

# **Does lobbying of firms complement executive networks in determining executive compensation?**

## **Abstract**

In this paper we predict and find that the lobbying activities of firms can complement executive networks in determining executive compensation. Firms of all sizes, after considering market competition as a governance mechanism, prefer to consider lobbying as a means of networking along with executive level networking to determine executive compensation. The empirical implication of the study provides guidance to scholars who should consider lobbying along with executive networks in determining executive compensation. The composite theoretical underpinning and the importance of information flow through lobbying activities of firms will be an important insight for policy makers involved in determining executive compensation.

**Keywords:** Corporate Lobbying; Executive Compensation; Executive Networks; Behavioral Agency Theory

## 1. Introduction

A firm may engage in corporate lobbying<sup>1</sup> to enhance its competitive position, which enables the firm to enjoy better financial performance compared to their peers in the market (Chen et al., 2015). The executives'<sup>2</sup> interests and risk preferences to increase the value of the firms are different from the shareholders' views (Smirnova and Zavertiaeva, 2017). Thus, in empirical literature, we find mixed results about the effect of agency conflict on executive compensation<sup>3</sup> (Cambini et al., 2015). Equity, debt, inside debt, cost of debt etc. (Core and Guay, 1999; Coles et al., 2006; Anantharaman et al., 2013; Li et al., 2018) are mainly explained as incentives of compensation and are used to explain the relationship between compensation and firm performance (Matsumura and Shin, 2005; Firth et al., 2006). In another strand of literature, the importance of executive networks is widely discussed in determining executive compensation (Akbas et al., 2016; Renneboog and Zhao, 2014; Fracassi and Tate, 2012). Executives have opportunities to utilize their networks in order to create a better compensation portfolio (Renneboog and Zhao, 2014). With large networks, executives continue to stay busy with maintaining their prestige, career concerns, and visibility for their own benefits (Adams and Ferreira, 2008). Thus far, research has been separately conducted on the positive and negative impact of executives' connectedness and lobbying activities on firm performance without considering the unique characteristics of lobbying firms (Mathur et al., 2013; El-Khatib et al., 2015; Chen et al., 2015; Unsal et al., 2016). Thus, the literature related to determinants of executive compensation remains inconclusive, especially in lobbying firms.

To address the above gap, this study provides empirical evidence of lobbying and executive networks being complementary to each other and can better determine executive compensation, compared to individual, in the US lobbying firms. Using an unbalanced panel of 266 US lobbying firms for the period of 2005 to 2018, we find that lobbying and executive

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<sup>1</sup> Political activity could be of two types. Direct political activity refers to campaign contributions and indirect political activity is done through *lobbying*. As firms are not allowed to make direct contributions to political campaigns from the firm treasury, they usually form political action committees (PACs) to support candidates for elections. But there is no limitation for lobbying expenditure, which can be funded from the treasury of the firm. In this study we focus on lobbying activities only.

<sup>2</sup> Following Intintoli et al. (2018) and Rennebog and Zhao (2014), in the present study, we refer to chief executive officers, chief operating officers, chief finance officers, executive and non-executive directors, and any other board member as *Executive*.

<sup>3</sup> Refer to Variable Description (section 3.2) and Appendix A for definition.

networks complement each other in determining compensation in lobbying firms. In addition, we find similar results for lobbying firms of all sizes, and in particular, when the firms consider market competition as a governance mechanism.

The findings of the study provide the following insights in academia. First, this study incorporates corporate lobbying and executive networks as complementary in the model of executive compensation. Thus, we extend the studies on executive pay which have, until now, shown mixed results (Vo and Canil, 2019). Second, we extend the significant contributions of Unsal et al. (2016) and Broadman et al. (2019) by focusing on executive compensation for lobbying firms. Finally, we develop a composite theoretical framework by integrating the Behavioral Agency Theory and the Network Theory to determine executive compensation in lobbying firms which enriches the existing literature on the theoretical framework determining executive compensation (Pepper and Gore, 2015).

The detailed analysis reveals that lobbying can complement the executives' centrality, which can push forward the executives' understanding about the strength of their networks in lobbying firms and improve stakeholders' understanding of how to consider lobbying for the value creation of the firm without creating any negative externalities. The findings of this work provide important insight for firms' stakeholders and policymakers. Existing studies find that executives may strategically increase their compensation by taking advantage of the political connections of the firm whilst ignoring the interest of the shareholders (Ridge et al., 2018). However, our findings suggest that executives can consider themselves to be important stakeholders, and as such they try to reduce the agency cost by using their lobbying as complementary to their networks. In other words, the outcome of the paper allows policymakers to revise their policies related to executive compensation after considering, that executives can consider lobbying as another means of networking, and after carefully considering the interest of other stakeholders, they may allow lobbying activities for the value creation of the firm. Moreover, the policy makers might consider the restriction of lobbying expenditure as executives can use lobbying on top of their networks to inflate their compensation. In addition, the findings of the present study can help executives to understand better about lobbying and networking during a financial crisis<sup>4</sup>, and might change the way networking is used by executives to increase their compensation during difficult times.

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<sup>4</sup> Following Vo and Canil, (2019), we considered 2008-2011 as the time of financial crisis in this study

The remainder of this paper is structured as follows: In Section 2, we review the relevant literature and develop the testable hypotheses; in Section 3, we present the research methodology and identification strategy; in Section 4, we report our main findings and robustness test; finally, in Section 5, we conclude the study and indicate the limitations and scope for further research.

## **2. Literature Review and Hypotheses Development**

### *2.1.1 Executive Compensation*

The literature related to executive compensation shows evidence of several ways in which executives can interfere in the design of their own pay structure. The independent directors in the compensation committee cannot eliminate the executive's power in the pay-setting process (Bebchuk and Fried, 2004). The independent directors of the compensation committee enjoy benefits from their affiliation with the firm (Vo and Canil, 2019). Thus, there exists an agency problem, and we cannot find a definite conclusion in the literature about the impact of agency conflict on executive compensation (Cambini et al., 2015). In discussing executive compensation, researchers have controlled for various firm characteristics that can affect the firm's performance and in turn can determine executive compensation (Ghosh and Wang, 2018). However, firm's characteristics (e.g. firm size) alone are not able to determine executive compensation completely, as executives have a tendency to choose the compensation paid to their peers (Albuquerque et al., 2013). Beyond firm characteristics, prior studies have examined the influence of the state and the market competition in determining executive compensation (Shleifer et al., 1998; Giroud et al., 2011). External influence, for example political intervention, can influence the corporate governance mechanism which plays an important role in determining compensation (Chen et al., 2015; Pagano and Volpin, 2005). Without considering lobbying as a mechanism of networking, researchers are not able to fully explore the empirical relationship between executive compensation and the various possible factors affecting the complex compensation decision.

Moreover, the executive compensation literature mainly revolves around CEO pay, and concludes that CEOs apply their managerial power to generate excessive compensation compared to other executives in the firm (Bebchuk et al., 2011). Unique incentive alignment

issues are also discussed to explain the determinants of CEO pay (Tosi et al., 2000). By incorporating the firm's wealth generated by lobbying among executives, and the influence of their position in the network on their compensation, this study provides a better understanding about the determinants of executive compensation in a lobbying firm.

### *2.1.2. Corporate Lobbying*

The influence of corporate political activity on firm performance is not a new topic of discussion (see Fuller, 2014). In the inconclusive prior literature, we find evidence of positive and negative associations between political activity and firm performance (Faccio et al., 2006; Cooper et al., 2010; Hadani, 2012). Specifically, lobbying is considered as the most influential political activity that affects the legislation governing the corporate (Yu and Yu, 2011). In the US, firms spent more than \$3.3 billion on lobbying activities in 2012, which is nine times greater than individual attempts (Blanes I Vidal et al., 2012) to influence the policy maker (Kerr et al., 2014). The lobbying expenditures doubled between 2002 and 2017 after the continuous recognition by firms of the advantages of lobbying. (Kong et al., 2017).

The extant studies concerning the link between lobbying and firm performance find either a positive (e.g. Chen et al., 2015) or negative (e.g. Hadani, 2012), or no relationship at all (Ansolabehere et al., 2004). Usually, firm executives take the rational decision of lobbying to increase the profitability of the firm (Cao et al., 2018). Lobbying effects lower the effective tax rates in the following tax year (Richter et al., 2009), which increases revenue and decreases the corporative cost, with a positive effect on firm performance. In addition, firms also get benefits from international business permission and possess additional information about international trading policy through lobbying activities, which helps them to have better access to international market information, and such knowledge of detailed trading policy influences their performance in the global market (Kerr et al., 2014). Moreover, lobbying also positively affects financial performance by reducing various costs (Chen et al., 2015), and sometimes the lobbying network effectively helps the firm to avoid fraud (Yu and Yu, 2011).

The firm performance outcome affects the compensation packages of the executives (Devers et al., 2008; Akbas et al., 2016). Ideally, executives maximize the profit of the firm to act on behalf of the shareholders (Jensen and Meckling, 1976). However, very often it is observed that the executives' decision to engage in lobbying activities is taken at the expense

of the firm's benefits. Entrenched and incompetent executives tend to spend more on lobbying (Mathur et al., 2013; Min, 2016). When executives have personal benefits, they spend money for certain political causes that are not related to the betterment of the firm (Aggarwal et al., 2012). This decision to lobby made by executives can adversely affect the interest of the principals (TIAA-CREF, 2011, pg. 27). Thus, corporate lobbying can negatively affect the firm value and generate a higher agency cost (Borisov et al., 2016). The lobbying activities can make executives more powerful when they focus on their self-benefit at the cost of the firm's long-term interest. As executives apply their managerial power to influence the compensation committee to determine excessive compensation for themselves (Bebchuk et al., 2011), there is a high possibility that the power generated by their lobbying activities can be very important in their compensation determining process.

### *2.1.3. Executive Networks*

The literature related to executive networks provides strong evidence of the impact of executive networks on executive compensation (Engelberg et al., 2012; Renneboog and Zhao, 2014). High quality executives are part of large networks that reflect information, reputation, and experience, which allow executives to make operational and strategic decisions for the value creation of the firm (Braun et al, 2018). Such executives' networks are translated into higher compensation (Renneboog and Zhao, 2011). Executives' networks allow executives to take advantage of screened and trustworthy information which is required for the quality decision making of the firm (Fracassi, 2017). Executive networks can also create value for the firm when such networks are used for political favor (Faccio et al., 2006). According to the market-value paradigm, a compensation hike can be observed when the executive leverages the network connection in order to benefit the firm (Engelberg et al., 2012).

However, when the executives are in control of the compensation contracting process, then there exists an agency problem. Executives gain managerial power through their networks and can apply the skimming view (Bertrand and Mullainathan, 2001) to develop the compensation contract at the cost of the firm's long-term benefits (Conyon and Read, 2004). Moreover, internal networks among executives can enhance or diminish the monitoring quality and so can increase or decrease a firm's value and ultimately their compensation (Adams et al., 2008).

The social psychology and organization outcome related literature suggests that group decision-making tendencies and dynamics can significantly influence the group decision (Baron and Kerr, 2003). Zhu (2014) finds that outside directors on average tend to support relatively high CEO compensation decisions prior to and after the board discussions. Thus, the group of executives consider the market norms and their personal referents to make a judgment about their compensation (Pepper and Gore, 2015). Lobbying is one of the major strategic decisions taken by executives of firms. Lobbying of controversial firms can generate higher market value (Ghouma and Hewitt, 2019). Few systematic studies have been conducted to examine whether executive compensation decisions of firms undertaking lobbying will be influenced by the tendencies and dynamics of executive networks and their lobbying activities.

To understand how executives' skills, power, and influential position in the network hierarchy will influence the quality of information and trust within the networks, we follow Fogel et al. (2018) and use the centrality measure to empirically examine whether the position of the executive in the networks can influence their compensation. The centrality of executives reduces information asymmetries and positively influences a firm's financial policies (Fracassi, 2017). However, it is also evident that executive centrality can reduce the efficiency of corporate governance mechanisms and generate social liability when executives use their power in the networks to disseminate negative information (Grosser et al. 2010). However, we also find evidence of the positive impact of centrality during the last financial crisis (Lins et al., 2017).

Thus, the existing inconclusive literature discussing the relationship between executive networks and executive compensation (Renneboog and Zhao, 2011; Akbas et al., 2016) does not consider whether the findings can be applied to lobbying firms where the executives can use lobbying along with the position-based networks. The compensation structure might be different if the executives' lobbying activities act as an additional networking tool in the lobbying firms. Thus, in this paper we examine whether lobbying activities can act together with executives' networks to influence the executive compensation structure in lobbying firms.

## 2.2 Hypotheses Development

The most dominant theoretical framework to explain executive compensation is the Agency Theory (Bratton, 2005). Because of a lack of incentives for compensation, the agency problems are serious, and thus, few optimal contracts exist for many firms. In a lobbying firm it is difficult to determine the prominent incentive of the executives to engage in lobbying along with incentives for market competition (Giroud and Mueller, 2011) and mutual monitoring (Li, 2014). A lack of clear ideas about the above-mentioned incentives with tournament incentives (Coles et al., 2018), board governance (Core et al., 2006) etc. restricts the application of the Agency theory in determining the executive compensation in lobbying firms. Following Pepper and Gore (2015), we applied the Behavioral Agency Theory (hereafter BAT) for the theoretical description of the research question. In addition, executives of a firm can follow other executives in their networks, and by exchanging valuable cost-effective information in the networks, executives can enhance the wealth of the firm for the betterment of the shareholders and also fulfil their self-interest (Gomez-Mejia et al., 2003). However, it is not yet clear in the research whether the executives of lobbying firms use their positional power in determining their compensation along with lobbying activities. This specific nature of lobbying firms restricts us from applying other commonly used theoretical<sup>5</sup> frameworks in explaining the determinants of executive compensation. Moreover, the Agency theory argues that more powerful and entrenched management teams pursuing their personal interests may distort the positive link between corporate lobbying and value creation (Mathur et al., 2013). Thus, in this paper we use the Behavioral Agency Theory and the Network Theory to develop a composite theoretical framework to explain the research question.

According to the Agency Theory and the BAT, we assume that the executives are rational. Rational executives should allocate resources to lobbying activities to maximize firm performance and shareholder's wealth. The bounded rational behavior of the executives is discussed more clearly in the Behavioral Theory. The cognitive limitation of information processing is considered as a main reason for suboptimal choices of the executive's change in

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<sup>5</sup> Tournament theory (Lazear and Rosen, 1981), Political theories (e.g., Ungson and Steers, 1984), the Institutional theory, the Managerial-power theory (Bebchuk and Fried, 2004), Human Capital theory (Combs and Skills, 2003), Fairness theory (e.g., Wade, O'Reilly, and Pollock, 2006) etc.

attention towards self-interest rather than their objective of value maximization of the firm. However, lobbying activities provide opportunities for executives to reduce the information processing cost (Unsal et al., 2016), and accordingly executives can trade-off between intrinsic and extrinsic motivation related to value maximization (Frey and Jegen, 2001; Sliwka, 2007). Executives take risks not only for maximizing shareholders' wealth, but also to gain competitive advantage over their peers, which allows them to pursue their strategic objectives (Sila et al., 2016; Hughes and Turrent, 2019). The Agency Theory is quite limited in determining a definite link between executives' pay and firm performance (Tosi et al., 2000; Frydman and Jenter, 2010). Executives are loss averse and their risk preferences are context dependent (Martin et al., 2015); thus, to overcome the shortcomings of the Agency theory we apply the BAT theory in this study to capture the prominent incentive of the executives to engage in lobbying, and to determine how such lobbying activities allow the executives to pragmatically determine their compensation contract with the principal.

The Network Theory states that executives collect unpublicized information through their networks and apply this information in their strategic decision making (Renneboog and Zhao, 2011), and thus executives' connectedness is an important predictor of firm performance (Chuluun et al., 2017). Past or current professional connections can help executives to determine the quantity and quality of diverse information they can access through their networks (Engelberg et al., 2012), and can apply this information to generate growth in the annualized return when they are involved in various informed trade activities (Akbas et al., 2016). The network generated information allows executives to gain competitive advantage over their peers and enhance the quality of monitoring by the directors (Francoeur et al., 2019). Reducing the cost associated with trade transactions and executives' involvement in increasing firm profitability positively impacts their compensation (Larcker et al., 2013; Fracassi and Tate, 2012). However, executives' networks can be negatively related to firm performance (Fracassi and Tate, 2012). Poor firm performance will lead to negative executives' compensation (Renneboog and Zhao, 2011). As lobbying firms closely follow each other, there is a high possibility that when executives of lobbying firms engage in networking, their performance will follow the same trend (Chen et al., 2015). High reliance on lobbying peers might reduce the quality of information exchanged among the executives, leading to a poor performance of the firm, which will in turn negatively affect the executive compensation (Lockhart and Unlu, 2018).

The centrality is widely used in the literature of executive networks to measure executives' ability to obtain information, how powerful an executive is in commanding others, and how executives can influence the strategic decision-making process of a firm (Crespi-Cladera and Pascual-Fuster, 2015; El-Khatib et al., 2015; Renneboog and Zhao, 2011). As executives can influence the compensation structure decision taken by the compensation committee (Vo and Canil, 2019), it is important to use centrality measures to identify the power of the executives' networks' generated information (Horton et al., 2012). Thus, we argue that the complementary relationship between lobbying and executive networks is prominent in lobbying firms, which is conceptually superior to the previous findings. To fill the gap in the academic literature related to the importance of corporate lobbying and executive networks as a determinant of executive compensation, we propose the following hypothesis:

*H1: Firm's lobbying complements executive networks in determining their compensation.*

### **3. Methods**

#### *3.1 Sample*

We collect data on the lobbying expenditure of US firms available in the Centre for Responsive Politics database (hereafter CRP) for the period between January 1, 2005 and December 31, 2018. Based on the lobbyists' semi-annual filed reports, CRP has lobbying information from 1998 onwards and contains information on corporate lobbying expenditures, the numbers of bills lobbied, and the numbers of issues lobbied in different industries (Burnett et al., 2018). CRP also maintains a publicly accessible database on lobby expenditure at OpenSecrets.org. Due to the complex nature of the channels and levels of political activities, in some of the sample periods we cannot find information on corporate lobbying expenditures. To avoid reducing the sample size, we do not drop the missing observations. Instead, when information on some lobbying expenditure is missing, we assumed there were no lobbying activities for that particular year (see Cao et al., 2018).

Executive compensation and executive network information of these lobbying firms are obtained from the BoardEx database<sup>6</sup>. BoardEx is an established source for executive information and is used extensively by researchers to measure executive networks and

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<sup>6</sup> Where unavailable, the data is complemented by Bloomberg database

compensation (Unsal et al., 2016). The database also contains information on executives' characteristics. Information on executive compensation packages is often missing or incomplete for some executives because these executives do not receive every component of compensation. For each fiscal year during the sample period, we collect data concerning salary, equity linked compensation, and bonuses, as well as the total compensation on all the available executives for each of the lobbying companies. Information on network ties is also missing or incomplete because the BoardEx database does not include all relevant executives. To avoid reducing the sample size, we followed the literature and decided not to drop the missing observations (Khanna et al., 2015). Instead, when the information is missing or incomplete for executive compensation or network ties, we assume that there is no change in the compensation or that there is no tie for the networks (Renneboog and Zhao, 2011). For each fiscal year of the sample period, we collect demographic information on each of the firm's executives, including information regarding their gender, age, role in the board, and tenure. In addition, the BoardEx also provides information about the connected executives of our sample firms. This information helps us to calculate the network centralities of these directors. The financial data of these firms is merged with the data from Capital IQ. Our final sample consists of an unbalanced panel of 5,128 firm-year observations, covering relevant information on 1,322 executives from 266 US (excluding SIC 6000-6999) lobbying firms for 2005-2018.

### *3.2 Variable Description*<sup>7</sup>

#### *Executive Compensation*<sup>8</sup>

The *Total Compensation* of executives is the sum of the components used to define executive compensation (such as Salary, Bonus, Equity-based compensation and various other forms of compensation including retirement plan, personal benefits etc.). *Salary* is a fixed and cash based annual payment. A *Bonus* is unfixed and a cash or shares based annual payment, which is based on specific targets or benchmarks achieved by executives. *Equity* is based on the estimated annual value of shares or options awarded to executives. The variable, *Total Compensation* (*Salary*, *Bonus* or *Equity*-based compensation), is the natural logarithm of one

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<sup>7</sup> For detailed variable definitions, see Appendix A

<sup>8</sup> For a detailed definition of the sub-categories of compensation, see Renneboog and Zhao (2011), section 4.3

plus total compensation (*Salary, Bonus or Equity*-based compensation) as reported in the BoardEx database<sup>9</sup> for a firm in a given year.

### *Corporate Lobbying*

We follow Duchin and Sosyura (2013) for the proxy of corporate lobbying activities and choose annual *lobbying expenditure*, which is the expenditure equal to the US dollar amount spent by firms in lobbying activities. Lobbying information is obtained from the CRP<sup>10</sup>. In addition, the CRP database includes detailed information about the number of bills lobbied, the number of issues lobbied, the total amount spent on lobbying, and the lobbying target (US House or US Senate), which makes this database widely used in literature.

### *Executives' Network Centrality*<sup>11</sup>

To examine the influence of the position of an executive in the network we use the common measures of centrality—degree, eigenvector, closeness, and betweenness centrality (El-Khatib et al., 2015). These centrality variables measure the level of direct and indirect connectedness of an individual executive. *Degree* measures all the direct links of executives in the networks with other executives and thus, it counts an executive's number of adjacent or direct connections to colleagues sitting of the same board. *Eigenvector* measures how important an individual is in the network. *Closeness* measures the number of steps that an executive need to take within their networks to reach another executive. This variable can capture the connection of executives to highly influential executives. *Betweenness* determines the shortest paths linking two executives in the networks and thus, is recognized as the most effective measure, capturing the absolute position of an executive in the networks. These measures consider the extent to which an individual is linked with other highly linked individuals. The degree and eigenvector centralities are considered to be the direct connectedness, whereas closeness and betweenness centralities are considered to be indirect connectedness of the information gathering potential of a director (see Renneboog and Zhao, 2011). We include all four centrality variables in our regression models by normalizing them with the size of the entire network in each year.

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<sup>9</sup> Where unavailable, the data is complemented by Bloomberg Database

<sup>10</sup> For lobbying information see [www.opensecrets.org/lobbying](http://www.opensecrets.org/lobbying).

<sup>11</sup> Directors' historic employment can help them form networks. We argue that our centrality measurement can capture this fact. The information regarding historic employment information includes the firms in which they worked, their roles, role descriptions, and years of employment.

### *Firm- and executive-specific control variables*

We include several firm specific control variables in our estimations that may influence the relationship between executives' compensation, corporate lobbying, and executives' networks. We control for both executive and firm level variables. To control for executive characteristics, we use executive *age*, *tenure* (number of years since the executive joined the firm), *female* (dummy equals 1 if the executive is female, 0 for male), and *duality* (if the executive of the board serves as a chairman or chairwoman of the board). For the firm level controls, we include *firm size* calculated as a natural logarithm of net assets (Li, 2014)<sup>12</sup>, *ROA* (return on assets- *measured as the ratio of net income and total assets*), *Board Size* (total number of executives on the board), and *free cash flow* (calculated as the ratio of operating income before depreciation, minus total income tax, minus capital expenditure and total assets), leverage (debt divided by equity), and *MB* (market to book calculated as the market value of equity divided by the book value of equity). Following Giroud and Mueller (2001), we use *market competition* to control for the possible channels of governance mechanism.

[Insert Table 1a and 1b here]

### *3.3 Descriptive Statistics*

Table 1a presents the descriptive statistics for the above-mentioned variables. The table shows the mean values of Total Compensation is 4.881, whereas the mean of Salary, Bonus, and Equity are 4.7719, 6.5494, 6.9927 and 3.6169 respectively. The mean and standard deviation of Corporate Lobbying is 16.1096 and 2.6968, which is consistent with the literature (Renneboog and Zhao, 2011). The mean values of *Degree*, *Eigenvector*, *Betweenness* and *Closeness* are 0.0029, 0.0028, 0.0033 and 0.0029, respectively. The above-mentioned centrality measures are based on executives in a particular financial year. To compare the centrality measures between years, following Goergen et al. (2019), we scale the executive level raw score by annual executive network size. The estimation indicate that executives have large networks, which is consistent with El-Khatib et al, (2015). Overall, the descriptive statistics of executives' centrality measures are in line with recent studies (e.g.,

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<sup>12</sup> We also use firm size calculated as natural logarithm of total assets (Cheng et al, 2014). Our regression results remain unchanged.

Miranda-Lopez et al, 2018). The mean value of the *firm Size* indicates that most of the sample firms are big firm. The control variables show that the sample firms demonstrate normal operating performance. The mean of the governance variables, e.g. the *Board Size* and others are consistent with literature (Balsam et al, 2017). Table 1b presents the yearly number of firms and related industries. We use Fama-French 49 industry classifications based on 4-digit SIC code. We also report the yearly compensations. It shows increase of compensation during 2009-2014. We also check (untabulated) the multicollinearity of our variables and the variance inflation factor shows no serious issue with the multicollinearity.

[Insert Table 1c here]

We report the correlation matrix of our main variables in Table 1c. Importantly, all the centrality variables are positively correlated with each other which indicates that executives use two or more centrality networks simultaneously. The centrality is also positively correlated with the lobby variable.

### 3.4 Identification Strategy

In this section, we test whether corporate lobbying and executives' centrality position in their networks affect their compensation. As there exists a hierarchy of levels where the executive compensation is affected by executives-and firm-level characteristics, we use multilevel mixed-effects models to capture the executive and firm specific impacts including the lobbying activities on compensation package of executives. The Breusch and Pagan Lagrangian multiplier test rejects the null hypothesis of absence of unobserved heterogeneity. To address any unobserved heterogeneity we use industry and year fixed effects.

So, for the baseline models, we use the following equation:

$$\begin{aligned}
 & \text{Compensation}_{ijt} \\
 &= \beta_0 + \beta_1 \text{Lobby}_{jt} + \beta_2 \text{Net}_{it} + \sum \beta_3 \text{Exec\_Characteristics}_{it} \\
 &+ \sum \beta_4 \text{Firm\_Characteristics}_{it} + \alpha_i + \varepsilon_i + \nu_{ijt} \dots \dots (1)
 \end{aligned}$$

Where,  $Compensation_{ijt}$  is the salary, equity, bonus and total compensation<sup>13</sup> (proxy for executive compensation) of executive  $i$  of firm  $j$  in year  $t$ ,  $Lobby_{jt}$  is the lobbying expenditure for firms  $j$ ,  $Net_{ijt}$  is the vector of executive's centrality variables – degree, eigenvector, closeness and betweenness.  $Exec\_Characteristics_{it}$  is the vector of executive traits such as age, tenure, gender and duality,  $Firm\_Characteristics_{it}$  is a vector of firm level controls such as ROA, market-to-book, firm size, board size, market competition, leverage, and free cash flow.  $v_{ijt}$  is the error terms, and  $\alpha_j$  is the firm-specific fixed effects, and  $\varepsilon_i$  is executive-specific fixed effects.

[Insert Table 2 about here]

#### **4. Empirical results**

##### *4.1 Corporate lobby, executive's networks and compensation*

Table 2 Column 1-4 presents our baseline models using ordinary least square (OLS) with firm level clustered standard errors. The dependent variable is total compensation. Following Renneboog and Zhou (2011), we define direct network as normalised degree and eigenvector centralities and indirect networks as normalised betweenness and closeness centralities. We regress these two types of networks of executives on the total compensation. The coefficient for degree centrality is negative and significant at 5% level. However, the eigenvector centrality is not statistically significant. On the other hand, the betweenness and closeness centralities – the measure of indirect network- is positive and statistically significant. Since, both firm characteristics and executive characteristics can influence executive's compensation, we use multilevel mixed models to estimate the effect of direct and indirect networks on total compensation. Columns 5-8 of Table 2 shows negative and significant coefficient of degree centrality and positive and significant coefficient of closeness centrality. A stronger positive coefficient for closeness centrality implies that information transmitted throughout the entire network of executives influence more to increase their compensation than the first-hand information through degree centrality.

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<sup>13</sup> In most of our models, we use total compensation as a proxy for executive compensation because, the total compensation reflects broad consequences of managerial rent extraction (Hoi et al. 2019).

In Table 3, we include lobby expenditure as a proxy for corporate lobby as well as the interaction terms of corporate lobby and executive network variables. In particular, we use the following specification:

$$\begin{aligned}
 & \text{Compensation}_{ijt} \\
 & = \delta_0 + \beta_1 \text{Lobby}_{jt} + \delta_2 \text{Net}_{it} + \delta_3 \text{Net}_{it} * \text{Lobby}_{jt} \\
 & + \sum \delta_4 \text{Exec\_Characteristics}_{it} + \sum \delta_5 \text{Firm\_Characteristics}_{it} + \alpha_i + \varepsilon_i \\
 & + v_{ijt} \dots \dots \dots (2)
 \end{aligned}$$

Where, the coefficient,  $\delta_3$  determines that effect of the interaction term between Lobby and executive network. The table shows that the lobby expenditure is positive and statistically significant at 1%. This indicates that executives use corporate lobbying for their compensation benefits. The coefficient of interaction term of degree centrality and lobby is negative and statistically significant at 5% level. Similar to previous results, the coefficient for the interaction term of closeness and lobby remains positive and significant. In addition to total compensation, we also use salary (Column 7) and equity (Column 8) compensation as dependent variables. We get the similar results. However, the relative magnitudes of coefficients for centralities in Table 2 and coefficients of interaction terms of centrality and lobby in Table 3 can provide significant information. They show that the centrality alone has larger effects on compensations. In addition, the positive and statistically significant coefficients of the interaction terms of closeness and lobby, thus, indicate that executives may use all these connections in right time to get valuable information associated with compensation when lobbying expenditure is increased. Thus, the above information helps the firms to enrich lobbying which in turn will assist the executive to have a better structure of their compensation.

Prior studies find that executive's networks centrality is mainly used to improve firm's performance (such as, Chuluun et al, 2017). These studies argue that executives use their power of network to get crucial and non-public information about competitors and thus, make investment in profit generating projects leading to higher firm performance and compensation. But generating profit from the investment is a long-term initiative which might not allow the executives to prove their efficiency in short term. Moreover, for building reputational capital executives may change their employer to get involve in larger lobbying network that might affect our results. So, to establish our predictions related to the

relationship of executive's lobbying and networks and their compensation in lobbying companies, we need further empirical investigation addressing possible problems in our model. The robustness of the results is confirmed in the next sections.

[Insert Table 3 here]

The results for control variables in Table 2 and 3 indicate that firms with high level of ROA and Leverage may want to invest their earnings more on different projects rather than increasing the compensation of executives. Statistically significant and negative coefficient of firm size and board size in these models of Table 3 indicates that when executives have responsibility in larger lobbying firms, their total compensation decreases. The reason can be executive's pay-for-performance can help them to get involved in more lobbying activities (Ferrell et al, 2016), which in return decreases their total compensation. These findings are consistent with the literature (Unsal et al., 2016). Moreover, while executives age has a negative effect on their compensation, their tenure affects their compensation positively.

[Insert Table 4a here]

#### *4.2 Addressing endogeneity and robustness tests*

In our hypotheses, we predict two causal explanations in Equation 1 for  $\beta_1 > 0$  for Corporate Lobbying and  $\beta_2 < 0$  network Centrality, wherein executive's network- from current employment and positional advantage in a network - to influence their compensation in lobbying firms. However, the results in support of our hypotheses shown in Table 2 and 3 can be weaker in the absence of persuasive instruments and proper estimation addressing potential endogeneity. In a complex relationship there is a high chance of endogeneity problems so in this paper we address important endogeneity issues that can affect the above-mentioned complex relationship between lobbying, executive networks and executive compensation (Li, 2016). In the next section, we address this with several specifications.

[Insert Table 4b here]

#### *Addressing reverse causality*

The statistical inference in prior studies related to corporate lobbying, may be erroneous if the results are attributable to reverse causality. Executives may be interested in lobbying

activities or develop a bigger network quickly compared to others when they remained successful with similar activities in their earlier employment. There is a possibility that these executives would manage to get positive outcome from the lobbying activities in their firms and thus, we may observe a positive relation between their compensation and lobbying and a negative coefficient for networks variables. The common practice to mitigate the problem of reverse causality is either to regress the dependent variable on lagged or lead values of independent variable (Faleye et al, 2014). When it is assumed that the previous success story of the executive is predetermined, we observe the use of lagged value. Moreover, the assumption behind the lead dependent variable is that higher executive compensation can motivate executive to get engaged in corporate lobbying or to expand their networks (Smirnova and Zaveriaeva, 2017). However, we cannot use lead/ lag values of independent variables because for many firms the observations are consistently available for few years and in some cases with a big gap of years.

Thus, to address the potential endogeneity arising from reverse causality, we use two-stage least square (2SLS) estimation with the following instruments (a) the distance between a firm's headquarter and Washington DC (b) blue state and (c) nationality mix. We choose the first instrument measured as the distance of between firm's headquarter and Washington D.C. because closer the firms headquarter from Washington, easier for the firms to access the policy makers. Thus, direct access to Washington can substitute the need for lobbying services (Lockhart and Unlu, 2018). So, there is no reason to justify that this instrument is strongly related to lobby variable, but not with the compensation. Following Rubin (2008), we use Blue States as one of the instruments for the lobby variable, since Rubin (2008) show that political decision of a firm is stronger if the firms headquarter is located in the Blue States. Hoi et al (2019) suggest that cultural background of people can influence their behaviour. Algan and Cahuc (2010) also show that parent's attitudes are good predictors of attitudes of children. So, as culture is likely to transmit across generations, and executives can be influenced by the cultural preference, the nationality of executives can be a valid instrument. Our instrument is exogenous with the error terms as well as no direct relationship with executive compensation. The location of the firm in a blue or red state can be directly correlated to the lobbying activities of the firms. Similarly, we use nationality mix (measured as the annual proportion of executives of a firm from different countries, as provided by the BoardEx) as an instrument for executive centrality. The Cragg and Donald (1993) instrument relevance test confirms a high correlation between our chosen instrumental variables.

Moreover, Sargan (1958) overidentification test also confirms no significant correlation between the instrumental variables and error terms of our model. In addition, the R-squared and F-statistics prove the goodness-of-fit of the first stage regressions. In the first stage, we include all the control variables used in the previous regressions and regress the instruments on corporate lobbying and network centralities. In the second stage of the 2SLS estimation, we include the fitted value of lobby and centralities in Equation 1. Table 4a and 4b show that the coefficients of Corporate Lobbying are statistically significant as expected and support the hypothesis.

[Insert Table 5 here]

#### 4.3 *Robustness Tests*

In the above-mentioned section, we try to test the relationship between corporate lobbying and executive compensation as well as the relationship between executive networks and executive compensation, addressing the reverse causality. However, our inference can be incorrect if there exists any omitted variable bias stemming from the lobbying decision. As our sample firms are those firms that choose to lobby, there is also a possibility that similar variables are likely to influence the executives in the treatment group (i.e. the firms choose to lobby) and their outcome, i.e. their expenditure in lobby. This selection bias can be addressed by Heckman two-step methodology. In the first stage, we use a probit model to estimate the effect of all other control variables on the propensity to lobby (measured as a dummy variable equal to 1 if the firm lobbied on any issue in the previous years, 0 otherwise). The estimated propensity, i.e. the inverse Mill's ratio, is then included in our pooled OLS model (Equation 1) in the second stage to control for self-selection bias. The results are reported in Table 5. All control variables are included but not reported for brevity. The coefficients remain qualitatively similar as our expectations. This shows evidence that corporate lobbying acts as an important determinant of executive compensation when compared with the influence of executive networks in determining the compensation.

[Insert Table 6 and 7 here]

#### *Alternative measure of centrality and network*

We measure our executive centrality in two different ways. Our network centralities – degree, eigenvector, betweenness and closeness are based on the executives who share the same board. So, our measures are inward facing. However, executives may also be connected

through past employment and education. BoardEx provide a variable called *network size* that takes care of executive's outward-facing connections. Following Ferris et al. (2017) we use the natural logarithm of one plus the BoardEx network size and estimate our model by 2SLS with blue state and nationality mix as instruments. We present our results in Table 6. The first stage regression shows the validity of our instruments. In the second stage, we see that the coefficients remain qualitatively similar. In addition, we also use alternative measure of corporate lobby as the number of issues the firms lobby in each year. The results remain unaltered.

In our next attempt, we calculate centrality by principal component analysis and based on the eigenvalue (greater than 1) we retrieve only one factor. We interacted this variable with the industry-adjusted centrality measures. The results are reported in Table 7. The coefficients are as our expectations and support our main results.

In the extant literature, researchers argued that one of the reasons for financial crisis is excess executive compensation (Adobor, 2006). In some firms, there was a huge drop in the executive compensation as the firm performance was badly affected by the financial crisis (Vo and Canil, 2019). After financial crisis companies have tighten their corporate governance mechanisms related to executive compensation. Thus, we exclude years representing financial crisis (2008-2011) from our data and run the same models (untabulated). In all specifications, we get similar results.

[Insert Table 8 here]

#### *Results from propensity score matching*

Firm size plays an important role in deciding the lobbying and executive's compensation (Dang et al., 2018). Nevertheless, the network of the executives also becomes endogenous in this case. In this section, we consider whether our results are influenced by the firm size, as in our main results the coefficients for firm size show strong and statistically significant. We generate a dummy variable equal to 1 if the firms are above the median, 0 otherwise. Thus, if we consider larger firms (when firm size above median) as our treatment group, we can apply propensity score-based methods to achieve covariate balance in treatment and control groups. Rosenbaum and Rubin (1983) argue that if firms (e.g. larger firms), receiving a treatment, can

share as many features as possible with non-treated firms (e.g. smaller firms), and these firms' between outcome comparisons may not be affected by self-selection. Following Imbens and Wooldridge (2007) we use inverse probability of treatment weighting (IPTW). In this method, observations with characteristics that result in high likelihood of treatment are down-weighted in the large firms and firms with low likelihood of treatment are down-weighted in smaller firms. Thus, we create a weighted sample to estimate the models. Table 8 reports the results of IPTW procedure. We find that the effect of network and lobby on compensation remains unaltered even after controlling for the covariate differences between larger and smaller firms.

[Insert Table 9 here]

### *Market competition and effects on executive compensation*

In this section we try to understand through which channel the lobbying and network can affect the executive compensation. Following Giroud and Mueller (2011), we test whether the market competition as a channel of corporate governance mechanism can influence our results. In Table 9, we report our regression results. The market competition (MC) is measured as the sum of squared market shares<sup>14</sup>. MC (Low) and MC (Medium) are dummies indicating whether these dummies lie in the lowest or medium tercile of their empirical distribution respectively (highest tercile is not included in the model multicollinearity as it becomes reference for the other two terciles). In Table 9, we interacted these MC dummies with lobby, degree (for direct network) and closeness (for indirect network). We also included MC dummies as additional control variables in our regression models. The eigenvector and betweenness are also tested in the same way (no reported for brevity, as the results are similar). In Column 2, we find that the interaction term between lobby and MC (Low) remains positive and significant. It implies that in higher market competition (low MC), increasing lobby expenditure can increase the compensation. When we use the interaction terms with medium MC, the coefficient is still positive but statistically insignificant. Similarly, the direct network (i.e. Degree) changes its sign when interacted with higher market competition. On the other hand, we see that the interaction term for indirect network (i.e. closeness) remains insignificant in highest market competition (low MC), and it changes sign in medium market competition with a negative and statistically significant

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<sup>14</sup> see Giroud and Mueller (2011, page 568-569) for more details.

coefficient. It implies that executives try to increase their compensation in high to medium competitive industries through lobbying or networks or both. Our results are consistent with Murthy and Salter (1975). They argue that, executives' rewards are strongly related to their financial performance only in firms in a highly competitive industry. It means executives may find different other ways to increase their compensation. So, lobby and networks may be few of those way.

## **5. Conclusion**

In this paper, we find that lobbying complements executive networks to determine the executive compensation of lobbying firms. Through lobbying, executives can influence regulations and policies which can generate significant profits for the firm. Involvement with lobbying keeps the executives informed about regulatory changes and puts them in an advantageous position with timely information generated through their political ties. The benefits accrued from lobbying make the executives more powerful in their compensation structure determination process (Henderson, 2011). However, executives can also engage in lobbying to support political causes that could be tied up with their personal benefits (Cao et al., 2018), allowing them to earn higher compensation (Unsal et al., 2016). We address the conflicting perspective in the existing literature concerning the influence of lobbying on executive compensation. In examining the above relationship, we consider the other strand of literature in which the researchers prove that executive networks can influence executive compensation. Very little is known though, about how the executive networks mechanism can be used with lobbying to determine executive compensation, especially in lobbying firms. As lobbying expenditure can be endogenous to firm characteristics, the empirical results can be spurious. After explicitly controlling for endogeneity, firm size, and market competition as governance mechanisms, we find that executives' compensation is jointly influenced by corporate lobbying and executive networks. The findings suggest that lobbying firms mitigate the agency problem by offsetting the executive's excess compensation with the expenditure incurred for lobbying. Another contribution of our study is that, we consider the Behavioral Agency Theory and the Network Theory to explain the incentive and the power of reducing information asymmetry through the executives' engagement in lobbying. In addition, we also observe a positive influence of lobbying on executive compensation during times of financial crisis. In summary, our results highlight the fact that to determine executive compensation, it is essential to discuss the benefits that firms can draw from lobbying and the networking

activities of their executives. This is the first study that thoroughly examines the influence of corporate lobbying and executive networks on executive compensation. To test this relationship, we use 266 publicly listed US companies between the period of 2005 to 2018. The results remained the same after the robustness test, including specifications for endogeneity and omitted variables.

The empirical findings of this paper contribute to the academic literature related to executive compensation, executive networks, and corporate lobbying. The results will be of interest to firms' executives as they will better understand when to get involved in lobbying and how to use the lobbying generated information to influence their compensation structure. The principals and the other stakeholders such as corporate activists and regulators should pay attention to lobbying activities along with executive networks in framing the rules and regulations related to the determination of executive compensation in a lobbying firm.

This study is not without limitations. We use US lobbying firms based on the availability of data; however, considering other countries which practise lobbying activities would be an interesting study in the future. Text analysis of qualitative information related to political activities can generate more useful information to determine executive compensation. Additional information on components of compensation and the influence of other types of political activities on lobbying can improve the findings. The mutual monitoring among executives (Li, 2018) and their networks will also be interesting to examine. We expect the results of this study to motivate additional research on the determinants of executive compensation of firms involved in political activities, which may provide a more complete understanding of the effects of executives' political activities and the impact of it on their compensation.

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## Appendix A: Variable Description

Variables	Description	Source
<b><u>Executive Compensation</u></b>		
Total Compensation	Natural logarithm of one plus total compensation of an executive in a given year	BoardEx
Salary Compensation	Natural logarithm of one plus fixed and cash based annual payment for an executive	BoardEx
Bonus Compensation	Natural logarithm of one plus unfixed and cash or shares based annual payment, which is based on specific targets or benchmarks achieved by an executive	BoardEx
Equity Compensation	Natural logarithm of one plus annual value of shares or options awarded to an executive	BoardEx
<b>Lobbying</b>		
Corporate Lobbying	The lobbying expense that firms spend for lobbying activities and are collected yearly.	Centre for Responsive Politics (CRP)
<b>Executive Centrality<sup>15</sup></b>		
Degree	All the direct links of executives in the network with other executives	Authors' Calculation
Closeness	The number of steps that an executive need to take within their network to reach another executive	Authors' Calculation
Betweenness	The shortest paths linking two executives in the network	Authors' Calculation
Eigenvector	The importance an individual is in the network	Authors' Calculation
<b>Control Variables</b>		
<i>Executive Characteristics</i>		
Age	Age of executives	BoardEx
Female	Dummy: 1 if the executive is a female, 0 if male	BoardEx
Tenure	Number of years since an executive has been an executive for the firm	BoardEx
Duality	Dummy: 1 if executive of board serves as a chairman or chairwoman	
<i>Firm Characteristics</i>		
Firm Size	The natural logarithm of net assets (Net assets= total assets – cash and short-term investments)	Capital IQ
ROA	The ratio of net income to total assets	Capital IQ
MB	Market to Book = Market value of equity /Book value of equity	
Leverage	(Long-term debt + Current Liability)/ (Total Assets – Book value of equity and market value of equity)	Capital IQ
Board size	Total number of executives on the board	Capital IQ
Free Cash Flow	(Operating income before depreciation- Tax-Capital Expenditure)/Total Assets	Capital IQ
Market Competition	The sum of squared market shares (Giroud and Mueller, 2001)	Capital IQ
<i>Instrumental variables</i>		
Distance	The mile distance between a firm's headquarter and Washington DC	Cao et al., 2018; Capital IQ
Blue state <sup>16</sup>	Dummy variable: 1 if a firm's headquarter is located in a blue or democratic state and 0 otherwise	wikipedia.com and azpundit.com
Nationality Mix	Yearly proportion of executives from different countries	BoardEx

<sup>15</sup> The data for each executive and connected executives is obtained from BoardEx. Wherever unavailable, we manually collect the information from Bloomberg.

<sup>16</sup> [http://en.wikipedia.org/wiki/File:Red\\_state,\\_blue\\_state.svg](http://en.wikipedia.org/wiki/File:Red_state,_blue_state.svg) (a state is a blue state if it is listed as a blue state (for details see Deng et al. 2013)).

**Table 1a: Descriptive Statistics**

The descriptive statistics is based on the 266 non-financial US firms between 2005-2018.

	Obs.	Mean	Median	Std. Dev	4 <sup>th</sup> Quartile
<b><i>Executive Compensation</i></b>					
Total Compensation	5044	4.881	4.7095	1.8937	6.3869
Equity Compensation	4316	6.9927	6.8217	2.1818	8.2744
Bonus Compensation	603	6.5494	6.6542	1.3827	7.4961
Salary Compensation	5044	4.7719	4.7095	1.7728	6.2166
<b><i>Lobby expenditure</i></b>	5128	16.1096	16.4108	2.6968	17.9578
<b><i>Executive Centrality</i></b>					
Degree (Normalized)	5128	.0029	.0013	.0069	.0028
Eigenvector (Normalized)	5128	.0028	0	.0271	0
Betweenness (Normalized)	5128	.0033	0	.0282	0
Closeness (Normalized)	5128	.0029	.0019	.0029	.0032
<b><i>Executive Characteristics</i></b>					
Age	5081	68.9833	69	7.9063	75
Female	5083	.1806	0	.3847	0
Tenure	4520	9.7016	7.3	8.6788	13
Duality	5128	.0907	0	.2872	0
<b><i>Firm Characteristics</i></b>					
ROA	4648	.0579	.0522	.0652	.085
MB	4586	1.0083	1	.0958	1
MB	4194	.4968	.4862	.1732	.5974
Leverage	4547	.0626	.0588	.0609	.0943
Free Cash Flow	4608	9.9893	9.8384	1.1663	10.6845
Firm Size	5128	11.6154	12	2.1888	13
Board Size	5128	.0692	.0579	.0677	.0723
Market Competition	5081	68.9833	69	7.9063	75

Table 1b

The table below shows a summary of lobby expenditure and executive compensation in each year between 2005-2018.

Year	Number of sample firms	Number of Fama-French industry (49)	Lobby Expenditure by firms (\$ml)	Executive compensation			
				Salary (\$000)	Equity (\$000)	Bonus (\$000)	Total (\$000)
2005	69	27	1,884	24,711	261,506	21,298	46,008
2006	80	31	2,850	51,688	53,667,791	42,947	94,636
2007	85	31	7,084	64,686	1,326,681	31,673	96,357
2008	76	28	11,610	34,646	2,548,971	25,849	60,494
2009	86	32	21,460	50,526	27,864,350	34,107	84,635
2010	99	31	19,770	58,412	41,311,383	25,196	83,609
2011	181	38	16,360	114,633	6,047,071	43,303	157,934
2012	175	38	19,080	65,512	6,939,634	32,795	98,308
2013	181	35	13,240	137,940	3,378,103	42,294	180,233
2014	159	38	11,090	99,503	3,157,581	27,750	127,253
2015	21	14	1,719	8,628	17,563,573	2,601	11,229
2016	21	16	13,360	8,915	885,971	2,401	11,316
2017	20	12	3,179	13,482	97,312	2,574	16,056
2018	101	32	8,159	420,545	20,086,174	271,789	692,331

**Table 1c: Correlation Matrix**

We report only the main dependent and independent variables. The Lobby is measured as natural logarithm of one plus lobby expenditure of a firm in a given year. Degree, Eigenvector, Betweenness and Closeness are normalized by the size of the entire network in a given year.

Variables	1	2	3	4	5	6	7	8	9
1. Total	1.00								
2. Equity	0.42***	1.00							
3. Bonus	0.87***	0.30***	1.00						
4. Salary	0.97***	0.38***	0.22***	1.00					
5. Lobby	-0.02	-0.01	0.32***	-0.02	1.00				
6. Degree (Norm)	-0.03**	-0.02	0.10***	-0.04***	0.15***	1.00			
7. Eigenvector (Norm)	0.02	0.03**	-0.02	0.01	0.09***	0.35***	1.00		
8. Betweenness (Norm)	-0.02*	-0.02	0.12***	-0.03*	0.05***	0.34***	0.02	1.00	
9. Closeness (Norm)	-0.00	0.00	-0.03	0.00	0.05***	0.44***	0.11***	0.14***	1.00

**Table 2: Baseline- Pooled OLS with industry and year fixed effects**

Effect of executive networks on executive compensation.

Table reports the results of multilevel mixed-effects model (maximum likelihood estimation), where the dependent variable is the total compensation of executives. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. Variables are defined in Appendix 1. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and clustered by firm. \*\*\* significant at 1%, \*\*significant at 5%, and significant at \* 10%.

	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Pooled OLS				Multilevel Mixed Models			
<i>Direct Network</i>								
Degree	-0.1389** (0.0547)				-0.1001* (0.0516)			
Eigenvector		-1.2478 (1.7296)				0.5720 (1.0533)		
<i>Indirect Network</i>								
Betweenness			0.0226** (0.0089)				0.0158 (0.0109)	
Closeness				2.0987*** (0.7666)				2.6132*** (0.6028)
<i>Executive Characteristics</i>								
Age	-0.0681*** (0.0040)	-0.0681*** (0.0040)	-0.0680*** (0.0040)	-0.0683*** (0.0040)	-0.0795*** (0.0041)	-0.0795*** (0.0041)	-0.0796*** (0.0041)	-0.0804*** (0.0041)
Female	-0.7304*** (0.0704)	-0.7492*** (0.0703)	-0.7694*** (0.0709)	-0.7556*** (0.0703)	-0.7401*** (0.0763)	-0.7498*** (0.0762)	-0.7623*** (0.0767)	-0.7569*** (0.0760)
Tenure	0.0264*** (0.0034)	0.0268*** (0.0034)	0.0269*** (0.0034)	0.0266*** (0.0034)	0.0247*** (0.0034)	0.0248*** (0.0034)	0.0251*** (0.0034)	0.0248*** (0.0034)
Duality	0.5295*** (0.1073)	0.5297*** (0.1071)	0.5187*** (0.1068)	0.5228*** (0.1066)	0.5661*** (0.0930)	0.5678*** (0.0931)	0.5601*** (0.0932)	0.5588*** (0.0928)
<i>Firm Characteristics</i>								
ROA	-3.5034*** (0.7486)	-3.6108*** (0.7490)	-3.6405*** (0.7498)	-3.4251*** (0.7313)	-1.7241** (0.7524)	-1.7803** (0.7525)	-1.7709** (0.7519)	-1.5179** (0.7527)
MB	0.0870 (0.3463)	0.1423 (0.3445)	0.1077 (0.3407)	0.1477 (0.3442)	1.4986*** (0.4892)	1.4863*** (0.4901)	1.4158*** (0.4917)	1.5129*** (0.4883)
Leverage	-1.3450*** (0.3112)	-1.3110*** (0.3073)	-1.2924*** (0.3027)	-1.2909*** (0.3019)	-0.2564 (0.2792)	-0.2100 (0.2792)	-0.2282 (0.2784)	-0.2148 (0.2780)
Free Cash Flow	1.4298 (1.0884)	1.6496 (1.0845)	1.7292 (1.0872)	1.4297 (1.0344)	0.1282 (1.0010)	0.1773 (1.0017)	0.2469 (1.0008)	-0.1266 (1.0011)
Firm Size	0.0520 (0.0407)	0.0441 (0.0405)	0.0407 (0.0405)	0.0232 (0.0400)	-0.0470 (0.0612)	-0.0588 (0.0612)	-0.0583 (0.0609)	-0.0854 (0.0612)
Board Size	-0.0458*** (0.0173)	-0.0488*** (0.0173)	-0.0514*** (0.0173)	-0.0494*** (0.0172)	-0.0431** (0.0199)	-0.0446** (0.0199)	-0.0452** (0.0199)	-0.0424** (0.0199)
Market Competition	-2.5288** (1.2272)	-2.5392** (1.2319)	-2.5539** (1.2272)	-2.4821** (1.2215)	-2.0317 (1.3208)	-1.8755 (1.3233)	-2.0293 (1.3219)	-1.9272 (1.3169)
Constant	12.3026*** (0.8926)	12.2837*** (0.8921)	12.3723*** (0.8909)	10.9803*** (1.0328)	11.6705*** (1.3692)	11.6874*** (1.3715)	11.8327*** (1.3713)	10.1250*** (1.4138)
Observations	3583	3583	3583	3583	3583	3583	3583	3583
R <sup>2</sup> /Pseudo R <sup>2</sup>	0.2121	0.2107	0.2114	0.2133	0.3310	0.3305	0.3308	0.3318
Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES

**Table 3: Baseline- Pooled OLS with industry and year fixed effects**

Effect of corporate lobby and executive networks on executive compensation.

Table reports the results of multilevel mixed model (maximum likelihood estimation), where the dependent variables are the Total (Columns 1-6), Salary (Column 7) and Equity (Column 8) compensation of executives. The degree and eigenvector centralities are direct network and betweenness and closeness centralities are indirect network. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. Variables are defined in Appendix 1. The standard errors are clustered at the firm level.

\*\*\* significant at 1%, \*\*significant at 5%, and significant at \* 10%.

	(1) Total	(2) Total	(3) Total	(4) Total	(5) Total	(6) Total	(7) Salary	(8) Equity
Lobby	0.0847*** (0.0204)	0.0875*** (0.0204)	0.0843*** (0.0204)	0.0835*** (0.0204)	0.0667*** (0.0227)	0.0640*** (0.0227)	0.0626*** (0.0215)	0.0053 (0.0294)
x Degree		-0.0058** (0.0028)				-0.0128*** (0.0035)	-0.0114*** (0.0033)	-0.0165*** (0.0044)
x Eigenvector			0.0291 (0.0554)			0.1158* (0.0606)	0.0933 (0.0571)	0.1188 (0.0738)
x Betweenness				0.0007 (0.0006)		0.0019*** (0.0007)	0.0015** (0.0006)	0.0016* (0.0009)
x closeness					0.0524* (0.0297)	0.0665** (0.0299)	0.0618** (0.0283)	-0.0193 (0.0378)
<i>Executive Characteristics</i>								
Age	-0.0802*** (0.0041)	-0.0801*** (0.0041)	-0.0801*** (0.0041)	-0.0802*** (0.0041)	-0.0802*** (0.0041)	-0.0799*** (0.0040)	-0.0777*** (0.0038)	-0.0410*** (0.0053)
Female	-0.7535*** (0.0760)	-0.7443*** (0.0761)	-0.7538*** (0.0760)	-0.7641*** (0.0765)	-0.7541*** (0.0759)	-0.7622*** (0.0763)	-0.6789*** (0.0719)	-0.9736*** (0.1023)
Tenure	0.0246*** (0.0034)	0.0245*** (0.0034)	0.0246*** (0.0034)	0.0248*** (0.0034)	0.0248*** (0.0034)	0.0248*** (0.0034)	0.0234*** (0.0032)	0.0515*** (0.0043)
Duality	0.5702*** (0.0929)	0.5692*** (0.0928)	0.5710*** (0.0929)	0.5642*** (0.0930)	0.5692*** (0.0928)	0.5546*** (0.0928)	0.5452*** (0.0875)	0.7604*** (0.1220)
<i>Firm Characteristics</i>								
ROA	-2.0428*** (0.7516)	-1.9923*** (0.7515)	-2.0451*** (0.7517)	-2.0361*** (0.7512)	-1.9588*** (0.7527)	-1.8177** (0.7517)	-1.5101** (0.7110)	-1.6575* (0.9953)
MB	1.7061*** (0.4894)	1.7154*** (0.4890)	1.6971*** (0.4900)	1.6437*** (0.4914)	1.6983*** (0.4891)	1.5210*** (0.4911)	1.3795*** (0.4663)	0.9068 (0.6367)
Leverage	-0.2719 (0.2767)	-0.3124 (0.2771)	-0.2634 (0.2772)	-0.2786 (0.2765)	-0.2566 (0.2767)	-0.3249 (0.2766)	-0.2325 (0.2630)	0.1499 (0.3566)
Free Cash Flow	0.3609 (0.9963)	0.2818 (0.9962)	0.3443 (0.9970)	0.4052 (0.9962)	0.2786 (0.9968)	0.1289 (0.9962)	0.3453 (0.9439)	1.1349 (1.3260)
Firm Size	-0.1762*** (0.0670)	-0.1674** (0.0670)	-0.1771*** (0.0670)	-0.1751*** (0.0668)	-0.1866*** (0.0672)	-0.1704** (0.0670)	-0.1580** (0.0642)	-0.0838 (0.0912)
Board Size	-0.0487** (0.0198)	-0.0474** (0.0198)	-0.0489** (0.0198)	-0.0494** (0.0198)	-0.0483** (0.0198)	-0.0477** (0.0198)	-0.0402** (0.0187)	0.0150 (0.0260)
Market Competition	-1.9784 (1.3172)	-2.1389 (1.3187)	-1.9283 (1.3205)	-2.0672 (1.3189)	-1.9089 (1.3172)	-2.2696* (1.3226)	-2.0646* (1.2472)	-4.3400*** (1.6416)
Constant	11.3513*** (1.3569)	11.3180*** (1.3553)	11.3468*** (1.3578)	11.4645*** (1.3579)	11.1534*** (1.3604)	11.2964*** (1.3575)	10.9370*** (1.2989)	11.6948*** (1.7731)
Observations	3583	3583	3583	3583	3583	3583	3583	3055
Pseudo R <sup>2</sup>	0.3317	0.3319	0.3313	0.3316	0.3318	0.3319	0.3257	0.3133
Industry fixed effects	YES							
Year fixed effects	YES							

**Table 4a: Two-stage least square regression**

Effect of corporate lobby on executive compensation.

Table reports the results of two-stage least square regressions. The second stage coefficients are reported with first stage R<sup>2</sup>. The dependent variable is the total compensation of executives. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and are clustered at the firm level. \*\*\* significant at 1%, \*\* significant at 5%, and significant at \* 10%.

Dependent Variable:	(1) Total	(2) Total	(3) Total	(4) Total	(5) Total
Lobby	0.7133** (0.2804)	0.7144*** (0.1586)	0.7042*** (0.1569)	0.7011*** (0.1570)	0.7241*** (0.1599)
<i>Direct network</i>					
Degree		-0.2207*** (0.0580)			
Eigenvector			-2.4751* (1.5023)		
<i>Indirect network</i>					
Betweenness				0.0111 (0.0088)	
Closeness					2.4145*** (0.8927)
<i>Executive characteristics</i>					
Age	-0.0777*** (0.0060)	-0.0781*** (0.0053)	-0.0779*** (0.0053)	-0.0776*** (0.0053)	-0.0783*** (0.0054)
Female	-0.8094*** (0.0822)	-0.7799*** (0.0802)	-0.8090*** (0.0800)	-0.8184*** (0.0805)	-0.8179*** (0.0813)
Tenure	0.0255*** (0.0043)	0.0253*** (0.0043)	0.0259*** (0.0043)	0.0257*** (0.0043)	0.0255*** (0.0043)
Duality	0.5735*** (0.1170)	0.5710*** (0.1161)	0.5702*** (0.1155)	0.5667*** (0.1158)	0.5646*** (0.1157)
<i>Firm characteristics</i>					
ROA	-5.6041*** (1.1684)	-5.4254*** (0.9640)	-5.5648*** (0.9642)	-5.5814*** (0.9639)	-5.4126*** (0.9509)
MB	4.9029** (1.9304)	4.8330*** (1.1615)	4.8553*** (1.1586)	4.8079*** (1.1609)	4.9891*** (1.1780)
Leverage	-1.4700*** (0.3560)	-1.5421*** (0.3638)	-1.4901*** (0.3573)	-1.4635*** (0.3517)	-1.4624*** (0.3535)
Free Cash Flow	2.1529* (1.2735)	1.8314 (1.2565)	2.1798* (1.2485)	2.1915* (1.2485)	1.9273 (1.1975)
Firm Size	-1.0358** (0.4222)	-1.0207*** (0.2447)	-1.0168*** (0.2426)	-1.0178*** (0.2430)	-1.0731*** (0.2483)
Board Size	-0.0545** (0.0215)	-0.0492** (0.0213)	-0.0538** (0.0212)	-0.0555*** (0.0213)	-0.0549** (0.0215)
Market Competition	-2.9184** (1.1818)	-3.0143** (1.1757)	-3.0520*** (1.1807)	-2.9525** (1.1814)	-2.9403** (1.1752)
Constant	7.3712*** (2.3183)	7.4110*** (1.5402)	7.4554*** (1.5328)	7.5037*** (1.5435)	5.8100*** (1.7086)
Observations	3583	3583	3583	3583	3583
First-stage R-squared	0.5734	0.3144	0.1241	0.1141	0.9744
Industry fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

**Table 4b: Two-stage least square regression**

Effect of corporate lobby and their networks on executive compensation.

Table reports the results of two-stage least square regressions. The second stage coefficients are reported with first stage R<sup>2</sup>. The dependent variables are Salary (Columns 1-5) and Equity (Columns 6-10) compensation of executives. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and are clustered at the firm level. \*\*\* significant at 1%, \*\* significant at 5%, and significant at \* 10%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Salary	Salary	Salary	Salary	Salary	Equity	Equity	Equity	Equity	Equity
Lobby	0.6923** (0.2690)	0.6474*** (0.1479)	0.6379*** (0.1463)	0.6348*** (0.1464)	0.6553*** (0.1489)	0.8211*** (0.2671)	0.5985*** (0.1743)	0.5825*** (0.1723)	0.5884*** (0.1735)	0.5904*** (0.1732)
<i>Direct network</i>										
Degree		-0.2085*** (0.0555)					-0.2291*** (0.0664)			
Eigenvector			-2.5741* (1.4193)					-0.8947 (2.2194)		
<i>Indirect network</i>										
Betweenness				0.0092 (0.0082)					-0.0105 (0.0104)	
Closeness					2.1797*** (0.8422)					0.2545 (0.8344)
All control included	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	7.3716*** (2.2287)	7.7255*** (1.4395)	7.7683*** (1.4328)	7.8076*** (1.4435)	6.2841*** (1.6002)	5.1973** (2.3897)	6.8028*** (1.7606)	6.8912*** (1.7511)	6.7878*** (1.7640)	6.6636*** (1.8184)
Observations	3583	3583	3583	3583	3583	3055	3055	3055	3055	3055
First-stage R-squared	0.5779	0.5785	0.5782	0.5780	0.5780	0.5779	0.5785	0.5782	0.5780	0.5780
Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

**Table 5: Heckman two-stage regression with interaction terms**

Effect of corporate lobby and executive networks on executive compensation.

Table reports the results of pooled OLS, where the dependent variable is the total and salary compensation of executives. In each column, the calculated inverse Mill's ratios (D:Degree, E: eigenvector, B: Betweenness, C: closeness) are included. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and are clustered at the firm level. \*\*\* significant at 1%, \*\*significant at 5%, and significant at \* 10%.

	(1) Total	(2) Total	(3) Total	(4) Total	(5) Salary	(6) Salary	(7) Salary	(8) Salary
Lobby	0.1022*** (0.0168)	0.0995*** (0.0167)	0.0980*** (0.0167)	0.0841*** (0.0193)	0.1007*** (0.0162)	0.0982*** (0.0161)	0.0967*** (0.0161)	0.0853*** (0.0186)
Lobby x Degree	-0.0079*** (0.0030)				-0.0076*** (0.0029)			
Inverse Mills Ratio (D)	1.3118 (0.9050)				1.0722 (0.8587)			
Lobby x Eigenvector		-0.0728 (0.0907)				-0.0840 (0.0826)		
Inverse Mills Ratio (E)		1.3801 (0.8973)				1.1476 (0.8468)		
Lobby x Betweenness			0.0012** (0.0005)				0.0010** (0.0004)	
Inverse Mills Ratio (B)			1.3812 (0.8894)				1.1348 (0.8390)	
Lobby x Closeness				0.0469 (0.0348)				0.0388 (0.0334)
Inverse Mills Ratio (C)				1.4020 (0.8823)				1.1496 (0.8334)
All controls included	YES							
Constant	11.2887*** (0.9520)	11.2725*** (0.9469)	11.3549*** (0.9434)	11.0613*** (0.9686)	11.2104*** (0.9113)	11.1943*** (0.9064)	11.2663*** (0.9045)	11.0199*** (0.9277)
Observations	3583	3583	3583	3583	3583	3583	3583	3583
R-squared	0.2218	0.2204	0.2209	0.2206	0.2246	0.2232	0.2235	0.2232
Industry fixed effects	YES							
Year fixed effects	YES							

**Table 6: Two-stage least square regression**

Alternative measures of lobby and executive network

The dependent variable is Total and Salary compensation. Number of issues lobbied is used as an alternative measure of Lobby. The Blue state (a dummy variable) and nationality mix are used as instruments. Following Goergen et al (2019), the variable Network is the variable measure using the Network size obtained from the BoardEx. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and are clustered at the firm level. \*\*\* significant at 1%, \*\*significant at 5%, and significant at \* 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	First Stage Regressions		Second Stage IV Regressions			
	Lobby Expenditure	Num of Issues Lobbied	Total	Salary	Total	Salary
Blue State	0.3377*** (0.0913)	0.1022*** (0.0209)				
Nationality Mix	-1.2903*** (0.2572)	-0.1744*** (0.0563)				
Lobby Expenditure			0.9039*** (0.2494)	0.8164*** (0.2336)		
Lobby Expenditure x Network			-0.0622*** (0.0184)	-0.0559*** (0.0172)		
Number of Issues Lobbied					6.2428*** (2.0060)	5.6568*** (1.8807)
Number of Issue Lobbied x Network					-0.6166*** (0.2080)	-0.5575*** (0.1949)
All controls included	YES	YES	YES	YES	YES	YES
Constant	7.1195*** (1.1846)	0.5979*** (0.2168)	4.7211** (1.9656)	5.2310*** (1.8475)	5.4904*** (2.0834)	5.9138*** (1.9550)
Observations	3495	3495	3419	3419	3419	3419
First-stage R-squared	0.5893	0.5818	-	-	-	-
Industry fixed effects	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES

**Table 7: Multilevel mixed-effects regression**

Alternative measures of executive network

The dependent variable is Total Compensation. The Network variable is the factor extracted from principal component analysis (PCA) with eigenvalue greater than 1. The centrality measures are the industry adjusted variables. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and are clustered at the firm level. \*\*\* significant at 1%, \*\*significant at 5%, and significant at \* 10%.

	(1) Total	(2) Total	(3) Total	(4) Total	(5) Total
Lobby	0.0862*** (0.0204)	0.0861*** (0.0204)	0.0801*** (0.0218)	0.1747*** (0.0418)	0.0882*** (0.0205)
x Network (PCA)	-0.0114** (0.0049)				
x Degree (Ind. Adj)		-0.0011*** (0.0004)			
x Eigenvector (Ind. Adj)			-0.0000*** (0.0000)		
x Betweenness (Ind. Adj)				0.0000* (0.0000)	
x Closeness (Ind. Adj)					-0.0018 (0.0012)
All controls included	YES	YES	YES	YES	YES
Constant	11.4173*** (1.3559)	11.2775*** (1.3586)	10.9666*** (1.3758)	7.6985*** (2.2372)	11.2994*** (1.3575)
Observations	3583	3583	3369	526	3583
Pseudo R <sup>2</sup>	0.3320	0.3321	0.3728	0.3074	0.3317
Industry fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

**Table 8: Inverse Probability of Treatment Weighting estimation**

This table reports the coefficients from covariate balance with propensity score-based weighting. The dependent variable is Total Compensation. The degree and closeness are normalized raw calculation of centralities and representing direct and indirect networks of executives respectively. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and are clustered at the firm level. \*\*\* significant at 1%, \*\*significant at 5%, and significant at \* 10%.

	(1) Total	(2) Total	(3) Total	(4) Total	(5) Total
Lobby	0.0748*** (0.0104)	0.0751*** (0.0105)	0.0757*** (0.0105)	0.0749*** (0.0104)	0.0743*** (0.0103)
Direct Network					
Degree		-0.2054*** (0.0656)			
Eigenvector			-0.0278 (0.0206)		
Indirect Network					
Betweenness				2.8078*** (0.8972)	
Closeness					-1.0867 (1.1665)
All controls included	YES	YES	YES	YES	YES
Constant	9.6853*** (0.8381)	9.9340*** (0.8525)	9.7219*** (0.8384)	9.5928*** (0.8444)	10.9636*** (1.6302)
Observations	3123	3123	3123	3123	3123
R-squared	0.3482	0.3505	0.3490	0.3491	0.3491
Industry fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

**Table 9: Pooled OLS with industry and year fixed effects**

This table demonstrates the channel of governance mechanism that might affect the relationship between compensation and Lobby (and network). The dependent variable is Total Compensation. We use tercile of Market Competition to create two dummies – MC (Low) and MC (Medium) indicating whether these dummies lie in the lowest or medium tercile of their empirical distribution respectively. The degree and closeness are normalized raw calculation of centralities. The sample consists of 266 US publicly traded firms in 2005-2018 with director-year level observations. The standard errors are Huber-White heteroscedasticity-consistent reported in parenthesis and are clustered at the firm level. \*\*\* *significant at 1%*, \*\**significant at 5%*, and *significant at \* 10%*.

	(1) Total	(2) Total	(3) Total	(4) Total	(5) Total	(6) Total
Lobby	0.1008*** (0.0167)	0.0553* (0.0292)				
MC (Low)		-1.0629* (0.5602)		-0.0030 (0.1816)		0.4263 (0.2845)
MC (Medium)		-0.3186 (0.2854)		0.0683 (0.0651)		0.2504*** (0.0739)
Lobby * MC (Low)		0.0608* (0.0337)				
Lobby * MC (Medium)		0.0215 (0.0169)				
Degree			-0.1373** (0.0544)	-0.1908** (0.0884)		
Degree * MC (Low)				0.2338* (0.1337)		
Degree * MC (Medium)				0.0056 (0.0459)		
Closeness					2.0957*** (0.7666)	3.4374*** (1.0407)
Closeness * MC (Low)						-1.4354 (0.9458)
Closeness * MC (Medium)						-0.7135*** (0.1700)
Constant	10.6100*** (0.7103)	11.5868*** (0.9417)	11.3338*** (0.7082)	11.3680*** (0.7859)	10.0314*** (0.8798)	9.6318*** (0.9238)
Observations	3583	3583	3583	3583	3583	3583
Pseudo R <sup>2</sup>	0.2183	0.2194	0.2113	0.2125	0.2125	0.2194
Industry fixed effects	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES