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Jieun Im
Seoul National University

Woojin Kim
Seoul National University and ECGI

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Jieun Im
Researcher
Seoul National University, Business School
1 Gwanak-ro, Gwanak-gu
Seoul, 08826, Republic of Korea
e-mail: jelim@snu.ac.kr

Woojin Kim*
Professor of Finance
Seoul National University, Business School
1 Gwanak-ro, Gwanak-gu
Seoul, 08826, Republic of Korea
phone: +822 880 5831
e-mail: woojinkim@snu.ac.kr

*Corresponding Author

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1. Introduction

Corruption is a multidisciplinary issue discussed in various fields of social science including political science, sociology, and economics. Although previous literature has defined the term in various ways, most definitions associate corruption with the actions of public officials. For example, Rose-Ackerman (2011) defines corruption as "an illegal payment to a public agent to obtain a benefit that may or may not be deserved in the absence of payoffs". According to this definition, bribery is a typical form of corruption.[1] Effect of corruption on economic outcome and firm performance has been under controversial debate for decades. In general, corruption is considered as having a negative impact on society and the economy as a whole. Mauro (1995) argues that corruption hinders economic development and growth by lowering investment, which is termed as "sanding the wheels". Paunov (2016) documents that corruption has a negative impact on firms' ownership of quality certificates and the investment in machinery needed to introduce innovations.

On the other hand, some claim that corruption is inevitable and may even be efficient, a perspective referred to as "grease in the wheels". Lui (1985) argues that corruption allows firms to overcome bureaucratic holdups by allocating government licenses to most efficient firms who can pay the highest bribes. Faccio (2006) reports that political connections are positively correlated to corruption, which in turn increase firm value. This increase in corporate value has been documented even in countries with low-corruption environment (Amore and Bennedsen (2013)).

Cross-sectionally, the effects of corruption may depend on the circumstances of a given firm or country. Since corruption can complement the consequences of a deficient institutional

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[1] A formal legal definition of bribery refers to payments paid to public officials in exchange for a specific favor, which is illegal. In this study, we use the term bribery to broadly refer to any gifts or entertainment expenses paid by a company for the benefit of public sector employees, regardless of its legality.

framework, such as weak rule of law or inefficient management (Webb *et al.* (2009)), we may observe more positive effect of corruption in less efficient institutional environment at the country level. At the firm level, corruption may have a positive impact on the profitability of private sector companies who needs to bribe the regulators to avoid regulations, but not on the profitability of state-owned firms which have little incentive to buy off public officials. (Jiang and Nie (2014)). For example, Zeume (2017) finds that the value of U.K. firms declines permanently after the enactment of the U.K. Bribery Act, and the passage of the law also negatively affects the economic activities of U.K. companies in corrupt countries. Despite the positive relationship between corruption and firm value, this evidence is broadly interpreted as being more consistent with rent-seeking than efficiency enhancing in a neoclassical sense. A key empirical challenge in establishing a causal relationship between bribes and firm performance, however, is the endogeneity of the former. First, there may be a reverse causality between bribes and firm performance. For example, a firm may treat its public sector counterpart as compensation for good past performance. Also, well-performing firms may afford to pay higher bribes, as pointed out by Lui (1985) and Cai *et al.* (2011). In addition, if bribes are positively correlated with unobservable variables that can increase firm performance, the coefficient estimates may be upward biased. Thus, it is crucial to identify bribes that are not affected by corporate performance or other unobservable variables.

In this paper, we attempt to establish a causal link between bribes and firm performance by taking advantage of a unique regulatory change in Korea that prohibits or drastically limits the companies from providing bribes to public sector employees. This regulation, called the Improper Solicitation and Graft Act (hereafter referred to as the anti-graft law), directly affects public servants, lawmakers, teachers and journalists, along with their spouses in receiving gifts or entertainment.

Unlike in U.S., Korea currently prohibits any formal lobbying activity by a third

party. In fact, Korea is the only country that forbids formal lobbying by registered lobbyists among the OECD countries. Despite the legal prohibitions, scandals of various illegal lobbying and bribery have persisted for decades. Implicit lobbying through entertainment expenses paid by a company has been widely spread throughout the economy.

Entertainment expenses refer to the amount of money spent by a business operator to pay for entertainment and gifts provided to business counterparts as a token of hospitality, congratulations, or condolences. A bribe is typically defined as "money or favor given or promised in order to influence the judgment or conduct of a person in a position of trust."[2] Entertainment expenses may be considered as simple token of gratitude, but they may well be used as a form of bribe. In fact, an important motivation behind the anti-graft law was to partially circumvent the difficulties in formally proving a causal link between bribery and subsequent favor in the court of law, which is required for criminal punishment. Following Cai *et al.* (2011), we resort to entertainment expenditure as a proxy for bribes at the firm level.

Entertainment expenditure is a component of selling, general and administrative expense, and is reported as a footnote in the financial statements of the annual report. Although this information is technically available, standard data vendors in U.S., for example Compustat, do not provide such information as a separate item, which is probably the main reason why previous literature on this subject is so scant. The only exception that we are aware of is Cai *et al.* (2011), who exploit entertainment expenditure of Chinese firms to infer implications of potential bribery. Korean data vendors on the other hand extract this information from the footnote and provide firm-level quarterly and annual entertainment expenditure in electronic format, which is a non-trivial data advantage.

Studies focusing on U.S. have taken advantage of lobby data, but this is more related

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[2] Merriam-Webster dictionary; https://www.merriam-webster.com/dictionary/bribe

with political connections. And studies that directly examine corruption have generally relied on Corruption Perception Index (CPI) to estimate country-level degree of corruption. A key advantage of our study is to utilize entertainment expense as a broad proxy for bribes at the firm-level.

To address the endogeneity in entertainment expenses, we take advantage of an exogenous variation in entertainment expenses surrounding the anti-graft law. Since this law restricts or prohibits providing hospitality to workers in the *public* sector, we create a *government exposure* measure under the presumption that companies with large sales to the public sector would be more affected by the law. Then, we interact the pre-law enactment government exposure (GE) with an indicator variable for the post-anti-graft period (ANTIGRAFT), and use this term as an instrument for entertainment cost. In other words, we instrument for *changes* in firm's entertainment expenses by exploiting the differential impact of the anti-graft law depending on the level of government exposure.

We also employ a difference-in-difference (DID) estimation to examine the impact of the law on corporate performance. We assign companies with relatively large sales to the government as the treated group, which are more likely to be influenced by the law which limits entertainment expenses paid for public officials.

The first stage result from the instrumental variable (IV) specification indicates that after the implementation of the anti-graft law, entertainment expenses decrease and this effect is indeed more pronounced for firms in industries with large sales to the government (high GE measure). This result is consistent with our conjecture that government-exposed firms are significantly more likely to be affected by the anti-graft law.

We next regress various measures of firm performance on the predicted value of entertainment expense obtained from the first stage. The result from this second stage estimation indicates that the predicted value of entertainment expense is significantly

negatively correlated with firm performance. This finding suggests that bribes may adversely affect corporate outcomes.

In our difference-in-difference analysis, we also find that firms that are more exposed to government sales experience an improvement in various measures of firm performance during the post anti-graft law period. This reduced form analysis also suggests that for firms that are likely to have been spending much entertainment expense before the anti-graft law which adversely affects performance, i.e. high GE firms, such negative relationship is mitigated after the law.

We contribute to the vast literature on corruption and firm performance in several ways. First, our sample is likely to reflect an institutional environment where corruption is costly, as suggested by Shleifer and Vishny (1993). They propose two conditions for corruption to adversely affect economic growth. First condition is, decentralization of power which significantly increases the cost of corruption. Under a centralized government, one needs to bribe only one or a few dictators. But under a decentralized government, e.g. post-communist Russia, many bureaucrats must be bribed, which would increase the cost of bribing. Second, the cost of corruption also increases when it has to be kept secret. If the process becomes illegal, any official caught taking bribes will be severely punished. To evade the law, bureaucrats may choose a bidder whose bribery technique is hard to detect even if he/she is less efficient.

Korea is well-suited to test the implications presented in Shleifer and Vishny (1993). Korea has gone through a massive decentralization since the 1990s when the democratic government began to take power after 32 years of authoritarian rule by the military regime. In addition, since Korea prohibits formal or official lobbying, implicit lobbying may proceed under the table, which increases the level of secrecy. These conditions allow us to test whether corruption adversely affect the economy precisely when power is decentralized and bribes need to be kept secret.

Second, we provide further evidence on the effectiveness of legislation to limit entertainment expenditures. While we may casually expect that this legal capping will result in a decrease in total entertainment spending, Che and Gale (1998) and Drazen *et al.* (2007) suggest theoretical argument and empirical evidence that a unilateral decrease in total bribes following a legal cap may not be so straightforward. For example, if the upper limit set by the law is binding for high valuation lobbyists, it allows the low-valuation lobbyist who did not try lobbying before to newly engage in lobbying, which could increase the overall lobbying amount. Our study sheds further light on this debate.

Finally, and most importantly, we make use of an exogenous change in entertainment expenditures to tease out the causal effect of bribes on firm performance. A few previous studies also report some relationship between entertainment expenses and firm performance. However, these results are close to correlations rather than causal relationships mostly due to inadequate treatment of potential endogeneity. In contrast, our empirical strategy extracts exogenous variations of entertainment expenses based on a new law affecting these expenditures.

This paper is organized as follows. Section 2 provides a detailed description of the Improper Solicitation and Graft Act in Korea. Section 3 discusses the empirical strategies and our research design. Section 4 describes the data and explains the key variables used in this study. Section 5 presents our main findings and discusses additional robustness tests. We conclude in Section 6.

2. The Improper Solicitation and Graft Act in Korea

The Improper Solicitation and Graft Act, more commonly known as the Kim Young-ran act named after a former Supreme Court Justice who came up with the original bill, is a comprehensive law to prohibit improper solicitations and the receipt of graft, which has taken effect on September 28, 2016. According to the document provided by National Law

Information Center, the stated purpose of this Act is "to ensure that public services are provided in a fair manner and to secure public confidence in government institutions by forbidding improper solicitations to public officials and relevant persons and by prohibiting them from accepting financial or other advantages".[3] More detailed contents of the Improper Solicitation and Graft Act as documented by the Anti-Corruption and Civil Rights Commission are as follows.

2.1 Scope of application

The anti-graft act is applicable to both organizations and individuals. It applies to all public institutions including constitutional institutions, central administrative agencies, local governments, municipal or provincial offices of education, and public service-related organizations. In addition, private and public schools of various levels, educational foundations under Private School Act, and media companies under Article 2.12 of the Act on Press Arbitration and Remedies are also subject to the Act. The law also applies to public officials or individuals performing public duties, and their spouses.

2.2 Prohibition of improper solicitations

The concept of improper solicitations is that no one should solicit, directly or through a third party, a public official or relevant person performing his or her duties. A total of 15 types of improper solicitations are stipulated to explicitly explain which acts constitute the acts of improper solicitation. Moreover, a public official or relevant person who performs his or her duties as directed by an improper solicitation should be punished by imprisonment for not longer than two years or by a fine not exceeding 20 million KRW, or roughly 20,000 USD.

If a public official or relevant person receives an improper solicitation, he or she should

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[3] National Law Information Center,
http://www.law.go.kr/LSW/eng/engLsSc.do?menuId=2&section=lawNm&query=The+Improper+Solicitation+and+Graft+Act&x=24&y=26#liBgcolor1

clearly express an intention to refuse the solicitation and report the fact to the head of the concerned agency, if such solicitations repeatedly occur.

2.3 Prohibition of acceptance of financial or other advantages

A public official or relevant person should be subject to criminal punishment if he or she receives financial or other advantages in excess of one million KRW, roughly one thousand USD at a time or three million KRW, roughly three thousand USD during a fiscal year from the same person, *regardless of his or her duties or the title of such offer*. That is, criminal sanction under this act does not require a tight link between the act of bribery and subsequent favor, which is what distinguishes this act from the traditional law.[4]

3. Empirical Strategy

Our goal is to come up with an empirical specification that examines how bribes may affect firm performance. We resort to corporate entertainment expenditure as a proxy for bribes in a broad sense. The entertainment cost is the expense that the company spends in the process of performing its business activities, and Korean tax law allows firms to claim a part of it as tax deductible expense at the end of the fiscal year.[5] Although these entertainment expenditures may be legal, as long as the treated individual does not directly provide a favor in return and the total amount does not exceed the limits stipulate in the anti-graft act, they may well leave an impression on the treated which may influence their decisions in the future over a longer term. And this is precisely the reason why firms are willing to pay these entertainment expenses.

A simple approach would be to estimate β in the following equation (1) using ordinary

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[4] Document from Anti-Corruption and Civil Rights Commission
[5] Current limit is 12 million KRW, or roughly 12,000 USD per year. Small and medium-sized enterprises prescribed by Presidential Decree may claim up to 66 million KRW, or roughly 66,000 USD.

least squares (OLS).

$$Y_{i,t} = \beta \cdot ENT_{i,t} + \sum controls_{i,t} + \mu_j + \eta_t + \delta_y + \epsilon_{i,t} \tag{1}$$

where $Y_{i,t}$ is firm *i*'s performance measure in quarter *t*, $ENT_{i,t}$ is firm *i*'s entertainment expenditure in quarter *t*, μ_j reflects industry fixed effects capturing any time-invariant differences across industries, η_t is a quarter dummy to control for seasonality, and δ_y is the year dummy, measuring any common variation in firm performance each year.

However, this specification is clearly misspecified since entertainment expenditures are not random. Even if entertainment expenses and firm performance are positively correlated, there may well be a reverse causality where the entertainment provision may be considered as a reward for past performance. In addition, if the entertainment costs are positively correlated with unobservable variables that can increase the performance of the firm, the coefficient value can be upward biased.

3.1. Instrumental variable analysis

In order to address this potential endogeneity, our main empirical strategy is to extract the exogenous variations of entertainment expenses following the implementation of the new law affecting entertainment expenses. Since this law restricts or prohibits providing hospitality to workers in the public sector, we constitute a government exposure measure under the hypothesis that companies with high sales to the public sector would be more affected by the law. Therefore, interaction between the pre-law enactment government exposure (GE) and an indicator variable equal to one in the post-anti-graft period (ANTIGRAFT) is used as an instrument for endogenous entertainment cost. In other words, we instrument for changes in firm's entertainment expenses by exploiting the differential impact of the anti-graft law depending on the level of government exposure. Specifically, we estimate the first-stage specification as follows:

$$ENT_{i,t} = \gamma \cdot \text{ANTIGRAFT} \cdot \text{GE}_j + \tau \cdot \text{ANTIGRAFT} + \theta \cdot \text{GE}_j + \sum controls_{i,t} + \eta_t + \epsilon_{it} \quad (2)$$

where ANTIGRAFT is an indicator variable that is equal to one for the post-regulation period, and GE_j captures the level of industry exposure to government purchases. We then use $\widehat{ENT}_{i,t}$ to test for the effect of entertainment cost on firm performance using the following second-stage specification:

$$Y_{i,t} = \beta \cdot \widehat{ENT}_{i,t} + \sum controls_{i,t} + \mu_j + \eta_t + \delta_y + \epsilon_{i,t} \quad (3)$$

where equation (3) provides the 2SLS-IV estimates of the impact of corruption and β captures the causal effect of entertainment expenditure on firm performance.

3.2. Difference-in-difference analysis

Difference-in-difference (DID) is a quasi-experimental econometric technique that measures the differential effect of a treatment on a 'treatment group' versus a 'control group' over time. In our setting, treatment is the enactment of the anti-graft law, and the treated group consists of firms that exhibit higher exposure to government purchases. Rather than constructing a dummy variable to dichotomize the sample into treated vs. control group, we resort to industry-level sales exposure to government purchases, a continuous variable, as a measure of treatment. That is, we examine how the relationship between government exposure and firm performance may change over time following the anti-graft law. Specifically, we run the following regression.

$$Y_{i,t} = \gamma \cdot \text{ANTIGRAFT} \times \text{GE}_j + \theta \cdot \text{GE}_j + \sum controls_{i,t} + \eta_t + \delta_y + \epsilon_{it} \quad (4)$$

where $Y_{i,t}$ is firm i's performance measure in quarter t. ANTIGRAFT is an indicator variable for post-regulation period, and GE_j captures the level of industry exposure to government expenditure. η_t is quarter dummy to control for seasonality and δ_y is year fixed effects,

measuring any common variation in firm performance each year.[6] Equation (4) is essentially a reduced form specification without the endogenous variable, namely entertainment expense where γ captures the relationship between government exposure and corporate performance since the enactment of the anti-graft law.

4. Data

4.1. Data Sources and Sample Selection

This section describes the data sources used for the empirical analysis. Our sample consists of non-financial firms listed on the Korea Stock Exchange, including those registered with the Korea Securities Dealers Automated Quotation (KOSDAQ). To construct our main and control variables, we obtain the companies' quarterly financial data from DataGuide provided by FnGuide, a local data source comparable to Compustat. To measure government exposure, we resort to industrial input-output tables obtained from the Economic Statistical System (ECOS) provided by the Bank of Korea. Since we use quarterly data, companies with fiscal month-ends other than March, June, September, and December are excluded from the sample for the purpose of matching accounting periods. The final sample includes 1,816 unique firms in the standard 2-digit Korean industrial classifications from January 2012 to June 2018. We start our sample period from 2012, after the introduction of IFRS, to maintain consistency in the accounting standards.

4.2. Variable Construction

In this section, we explain how we constructed each variable used in the analysis. Table

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[6] We do not include period dummy ANTIGRAFT as a separate regressor in this specification since we have year fixed effects.

1 briefly summarizes the definition of all variables.

4.2.1. Measure of Bribery

We resort to entertainment cost reported in quarterly statements as a broad proxy for the firm-level bribery. As a part of selling, general and administrative expenses (SG&A), entertainment expenditure generally refers to expenses or goods that are paid to clients reflecting hospitality, fellowship, or reward related to the business of the company. Although this expense is tax deductible up to certain level, it may well be used as a form of *de facto* bribe in a broad sense by which a favor may occur at a much later date. Specifically, we resort to expenditure on entertainment scaled by assets, ENT, as our main proxy for bribery. We also consider alternative measures of entertainment expense where we scale by sales (ENT/SALES) or SG&A (ENT/SGA).

4.2.2. Firm Performance Measure

Our measures of operating performance are return on assets (ROA), sales scaled by total assets (SALES), operating income scaled by total assets (OI), and net income scaled by total assets (NI). In addition, Tobin's q and Market to Book ratio are used to measure firm value. All variables are computed for firm i over its quarter t in principle.

4.2.3. Government Exposure Measure

Following Belo *et al.* (2013), we measure the industry-level exposure to government spending as the ratio of the amount purchased by the government to total production of a given industry based on the input-output table. This measure reflects how much of the industry's total output is sold to the government sector. Government exposure measure is our key instrument variable when extracting exogenous variations of entertainment expenses.

The components of this measure are extracted from the input-output (I-O) table provided by the Bank of Korea. This is a matrix table reporting the process in which outputs produced in each industry are directly or indirectly consumed by the final users. The final

demand group consists of consumption, investment and exports. Consumption is divided into private consumption expenditure and government consumption expenditure. Investment consists of private fixed capital formation, government fixed capital formation, inventory variation, and net acquisition of valuables. Among these final users, we select government expenditure and government fixed capital formation to construct government spending at the 2-digit Korean standard industrial classification (KSIC) level.[7]

The industry classification provided in the input–output table does not exactly match Korean standard industrial classification (KSIC). We match I–O industry codes with the Korean standard industrial classification as follows. There are 82 subdivisions of I-O industry code and 77 subdivisions of Korea's standard industry classification at the 2-digits level. We then rearrange I-O industry codes into standard industry classification codes by manually checking the industry names.

4.2.4. Control Variables

We control for various firm characteristics that have been identified in the previous literature to affect a firm's future performance. All variables are computed for firm i over its fiscal quarter t. The control variables include (1) firm size, SIZE, measured by the natural logarithm of total assets in KRW; (2) asset growth, ATG, measured by growth rate of total assets over the previous quarter; (3) leverage, LEV, measured as the ratio of book value of total debt to total assets; (4) investing activities, ICF, measured by cash outflow from investing activities scaled by total assets; (5) investment in innovation, RND, measured by research and development expenditures scaled by total assets; (6) investment in advertisement and promotion, ADPROMO, measured by the sum of advertisement and promotion expense scaled by total assets.

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[7] Government exposure variable is a cross-sectional measure calculated based on I-O table as of 2014.

4.3. Descriptive statistics

Table 2 contains the summary statistics of the key variables for our firm-quarter observations. To minimize the impact of outliers, all continuous variables are winsorized at the top and bottom 1% of each variable's distribution. The mean and median values of our key proxy for bribery, ENT, are 0.06% and 0.03%, respectively.

On average, 9.21% (5.89%, median) of the total output of a given industry is purchased for final use by the government sector. The distribution of industry-specific measures of government exposure (GE) is given in table A1 in the appendix. The government exposure measure (GE) is classified by 61 industries from KSIC 2digit industry classification. Since the industry classification is different between KSIC and input-output account, some industries are subdivided into 3 digits to match codes of KSIC and input-output account.

Even though we account for outliers through winsorizing, there are some substantial gaps between means and medians of some of the variables, which suggests that their distributions are skewed toward the right. Moreover, since expenses are only measured over a quarter rather than a full year, the value of ENT is relatively small.

Table 3 presents the correlation matrix between the main entertainment measure (ENT), government exposure measure (GE), various firm performance measures, and all control variables used in this study. Table 3 shows that ENT and SALES are positively correlated while the correlation between ENT and OI or NI turns out to be negative. Since OI and NI subtracts off SG&A from SALES, we may observe a mechanical negative relationship between ENT and these two measures of performance. As such, examining the impact of ENT directly on SALES may be more relevant. We observe similar correlations between ENT and 1-quarter lead variables, SALES+1, OI+1 and NI+1.

5. Empirical results

We first conduct a univariate analysis to test whether there is actually a decrease in entertainment expenses after the introduction of the Improper Solicitation and Graft Act. Panel A in Table 4 shows the changes in the mean of dollar amount of total entertainment expenses (in KRW million) and entertainment expenses scaled by assets, sales, and SG&A expenses, respectively, before and after the enactment of the anti-graft law. We note that all measures of entertainment costs have decreased after the introduction of the anti-graft law, and the decrease is statistically significant.

Since the anti-graft law restricts the provision of hospitality to employees in the public sector, we hypothesize that companies with high exposure to the government will be affected more by the law. Figure 1 presents the average entertainment ratio (ENT) for both high-government exposure group and low government exposure group over time. High (low) government exposure group corresponds to Quartile 4 (1) based on the GE measure. We first note that there is a strong seasonality in entertainment expense. Specifically, these expenses are concentrated in the last quarter, which includes Chusok, Korean Thanksgiving, lunar August 15th. This suggests that such seasonality should be adequately accounted for, which we do by including quarter dummies in all of our specifications.

We also note that there is a drop in entertainment costs since September 2016, when the law was enacted, and the drop is more conspicuous for the high government exposure group. This suggests that the new law was indeed successful in curbing the firm-level entertainment expenses.

Panel B in Table 4 reports the result of a univariate test to investigate the difference in entertainment costs before and after the anti-graft law for different quartiles of government

exposure levels. The results indicate that the decline in entertainment expenses is the largest in the fourth quartile of government exposure - high exposure group - after the law was enacted, consistent with the results reported in Figure 1. Based on these results, we confirm that the influence of the anti-graft law is larger for firms with higher government exposure.

--- Insert Table 4 ---

--- Insert Figure 1 ---

5.1. OLS specification

In Table 5, we present the results of OLS regressions of various firm performance directly on entertainment cost. While columns (1) and (5) of Table 5 indicate that SALES and SALES+1 are significantly positively correlated with ENT, the results in columns (2), (3) and (6), (7) are also consistent with previous studies, reporting a negative relationship between OI, NI and ENT. However, as discussed earlier in section 2, the OLS estimation results may well be biased and as such may not be suitable for inferring a causal relationship between entertainment cost and firm performance. In the next subsection, we address this issue by implementing an instrumental variable approach.

--- Insert Table 5 ---

5.2. IV-2SLS

To address potential endogeneity concerns arising from any unobservable factors or reverse causality, we estimate the two-stage least squares regression incorporating government exposure and anti-graft law enactment as the instrumental variable. The anti-graft law is an exogenous shock which affects entertainment costs, but not firm performance. By using this shock as an IV, we can exploit exogenous variation in entertainment cost. More specifically, since this law prohibits providing entertainment to employees in the public sector, companies with more sales to the government are expected to be affected more by the law.

Table 6 presents the 2SLS results, where we use the interaction between the pre-law enactment government exposure (GE) and an indicator variable equal to one in the post-anti-graft period (ANTIGRAFT) as an instrument for entertainment cost. We also include GE and ANTIGRAFT as separate regressors to capture the effect of government exposure on entertainment expense prior to the new law and the effect of the law on low government exposure firms. Column (1) in Table 6 presents the first stage regression results where entertainment costs are regressed on our instrument variables and other control variables.

The results from column (1) of Table 6 indicate that after the implementation of the anti-graft law, entertainment expenses decrease in general and firms in industries with high sales to the government (high GE measure) experience a greater decline in entertainment costs. We also note that high government exposure firms paid more entertainment costs prior to the law enactment. That is, high exposure firms paid more entertainment costs prior to the law, but they also cut more following the law. These results confirm that government-exposed firms are significantly more likely to be affected by the anti-graft law. In addition, R^2 and the F-statistic of the first stage amounts up to 22% and 40.83, respectively, which implies that our instrument variable is not weak.

Columns (2) - (9) in Table 6 present the second stage estimation results in which fitted values of entertainment expenses are used as the regressor to explain various firm performance measures. The results from column (2) indicate that the effect of fitted ENT on SALES is significantly negative. This is in strict contrast with the results of the OLS analysis in Table 5 where these variables were positively correlated. After adequately controlling for the potential endogeneity, exogenous variation in entertainment cost seems to be negatively associated with sales. In other words, the previous results reported in Table 5 may not imply a causation but simply reflect a correlation, which is also consistent with the correlation matrix presented in Table 3. The remaining performance measures, other than sales, exhibit either negative or

insignificant results, similar to OLS results.

--- Insert Table 6 ---

As a robustness check, we consider a discrete measure of government exposure rather than a continuous measure. Specifically, we group all firms into quartiles based on government exposure and create dummies for each group, and then interact each dummy with the period dummy, ANTIGRAFT. We report this result in Table 7.

The results from column (1) of Table 7 indicate that the estimated coefficient for the interaction term is significantly negative only for quartile 4, the high government exposure group. In contrast, other groups do not exhibit a significant difference following the enactment of the new law. This suggests that our instrument variable is not sensitive to discrete or continuous characterization. The results of second stage are largely similar to those reported in Table 6.

--- Insert Table 7 ---

5.3. Difference-in-difference

Since the anti-graft law prohibited or drastically limited the companies' practice of providing 'entertainment' to public sector employees, the law would be expected to disproportionately affect those firms with substantial *ex ante* government exposures. To conduct these tests, we interact the pre-law enactment government exposure (GE) with an indicator variable equal to one in the post-anti-graft period.

We then conduct a difference-in-difference analysis to compare the firm performance before and after the law for firms that are more likely to be affected by the law, namely high government exposure firms, and for those that are less likely to be affected, namely low exposure firms. This is essentially a reduced form estimation of IV-2SLS specification where we directly link performance with government exposure. Note that we do not include the period dummy, ANTIGRAFT in this specification since we control for year fixed effects.

The results reported in Table 8 first indicate that prior to the anti-graft law, more

government exposure adversely affected operating performance. For example, the coefficients on GE in columns (1), (3), (5), (7) are all significantly negative. But once the law is enforced, this negative relationship is significantly mitigated. Specifically, the coefficient of ANTIGRAFT x GE is significantly positive in columns (1), (2), (3), and (5).

In contrast to operating performance, government exposure is positive correlated with valuation measures even prior to the new law. Once the law is enacted, this positive relationship becomes even stronger, as can be seen from the significantly positive coefficients on ANTIGRAFT x GE in columns (4) and (8). This implies that the market values the effect of anti-graft law more so for firm with high government exposure. Overall, the results from Table 8 suggest that the anti-graft law has a positive influence on firms in industries with large government sales.

--- Insert Table 8 ---

6. Conclusion

This paper investigates how bribes may affect corporate performance based on a quasi-natural experiment. Since September 2016, Korea has implemented the Improper Solicitation and Graft Act, which prohibits or drastically limits the companies' practice of providing 'entertainment' to public sector employees. Based on the univariate analysis, we first confirm that the influence of the anti-graft law on firm-level entertainment expenditure is larger for firms with higher government exposure.

Since bribery, proxied by entertainment expenses, is not random, simple OLS may yield a biased estimation results. To address this potential endogeneity concerns and correctly identify the causal effect of bribery on corporate outcomes, we exploit the enactment of the law as an exogenous shock to firms' entertainment expenditure to treat their potential business partners from the public sector. Based on this shock, we conduct both an instrumental variable

(IV) approach and a difference-in-difference analysis. The instrumental variable specification reveals that entertainment cost has a negative impact on firm performance. In the difference-in-difference analysis, we find that firms that with more government expenditure experience a larger improvement in performance relative to those with less government expenditure subsequent to the anti-graft law enactment.
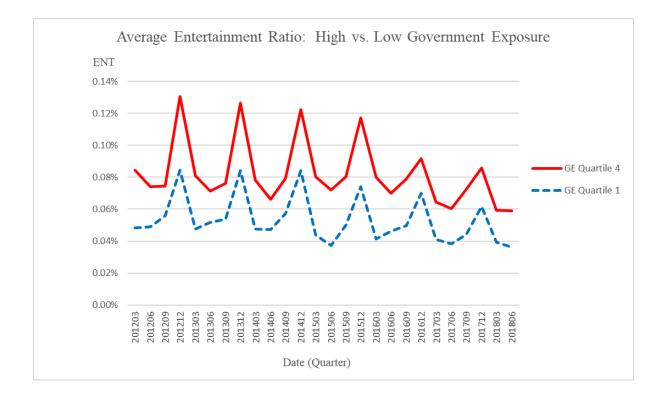
Our findings suggest that bribes may have a negative effect on firm performance. While a few previous studies report some relationship between bribes and firm performance, these are mostly correlations, our key contribution is to establish a causal relationship directly addressing potential endogeneity of bribes. Our study also suggests that the Improper Solicitation and Graft Act has a positive influence on firms with high government exposure. This implies that entertainment expenditures may have been a deadweight cost that firms had to bear in the past, which can now be avoided due to the new law. Our study also provides insights for regulators who are seeking to adopt some form of anti-corruption measures. In our sample at least, firms seem to benefit from such regulations.

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Figure1

This graph shows the average entertainment ratio (ENT) for both high-government exposure group and low government exposure group over time. High (low) government exposure group corresponds to Quartile 4 (1) based on government exposure (GE) measure. GE represents the level of industry exposure to government spending calculated as the proportion of the industry's total output purchased by the government sector for final use. The sample period is from 2012 1Q to 2018 2Q,

Average Entertainment Ratio: High vs. Low Government Exposure

22

Table 1

Variable Definitions

This table provides the detailed definitions of all variables used in this study.

Variable	Definition
GE	Measure of Government Exposure; According to Belo el al.(2013), GE is a measure of governement exposure which represents the level of industry exposure to government spending calculated as the proportion of the industry's total output purchased by the government sector for final use using industry level data from input-output accounting which is obtained from the Economic Statistical System (ECOS) provided by the Bank of Korea.
ANTIGRAFT	A dummy variable indicating whether the period after the anti-graft law is enforced, 0 otherwise
Measure of Entertainment costs	
ENT	Ratio of entertainment cost to total assets
ENT/SGA	Ratio of entertainment cost to sales, general, and administrative expense(SG&A)
ENT/SALES	Ratio of entertainment cost to sales
Measure of Performance	
SALES	Ratio of sales to total assets
OI	Ratio of operating income to total assets
NI	Ratio of net income to total assets
Tobin's q	Ratio of market value of assets to book value of assets. Market value of assets is estimated by [book value of debt + book value of preferred stock + market value of common stock]
MBratio	Mbratio Market value of common stock / Book value of common stock
	Market value of common stock = [stock price*number of share outstanding]
	Book value of common stock = [capital stock-common+ additional paid in capital + retained earnings + deferred tax liabilities - treasury stock]
Control variables	
SIZE	Natural logarithm of total assets
ATG	growth rate of total assets over the previous quarter
LEV	Ratio of book value of total debt to total assets
ICF	Cash outflow from investing activities scaled by total assets
RND	Ratio of research and development expense to total assets
ADPROMO	Sum of advertisement and promotion expense scaled by total assets

Table 2

Summary Statistics

This table reports the summary statistics for the firm-quarter observations in our sample. The sample includes all non-financial public firms in Korea from 2012. 1Q to 2018. 2Q. GE is a measure of government exposure which represents the level of industry exposure to government spending calculated as the proportion of the industry's total output purchased by the government sector for final use. ANTIGRAFT is a dummy variable for the post-anti-graft law period. Detailed definitions of other variables are provided in Table 1.

Variable	N	MEAN	SD	P5	P25	P50	P75	P95
GE	31940	0.0921	0.1073	0.0200	0.0329	0.0589	0.0978	0.4649
ANTIGRAFT	31962	0.2974	0.4571	0.0000	0.0000	0.0000	1.0000	1.0000
Measure of Entertainment costs								
ENT	31527	0.0006	0.0009	0.0000	0.0001	0.0003	0.0007	0.0024
ENT/SGA	31957	0.0223	0.0259	0.0010	0.0060	0.0138	0.0286	0.0747
ENT/SALES	31882	0.0048	0.0087	0.0001	0.0007	0.0018	0.0049	0.0194
Measure of Performance								
SALES	31523	0.2072	0.1374	0.0269	0.1139	0.1824	0.2705	0.4768
OI	31523	0.0070	0.0248	-0.0350	-0.0022	0.0071	0.0185	0.0463
NI	31523	0.0006	0.0384	-0.0641	-0.0058	0.0055	0.0170	0.0448
Tobin's q	31552	1.4399	1.0384	0.5884	0.8544	1.1155	1.6218	3.3981
MBratio	30526	1.7741	1.7463	0.3995	0.7520	1.2162	2.0896	5.1108
SALES+1	30227	0.2046	0.1352	0.0264	0.1133	0.1809	0.2673	0.4645
OI+1	30227	0.0069	0.0241	-0.0336	-0.0021	0.0069	0.0181	0.0450
NI+1	30227	0.0017	0.0358	-0.0551	-0.0051	0.0056	0.0170	0.0435
Control variables								
SIZE	31552	25.7587	1.2508	24.0487	24.9248	25.5745	26.4258	28.0424
ATG	31241	0.0138	0.0922	-0.1122	-0.0236	0.0061	0.0396	0.1586
LEV	31552	0.3948	0.2144	0.0798	0.2242	0.3846	0.5441	0.7636
ICF	31523	0.0554	0.0917	-0.0005	0.0071	0.0229	0.0642	0.2417
RND	31523	0.0038	0.0074	0.0000	0.0000	0.0003	0.0041	0.0193
ADPROMO	31523	0.0033	0.0099	0.0000	0.0000	0.0001	0.0014	0.0177

Table 3

Correlation Matrix

This table presents the correlations between the main entertainment measure (ENT), government exposure measure (GE), various firm performance measures, and all control variables used in this study. Detailed definitions of variables are provided in Table 1. ***, **. * indicate significance at 1%, 5%, and 10% level, respectively.

	GE	ENT	SALES	OI	NI	Tobin's q	Mbratio	LEV	ICF	RND	ADPROMO	ATG	SALES+1	OI+1	NI+1
GE	1														
ENT	0.121***	1													
SALES	-0.104***	0.100***	1												
OI	0.0171**	-0.0620***	0.338***	1											
NI	-0.00981	-0.102***	0.242***	0.714***	1										
Tobin's q	0.216***	0.167***	-0.0633***	0.0163**	-0.0628***	1									
Mbratio	0.199***	0.160***	-0.0304***	-0.0233***	-0.106***	0.896***	1								
LEV	-0.0486***	-0.0353***	0.250***	-0.184***	-0.237***	-0.0966***	0.0467***	1							
ICF	0.0227***	0.0777***	-0.0333***	0.0254***	0.00911	0.186***	0.152***	-0.173***	1						
RND	0.0614***	0.229***	0.00529	-0.0288***	-0.0456***	0.212***	0.200***	-0.105***	0.0982***	1					
ADPROMO	0.123***	0.136***	0.142***	0.0642***	0.0248***	0.133***	0.131***	-0.0267***	0.00449	0.0448***	1				
ATG	0.0117*	0.0721***	0.179***	0.254***	0.308***	0.0775***	0.0767***	-0.0316***	0.262***	0.0423***	0.0199***	1			
SALES+1	-0.100***	0.0668***	0.855***	0.192***	0.149***	-0.0597***	-0.0233***	0.246***	-0.0625***	-0.0188**	0.120***	0.0341***	1		
OI+1	0.0232***	-0.0658***	0.207***	0.571***	0.421***	0.0233***	-0.00267	-0.161***	0.0268***	-0.0262***	0.0590***	0.138***	0.330***	1	
NI+1	-0.0127*	-0.0624***	0.164***	0.413***	0.332***	-0.0185**	-0.0495***	-0.180***	0.0251***	-0.00912	0.0339***	0.0952***	0.237***	0.719***	1

Table 4

Univariate results: Entertainment Expense Before and After the Anti-Graft Law

This table presents the level of entertainment expense both before and after the anti-graft law enactment as well as the difference between the two. Panel A presents the results for various measures of entertainment expenses, including the dollar amount of entertainment expenses in KRW million, and entertainment expenses scaled by assets, sales, and SG & A expenses, respectively. Panel B reports the results separately for each quartile based on the level of government exposure (GE). GE represents the level of industry exposure to government spending calculated as the proportion of the industry's total output purchased by the government sector for final use.

Panel A. Various Measures of Entertainment Expense

ENT measure	Before	After	Difference	
	ANTIGRAFT=0	ANTIGRAFT=1	After - Before	(t-value)
Dollar amount of entertainment expense (KRW mil.)	97.700	81.900	-15.800	(-10.07)
Entertainment expense/assets [ENT] (%)	0.067	0.055	-0.011	(-10.94)
Entertainment expense/sales [ENT/SALES] (%)	0.494	0.464	-0.030	(-2.85)
Entertainment expense/sg&a [ENT/SGA] (%)	2.340	1.960	-0.380	(-12.57)

Panel B. Subsamples based on Government Exposure

GE (%)		ENT			
		Before	After	Difference	
		ANTIGRAFT=0	ANTIGRAFT=1	After - Before	(t-value)
GE Low	Quartile 1	0.056	0.049	-0.008	(-4.55)
	Quartile 2	0.067	0.055	-0.013	(-6.24)
	Quartile 3	0.054	0.047	-0.007	(-3.73)
GE High	Quartile 4	0.089	0.071	-0.018	(-7.14)
	4Q-1Q	0.033	0.023	-0.010	
	(t-value)	(17.34)	(9.59)	(-3.18)	

Table 5

OLS Regression

This table reports the results of OLS regressions of various firm performance measures on raw entertainment expense. ENT is the ratio of entertainment expense to total assets; OI is the ratio of operating income to total assets; NI is the ratio of net income to total assets; Tobin's q is the ratio of market value of assets to book value of assets; MBratio is the ratio of market value of common stock to book value of common stock. Detailed definitions of all other variables are provided in Table 1. T-values are reported in the parenthesis and are based on standard errors clustered at the firm level. ***, **. * indicate significance at 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	SALES	OI	NI	Tobin's q	SALES+1	OI+1	NI+1	MBratio
ENT	12.476***	-1.029**	-2.025***	13.635	10.405***	-1.024**	-1.257**	12.128
	(4.986)	(-2.297)	(-3.473)	(0.571)	(4.196)	(-2.310)	(-2.412)	(0.331)
ICF	-0.076***	-0.014***	-0.036***	1.266***	-0.057***	-0.004	-0.004	1.855***
	(-4.565)	(-4.382)	(-7.961)	(7.792)	(-3.518)	(-1.157)	(-0.994)	(7.184)
ATG	0.295***	0.069***	0.130***	0.237***	0.064***	0.034***	0.036***	0.480***
	(22.297)	(24.157)	(28.107)	(2.745)	(5.157)	(14.542)	(10.671)	(3.093)
RND	0.898***	-0.027	-0.047	14.633***	0.747***	-0.009	0.049	25.669***
	(3.225)	(-0.489)	(-0.695)	(5.185)	(2.655)	(-0.158)	(0.764)	(5.817)
ADPROMO	2.124***	0.170***	0.157***	8.148***	1.937***	0.164***	0.140***	13.425***
	(7.439)	(3.857)	(3.090)	(3.844)	(6.671)	(3.693)	(2.714)	(3.652)
LEV	0.111***	-0.027***	-0.053***	0.183**	0.105***	-0.023***	-0.037***	1.633***
	(9.205)	(-17.064)	(-25.524)	(2.423)	(8.500)	(-14.300)	(-18.822)	(11.484)
SIZE	0.005*	0.004***	0.006***	-0.120***	0.003	0.004***	0.005***	-0.232***
	(1.726)	(11.907)	(13.436)	(-6.457)	(1.266)	(10.947)	(11.999)	(-7.594)
Quarter dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,218	31,218	31,218	31,218	29,935	29,935	29,935	30,357
R-squared	0.269	0.180	0.254	0.261	0.229	0.127	0.126	0.259

Table 6

IV-2SLS Regression: Continuous Government Exposure

This table presents the 2SLS results, where entertainment expenses are instrumented by the pre-law enactment government exposure (GE), a continuous variable, and an indicator variable equal to one in the post-anti-graft period (ANTIGRAFT). ENT is the ratio of entertainment expense to total assets; GE is a measure of government exposure calculated as the proportion of the industry's total output purchased by the government sector for final use; OI is the ratio of operating income to total assets; NI is the ratio of net income to total assets; Tobin's q is the ratio of market value of assets to book value of assets; MBratio is the ratio of market value of common stock to book value of common stock. Detailed definitions of all other variables are provided in Table 1. Column (1) reports the result from the first stage of 2SLS. Columns (2) - (9) are the second stage results where various firm performance measures are regressed on the fitted values of entertainment expense obtained from the first stage. T-values are reported in the parenthesis and are based on standard errors clustered at the firm level. ***, **. * indicate significance at 1%, 5%, and 10% level, respectively.

VARIABLES	First Stage	Second Stage							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ENT	SALES	OI	NI	Tobin's q	SALES+1	OI+1	NI+1	MBratio
$\widehat{ENT}$		-0.708***	-0.104*	-0.199***	-2.809	-0.632***	-0.101**	0.069	-4.620
		(-3.598)	(-1.939)	(-2.602)	(-1.086)	(-3.432)	(-2.156)	(1.153)	(-1.097)
ANTIGRAFT x GE	-0.043***								
	(-2.614)								
ANTIGRAFT	-0.010***								
	(-5.585)								
GE	0.099***								
	(3.953)								
ICF	0.006	-0.072***	-0.013***	-0.035***	1.283***	-0.053***	-0.003	-0.004	1.884***
	(0.616)	(-4.301)	(-4.096)	(-7.566)	(7.840)	(-3.274)	(-0.919)	(-1.091)	(7.248)
ATG	0.078***	0.359***	0.076***	0.143***	0.462**	0.120***	0.041***	0.029***	0.843**
	(9.994)	(18.390)	(15.303)	(19.472)	(2.178)	(6.726)	(9.833)	(5.432)	(2.412)
RND	1.648***	2.274***	0.127	0.247*	19.485***	1.966***	0.140	-0.086	33.470***
	(6.851)	(5.337)	(1.155)	(1.716)	(3.742)	(4.795)	(1.397)	(-0.700)	(4.003)
ADPROMO	0.921***	2.889***	0.257***	0.323***	10.866***	2.617***	0.249***	0.065	17.806***
	(3.456)	(8.241)	(3.955)	(3.676)	(3.591)	(7.501)	(3.990)	(0.836)	(3.435)
LEV	0.015***	0.124***	-0.025***	-0.051***	0.228***	0.116***	-0.021***	-0.038***	1.705***
	(2.615)	(10.083)	(-14.623)	(-21.738)	(2.643)	(9.213)	(-12.311)	(-17.514)	(11.187)
SIZE	-0.024***	-0.015***	0.002	0.001	-0.191***	-0.014***	0.002	0.007***	-0.347***
	(-16.341)	(-2.771)	(1.208)	(0.751)	(-2.913)	(-2.735)	(1.254)	(4.599)	(-3.230)
Quarter dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,218	31,218	31,218	31,218	31,218	29,935	29,935	29,935	30,357
R-squared	0.216	0.265	0.179	0.253	0.261	0.226	0.126	0.125	0.259

Table 7

IV-2SLS Regression: Discrete Government Exposure

This table presents the 2SLS results, where entertainment expenses are instrumented by a discrete characterization of the pre-law enactment government exposure (GE) and an indicator variable equal to one in the post-anti-graft period (ANTIGRAFT). We create dummy variables for each quartile based on the level of government exposure (GE). GE is calculated as the proportion of the industry's total output purchased by the government sector for final use. ENT is the ratio of entertainment expense to total assets; OI is the ratio of operating income to total assets; NI is the ratio of net income to total assets; Tobin's q is the ratio of market value of assets to book value of assets; MBratio is the ratio of market value of common stock to book value of common stock. Detailed definitions of all other variables are provided in Table 1. Column (1) reports the result from the first stage of 2SLS. Columns (2) - (9) are the second stage results where various firm performance measures are regressed on the fitted values of entertainment expense obtained from the first stage. T-values are reported in the parenthesis and are based on standard errors clustered at the firm level. ***, **. * indicate significance at 1%, 5%, and 10% level, respectively.

VARIABLES	First Stage (1) ENT	Second Stage (2) SALES	(3) OI	(4) NI	(5) Tobin's Q	(6) SALES+1	(7) OI+1	(8) NI+1	(9) MBratio
$\widehat{ENT}$		-0.980***	-0.150***	-0.102*	-1.252	-0.632***	-0.069*	0.043	-3.018
		(-5.323)	(-3.405)	(-1.720)	(-0.734)	(-3.611)	(-1.740)	(0.791)	(-0.998)
ANTIGRAFT x GEQ4	-0.011***								
	(-2.881)								
ANTIGRAFT x GEQ3	0.002								
	(0.733)								
ANTIGRAFT x GEQ2	-0.001								
	(-0.228)								
ANTIGRAFT	-0.010***								
	(-4.706)								
GEQ2	0.015***								
	(3.836)								
GEQ3	0.014***								
	(3.488)								
GEQ4	0.029***								
	(5.814)								
ICF	0.006	-0.072***	-0.013***	-0.036***	1.272***	-0.054***	-0.003	-0.004	1.871***
	(0.553)	(-4.279)	(-4.066)	(-7.728)	(7.812)	(-3.325)	(-1.006)	(-1.032)	(7.212)
ATG	0.077***	0.379***	0.079***	0.136***	0.342**	0.120***	0.039***	0.031***	0.718***
	(9.997)	(20.108)	(17.947)	(21.470)	(2.308)	(6.660)	(10.280)	(6.001)	(2.681)
RND	1.754***	2.826***	0.217**	0.098	17.058***	2.034***	0.095	-0.048	31.160***
	(7.152)	(6.801)	(2.221)	(0.790)	(4.199)	(4.970)	(1.010)	(-0.401)	(4.603)
ADPROMO	0.892***	3.108***	0.295***	0.230***	9.385***	2.597***	0.217***	0.090	16.225***
	(3.312)	(9.158)	(4.925)	(2.954)	(3.762)	(7.659)	(3.650)	(1.191)	(3.758)
LEV	0.017***	0.129***	-0.024***	-0.052***	0.207**	0.117***	-0.022***	-0.038***	1.685***
	(2.812)	(10.474)	(-14.588)	(-23.054)	(2.543)	(9.261)	(-12.774)	(-17.382)	(11.378)
SIZE	-0.024***	-0.022***	0.001	0.004**	-0.153***	-0.014***	0.002**	0.006***	-0.309***
	(-16.375)	(-4.160)	(0.466)	(2.483)	(-3.307)	(-2.814)	(2.179)	(4.459)	(-3.789)
Quarter dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,240	31,218	31,218	31,218	31,218	29,935	29,935	29,935	30,357
R-squared	0.216	0.265	0.179	0.252	0.261	0.226	0.126	0.125	0.259

Table 8

Difference-in-Difference

This table presents the results of a difference-in-difference analysis where the treatment is the enactment of the anti-graft law and the treated group consists of those firms with more government exposure (GE) which are more likely to be affected by the law. We consider a continuous characterization of government exposure rather than a dichotomous characterization. ANTIGRAFT is an indicator variable equal to one in the post-anti-graft period; GE is the proportion of the industry's total output purchased by the government sector for final use; OI is the ratio of operating income to total assets; NI is the ratio of net income to total assets; Tobin's q is the ratio of market value of assets to book value of assets; MBratio is the ratio of market value of common stock to book value of common stock. Detailed definitions of all other variables are provided in Table 1. T-values are reported in the parenthesis and are based on standard errors clustered at the firm level. ***, **. * indicate significance at 1%, 5%, and 10% level, respectively.

VARIABLES	(1) SALES	(2) OI	(3) NI	(4) Tobin's q	(5) SALES+1	(6) OI+1	(7) NI+1	(8) MBratio
ANTIGRAFT x GE	0.033**	0.007*	0.010**	0.579***	0.028**	0.006	0.001	0.908***
	(2.280)	(1.809)	(2.011)	(2.839)	(1.981)	(1.595)	(0.328)	(2.782)
GE	-0.153***	-0.002	-0.012**	1.659***	-0.141***	0.000	-0.009*	2.667***
	(-6.734)	(-0.416)	(-2.518)	(6.578)	(-6.206)	(0.022)	(-1.830)	(6.216)
ICF	-0.065***	-0.014***	-0.037***	1.482***	-0.045**	-0.004	-0.006	2.227***
	(-3.536)	(-4.160)	(-7.796)	(8.209)	(-2.527)	(-1.262)	(-1.520)	(7.759)
ATG	0.300***	0.069***	0.129***	0.291***	0.068***	0.035***	0.036***	0.564***
	(22.246)	(23.584)	(27.366)	(3.263)	(5.343)	(14.275)	(10.643)	(3.498)
RND	0.426	-0.049	-0.094	20.519***	0.239	-0.046	-0.021	35.638***
	(1.456)	(-0.889)	(-1.454)	(7.713)	(0.818)	(-0.830)	(-0.325)	(8.322)
ADPROMO	2.105***	0.140***	0.100**	10.385***	1.924***	0.136***	0.110**	17.402***
	(6.693)	(3.432)	(2.168)	(5.192)	(6.007)	(3.310)	(2.432)	(4.948)
LEV	0.156***	-0.025***	-0.050***	-0.004	0.151***	-0.022***	-0.036***	1.256***
	(12.033)	(-16.592)	(-25.060)	(-0.054)	(11.373)	(-14.085)	(-18.942)	(9.045)
SIZE	0.001	0.004***	0.006***	-0.158***	-0.000	0.004***	0.005***	-0.288***
	(0.233)	(12.309)	(15.067)	(-9.691)	(-0.146)	(11.609)	(13.527)	(-10.398)
Quarter dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,218	31,218	31,218	31,218	29,935	29,935	29,935	30,357
R-squared	0.137	0.146	0.231	0.184	0.094	0.089	0.102	0.182

Appendix

Table A1

Distribution of Government Exposure (GE) by Industry

This table presents the distribution of government exposure measure (GE) for 61 industries from KSIC 2-digit industry classification. GE is a measure of government exposure which represents the level of industry exposure to government spending calculated as the proportion of the industry's total output purchased by the government sector for final use. Since the industry classification is different between KSIC and input-output account, some industries are subdivided into 3 digit to match codes of KSIC and input-output accounts.

INDUSTRY	KSIC CODE	GE
Manufacture of pharmaceuticals, medicinal chemical and botanical products	21	46.49%
Education	85	41.96%
Heavy and civil engineering construction	42	33.24%
Creative, arts and recreation related services	90	32.55%
Printing and reproduction of recorded media	18	22.73%
Manufacture of other transport equipment; except ships and boats	31	18.78%
Waste collection, treatment and disposal activities; materials recovery	38	18.11%
Mining of non-metallic minerals, except fuel	7	18.00%
Manufacture of other non-metallic mineral products	23	17.27%
Architectural, engineering and related technical services	74	16.64%
Rental and leasing activities; except real estate	76	16.47%
Building construction	411	16.31%
Research and development	70	12.71%
Information service activities	63	11.69%
Publishing activities	58	11.54%
Manufacture of wood and of products of wood and cork; except furniture	16	10.78%
Electricity, gas, steam and air conditioning supply	35	10.65%
Real estate activities	68	10.64%
Manufacture of medical, precision and optical instruments, watches and clocks	27	10.41%
Business support services	75	9.78%
Manufacture of fertilizers, pesticides, germicides and insecticides	203	9.51%
Manufacture of fabricated metal products, except machinery and furniture	25	9.16%
Business related professional services	71	9.01%
Food and beverage service activities	56	8.97%
Postal activities and telecommunications	61	8.63%
Manufacture of pulp, paper and paper products	17	8.44%
Remediation activities and other waste management services	39	8.02%
Other professional, scientific and technical services	73	7.38%
Land transport and transport via pipelines	49	6.83%
Sale of motor vehicles and parts	45	6.56%
Wholesale trade on own account or on a fee or contract basis	46	6.56%
Retail trade, except motor vehicles and motorcycles	47	6.56%
Mining of coal, crude petroleum and natural gas	5	6.54%
Manufacture of furniture	32	6.40%
Manufacture of basic metals	24	6.15%
Mining of metal ores	6	6.13%
Motion picture, video and television programme production, sound recording and music publishing activities	59	5.89%
Warehousing and support activities for transportation	52	5.79%
Air transport	51	5.70%
Manufacture of rubber and plastics products	22	5.66%
Broadcasting activities	60	5.62%
Computer programming, consultancy and related activities	62	5.52%
Manufacture of electrical equipment	28	5.33%
Manufacture of coke, briquettes and refined petroleum products	19	5.21%
Other manufacturing	33	5.04%
Fishing and aquaculture	3	4.88%
Agriculture	1	4.71%
Manufacture of glass and glass products	231	4.43%
Accommodation	55	4.35%
Manufacture of beverages	11	4.22%
Manufacture of food products	10	4.16%
Manufacture of chemicals and chemical products; except pharmaceuticals, medicinal chemicals, fertilizers, pesticides, germicides and insecticides	20	4.03%
Manufacture of textiles, except apparel	13	3.60%
Manufacture of wearing apparel, clothing accessories and fur articles	14	3.39%
Manufacture of other machinery and equipment	29	3.29%
Manufacture of leather, luggage and footwear	15	2.73%
Manufacture of motor vehicles, trailers and semitrailers	30	2.58%
Manufacture of electronic components, computer; visual, sounding and communication equipment	26	2.00%
Sports activities and amusement activities	91	1.70%
Water transport	50	1.39%
Building of ships and boats	311	1.27%

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