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Corporate profitability and the global persistence of corruption

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ABSTRACT

We examine the persistence of corporate corruption for a sample of privately-held firms from 12 Central and Eastern European countries from 2001 to 2015. Using publicly available information and stochastic frontier analysis, we create a proxy for corporate corruption based on a firm's internal inefficiency. We find that corruption enhances a firm's profitability. A channel analysis further reveals that inflating staff costs is the most common approach by which firms divert funds to finance corruption. In spite of corruption's negative effects on a country's economy, we conclude that it persists because of its ability to improve corporate profitability. We refer to this effect as the *Corporate Advantage Hypothesis.*

1. Introduction

Corporate corruption exerts a number of adverse effects on a nation's economy (Murphy et al. 1993; Shleifer and Vishny 1993; Mauro 1995).[1] For example, an extensive literature examines the relation between corruption and tax compliance. Studies by Cule and Fulton (2009) and Alm et al. (2016) find that corruption is a meaningful determinant of tax evasion and national levels of tax compliance. Corruption erodes what Alm and McClellan (2012) refer to as "tax morale", resulting in less total tax revenue collected and a degradation of governmental legitimacy. Similarly, Litina and Palivos (2016) describe how corruption increases the distrust between citizens and their government, ultimately resulting in the social legitimization of tax evasion.

Corruption also affects the nature of a country's shadow, underground, or parallel economies (Choi and Thum 2005; Levy 2007). The presence of corruption encourages the growth of these unofficial economies (Tanzi 1983; Slemrod 2007) and, in general, impedes economic growth (Mo 2001; Mauro 1995,). Corruption retards innovation in an economy (Murphy et al. 1991, 1993) as well as the development of market-supporting institutions such as independent legal or regulatory systems (de Soto 1989; Shleifer and Vishny 1993; Johnson et al. 2000). Alford and Feige (1989) and Slemrod (2007) describe how a corrupt economy distorts economic data, resulting in flawed analyses and often, policy failures. Pareto (1896) summarizes the effect of corruption on society with his observation that "a society in which wealth is achieved only by work, industry and trade, will differ considerably from a society in which wealth is, to a considerable degree, the fruit of fraud and political intrigue". He concludes that societies plagued by corruption suffer poorer economic prospects than those which are not. We refer to this negative impact of corruption on the aggregate economy as the

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[1] A recent survey of corruption's effect on national economies is Dimant and Tosato (2018). Related studies include Tanzi (1998), Rose-Ackerman and Palifka (1999), Treisman (2000), Jain (2001), Aidt (2003), and Lambsdorff (2006).

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corruption effect.

Our study makes two important contributions to the international corporate finance literature. Perhaps of greatest significance is our new approach for estimating corruption at the firm level using publicly available data. This new measure will allow future research to further probe the effect of corruption on a variety of corporate behaviors and practices, rather than being limited to survey data of the national economy. It will permit researchers to more fully integrate the effects of corruption into studies of global corporate finance. Another contribution of this study is our examination of the channels through which corruption occurs. The identification of these channels provides a natural target for regulators, lawmakers, and others who have an interest in eliminating corruption from the greater political economy. This channel analysis is useful for the design and implementation of public policy aimed at stimulating economic growth and efficiency.

Despite the widespread recognition of corruption's adverse effects, it persists. It remains a global phenomenon despite increased corporate transparency, expanded international capital flows, and enhanced institutional monitoring. Indeed, Ernst and Young (2016) conclude in their 14th Global Fraud Survey that corruption represents a threat that can lead to "sluggish global growth and fragile financial markets".

Attempts to explain corruption's persistence include arguments that it mitigates red tape, circumvents legal rigidities, or provides preferential access for firms (e.g., Leff 1964; Huntington 1968; Lui 1985; Beck and Maher 1986; Meon and Weill, 2010). Firms might gain a regulatory advantage, secure accelerated policy decisions, or obtain waivers from administrative requirements by providing side payments to government officials or regulators. Recent research further suggests that corruption in the form of bribery or its associated forms creates value for firms. Cheung et al. (2012) find that a bribe of $1 returned $11 of contract value for a set of firms prosecuted for international bribery. Ferris et al. (2016) report that corporate bidders with political connections are more likely to achieve merger completion and avoid regulatory delay or denial. They further determine that investors recognize that merger bids by politically-connected acquirers are more likely to create firm value. Zeume (2017) reports that U.K. firms operating in high corruption countries experience a decline in value after the U.K. Bribery Act of 2010 came into force. O'Donovan et al. (2019) argue that firms use offshore legal and accounting entities to enhance their value by promoting illegal or corrupt activities.

Research regarding private equity firms also reports various benefits stemming from corrupt environments. Cumming et al. (2010) examine private equity returns in Asia and find that they are higher in countries with greater levels of corruption. They conclude that private equity managers are successful in adapting organizational structures to mitigate the negative effects of corruption, but cannot exclude the possibility that private equity fund managers are themselves "corrupt". Johan and Zhang (2016) examine divestment strategies of private equity firms and show that in countries with higher levels of corruption, investors mitigate the costs of corruption to increase the probability of IPO success.

Given this evidence, we contend that despite its drag on the aggregate economy, corruption persists because of the financial advantages it provides to firms. This view is consistent with Galang (2012), who argues that the effect of corruption on a firm's performance is heterogeneous, allowing some firms to benefit from it. We refer to this conjecture as the *Corporate Advantage Hypothesis.*

We find that corporate corruption is profitable for firms. While prior research finds that the aggregate economy suffers (e.g., Shleifer and Vishny 1993; Alm et al. 2016; Litina and Palivos 2016), we show that more corrupt firms have higher profitability. Indeed, we observe that corruption is positively associated with a firm's return on assets (ROA) and return on equity (ROE). To gain a better understanding of how corruption actually improves corporate profitability, we use the DuPont identity to decompose profitability into its turnover and margin components. We find that corruption has its strongest association with profit margins, while also affecting turnover.

Corruption requires a channel within the firm through which to operate. That is, there must be a mechanism by which a firm can divert capital into illicit or corrupt activities. Our channel analysis reveals that staff costs are positively related to corporate corruption across nearly all of our sample countries and industries. This result is consistent with the use of phantom employees or false invoices to fraudulently transfer wealth from the firm. We also report interesting industry patterns in the use of channels such as materials and inventory costs to redirect capital from the firm. These channels are consistent with the OECD handbook for the detection of foreign bribery (OECD 2017).

Our study contains nine sections. The following section develops the hypothesis and describes how corruption can generate benefits for the firm. Section 3 derives our measure of corporate corruption from a decomposition of a firm's inefficiencies. Section 4 describes how we use stochastic frontier analysis to empirically estimate corporate corruption. We describe our data and sample in Section 5. In Section 6 we validate our measure of corporate corruption against the proxies that currently exist in the literature. Our major empirical findings regarding the relation between corruption and firm profitability are presented in Section 7. We provide a channel analysis in Section 8 to better understand how firms are able to divert capital into corrupt activities. We conclude with a summary and discussion of the importance of our findings in Section 9.

2. Hypothesis development

As noted earlier, there is an extensive literature that establishes the adverse effect of corruption on national economies. Mauro (1995) and Mo (2001) report corruption's detrimental impact on investment, Wei (2000) describes its negative effect on foreign capital inflows, while Mauro (1995, 1998) and Mo (2001) explain how national productivity and economic growth is hampered by corruption. At the micro level, Shleifer and Vishny (1993), Bertrand et al. (2007) and Harstad and Svensson (2011) find that corruption negatively influences the allocation of capital within a country. Hanousek et al. (2019) discover that corrupt legal and political environments decrease a firm's operating efficiency. Svensson (2003) reports that firms underinvest in tangible assets in a corrupt environment to minimize the cost of corporate mobility, while Fisman and Svensson (2007) show an inverse relation between corruption and firm

growth.

Given this extensive evidence regarding corruption's adverse impact on national economies, its persistence initially appears puzzling. Another strand of research, however, contends that corruption can provide benefits to the individual firm, viewing corruption as a lubricant to offset the frictions of rigid government policies and procedures (Leff 1964; Huntington 1968). Leff (1964), Lui (1985), and Meon and Weill (2010) contend that corruption allows firms to receive preferential treatment and handling by government officials.

Firms operating in corrupt environments often pay bribes, provide gifts, make contributions, or otherwise direct funds to regulators, bureaucrats, and government officials to facilitate their business transactions. By providing these payments, firms can gain privileged access to their regulators, secure accelerated/more favorable administrative decisions, or obtain waivers from burdensome bureaucratic requirements.

A number of studies establish a positive relation between corruption and corporate outcomes. Rock and Bonnett (2004) find a positive relation between corruption and firm growth while Vial and Hanoteau (2010) show increased production output in more corrupt environments. Other studies such as Cheung et al. (2012), Ferris et al. (2016), O'Donovan et al. (2019), Zeume (2017) and Ferris et al. (2019) discuss how corruption through bribes and preferential political access can generate value for a firm in Western economies. Research in the private equity literature also finds a positive association between corruption and positive firm outcomes. Cumming et al. (2010) find that private equity returns are higher in countries with greater levels of corruption. Johan and Zhang (2016) find that the probability of investor exit through an IPO increases in more corrupt environments.

While corruption is inefficient for national economies, it continues to exist because it provides benefits to some firms. The access to regulators, bureaucratic waivers, and accelerated/more favorable administrative decisions are profitable for firms and encourage them to continue their corrupt practices. In this sense, corporate corruption persists because it is a positive net present value project for some firms. More formally, we hypothesize that corporate corruption persists because it provides financial benefits to some firms. We refer to this as the *Corporate Advantage Hypothesis.*

3. Corporate inefficiency and corruption

To examine the persistence of corruption within a firm, we must measure it at that level. The literature on estimating corruption at the corporate level, however, is essentially non-existent. To study the effect of non-legal business activity, previous studies use either leaked data (Mironov 2013, 2015; Mironov and Zhuravskaya 2016) or anonymous survey data created by the World Bank (i.e. Kaufmann and Wei 1999; Svensson 2003; Fisman and Svensson 2007; Vial and Hanoteau 2010; Commander and Svejnar 2011).[2] Both of these approaches suffer from significant methodological or estimation limitations.[3] Thus, a new approach for estimating corruption/illegal corporate activities at the individual firm level is needed.

Our approach begins with the concept of firm inefficiency. We define inefficiency as reduced corporate productivity resulting from the non-optimal use of the firm's labor and capital. Eq. (1) decomposes corporate inefficiency for firm *i* at time *t* into two components, internal and external inefficiency, as shown below.

$$\text{Corporate Inefficiency (CI)}_{i,t} = \text{Internal Inefficiency(II)}_{i,t} + \text{External Inefficency(EI)}_{i,t} \tag{1}$$

$$\text{Operating Inefficiency (OI)}_{i,t} \quad \text{Corporate Corruption (CC)}_{i,t}$$

External inefficiency (EI) captures corporate inefficiencies resulting from factors external to the firm, such as inadequate national infrastructure, legal and regulatory rigidities, or resource scarcities. These inefficiencies are common to all firms within an industry and are not easily remedied.

Internal inefficiency relates to the inefficiencies that are internal to the firm and is further decomposed into two separate subcomponents. The first of these, operating inefficiency (OI), results from ineffective administrative policies, insufficient financial oversight, or weak management (Bloom and Van Reenen 2007). The second sub-component is inefficiency due to corporate corruption (CC). It is well established in the literature that a firm's corrupt activities are usually associated with higher material, labor, and other operating costs.

To isolate CC, the sub-component of internal inefficiency due to corporate corruption, we introduce the concept of an "honest" firm.

[2] Now known as the Business Environment and Enterprise Performance Survey (BEEPS).

[3] Leaked data regarding corrupt practices in other countries does not exist, while the data obtained from the World Bank has several drawbacks. In addition to the fact that it is anonymous, the accounting information is self-reported and unaudited. Responses pertaining to corruption are missing for many firms. Additionally, firms are inclined to provide false positive answers if they operate in politically repressive environments (Jensen et al. 2010). Further the composition of this data changes, with different industry sectors contained in each survey.

We define honest firms as foreign-owned firms that are headquartered in a country with a low level of corruption as measured by Transparency International's Corruption Perception Index (CPI).[4] In n each country we define an honest firm as one whose controlling foreign owner originates from a country that is included among the ten least corrupt countries in the world based on the Transparency International Corruption Perception Index (CPI) values for year *t*.

Foreign firms headquartered in countries with low levels of corruption should have a lower propensity to engage in illegal activities, even when operating abroad. This is because such firms tend to adhere to their home cultural and legal practices regardless of their immediate operating environment (Stopford and Strange 1991; Fisman and Miguel 2007; Cuervo-Cazurra, 2008a, b). We recognize that even these "honest" firms might engage in some level of corrupt practices, but contend that such corruption represents a lower bound for these activities within their country-industry group. Hence, throughout this study we refer to this group of firms as "honest firms". All other firms operating within the country are referred to as "non-honest" firms.

Let us now represent the difference in corporate inefficiency between a non-honest and an honest firm within a given country-industry group during the same year as follows:

$$\text{Diff} = \text{CI}^{\text{Non-honest}} - \text{CI}^{\text{Honest}} \tag{2}$$

But since CI = EI +(OI + CC) as defined in Eq. (1), we can express the difference in corporate inefficiency between these two firms as:

$$\text{Diff} = [\text{EI} + (\text{OI} + \text{CC})]^{\text{Non-honest}} - [\text{EI} + (\text{OI} + \text{CC})]^{\text{Honest}} \tag{3}$$

We contend that CC is either zero or at least a lower bound for the honest firms, given their high home country ranking for corporate integrity and the practice of firms adopting home country ethical practices (Stopford and Strange 1991; Fisman and Miguel 2007; Cuervo-Cazurra, 2008a, b). Consequently, Eq. (3) simplifies to the following:

$$\text{Diff} = [\text{EI} + (\text{OI} + \text{CC})]^{\text{Non-honest}} - (\text{EI} + \text{OI})^{\text{Honest}} \tag{4}$$

We contend that firms which operate in the same country-industry group in a given year are subject to the same external inefficiencies (EI). That is, both honest and non-honest firms within a country-industry group will face similar external inefficiencies in a particular year. These firms operate in the same geographical environment with identical logistical, regulatory, and political challenges. Hence Eq. (4) simplifies to:

$$\text{Diff} = (\text{OI} + \text{CC})^{\text{Non-honest}} - (\text{OI})^{\text{Honest}} \tag{5}$$

But, on average, OI levels tend to approximate each other for the honest and non-honest firm since they operate within the same industry, follow common industry best practices, and often use the same supply and logistics chain. Further, they are likely to employ identical technologies and are monitored by an identical set of investors, analysts, and regulators. The labor market mobility of managerial and engineering talent also narrows the gap in OI between honest and non-honest firms. Hence, Eq. (5) can be further reduced to:

$$\text{Diff} \approx \text{CC} \tag{6}$$

Eq. (6) shows that the difference in corporate inefficiency between the non-honest and honest firms can capture corporate corruption within the individual firm. We note, however, that if honest firms systematically enjoy stronger governance and better oversight, then this component will also contain an element of inefficiency due to poor governance.[5]

It is important to note that we use the term corporate corruption to include a broad range of illegal activities undertaken by firms. These consist of bribery, extortion, kickbacks, sweetheart contracts, tunneling, tax evasion, accounting fraud and a variety of other activities that are prosecutable. These activities can include theft, graft, or expropriation of corporate resources. The following section describes in detail how we empirically estimate corporate corruption by using a stochastic frontier approach to calculate firm level inefficiency.

4. Estimating corporate inefficiency

This section describes how we empirically estimate the theoretically derived measure of corporate corruption derived in the preceding discussion. Our estimation approach is based on a firm's production inefficiency adjusted for country and industry factors. We then introduce a country-industry matched honest firm. These firms enjoy low or zero inefficiency due to corruption. Therefore, we use it to adjust the internal efficiency of our sample firms to obtain an estimate of corporate corruption.

[4] The CPI measures a country's corruption from its perceived level as determined by expert assessments and opinion surveys. It broadly identifies corruption as the misuse of public power for private benefit.

[5] In un-tabulated results we compare four measures of financial oversight between honest and non-honest firms and find no statistically significant differences.

4.1. The production function and corporate inefficiency

To begin our estimation of corporate inefficiency, we introduce the concept of a production function. A production function relates inputs to output levels and therefore allows the calculation of inefficiency. It permits us to estimate the difference in the production levels we observe for a firm from what they should be given the labor and capital inputs. The stochastic frontier model defines the production frontier as the maximum potential output for a given set of inputs. Hence the edge of the production function defines the set of "best practice" firms. A firm's distance from this "best practices" frontier is defined as its corporate inefficiency.[6]

Thus, to estimate corporate inefficiency, we introduce the following generic production function and an associated efficiency measure:

$$y_{it} = f(x_{it};\beta) \cdot E_{it} \tag{7}$$

This production function relates output y_t to the vector of inputs x_t. The efficiency of input use by the firm is reflected by E_i,. A firm uses its inputs efficiently if $E_i = 1$, since at this point it achieves maximum output. When $E_i<1$, inefficiency occurs because the firm produces less than the maximum output with its given inputs.

We now make two standard assumptions to estimate firm efficiency using stochastic frontier analysis. First, the distribution of E_i is common across firms and is denoted as $E_i = \exp.(-u_{it}]$ where u_{it} is non-negative and measures the distance from the efficiency frontier. That is, it represents inefficiency within the firm. To account for random shocks in production we label the error term as $\exp.(v_{it})$. We now rewrite Eq. (7) in convenient log form to account for these terms:

$$lny_{it} = \beta_0 + \sum_{j=1}^{k} \beta_{jit} lnx_{it} + v_{it} - u_{it} \tag{8}$$

We use the Cobb-Douglas model of the production function (Douglas 1976), because it has a standard form, is flexible, and has robust functionality within homogeneous sectors. Specifically, we interact the estimated parameters in the standard Cobb-Douglas production function with 2-digit NACE industry dummies to control for production idiosyncrasies at the industry level, as noted by Chirinko et al. (2011). The efficiency frontier model for a set of I firms in J two-digit NACE sectors over T time periods is then specified as:

$$lny_{it} = \sum_{j=1,\ldots,J} \left[\beta_{0j} + \beta_{1j} lnc_{it} + \beta_{2j} lnl_{it}\right] \cdot ID_{itj} + \phi_t + v_{it} - u_{it} \tag{9}$$

To estimate firm inefficiency using Eq. (9) we use the *Value Added* variable from the.

Amadeus database as the output variable y_{it}. This measure is defined as: Income taxes + Other taxes + Profit/loss for the period + Staff costs + Depreciation + Interest payable on loans. The *Value Added* measure reflects corporate profitability as the aggregation of profit (loss) for the period, minority interest, taxes, employee costs, depreciation and interest paid. *Value Added* has the further advantage of being more comprehensive than accounting profitability. This measure has been used by various researchers, including Beck et al. (2008), Hanousek, Kocenda, and Shamshur (2015) and Faccio et al. (2016), to capture value created for corporate stakeholders.

As a robustness check we also use *Operating Revenue* (OPRE) to calculate inefficiency. This variable approximates gross sales and provides qualitatively identical results in our empirical analysis. Hence, we do not report them separately.

The input variables for the Cobb-Douglas production function are the log of each firm's capital (i.e., total fixed assets plus working capital) and labor (i.e., number of employees). These variables are included since capital and labor are the fundamental inputs to any production process. $ID_{i,j,t}$ is a vector of industry dummy variables to control for industry-specific effects. The constant term and both inputs into the production (i.e., capital and labor) interact with a 2-digit NACE industry dummy to allow for a flexible functional form.[7] The variable v_{it} is a normally distributed error term while u_{it} represents a firm's inefficiency. Again, u_{it} equals 0 if the firm is fully efficient.

We estimate Eq. (9) on a rolling window basis, which always contains 3 years. Greene (2005) shows that using shorter time periods for the fixed effect stochastic frontier model reduces potential bias in the estimated parameters. We perform the estimation country-by-country to account for different levels of industry efficiency across our sample countries. We also include year fixed effects to control for time specific events that might occur during our sample period.

4.2. Estimating corporate corruption

As described above, we are able to obtain estimates of the corporate inefficiency for our sample firms. Based on Eq. (5) developed in Section 3, we can estimate corporate corruption as the difference between corporate inefficiency and mean of inefficiencies of the

[6] For additional details see Aigner et al. (1977) and Meeusen and van den Broeck (1977). A panel data application of stochastic frontier analysis is discussed in Schmidt and Sickles (1984), Kumbhakar (1990), and Greene (2005). Further, Kumbhakar and Lovell (2000) and Amsler et al. (2016) provide literature surveys on this topic.

[7] Note that this specification has been estimated country-by-country and that Eq. (9) allows different Cobb-Douglas parameters for each industry. Further, the set of annual dummy variables provides a more flexible version of the production function.

honest firms operating in the same country and industry. Since u_{it} represents a firm's inefficiency, it can be formally written as:

$$CC_{it} = \widehat{u_{it}} - \sum_{j \neq i} \widehat{u_{jt}} \cdot IH_{jt} \cdot IC_{ijt} \cdot II_{ijt} \Big/ \sum_{j \neq i} IH_{jt} \cdot IC_{ijt} \cdot II_{ijt}. \tag{10}$$

Now $\widehat{u_{it}}$ stands for estimated firm's inefficiency, IH_{jt} is the dummy variable equal to one if the firm j is classified as honest in year t, similarly IC_{ijt} and II_{ijt} are dummies equal to one if firms i and j operate in the same country and industry, respectively.

It could be that some countries or industries within a country lack honest firms. This could be due to lack of profitable opportunities, government protectionism, or other factors which deter foreign investment. For the analysis contained in this study, we only use country-industry groups where honest investors are present. Using honest firms as a benchmark provides the clearest measure of firm level corruption. A possible alternative benchmark to that of an honest firm would be to use the mean country-industry inefficiency. This means that instead of subtracting the mean inefficiency of honest firms we would subtract the mean inefficiency in each country-industry group. Formally, this can be written as follows:

$$CC_{it} = \widehat{u_{it}} - \sum_{j \neq i} \widehat{u_{jt}} \cdot IC_{ijt} \cdot II_{ijt} \Big/ \sum_{j \neq i} IC_{ijt} \cdot II_{ijt}. \tag{11}$$

The interpretation of Eq. (11), however, is different from that of using an honest firm as the benchmark. The corporate corruption measure using this alternative benchmark can be seen as an estimate of "excess corruption". That is, it captures the extent to which the firm's corruption exceeds that of its country-industry competitors and is relative in nature. By construction, our CC measure has the character of a z-score, centered around the mean inefficiency of honest firms (Eq. 10) or around the mean inefficiency of an industry-country grouping(Eq. 11). In un-tabulated results, we find that our use of a country-industry mean rather than that of an honest firm yields comparable results regarding corruption's positive association with corporate profitability.[8]

5. Data and sample characteristics

5.1. Data

This study examines 12 countries from Central and Eastern Europe from 2001 to 2015. To determine the extent to which corruption persists across our sample economies, we use the Corruption Perception Index (CPI), constructed by Transparency International. For ease of interpretation, we modify the CPI to facilitate understanding. Specifically, we construct a reversed CPI which is estimated as *100 – CPI*. With this measure, higher values are associated with an increased perception of corruption.

We draw our data from the Amadeus database, maintained by Bureau van Dijk (BvD), which contains comprehensive financial and ownership information on private European firms. We create our dataset from seven bi-annual versions of Amadeus and special historical queries. We do so because BvD eliminates firm data after ten years or for firms which are inactive, merge, or change identification. In addition, the Amadeus database records only the most recent ownership structure with its starting date. Thus, for end-of-the year ownership structures we need to initiate a variety of historical queries. We only use unconsolidated financial statements to avoid double counting subsidiaries or operations abroad. We also exclude the financial services and insurance industries (NACE codes 64–66), due to their extensive oversight by government regulatory authorities and fundamental differences in financial data presentation. Our sample consists of 115,753 firm-year observations which span fifteen years.

5.2. Sample construction

Our sample construction is based on several criteria. First, the country and firm must be included on the Amadeus database. Further, there needs to be some honest firms present, to allow us to estimate our measure of corporate corruption. Since we provide a fixed effect estimation for robustness, we require at least two years of data for each firm. Further, our measures of profitability which require various income statement variables must be non-missing. In some countries this data is absent for many firms, causing us to eliminate that country from our sample. For instance, one of our key variables is value-added. This variable, however, is missing for nearly all of the Russian firms. Hence, we are unable to include Russia among our sample countries, despite the country's large size.

Our final sample consists of firm operating in 12 countries located in central and eastern Europe. For our empirical analysis, we obtain 115,753 firm-year observations distributed over the years 2001 through 2015.[9]

[8] The corruption proxies used in Eqs. (10) and (11) require consideration of legal inefficiencies due to tax credits, incentives, and subsidies when estimated for foreign firms. Host countries are interested in attracting FDI by offering various incentives, due to the expectation that FDI will increase raise employment, exports or overall tax revenue, and contribute to knowledge spillovers to domestic firms (Blomström et al., 2003). Consequently, FDI subsidies exert a significant impact on the Value-Added measure of these foreign-owned firms.

[9] In the Internet Appendix we present results for various robustness and sensitivity analyses, including a sample without these various restrictions. That sample has a total of 188,994 observations. Our results, however, remain robust to sample composition.

5.3. Sample characteristics

We observe in Table 1 that the values of the reversed CPI range from 36.3 to 75.4, with higher scores indicating greater corruption. The average score for our sample countries is 55.6. The least corrupted countries on the European continent in 2016 are Denmark (1), Finland (3), Sweden (4), Norway (6), Netherlands (8), and Germany (10). The average reversed CPI score for these six nations is 14.

Table 1 also shows the persistence of corruption in our sample countries. Indeed, the annual decline in corruption across our sample countries is only 1.6%. This limited decline occurs in spite of EU expansion (i.e., Estonia, Latvia, Poland, Czech Republic, Slovakia, Slovenia and Hungary joined in 2004; Bulgaria and Romania in 2007), increased accounting transparency from globalization, and the growth of world capital markets.

Table 2 presents select summary statistics for our sample. Panel A presents various measures of central tendency and dispersion for our variables of interest. We observe that the median ROA is 5.9% while the median ROE after tax is 10.0%. The typical firm has a leverage ratio of 9.2% indicating that equity is the most important source of financing for our sample firms. Our sample firms are profitable, with a median before (after)-tax income margin of 2.4% (2.0%).

In Panel B we present the distribution of our sample by year and country. The sample averages more than 7700 observations per year, although the early years of our sample contain fewer observations. The countries with the least observations are Estonia with 6 and Latvia with 87 observations, while the Czech Republic has the most with more than 29,000 observations. Panel C contains an industry distribution of our sample. The highest number of observations occurs in manufacturing, with 51,424. The fewest observations occur in mining and quarrying, with 492.

6. Comparison with existing measures of corporate corruption

To assess our proposed measure of corporate corruption, we examine it in relation to two existing measures of corruption that appear in the literature. These are the country level Corruption Perception Index (CPI) and the more granular business environment corruption proxies created from the anonymous responses to the Business Environment and Enterprise Performance Survey (BEEPS). The BEEPS dataset is administered by the European Bank for Reconstruction and Development (EBRD) and the World Bank. Svensson (2005) contends that this is the best and most granular data by which to measure corruption presently available to researchers. We create three measures of corruption from this dataset based on three different questions that appear in the survey.

The first question we use to construct a BEEPS-based corruption measure is the following:

It is said that establishments are sometimes required to make gifts or informal payments to public officials to "get things done" with regard to customs, taxes, licenses, regulations, services etc. *On average, what percent of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?*

Using survey responses, we create a mean variable for each cluster, which is defined by country, industry (2-digit ISIC rev 3.1), firm size (micro, small, and medium-large firms), urban location (capital, city with more than 1 million inhabitants, city with less than 1 million inhabitants), and the corresponding BEEPs wave (2000–2002, 2003–2005, 2006–2009, and 2010–2013). We label this variable *BEEPS Mean Corruption as % Sales*, and it measures the average percentage of sales which is spent on corruption for a particular cluster of firms.

The second question we use is:

As you list some factors that can affect the current operations of a business, please look at this card and tell me if you think that each factor is No Obstacle, a Minor Obstacle, a Moderate Obstacle, a Major Obstacle, or a Very Severe Obstacle to the current operations of this establishment.

Corruption is listed as one factor with answers ranging from 0 (No Obstacle) to 4 (Very Severe Obstacle). We normalize the responses and again create clusters.[10] We label this variable *BEEPS Mean Corruption as Obstacle.* A higher mean value of the response to this question indicates that corruption is a greater hinderance to business activity.

The last question we employ is the following:

Is it common for firms in my line of business to have to pay some irregular "additional payments or gifts" to get things done with regard to customs, taxes, licenses, regulations, services etc.

The responses to this question are again scaled from 1 (Never) to 6 (Always). We unit normalize the responses and label this variable *BEEPS Mean Corruption.* Higher values indicate that it is *more common* to bribe to accomplish commercial transactions.

In Table 3 we present the correlations of our inefficiency-based measure of corruption with those already established in the literature. We observe that our measure of firm level corruption tracks well with the two measures that currently exist in the literature. The correlations between our measure and the reversed CPI are significantly positive across all subsamples. Further, we observe that our corruption proxy is positively related to the BEEPS measures and is generally statistically significant. Although the levels of the correlations are not high, this is likely due to the construction of these measures. The reversed CPI, for instance, is represented by one observation per year and country, and hence does not vary across industries and firm size.

[10] The normalization always takes the following form: (x minus minimum value)/(maximum value). This transforms the responses to an interval between 0 and 1.

Table 1
Corruption levels across sample countries.

Country	Reversed CPI Mean	Minimum (year)	Maximum (year)	Average Percent Change Over 2001 to 2015
Bosnia and Hercegovina	66	58 (2012,2013)	71 (2005, 2006)	−0.86
Bulgaria	60.7	57 (2014)	67 (2011)	−0.71
Czech Rep	53.7	44 (2015)	63 (2002)	−1.66
Estonia	36.3	30 (2015 2016)	45 (2003)	−2.43
Hungary	49.2	45 (2012)	54 (2011)	0.3
Latvia	54.8	45 (2016)	66 (2000,2001)	−2.85
Poland	52.7	38 (2015 2016)	66 (2005)	−2.87
Romania	64.4	54 (2016)	74 (2002)	−2.06
Serbia	66	58 (2013 2016)	77 (2003)	−2.26
Slovenia	39	33 (2008)	48 (2001)	−1.17
Slovakia	55.9	49 (2015 2016)	63 (2000)	−1.9
Ukraine	75.4	72 (2016)	79 (2002)	−1.18
Mean	**55.6**			**−1.64**

This table presents the distribution of a country's Corruption Perception Index (CPI). We calculate a reverse CPI to facilitate interpretation, since higher values of the Reverse CPI are associated with higher levels of perceived corruption. Reverse CPI is calculated as 100- CPI. The 'Minimum' and 'Maximum' columns show the minimal and maximal level of the reversed CPI, respectively. In parentheses, we present the particular year(s) in which this minimum or maximum value is reached. The CPI is drawn from the Transparency International database.

7. Corruption's effect on profitability

7.1. Multivariate model of corporate profitability

Our model to examine the association between corruption and corporate profitability is based on Mironov (2013, 2015) and is specified as follows:

$$Corporate\ Profitability_{i,t} = \alpha_1 + \alpha_2 .I[foreign] + \gamma_1 Corruption_{i,t} + \gamma_2 Corruption_{i,t} .. I[foreign] + + \beta\, X_{it} + \delta_i + \tau + \varepsilon_{i,t}. \quad (12)$$

In Eq. (12) we include an interaction term between foreign ownership and corruption where the domestic firm serves as the base category. The dependent variable, *Corporate Profitability,* captures the various measures of firm profitability used in the analysis (e.g., ROA, ROE, EBIT Margin). *Corruption* represents the corruption measure for firm i at time t. Vector X_{it} contains various firm characteristics as additional controls. Larger firms tend to enjoy economies of scale which affect profitability (Hall and Weiss 1967). Hence we include *Log(Total Assets)* as a proxy for size. Tangibility is a measure of collateral which can lower the cost of capital (Berger and Udell 1990; Bharath et al. 2011) and mitigate agency conflict (Himmelberg et al. 1999). Intangible assets serve as an indicator of future growth opportunities for the firm (Titman and Wessels 1988). Consequently, we include *Log(Fixed Assets), Log(Intangible Assets),* and the *Log(Tangible Assets)* as regressors.[11] The corporate use of leverage can lower the cost of capital as well as reduce agency costs (Jensen 1986). We measure leverage as the ratio of long-term liabilities scaled by total assets. We also include country (δ_i) and year fixed effects (τ). The error term is represented as $\varepsilon_{i,\ t}$. As a robustness check we estimate Eq. (12) using firm fixed effects and obtain qualitatively identical results.

7.2. Profitability analysis

In this section we provide the results for our estimation of the profitability model described in Eq. (12). In Panel A of Table 4, we present regression coefficients of the association between corporate corruption and various measures of profitability: (1) Return on Assets, (2) Before-Tax (BT) Return on Equity, and (3) After-Tax (AT) Return on Equity. The association between corruption and firm profitability is significantly positive for all variables. We observe that corruption exerts a consistently significant positive association

[11] Note that the logarithmic form of these asset measures allows us to control for the actual magnitude of the variables as well as their linear combination such as a ratio.

Table 2
Sample summary statistics.

Panel A: Summary Statistics

Variable	N	Mean	Median	StdDev	p25	p75
Corruption	115,753	0.001	0.006	0.122	−0.049	0.052
Log (Total Assets)	115,753	15.598	15.639	1.123	14.909	16.337
Log (Fixed Assets)	115,753	14.472	14.603	1.461	13.599	15.452
Log (Tangible Fixed Assets)	115,753	14.283	14.448	1.543	13.383	15.326
Log (Intangible Fixed Assets)	115,753	9.243	9.205	2.189	7.688	10.753
Leverage	115,753	0.158	0.092	0.217	0.000	0.244
Return on Assets	115,753	0.074	0.059	0.107	0.018	0.123
Return on Equity (Before Tax)	112,884	0.176	0.124	0.353	0.023	0.291
Return on Equity (After Tax)	112,828	0.141	0.100	0.317	0.015	0.241
Net Income Margin (Before Tax)	113,992	0.032	0.024	0.078	0.004	0.064
Net Income Margin (After Tax)	113,797	0.024	0.020	0.072	0.002	0.053
EBIT margin	114,059	0.043	0.035	0.074	0.011	0.075
Sales over Assets	113,779	1.878	1.584	1.235	1.029	2.380
Equity multiplier	112,381	3.503	2.180	5.286	1.500	3.635

Panel B: Observations by Year and by Country

Year	N	Percent	Country	Honest	N (all)	Percent of total sample
2001	1132	0.98	Bosnia&Hercegovina	25	240	0.21
2002	1232	1.06	Bulgaria	600	11,974	10.34
2003	1411	1.22	Czech Republic	4767	29,088	25.13
2004	60	0.05	Estonia	3	6	0.01
2005	3565	3.08	Hungary	810	7766	6.71
2006	5126	4.43	Latvia	23	87	0.08
2007	6481	5.6	Poland	4112	24,894	21.51
2008	14,514	12.54	Romania	626	7835	6.77
2009	14,872	12.85	Serbia	209	2734	2.36
2010	13,971	12.07	Slovenia	474	2713	2.34
2011	13,228	11.43	Slovakia	981	7102	6.14
2012	7091	6.13	Ukraine	695	21,314	18.41
2013	11,529	9.96	Total	13,325	115,753	100.00
2014	10,783	9.32				
2015	10,758	9.29				
Total	115,753	100				

Panel C: Observations by Industry	Observations		
Industry	Total	Domestic	Honest
Agriculture, forestry, and fishing	5168	3708	77
Mining and quarrying	492	372	56
Manufacturing	51,424	35,722	7509
Electricity, gas, steam, and air-conditioning supply	676	572	59
Water supply, sewerage, waste management and remediation	1878	1528	153
Construction	8220	6764	346
Wholesale and retail trade, repair of motor vehicles and motorcycles	26,533	19,008	2576
Transportation and storage	5646	3988	652
Accommodation and food service activities	1947	1570	136
Information and communication	3047	1917	570
Real estate activities	1744	1226	83
Professional, scientific, technical, administration and support services	6067	4100	1022
Public administration, defense, education, health and social activities	2911	2281	86
Total[*]	115,753	82,756	13,325

This table provides sample summary statistics. The sample period is 2001 to 2015. Panel A shows the summary statistics for the variables used in our subsequent empirical analysis. Corruption is defined as the difference between a firm's internal inefficiency and the mean operating inefficiency of "honest" firms operating within the same country and industry. We classify an honest firm as one that is headquartered in a country with a low level of corruption as measured by the Corruption Perception Index (CPI) estimated by Transparency International. Operating inefficiency is estimated using the Stochastic frontier approach. For details see Eqs. (2) through (6). All unscaled variables (i.e., logarithms of various asset categories) are denominated in U.S. dollars. Panel B contains the annual number of observations by both year and country. Panel C presents the number of observations by industry. Financial data is obtained from the Amadeus database provided by the Bureau van Dijk. Variable definitions are contained in the Appendix.

[*] Note that for 19,672 domestic firms in the main sample we do not have identification of the NACE2 industry.

with the firm profitability.

In Panel B of Table 4 we examine the marginal relation between corruption and profitability. We observe that at the 75th percentile, a 1% increase in corruption is associated with an increase in ROA by about 0.14%. We also examine ROE, which measures the return to

Table 3
Correlations across corporate corruption measures.

Corruption Measure	All Firms	Honest firms Excluded	Foreign firms excluded
CPI (Reversed)	0.1891*	0.2648*	0.1265*
BEEPS Mean Corruption as % Sales	0.1199*	0.1808*	0.0916*
BEEPS Mean Corruption as Obstacle	0.0664*	0.1087*	0.0664*
BEEPS Mean Corruption Intensity	−0.004	−0.005	0.004

This table shows the correlation coefficients between our inefficiency-based measure of corporate corruption and the two measures of firm level corruption existing in the literature. We classify an honest firm as one that is headquartered in a country with a low level of corruption as measured by the Corruption Perception Index (CPI) estimated by Transparency International. Detailed description of the variables appears in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4
Corporate corruption and profitability.

Panel A: Corporate Corruption and Profitability

Independent Variables	ROA	BT ROE	AT ROE
Corruption	0.283***	0.391***	0.333***
	(0.003)	(0.012)	(0.011)
Corruption*Foreign firm	−0.032***	−0.091***	−0.088***
	(0.006)	(0.021)	(0.019)
Log (Total Assets)	0.011***	0.063***	0.052***
	(0.000)	(0.002)	(0.002)
Log (Fixed Assets)	−0.018***	−0.063***	−0.050***
	(0.001)	(0.003)	(0.003)
Log (Intangible Fixed Assets)	0.002***	−0.018***	−0.015***
	(0.001)	(0.002)	(0.002)
Log (Tangible Fixed Assets)	−0.001***	0.001	0.000
	(0.000)	(0.001)	(0.001)
Leverage	−0.026***	0.020***	0.026***
	(0.001)	(0.005)	(0.004)
Constant	0.148***	0.375***	0.301***
	(0.005)	(0.017)	(0.016)
Foreign firm	−0.003***	0.002	−0.001
	(0.001)	(0.003)	(0.002)
Country & Year Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.117	0.071	0.061
N	115,753	114,650	114,580

Panel B: Corruption's Marginal Association

Independent variables	ROA	BT ROE	AT ROE
Corruption domestic *(Coefficient)*	0. 283***	0.391***	0.333***
Marginal Influence @ Mean	[0.006]	[0.006]	[0.007]
Marginal Influence @ 75%	[0.140]	[0.078]	[0.079]
Controls	Yes	Yes	Yes
Country and Year FE	Yes	Yes	Yes
Adjusted R^2	0.117	0.071	0.061
N	115,753	114,650	114,580

This table presents the association between corporate corruption and corporate profitability as measured by ROA and ROE. Inefficiency is calculated using stochastic frontier analysis. Panel A shows the regression coefficients, while Panel B contains the marginal effects of corruption. *Return on Assets (ROA)* is calculated as EBIT scaled by total assets. *Return on Equity (ROE)* is calculated as income before taxes (BT ROE) and after taxes (AT ROE) scaled by shareholder's equity (SHFD). Corruption is defined as the difference between a firm's internal inefficiency and the mean operating inefficiency of "honest" firms operating within the same country and industry. We classify an honest firm as one that is headquartered in a country with a low level of corruption as measured by the Corruption Perception Index (CPI) estimated by Transparency International. Operating inefficiency is estimated using Stochastic frontier approach. For details see Eqs. (2) through (6). All unscaled variables (i.e., logarithms of various asset categories) are denominated in U.S. dollars The corruption variable and the constant term interact with the Foreign firm dummy. The base line (omitted category) refers to domestic firms. The remaining variables are defined in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

a firm's shareholders. We estimate two variants of this measure. One is based on a before-tax measure of income and the other uses an after-tax measure, columns (2) and (3). At the 75th percentile, a 1% increase in corporate corruption is associated with a 0.078% (0.079%) increase in the return to shareholders, before (after) taxes.

We conclude from Table 4 that corporate corruption is positively associated with a firm's profitability. This result holds whether we examine a firm's return to total invested capital or to the return experienced by shareholders. This result is consistent with the Corporate Advantage Hypothesis. That is, corruption persists because of its ability to improve corporate profitability levels.

7.3. Decomposition of corporate profitability

To gain further insight into how corruption affects corporate profitability, we decompose the ROA and ROE measures into its components. This approach allows us to more clearly determine what elements of corporate profitability are most affected by corruption and how benefits are actually generated for the firm. Because our decomposition involves a separate analysis of sales turnover it allows us to address the observation by that "sales are less dependent on accounting convention, are harder to manipulate or smooth through accounting practices, and are less subject to theft". Our decomposition can also provide an initial indication of which channels most enable corruption to occur.

A firm's ROA can be deconstructed into two components as per the well-known DuPont equation. The first component is margin. As margin increases, the firm's profitability increases for each dollar of sales. The second component is asset turnover. As turnover increases, more sales are generated for each dollar of assets. We model ROA and its decomposition as per Eq. (14):

$$ROA = EBIT\ Margin \times Asset\ Turnover \tag{14}$$

We estimate these two components of ROA using Eq. (15) below[12]:

$$ROA = \frac{EBIT(OPPL)}{Sales(OPRE)} \times \frac{Sales(OPRE)}{Assets(TOAS)} \tag{15}$$

We continue our analysis of corruption's association with profitability by examining the return to equity. ROE is decomposed into three components. Similar to the ROA analysis, we include terms for margin and turnover, but financial leverage is added as a third term. We decompose ROE into these three components as shown below:

$$ROE = \frac{Net\ Income(Before\ tax\ [PLBT]\,;After\ Tax\ [PLAT]\,)}{Sales(OPRE)} \times \frac{Sales(OPRE)}{Assets(TOAS)} \times \frac{Assets(TOAS)}{Equity(SHFD)}$$

$$ROE = Net\ Income\ Margin \times Asset\ Turnover \times Equity\ Multiplier \tag{16}$$

7.4. Empirical association between corruption and elements of corporate profitability

In Table 5 we present our findings from our examination of corruption's relation to the elements of corporate profitability. We observe in Panel A that corruption positively influences all of the various margins: before tax, after-tax, and EBIT. It also positively affects total asset turnover. That is, corruption appears to be positively associated with both sales and the cost efficiency with which sales are transformed into income. We further observe that corruption is inversely related to the equity multiplier. This might reflect less use of leverage by these firms to avoid bank and creditor monitoring.

To gain a o gain a deeper understanding of corruption's association on corporate profitability, we examine its marginal influence on the various components in Panel B. Our results suggest that corruption is most associated with the firm's profit margin. Consider, for example, the marginal effect of corruption at the 75th percentile. We observe that a 1% increase is associated with a 0.14% increase in margin, but only a 0.05% increase in asset turnover. Corruption can lower expenses through the waiver of administrative requirements, the acceleration of regulatory decisions, or the reduction of government fees and costs. Even though the impact on asset turnover is smaller, it is still meaningful. Corruption can influence contract awards, new business approvals, operating variances, and import/exporting licenses, which directly influences the level of corporate sales. Corruption less often affects total assets levels, since those are typically the result of capital budgeting decisions.

7.5. Robustness of the relation between corporate corruption and profitability

7.5.1. Corporate profitability, corruption, and firm origin

To test the possibility that there is a bias related to the profitability of foreign firms relative to local firms, we undertake a separate analysis based on the national origin of the firms operating within each country. That is, since local firms operate in the central and eastern European countries, which we do not classify as honest, there might be a bias related to the profitability of foreign firms versus local firms rather than corporate corruption behaviors.

Using the business identification number uniquely assigned to each firm in the Amadeus database, we create subsamples of foreign and domestic firms operating within a country. We then re-examine our profitability results initially presented in Tables 4. Our findings are contained in Table 6. We observe that the results continue to hold for both sets of firms. That is, regardless of the firm's national origin, corruption is associated with increased corporate profitability. Corruption is positively associated with the profitability of both foreign and domestic firms within a country.

7.5.2. Financial crisis of 2007

It might be that our results are sensitive to the financial crisis of 2007. More specifically, the various changes in financial reporting and the expanded oversight of the financial system following the crisis of 2007 might have made corruption less possible, or less

[12] In parentheses we provide the Amadeus variable names.

Table 5
Corporate corruption and the elements of profitability.

Panel A: Corporate Corruption and Profitability Elements

Independent Variables	BT Income Margin	AT Income Margin	Equity Multiplier	Total Asset Turnover	EBIT Margin
Corruption	0.165***	0.184***	−4.919***	1.860***	0.162***
	(0.002)	(0.003)	(0.174)	(0.036)	(0.002)
Corruption*Foreign firm	−0.008**	−0.010**	0.508*	−0.654***	−0.011***
	(0.004)	(0.004)	(0.301)	(0.063)	(0.004)
Log (Total Assets)	0.009***	0.010***	0.940***	0.110***	0.008***
	(0.000)	(0.000)	(0.025)	(0.005)	(0.000)
Log (Fixed Assets)	−0.003***	−0.003***	−0.757***	−0.534***	−0.002***
	(0.001)	(0.001)	(0.041)	(0.009)	(0.001)
Log (Intangible Fixed Assets)	−0.001*	−0.001***	−0.061*	0.049***	0.000
	(0.000)	(0.001)	(0.035)	(0.007)	(0.001)
Log (Tangible Fixed Assets)	−0.001***	−0.001***	0.013	0.031***	−0.001***
	(0.000)	(0.000)	(0.008)	(0.002)	(0.000)
Leverage	−0.054***	−0.061***	1.852***	0.099***	−0.013***
	(0.001)	(0.001)	(0.069)	(0.015)	(0.001)
Constant	−0.030***	−0.030***	0.070*	6.851***	−0.033***
	(0.003)	(0.004)	(0.040)	(0.054)	(0.004)
Foreign firm	−0.008***	−0.008***	−0.258	0.067***	−0.007***
	(0.001)	(0.001)	(0.253)	(0.008)	(0.001)
Country & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.126	0.126	0.041	0.221	0.078
N	115,464	115,556	114,497	115,856	115,667

Panel B: Marginal Association with Margin and Turnover

Independent Variables	BT Income Margin	AT Income Margin	Equity Multiplier	Asset Turnover	EBIT Margin
Corruption domestic (*Coefficient)*	0.165***	0.184***	−4.919***	1.860***	0.162***
Marginal Effect @ Mean	[0.040]	[0.032]	[−0.020]	[0.006]	[0.020]
Marginal Effect @ 75%	[0.206]	[0.181]	[−0.202]	[0.050]	[0.143]
Controls	Yes	Yes	Yes	Yes	Yes
Country & Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.126	0.126	0.041	0.221	0.078
N	115,464	115,556	114,497	115,856	115,667

This table examines the relation between corporate corruption and the elements of firm profitability. Corruption" is defined as the difference between a firm's internal inefficiency and the mean operating inefficiency of "honest" firms operating within the same country and industry. We classify an honest firm as one that is headquartered in a country with a low level of corruption as measured by the Corruption Perception Index (CPI) estimated by Transparency International. Corporate inefficiency is estimated using the Stochastic frontier approach. All unscaled variables (i.e., logarithms of various asset categories) are denominated in U.S. dollars Panel A shows the regression coefficients, while Panel B presents the marginal effects of corruption. *Return on Assets* is decomposed into EBIT margin and Total Asset Turnover. *Return on Equity (ROE)* is decomposed into After (Before) Tax Margin, Total Asset Turnover, and the Equity Multiplier. All variables are defined in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

capable of generating profitability improvements for the firm. Consequently, we undertake a comparative analysis of corruption's effects before and after the financial crisis of 2007.

In Table 7 we present our empirical findings regarding the effect of the 2007 financial crisis on corruption's association with corporate profitability. In Panel A we examine the period prior to the crisis and obtain results that are generally consistent with our original findings. That is, corruption is significantly positively associated with firm profitability. In Panel B we analyze the post-crisis period and observe similar results. Corruption continues to be positively associated with the firm's return on assets and to shareholder equity.

We conclude from this analysis that the financial crisis of 2007 did not have a meaningful effect on corruption's relation to corporate profitability. It remains persistent and appears invariant to regulatory or disclosure changes mandated following this most recent financial crisis. This result further confirms our Corporate Advantage Hypothesis.

8. Channels for corporate corruption

Given that corruption is persistent and is associated with increased profitability, we now examine what channels firms use to divert capital to fund their corrupt practices. We identify four such possible channels. These candidate channels are partially selected on the basis of Moeller's (2009) observation that poor screening procedures for new employees, frequent related party transactions, close relations to suppliers, and inventory mismanagement are common sources of corporate fraud. These accounting practices are also highlighted in the OECD handbook for the detection of foreign bribery (OECD 2017).

Table 6
Corporate profitability, corruption, and firm origin.

Independent Variables	Domestic (1)	Foreign (2)
Corruption	0.286***	0.251***
	(0.003)	(0.005)
Log (Total Assets)	0.011***	0.012***
	(0.001)	(0.001)
Log (Fixed Assets)	−0.018***	−0.018***
	(0.001)	(0.001)
Log (Intangible Fixed Assets)	0.001	0.004***
	(0.001)	(0.001)
Log (Tangible Fixed Assets)	−0.000*	−0.001***
	(0.000)	(0.000)
Leverage	−0.023***	−0.027***
	(0.002)	(0.002)
Constant	0.164***	0.120***
	(0.006)	(0.009)
Country & Year Fixed Effects	Yes	Yes
Adjusted R^2	0.128	0.109
N	76,813	35,469

This table presents the sensitivity analysis of the profitability results shown in Table 4, based on full interactions (included set of control variables) and using Eq. (11) for sectors without benchmark for honest investors. Columns (1)–(2) replicate the results for Table 4 using foreign and domestic subsamples. Similarly, columns (3)–(4) replicates domestic and foreign subsamples using Eq. (11). Profitability is the firm's *Return on Assets (ROA),* which is estimated as EBIT scaled by total assets. Corruption" is defined as the difference between a firm's internal inefficiency and the mean operating inefficiency of "honest" firms operating within the same country and industry. We classify an honest firm as one that is headquartered in a country with a low level of corruption as measured by the Corruption Perception Index (CPI) estimated by Transparency International. Operating inefficiency is estimated using the Stochastic frontier approach. For details see Eqs. (2) through (6). All unscaled variables (i.e., logarithms of various asset categories) are denominated in U.S. dollars The remaining variables are defined in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

8.1. Cost of employees

A common mechanism for the fraudulent transfer of wealth from the firm is to hire phantom employees who generate salary costs, but are not actually employed. Using this "ghost" employee channel, managers create a stable and predictable flow of funds for extra-legal activities. To examine the frequency and effect of phantom employees as a diverting channel, we calculate the cost of employees and staff (STAF), which consists of wages, salaries, and other employee expenses. We then standardize this cost by the firm's operating revenue.

8.2. Cost of goods sold

A firm's cost of goods sold is usually a high percentage of its total sales. Thus, it is relatively easy to camouflage other expenses within it. Consequently, we adjust the COGS by employee and material costs, since these costs are accounted for separately. We scale this adjusted cost of goods sold, *AdjCOGS* (i.e., COST- STAF – MATE), by the firm's operating revenue. We contend that it is easier for managers to divert funds from a large cost account than a smaller one. Small accounts tend to have less activity charged against them, with each transaction representing a much larger percentage of the total. Thus, each transaction attracts greater attention and scrutiny. Smaller accounts also have less capacity to fund re-occurring transactions for the replenishment of off-balance sheet capital pools.

8.3. Material costs

The logic for including material costs as a potential source for diverted funds is similar to that for the Cost of Goods Sold. Managers might report higher materials costs in their income statement as a way to divert funds away from the firm. Mironov (2013) describes how this can be accomplished by establishing "intermediary" corporations that increase the reported purchase price and thus allow the extraction of wealth. We scale material costs (MATE) by the firm's operating revenue to arrive at our standardized materials cost variable, *Materials*.

8.4. Inventories

Firms can also overpay for inventory to channel funds outside through "intermediary" corporations (Mironov 2013). This is an effective technique because 'inventories' is a large account with a high level of transaction activity. Further, some items will require purchases on the spot market, adding further opacity to price discovery. Managers might also sell inventory for cash without a receipt.

Table 7
Financial crisis, corruption, and profitability.

Panel A: Corruption and Profitability, Pre-Crisis Period			
Independent Variables	ROA	BT ROE	AT ROE
Corruption domestic (*Coefficient)*	0.322***	0.550***	0.457***
Marginal Effect @ Mean	[0.067]	[0.004]	[0.004]
Marginal Effect @ 75%	[0.093]	[0.061]	[0.064]
Marginal Effect @ Mean	[0.006]	[0.001]	[0.001]
Marginal Effect @ 75%	[0.040]	[0.016]	[0.010]
Controls	Yes	Yes	Yes
Country & Year Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.151	0.108	0.098
N	33,521	33,259	33,241
Panel B: Corruption and Profitability, Post-Crisis Period			
Independent Variables	ROA	BT ROE	AT ROE
Corruption domestic (*Coefficient)*	0.254***	0.265***	0.230***
Marginal Effect @ Mean	[0.070]	[0.029]	[0.030]
Marginal Effect @ 75%	[0.098]	[0.045]	[0.046]
Marginal Effect @ Mean	[−0.004]	[−0.001]	[−0.002]
Marginal Effect @ 75%	[−0.016]	[−0.009]	[−0.009]
Controls	Yes	Yes	Yes
Country and Year FE	Yes	Yes	Yes
Adjusted R^2	0.099	0.051	0.045
N	53,389	52,955	52,913

This table presents the effect of corporate corruption on profitability and revenue during the pre-crisis (2000–2007) and post-crisis (2011–2015) periods. Corruption" is defined as the difference between a firm's internal inefficiency and the mean operating inefficiency of "honest" firms operating within the same country and industry. We classify an honest firm as one that is headquartered in a country with a low level of corruption as measured by the Corruption Perception Index (CPI) estimated by Transparency International. Operating inefficiency is estimated using the Stochastic frontier approach. For details see Eqs. (2) through (6). The variables and controls are identical to those in Table 4. For brevity, we present only the regression coefficients and their marginal effects evaluated at the mean and at the upper quartile (75%). ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Detailed definitions of the variables appears in the Appendix.

This generates a stream of income which can easily be diverted from the firm. We scale inventories (STOK) by the firm's operating revenue to obtain our variable of interest, *Inventory*.

8.5. Channel analysis

To determine whether these channels explain how corporate corruption is funded, we regress them against corruption. In Table 8 we present our findings. Panel A shows the beta regression results by country.[13] We observe that *Staff Cost* is positive and significantly related to corruption in 8 out of 12 countries. *Materials* is positively related for 6 of the 12 sample countries. The findings for *Inventories* are more mixed. Six of the coefficients are negative, four statistically insignificant, and two have a positive association with corruption. It might be that larger inventories require greater management and control, thus actually reducing the opportunities for executives to divert funds using this channel. The relation between *AdjCOGS* and corruption is mostly insignificant. We conclude that *Staff Cost* and *Materials* appear to be the most effective channels for the diversion of corporate funds to external purposes.[14]

In Panel B we compute beta coefficients by industry. Our results are consistent with the general wisdom that corruption is also industry specific. In general, corruption is more extensive in industries subject to licensing, public procurement, and frequent interactions with government and enforcement officials (De Rosa et al., 2010). Consequently, industries with a higher affinity towards corruption are construction, extraction, transportation, and finance, while manufacturing industries (if not involved with governmental contracts) represent industries with less potential for corruption.

We obtain a variety of insights into the relation between corruption and specific corporate channels. We find *Staff Cost* to be positive and significantly related to corporate corruption in 12 of the 13 industries. This suggests that it is a common and effective way for executives to redirect corporate funds for extra-legal purposes. The effect of *Materials,* however, is not consistent. It is insignificant in 5 cases, positively significant in 2, and negative in 6. It appears most effective as a channel for corruption in the manufacturing, construction, and government-related sectors. These industries typically report substantial material costs, given their extensive need

[13] Beta coefficients (beta weights) are also called standardized regression coefficients. These coefficients correspond to the regression model in which all variables (dependent and independent) are scaled to have variance equal to 1. The size of the coefficients can then be used to determine which regressor has greater explanatory power for the dependent variable.

[14] The limited accounting information contained in the Amadeus database does not allow us to generate a more detailed channel analysis of how corruption occurs.

Table 8
Channel beta regressions by country and industry

Panel A: Channels by Country

Independent Variables	BA	BG	CZ	EE	HU	LV	PL	RO	RS	SI	SK	UA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Staff Cost	0.042	0.120***	0.167***	0.108	0.226***	0.034	0.157***	0.109***	−0.012	0.109***	0.162***	0.930***
Materials	0.152***	0.089***	0.009*	0.144	0.061***	0.075	−0.003	0.056***	0.031	0.002	0.044***	0.037***
Inventory	0.044	−0.100***	−0.037***	−0.165	−0.064***	0.032	−0.039***	−0.037***	0.101***	−0.019	−0.018*	0.012**
Adj. COGS	0.173***	−0.01	0.006	−0.230**	0.029***	0.083	0.009	0.007	0.006	0.057***	0.007	−0.930***
Adjusted R^2	0.058	0.038	0.031	0.017	0.064	−0.003	0.029	0.015	0.011	0.02	0.03	0.038
N	1531	19,775	40,561	110	10,804	210	34,396	17,156	6997	4220	11,702	39,289

Panel B: Channels by Industry.

Independent Variables	Agriculture, forestry and fishing	Mining and quarrying	Manufacturing	Electricity, gas, steam and air-conditioning supply	Water supply, sewerage, waste management and remediation	Construction	Wholesale and retail trade, repair of motor vehicles and motorcycles
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Staff Cost	0.086***	0.151***	0.151***	0.187***	0.124***	0.036	1.767***
Materials	0.009	0.037	0.036***	−0.023	−0.012	0.074***	−0.073***
Inventory	0.099***	−0.02	−0.018***	−0.022	−0.106***	−0.055***	−0.004
Adj. COGS	−0.020*	0.104***	0.034***	0.087***	−0.013	−0.079***	−1.700***
Adjusted R^2	0.018	0.049	0.029	0.046	0.025	0.005	0.033
N	8227	1155	83,003	2114	4140	15,782	37,931

Independent Variables	Transportation and storage	Accommodation and food service activities	Information and communication	Real estate activities	Professional, scientific, technical, administration and support service activities	Public administration, defense, education, human health and social work activities
	(8)	(9)	(10)	(11)	(12)	(13)
Staff Cost	0.241***	0.172***	0.194***	0.198***	0.187***	0.255***
Materials	−0.026**	−0.005	−0.075***	−0.038**	−0.067***	0.028
Inventory	−0.068***	−0.111***	−0.058***	−0.021	−0.023**	0.065***
Adj. COGS	−0.046***	0.014	0.014	0.01	0.030***	−0.104***
Adjusted R^2	0.059	0.034	0.039	0.039	0.044	0.069
N	8432	4106	4051	3192	9247	5371

This table analyzes the channels through which corruption is funded. The dependent variable is corporate corruption which is defined as the difference between a firm's internal inefficiency and the mean operating inefficiency of "honest" firms operating within the same country and industry. We classify an honest firm as one that is headquartered in a country with a low level of corruption as measured by the Corruption Perception Index (CPI) estimated by Transparency International. Operating inefficiency is estimated using the Stochastic frontier approach. For details see Eqs. (2)–(6). Panel A shows beta regressions by country, while Panel B presents beta regressions by industry. Columns in Panel A represent the two-character abbreviations of the country's name: BA = Bosnia and Hercegovina, BG = Bulgaria, CZ = Czech Republic, EE = Estonia, HU = Hungary, LV = Latvia, PL = Poland, RO = Romania, RS = Serbia, SI = Slovenia, SK = Slovakia, UA = Ukraine. *Staff cost*, *Materials*, *Inventory*, and *Adjusted cost of goods sold* (COGS) represents the firm's cost structure reported in the AMADEUS database; all costs are scaled by total assets. The variables are defined in the Appendix. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

for real assets. *Inventories* again appear to play only a modest role as a channel for corruption. We find from estimating a set of pairwise correlations that only Inventories are negatively correlated with corruption, while the other costs are positively correlated. Given the ability of modern accounting systems to monitor inventory costs, inventories appear to be an inconvenient mechanism for the diversion of corporate wealth. The *AdjCOGS* demonstrates only a selected ability to facilitate the flow of money outside the firm.

9. Summary and discussion

The existing literature reports that corruption adversely affects national tax practices, contributes to the growth of underground or shadow economies, and introduces a variety of distortions to national economic policies. It persists, however, in spite of attempts to eradicate it by national courts and regulators. It also persists despite the transparency required by international accounting standards and the monitoring of global investors. Attempts at explaining corruption's persistence include arguments that it can waive bureaucratic or regulatory requirements, provide preferential access, and accelerate government approvals.

Given these arguments, we develop a hypothesis based on corruption providing financial advantage to the firm. Our Corporate Advantage Hypothesis contends that corporate corruption persists because of the financial benefits it provides to firms. We test our hypothesis by developing a new measure of firm-level corruption based on inefficiency estimated from a stochastic frontier analysis of corporate accounting data.

To test our Corporate Advantage Hypothesis, we examine the association between corruption and the firm's ROA and ROE. We find that corruption influences the returns enjoyed by a firm's investors. To understand how corruption improves profitability, we decompose our return measures into their margin, turnover, and multiplier components. Corruption works its effect on profitability through the improvement of both margins and turnover.

We also find that corruption still relates positively to profitability after the financial crisis of 2007. The additional disclosure requirements and increased monitoring of the global financial system enacted after the 2007 financial crisis appears to have had no effect on the proclivity of firms to engage in corrupt practices.

For corruption to occur, there must be a channel to create the actual off-balance capital accounts from which they can make their payments. Our analysis reveals that materials and staff costs appear to be the most effective channels for the diversion of corporate funds. Our finding regarding staff costs is consistent with the widespread use of phantom employees to fraudulently transfer wealth from firms. Our examination of channels also reveals interesting industry differences in their use. The variable *Staff costs* is a popular channel across all industries, but the use of material costs to divert funds is much less common.

The findings in this study are important for two major reasons. First, it develops a new approach for the estimation of corruption at the firm level using publicly available data. This allows the analysis of a number of interesting questions regarding the association between corruption and corporate behaviors that were heretofore unexamined due to data unavailability or the limitations of national survey data. Our examination of the channels by which corruption occurs identifies a target for regulators, law makers, and others who have an interest in eliminating corruption from the greater political economy. Our channel analysis will be valuable for the design and implementation of public policy aimed at economic growth and efficiency.

Our results also suggest substantial future research. We examine four separate channels, but it is likely that there are other mechanisms for the diversion of corporate funds. It is also possible that there could be a combination of channels that jointly facilitate the diversion of corporate funds. These results also have important implications for governance research since the monitoring and oversight of executives is the essential charge of corporate governance. The relation between corporate governance processes and the extent to which the firm makes extra-legal payments to secure financial advantage warrants further analysis.

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Appendix A. Appendix: List of financial variables used in the empirical analysis

Note that we used two kind of variables: (1) standardized or scaled variables, i.e., the variables that are scaled by total assets (TOAS), sales (OPRE) or shareholder's equity (SHFD) and (2) Level variables, measured in U.S. dollars.

The source for all financial variables is the Amadeus database (Bureau van Dijk, Moody) which reports values in U.S. dollars. Foreign currency values are converted by the Amadeus database which uses the average annual exchange rate for national currencies.

Variable Name	Description
Scaled (standardized) variables	
Adj_COGS	Cost of goods sold minus staff costs minus materials costs (COST-STAF-MATE)/ sales (OPRE)
Asset Turnover	Sales (OPRE)/assets (TOAS)
Corruption	The difference between a firm's internal inefficiency and the mean operating inefficiency of "honest" firms operating within the same country and industry.
EBIT	Earnings before interest and taxes
EBIT Margin	EBIT (OPPL)/sales (OPRE)
Equity Multiplier	Assets (TOAS)/shareholder's equity (SHFD)
Inventory	Inventories (STOK)/sales (OPRE)
Leverage	Long-term liabilities (LTDB)/total assets (TOAS)
Materials	Material costs (MATE)/sales (OPRE)
Net Income Margin (After tax)	Income after taxes (PLAT)/sales (OPRE)
Net Income Margin (Before tax)	Income before taxes (PLBT)/sales (OPRE)
Return on Assets (EBIT/ Assets)	EBIT (OPPL)/assets (TOAS)
Return on Equity (ROE) (After tax)	Income after taxes (PLAT)/shareholder's equity (SHFD).
Return on Equity (ROE) (Before tax)	Income before taxes (PLBT)/shareholder's equity (SHFD)
Staff Cost	Cost of employees and staff (STAF)/sales (OPRE)
Level variables measured in U.S. dollars	
Log (Total Assets)	Log of total assets (TOAS).
Log (Fixed Assets)	Log of total fixed assets (FIAS).
Log (Intangible Fixed Assets)	Log of intangible fixed assets (IFAS)
Log (Tangible Fixed Assets)	Log of tangible fixed assets (TFAS)

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcorpfin.2020.101855.

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