, where firms reported the least amount of bribery and financial misreporting, there are cases of extortion and corrupt loan allocations. We argue, however, that construction and primary commodities — in particular extractives — are especially prone to predation by state actors because of the informational asymmetries that structure each sector, which generate more opportunities for hidden profits.

What are the implications of our theory for the study of corruption in the private sector? While scholarship has long recognised that some arenas of economic activity are more corrupt than others, most theories emphasise the specificity of different sectors — monopoly rents in petroleum extraction and timber logging, for example, or high levels of state ownership in utilities. In other words, theories of sectoral variation are highly specific. More general theories of cross-sector variation blame regulatory burdens which provide more opportunities for extortion. We instead treat the regulatory architecture as endogenous and seek an explanation in the microeconomic characteristics of different sectors.

Our findings have implications for anti-corruption reform. Much advocacy in this domain leverages data from international indexes such as Transparency International's Corruption Perceptions Index and the Global Corruption Index by Global Risk Profile, for example. Empirical differences between economic sectors are usually lost in these aggregated indexes. Our study suggests that understanding sectoral variation is potentially critical for designing appropriate anti-corruption interventions, which may be more effective if focused not just on reducing state actors' bribe-seeking behaviour (through punitive measures or wage increases, for example), but also on changing firm behaviour in specific sectors where hidden profits are easiest to generate.

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Appendix for:

**A Firm-Centered Analysis of Corruption and Reform:
Evidence from Indonesia**

Paul D. Kenny
Australian Catholic University

Eve Warburton
National University of Singapore

Appendix A: Tables and Figures

Table A1 Population of Firms by Sector and Province

Region	Sector									Total	%
			C. Processing								
	A. Agriculture	B. Extraction	Food and Beverages	Others	F. Construction	G. Trade	H. Logistics	K. Finance			
North Sumatra	430	37	771	955	1,320	6,640	1,419	2,516		**14,088**	**5.5%**
Riau	258	91	362	195	964	4,366	725	1,454		**8,415**	**3.3%**
South Sumatra	174	138	145	197	853	3,312	592	1,352		**6,763**	**2.6%**
DKI Jakarta	48	83	450	2,644	8,712	31,077	7,048	6,123		**56,185**	**21.8%**
West Java	474	216	1,905	8,429	3,045	30,127	3,601	7,761		**55,558**	**21.6%**
Central Java	225	77	1,365	4,822	1,503	17,896	2,551	7,297		**35,736**	**13.9%**
East Java	410	173	2,524	6,909	2,563	27,965	4,971	7,659		**53,174**	**20.6%**
Banten	97	56	586	4,286	1,060	10,337	1,570	2,091		**20,083**	**7.8%**
East Kalimantan	214	299	110	206	1,460	3,037	989	1,275		**7,590**	**2.9%**
TOTAL	**2330**	**1,170**	**8,218**	**28,643**	**21,480**	**134,757**	**23,466**	**37,528**		**257,592**	**100%**
%	**0.9%**	**0.5%**	**3.2%**	**11.1%**	**8.3%**	**52.3%**	**9.1%**	**14.6%**		**100.0%**	

Sources: Agricultural sector population data (column A) are taken from the 2013 BPS Agricultural Census; all other sector data sources (columns B to K) are taken from the 2016 Economic Census)

Table A2 Unweighted Sample by Sector and Province

Region	Sector								Total	%
	A. Agriculture	B. Extraction	C. Processing		F. Construction	G. Trade	H. Logistics	K. Finance		
			Food and Beverages	Others						
North Sumatra	11	4	1	4	6	5	6	5	42	6.3%
Riau	7	7	1	1	4	4	2	5	31	4.6%
South Sumatra	7	9	1	1	4	3	2	3	30	4.5%
DKI Jakarta	9	5	3	6	38	19	37	16	133	19.8%
West Java	12	21	8	21	14	21	14	21	132	19.6%
Central Java	11	7	5	11	7	15	9	16	81	12.1%
East Java	11	14	6	16	10	23	19	18	117	17.4%
Banten	11	6	3	8	5	8	6	7	54	8.0%
East Kalimantan	11	23	1	1	7	2	4	3	52	7.7%
TOTAL	90	96	29	69	95	100	99	94	672	100%
%	13.4%	14.3%	4.3%	10.3%	14.1%	14.9%	14.7%	14.0%	100.0%	

Table A3 Weighted Sample by Sector and Province

Region	Sector								Total	%
	A. Agriculture	B. Extraction	C. Processing		F. Construction	G. Trade	H. Logistics	K. Finance		
			Food and Beverages	Others						
North Sumatra	1.1	0.1	2.0	2.5	3.4	17.3	3.7	6.6	37	5.5%
Riau	0.7	0.2	0.9	0.5	2.5	11.4	1.9	3.8	22	3.3%
South Sumatra	0.5	0.4	0.4	0.5	2.2	8.6	1.5	3.5	18	2.6%
DKI Jakarta	0.1	0.2	1.2	6.9	22.7	81.1	18.4	16.0	147	21.8%
West Java	1.2	0.6	5.0	22.0	7.9	78.6	9.4	20.2	145	21.6%
Central Java	0.6	0.2	3.6	12.6	3.9	46.7	6.7	19.0	93	13.9%
East Java	1.1	0.5	6.6	18.0	6.7	73.0	13.0	20.0	139	20.6%
Banten	0.3	0.1	1.5	11.2	2.8	27.0	4.1	5.5	52	7.8%
East Kalimantan	0.6	0.8	0.3	0.5	3.8	7.9	2.6	3.3	20	2.9%
TOTAL	6	3	21	75	56	352	61	98	672	100%
%	0.9%	0.5%	3.2%	11.1%	8.3%	52.3%	9.1%	14.6%	100.0%	

Table A4 Sample Validation

	Population	Sample (weighted)
SECTOR		
Agriculture	0.9	0.9
Extraction	0.5	0.5
Processing – Food	3.2	3.2
Processing – Other	11.1	11.1
Construction	8.3	8.3
Trade	52.3	52.3
Logistics	9.1	9.1
Finance	14.6	14.6
REGION		
North Sumatra	5.5	5.5
Riau	3.3	3.3
South Sumatra	2.6	2.6
DKI Jakarta	21.8	21.8
West Java	21.6	21.6
Central Java	13.9	13.9
East Java	20.6	20.6
Banten	7.8	7.8
East Kalimantan	2.9	2.9
ENTERPRISE/BUSINESS SCALE*		
Medium	90.2	91.1
Large	9.8	8.9

*NOTE: The business scale does not include sector A (Agriculture) because the population data in the Agriculture sector (Agricultural census) does not contain company scale category information.

Table A5 Estimated Unofficial Fees by Sector

	0	<1%	1 – 2,5%	> 2,5 – 5%	> 5 – 10%	> 10 – 25%	> 25 – 50%	missing
Agriculture	27.78	24.44	11.11	5.56	2.22	0.00	0.00	28.89
Extraction	18.75	13.54	21.88	3.13	2.08	0.00	1.04	39.58
Processing	36.73	19.39	21.43	5.10	0.00	0.00	0.00	17.35
Construction	24.21	25.26	20.00	7.37	1.05	4.21	0.00	17.89
Trade	35.00	20.00	18.00	4.00	0.00	0.00	0.00	23.00
Logistics	27.27	20.20	21.21	3.03	3.03	1.01	0.00	24.24
Finance	44.68	11.70	6.38	2.13	1.06	0.00	0.00	34.04
Total	30.65	19.20	17.26	4.32	1.34	0.74	0.15	26.34

Appendix B: Survey Questions

C_2. According to you, are the rules and regulations related to the line of business of your company that are currently implemented make your business become more convenient or more difficult?

C_3. According to you, how is the practice of rules implementation related to your current business field?

C_4. According to you, how are the security conditions in running your business?

E_1. In general, are companies in your business sector very often, quite often, rarely, very rarely, or have never been asked to pay outside the official provisions (extortion, facilitation, security money) to state officials?

E_2_D. According to your observations, are Changing the financial statements to comply with the provisions even though they are not in accordance with the real implementation very frequent, frequent, rare, very rare, or have never happened in your business sector?

E_5. Do your own company very often, quite often, rarely, very rarely, or have never been asked to pay fees outside the official requirements (extortion, facilitation, security money)?

E_6. Do your own company very often, quite often, rarely, very rarely, or have never paid fees outside the official requirements (extortion, facilitation, security money)?

E_8_2. What percentage of the income does your company pay for unofficial fee expenses (extortion, facilitation, security money)?

E_12. Imagine that a new program is being put in place between the World Bank and the KPK which aims to stop bribery and extortion between the private sector and government. It is estimated by experts that the program will succeed. However, to finance the program, the government needs to increase corporate taxes. How much additional tax is willing to be paid by your company if bribery and extortion can be eliminated?