ESSAYS ON CEO AND EMPLOYEE COMPENSATION

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by
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ABSTRACT

With the continued increase in executive compensation and the resulting increase in pay disparity between executives and rank-and-file employees, CEO compensation relative to the average worker pay underscores the popular apprehension related to equity vs. efficiency. This dissertation empirically examines the determinants and consequences of the CEO-worker pay ratio, and the association between acquisitions and CEO compensation.

In the first chapter, I show that country-level factors such as national culture, matter in determining the CEO-worker pay ratio across countries. Using global firm-level data from 44 countries for 2002-2015, I show that the CEO-worker pay ratio is associated with national characteristics such as culture and societal equity orientation. Specifically, I find that the CEO-worker pay ratio is positively associated with power distance and masculinity of the national culture, and it is negatively associated with uncertainty avoidance and long-term orientation. This pay ratio also reflects societal equity orientation, measured by income and wealth distribution proxies. This chapter contributes to the existing literature on executive compensation by documenting national culture as an important determinant of CEO-worker pay ratios globally.

In the second chapter, I examine the impact of the CEO-worker pay ratio on firm value for 1997-2015. I find that the relationship between firm value and the pay ratio is an inverse-U shape, which is consistent with elements of tournament theory, efficient contracting theory, rent extraction theory, and equity fairness theory. This is also consistent with there being an optimal pay ratio, or inflection point, beyond which increases in the

pay ratio decrease firm value. I then show that the relationship between the pay ratio and firm performance differs systematically with regard to firm characteristics, i.e., in firms with a greater need for collaboration and information sharing, the optimal ratio is lower. In the final analysis, I show that pay disparity within the executive suite has little effect on firm value, rather it is the pay disparity between the named executive officers and the rank and file that drive my results. This chapter contributes to the existing literature by showing that the relationship between firm value and CEO-worker pay ratio is nonlinear.

In the third chapter, I examine the effect of acquisitions, especially international acquisitions on CEO compensation, using firm-level panel data for 1995-2016, covering both international and domestic acquisitions by US firms. I find that acquisitions lead to higher CEO compensation, which can be explained by size premium, complexity premium, and opportunism. I also find that international acquisitions lead to higher CEO compensation than domestic acquisitions, which is consistent with the matching theory, as international acquisitions are larger and more complex to manage. This chapter provides direct empirical evidence on the effect of acquisitions on CEO compensation with a large database based on US firms. This chapter also adds to the literature on the comparison of international acquisition and domestic acquisition in terms of their impact on CEO compensation, which has been lacking in existing work.

Overall, this dissertation advances our understanding on the determinants and consequences of the CEO-worker pay ratio, and adds insights to the literature on the implications of international acquisitions and managerial compensation.

To

my beloved parents, Chengtao Ju and Qiuhong Wan,

for your endless love, patience, and encouragement.

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I love all three of you more than you will ever know.

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CHAPTER 1

WHAT EXPLAINS THE CEO-WORKER PAY RATIOS?

EVIDENCE ON THE EFFECTS OF CULTURE AROUND THE WORLD

Introduction

Ostensibly high levels of executive compensation for CEOs relative to the average worker has become a major political economy issue in the aftermath of the recent global financial crisis. From a societal perspective, rising income disparity raises an issue of fairness as well as efficiency and performance as the pay gap between top executives and employees increased over time. Joseph Stiglitz, a Nobel prize-winning economist, states in his book The Price of Inequality (2012), "(f)air pay within companies matters; it affects productivity, employee engagement and trust in our businesses…" Similarly, Wade, O'Reilly, and Pollock (2006) argue that the pay ratio between the CEO and that of rank-and-file employees in the same company can provide a reference in assessing fairness and influencing employees' reactions to their own compensation.

Responding to these concerns, the Securities and Exchange Commission (SEC) adopted a final rule in August 5, 2015 that mandates the public listed firms to disclose the ratio of the compensation of its CEO to the median compensation of its employees, starting with the fiscal year on or after January 1, 2017. Additionally, the rule implements one of the requirements of the Dodd-Frank Wall Street Reform and Consumer Protection Act of

2010.[1] The European Commission has also proposed requiring a binding vote on a wide range of sensitive remuneration benchmarks, including the CEO-worker pay ratios.

There has also been a significant media attention paid to the executive-worker pay gap as well. For instance, a Wall Street Journal article (Spector and McGinty, 2012, January 27) reports that executives in the US make more than 300 times more than their worker counterparts, up from 70 times in the past three decades; similarly, U.K. CEOs earn 219 times the average workers' median pay, up from 47 times over the past ten years. A Washington Post article (Ferdman, 2014, September 25) points out that, in 2013, the CEOs in Switzerland made 148 times the average worker, with similar ratios in Germany (147 times more) and in Spain (127 times more). The global data obtained from Capital IQ and Compustat Global provides corroborating evidence about the pattern of CEO-worker pay ratios over time and across countries. Further, there is a large literature on CEO compensation, but little systematic analysis has been done on what explains the disparity in the compensation of CEO relative to average workers in the same firm across countries.[2]

In this study, I examine how the cross-national variability in pay ratios between CEO and average workers in the same firm are related to differences in culture and societal equity orientation, after controlling for country institutions and firm-specific variables used

[1] This rule is subject to debate. Supporters argue that the disclosure of information on the overall compensation framework at a firm level "can help rein in excessive executive pay" (Ferrarini and Ungureanu, 2014), while opponents maintain that the pay ratio would provide little additional insight for investors (Shorter, 2013).

[2] Tosi and Greckhamer (2004) relate national cultural traits to CEO compensation, but they use country-level aggregate compensation data, not firm level, and do not examine the CEO-worker pay ratios.

in existing work on executive compensation. Guiso, Sapienza, and Zingales (2006, 2009) argue that national culture has a significant effect on economic outcomes since culture influences preferences and beliefs of individuals and their economic decision-makings. Stulz and Williamson (2003) and others examined the effect of culture on a variety of economic outcomes including firm performance.[3]

I formulate two sets of hypotheses, one on culture and the other on societal equity orientation, which is embedded in culture. Regarding the first set of hypotheses on cultural traits á la Hofstede (2010), (a) bargaining power theory (Hayes and Schaefer, 1999) predicts that there is a positive association between CEO-worker pay ratios and power distance. I further hypothesize that (b) there is a positive relation between the pay ratios and individualism, as CEOs in a society with high level of individualism will have more opportunities to engage in rent seeking. I also expect that (c) there is a negative association between pay ratios and uncertainty avoidance: high uncertainty avoidance implies low corporate risk taking (Li, Griffin, Yue, and Zhao, 2013), which may lead to lower firm performance and hence lower CEO compensation relative to workers. Similarly, (d) the pay ratios are related negatively with long-term orientation, because firms in long-term oriented culture may find that boosting short-term CEO compensation to increase short-term earnings may not be as important as in short-term oriented environment, assuming the presence of short-term bias in executive compensation contracts as well as some link

[3] Various studies examine the effect of culture on a variety of economic and financial variables. For instance, cultural differences between countries affect equity investment (Hwang, 2011), stock market participation (Guiso, Sapienza, and Zingales, 2008), price momentum (Chui, Titman, and Wei, 2010), corporate investment (Shao, Kwok, and Zhang, 2013), and mergers (Ahern, Daminelli, and Fracassi, 2015).

between performance and compensation. Finally, I hypothesize that (e) there is a positive relation between the pay ratios and the degree of masculinity as there is a stronger emphasis on achievement, growth, and challenge in a masculine than feminine society. I do not have any a priori expectations regarding the last cultural trait described by Hofstede (2010): indulgence.

The second set of hypotheses concern the societal equity orientation. I expect that the relative pay ratios are associated with the extent to which income distribution is unequal within an economy. That is, the CEO-worker pay ratios will be higher if the degree of income or wealth inequality is higher, measured by the Gini coefficient or equitable wealth creation index. I use a large firm-level global panel data for 44 countries obtained from Compustat North America, Compustat Global, and Capital IQ for a 14-year period from 2002 to 2015. For the CEO-worker pay ratio, I use the natural logarithm of the ratio of CEO compensation to average employee pay, measured by total staff expense per employee. To address the sample selection bias due to non-random disclosure of staff expense or number of employees, I use the Heckman (1979) selection model.

I find that culture and societal equity environment are important as determinants of the CEO-worker pay ratios, after controlling for firm-specific variables. Specifically, the tests uncover that the CEO-worker pay ratios are positively associated with power distance, individualism, and masculinity, and negatively associated with uncertainty avoidance and long-term orientation, regardless of whether Hofstede's cultural measures or Globe's scores are used. I also find that the pay ratios are higher in countries with high income or wealth inequity. Finally, I reiterate that the pay ratio increases with the decrease in efficacy

of corporate governance as measured by CEO-chair duality and other board characteristics using global data.

This chapter contributes to the existing literature on executive compensation in several ways. First, the present study provides the first systematic analysis of the CEO-worker pay ratios in the same firm using global firm-level panel data. Second, I document the influence of national culture on the pay disparity using disaggregate firm-level data. Third, I also show that the CEO-worker pay disparity reflects larger societal pattern of income or wealth distribution. Finally, I note that empirical results obtained here provide global evidence and contribute to informing the national policy debate accordingly. On the other hand, I acknowledge weaknesses in my analysis, such as the lack of differential compensation data among the executive ranks. I also use of the total labor expense per employee reported by the firm as average worker pay rather than actual individual pay packages; although the SEC regulation refers to the CEO vs. the median rather than the mean worker compensation in the same firm, such data are not available globally. Perhaps these weaknesses can be forgiven given the use of comprehensive worldwide firm-level data. As new data on pay ratios mandated by regulation becomes available, data quality will improve in some countries such as the US.

The remainder of the chapter is organized as follows. Next section covers the relevant literature, and hypotheses. Then the following section describes data, variables used and empirical specifications. Following section presents the main empirical results, followed by robustness tests. The last section contains concluding remarks.

Literature Review on CEO Compensation

There is a large literature on executive compensation (largely focused on the CEO), but there is little from a cross-cultural perspective. Existing work mostly focus on executive compensation in the domestic context. Broadly, there are two opposing views concerning executive compensation. First is the view that the observed compensation levels reflect the result of optional contracting between the firm and managers. From the optimal contracting standpoint, the executive compensation scheme is designed to provide incentives to the managers to maximize shareholder values. In this view, the pay-performance correlation is often used to test the effectiveness of incentive contracts in enhancing profitability (Jensen and Murphy, 1990; Jouber and Fakhfakh, 2011). A variant of this view attributes the pay gap to the "efficient outcome of a labor market in which firms optimally compete for managerial talent" (Frydman and Jenter, 2010). Gabaix and Landier (2008) find that CEO compensation should rise along with an increase in the size of the typical firm in the economy.

Second is the rent extraction view, which argues that the executive compensation is decided by executives themselves, who seek to maximize their own wealth rather than the shareholder value. Specifically, the managerial power approach predicts that the executive pay is higher in firms in which managers have relatively more power (e.g., Garvey and Milbourn, 2006). Moreover, the tournament theory suggests that the size of the reward is increasing at each level of hierarchy, with an extra reward for the CEO (Rosen, 1986). In this view, the high compensation of executives is related to peer pressure. Powerful CEOs and co-opted boards opportunistically choose peer firms in a way that

inflates CEO pay (Bebchuk and Fried, 2004). Bebchuk, Cremers and Peyer (2011) further examine the effect of CEO pay slice (CPS) – the fraction of the aggregate compensation of the top-five executive team captured by the CEO. They find that CPS is negatively associated with industry-adjusted Tobin's Q. In addition, a firm's CPS is positively associated with industry median CPS, the CEO-chair duality, firm age, and relative equity compensation, among others. This chapter is remarkable because it considers the effect of pay disparity within the executive suite.

Beyond firm-level explanations, several papers in management suggest the importance of social factors in employee compensation. O'Reilly, Main and Crystal (1988) argue that the CEO pay is better explained in terms of a social comparison process, "more so than the economic performance of the firm." Pennings (1993) and Schuler and Roginsky (1998) examine corporate human resource policies in light of national culture. Fernandes, Ferreira, Matos, and Murphy (2013) challenge the widely accepted notion that American CEOs are paid significantly more than their foreign counterparts. They find that the U.S. pay premium is economically modest and primarily reflects the performance-based pay demanded by institutional shareholders and independent boards. Similar conclusions are given by Conyon, Core, and Guay (2011), who examine the CEO pay difference between the U.S. and the U.K. They concluded that the U.S. CEOs get higher pay but also bear higher risks; on a risk-adjusted basis there is no significant difference between the two countries.

Tosi and Greckhamer (2004) relate cultural traits of Hofstede (1980a, 2001) to the average CEO compensation from twenty-three countries, but they use country aggregate

data not the firm-level compensation data, and they do not examine CEO-worker pay ratios. Bryan, Nash, and Patel (2014) find that law and culture are important factors to the use of equity-based compensation globally. Neither examines the CEO-worker pay ratios at a firm level globally. In this chapter, I go beyond existing work by examining the effect of culture and societal equity orientation on the vertical pay disparity between the CEO and average worker using a comprehensive firm-level panel data for 44 countries for a 14-year period from 2002 to 2015.

Hypothesis Development

Following the anthropological definition of culture (e.g., Kluckhohn, 1951),[4] Hofstede (1980) defines culture as the patterned ways of thinking, feeling, and reacting that are reflected in traditional ideas and values that differentiate members of one human group from other human groups. National culture plays an important role in explaining the cross-national differences in compensation practices (Grenness, 2011) due to its prevailing influence on organizational and individual behaviors in the nation. One such example is the extent to which the average workers accept the pay gap, and how people see "income inequality as desirable, and hard work as rewarding, and the workplace as hierarchical" (Burns, Minnick, and Starks, 2017).

[4] "(C)ulture consists in patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts." (Kluckhohn (1951), p.86, n.5).

Power Distance

Power distance, as per Hofstede (1980, 2001, and 2010), expresses the extent to which the less powerful members of organizations accept and expect unequal distribution of power. For instance, in the society with high degree of power distance, people are more likely to accept a hierarchical order. Conversely, in societies with low power distance, people strive for more equitable distribution of power and demand justification for inequalities of power. Consequently, there will be less tolerance to the big salary gap in such societies. If there is a large pay gap, there must be justified by other reasons such as the leader's superior ability. Additionally, in high power distance countries, the organizational hierarchy will be steeper, and the CEO pay will be greater relative to average worker because there are increased organizational layering and more supervisory personnel, which tend to create a larger wage differential between the top and the average worker. According to Hofstede (2001), in high power distance countries there is also a tendency for more elitism such that those in positions of power may be able to extract more of the wealth of the society for personal gains; this will be viewed as normal in those societies compared to low power distance countries.

Combining culture and governance, the rent extraction theory (Garvey and Milbourn, 2006) suggests a view that, in a society with higher power distance, managers seek to maximize their own personal wealth (Faleye, Reis and Venkateswaran, 2013). Also, as argued by Crossland and Hambrick (2011), stakeholders in such countries are more likely to acquiesce in executive actions, resulting in CEO's greater bargaining power over

the board. Thus, it is expected that in a society with higher degree of power distance, the CEO-worker pay ratio is larger.

Individualism

Hofstede (2001) defines individualism as a measure of the extent to which managers consider their own individual interests rather than the group. For example, in a society that emphasizes individualism, members of a group should be more inclined to pursue their own self-interest and be less concerned about the interests of the group. Conversely, members in a society which cherish collectivism should likely consider group interests more than individual interests. In such countries, the manager would ask for less individual benefit because it may drain resources from the firm, resulting in lower pay gap with the average worker. Generally, there should be a positive association between the degree of individualism and agency conflict between the CEO's personal interest and firm interest. According to managerial power theory, managers in a society with higher degree of individualism will have more rent-seeking behavior, leading to higher pay gap. Thus, it is expected that the CEO-worker pay ratio increases with the degree of individualism.

Uncertainty Avoidance

Shane (1993) argues that societies characterized with low uncertainty avoidance would have higher tolerance for ambiguity, whereas in societies with high uncertainty avoidance, the fear of failure is high, and people would be less risk-taking (Sully de Lugue and Javidan, 2004). Since uncertainty avoidance is highly correlated with risk aversion, one may expect individuals in cultures with low uncertainty avoidance to prefer compensation practices that promote and reward risk-taking. Hence, the proportion of

variable compensation to total CEO compensation is negatively related to uncertainty avoidance. To compensate for potential loss from risk taking, the CEOs would require a higher pay. In such societies with low uncertainty avoidance, CEO compensation contracts should also consist of larger percentage of cash-based compensation relative to the riskier, equity-based compensation (Penning, 1993), which may lead to greater total compensation package for CEOs. Competition, conflict, and confrontation are more acceptable in such culture. Li, Griffin, Yue, and Zhao (2013) find that there is a negative relation between uncertainty avoidance and corporate risk-taking. Thus, it is expected that in a society with higher degree of uncertainty avoidance, the CEO-worker pay gap is smaller.

Long-term Orientation

Long-term orientation refers to how organization cares about their history and how they deal with the present and future challenges. Agency costs could also stem from differences in decision-making horizons (Gerhart, Minkoff, and Olsen, 1995).[5] In a society with short-term orientation, firms with a strong inclination to preserve wealth may be unwilling to invest in R&D projects with uncertain outcomes or to risk capital to expand operations (Lumpkin, Brigham, and Moss, 2010). Also, managers would spend less time in the job or build with the organization, as they may be more inclined to maximize short-run performance rather than the long-term interest of the firm. Thus, in a society with shorter time horizon, managers are more likely to maximize their personal wealth through negotiating for higher pay, leading to higher total CEO pay (Gomez-Mejia and Werner,

[5] To some extent, long term orientation may also be related to high level of uncertainty avoidance (Zhao, 2000; Sully de Luque and Javidan, 2004).

2008). Thus, the expectation is that the greater the degree of long-term orientation, the smaller would be the CEO-worker pay ratio.

Masculinity

Masculinity versus femininity refers to the distribution of roles between the genders. That is, another general issue for any society. The masculinity side represents a preference in society for achievement, heroism, assertiveness, and material rewards for success. This kind of organization is generally more competitive. In a masculine environment, companies tend to press their workers hard and award them for results. In this culture, the pay gap thus tends to reflect the difference of ability and achievement among individuals rather than seniority. On the other hand, in feminine culture, there is a greater emphasis on cooperation, modesty, caring for the weak, and quality of life, which generally results in lower pay gap between workers.

In such with high masculinity countries as Japan, Germany, and the U.S., there is a stronger emphasis on professional achievement, growth, and challenge. People may be more concerned with job performance and pay rather than work environment. High masculinity encompasses a tendency towards higher motivation for achievement, including recognition as well as wealth (Greckhamer, 2011). Applying governance theory to culture, as tournament theory argues, people in masculine society will try to achieve their highest performance relative to their peers and get promotion and extra reward (Goel and Thakor, 2008). Thus, I expect that the CEO-worker pay ratio increases with the degree of masculinity.

Indulgence

Indulgence concerns the extent to which members in society try to control their desires and impulses; the opposite is restraint (Hofstede, Hofstede, and Minkov, 2010). In a society of indulgence, people behave without much constraint and openly show their aspirations. Conversely, in a society of restraint, people may be more disciplined; there may also be more regulations that constrain individual behaviors in these countries. Implications for the CEO-worker pay ratios are less clear. On the one hand, the CEO in self-indulgence may use his power to extract the highest compensation package from the firm to the neglect of industry norm or negative externality on other employees or societal common good. This leads to positive association between the CEO-worker pay ratio and the degree of indulgence. However, it is also possible that the self-indulgent CEO may care less about tournament prizes, resulting in lower pay ratio.

Societal Equity Orientation

According to Jasso and Milgrom (2008), there are two types of justice: microjustice and macrojustice. Income distribution is an indicator of macrojustice and it is expected to have substantial influence on microjustice, which can be demonstrated by the pay gap between executive and rank-and-file employees.

The Gini Index is a measurement of income inequality in a society, and is based on the Lorenz curve, which plots the proportion of the total income of the population that is cumulatively earned by the bottom x% of the population. The coefficient varies between 0 and 1 (or 100 in percentage). The value of 0 reflects complete income equality, and 1 indicates complete inequality, i.e., one person has all the income in the country. Burns and

Minnick (2013) use the Gini coefficient as a measure of a country's economic structure, which is related to CEO tournament structure. Since a higher Gini coefficient indicates greater income differential in society, it is reasonable to assume that the pay gap is larger with the value of the Gini coefficient.

Another measure of societal disparity pertains to wealth distribution. Since wealth is accumulation of income, wealth inequality is generally greater than income inequality because of inheritance and bias toward capitalists versus workers in typical capitalistic countries. Although both the rich and the poor benefit from economic growth and wealth creation, the rich may benefit more than the poor; the growing gap may lead to political instability, violence, or possibly revolution, even when the economy is growing economically (Knack and Keefer, 1995). As Winston Churchill states, "Capitalism is the unequal distribution of wealth." In capitalistic countries, pursuing the maximum earning is the economic norm for most people, and it is more of an exception than the norm for the CEO to act otherwise. Thus, whenever there is a chance, the CEO may not hesitate to use his economic power to act opportunistically, which contributes to a larger pay gap. The term, "equitable wealth creation" clarifies how the economy creates wealth efficiently, and shares that wealth equitably (Judge, Fainshmidt, and Brown, 2014). Thus, it is expected that in a society with higher degree of equitable wealth creation, the CEO-worker pay gap is smaller.

Sample Construction, Variable Construction, and Descriptive Statistics

Sample Construction

I use several databases to construct my sample. I start with the Compensation Summary database from Capital IQ People's Intelligence, which contains detailed compensation information of corporate executives (covering over 40 different compensation types including salary, bonus, directors fee, stock options, stock grant, and many more) for a wide cross-section of countries. The sample period is from 2002 to 2015. The accounting and employee compensation data are from Compustat Global (which contains non-North American firms) and Compustat North America. The stock return data are from CRSP and Compustat Global-Security Daily. One limitation of this database is that the disclosure of total employee expenses and the number of employees may not be uniform. To address the sample selection bias due to non-random disclosure of staff information, I use the Heckman selection model as a robustness test.

The primary sample consists of 44,425 firm-year observations from 44 countries between 2002 and 2015. All firms in the sample are public firms. Appendix A presents the firm-level observations in the full sample by country (Panel A) and by industry (Panel B) respectively, for the years 2002-2015.

Dependent Variable Measurement

The primary dependent variable is the ratio of CEO pay relative to average rank-and-file employee pay. Total annual CEO compensation is the sum of salary and bonuses, value of stock option grants, restricted stock grants, other annual compensation, long-term incentive payouts, and all other compensation, as reported in Capital IQ People's

Intelligence. To construct the average-worker pay requires data on ordinary employee compensation. Following Banker, Bu, and Mehta (2016), I use "staff expense (XLR)" from Compustat to proxy for the total pay of rank-and-file employees of a firm. This item represents salaries, wages, pension costs, profit sharing and incentive compensation, payroll taxes and other employee benefits. The average employee compensation is obtained by dividing total staff expense by the total number of employees in the firm.

I use two measures of pay disparity. The primary measure is the CEO-average worker pay ratio, which is widely used in media press. It is calculated as CEO total compensation divided by average employee pay. I also use absolute value of pay differences between CEO and average employees in the regression as an alternative measure of pay disparity. Although the SEC requires U.S. firms to disclose median annual employee compensation as of January 2017, such data are not availability globally for the sample period I study.[6]

Independent Variable Measurement

Firm Characteristics

Following literature on executive compensation, I include a set of firm characteristics, such as firm size, growth opportunity, ROA, leverage, and risk. As argued by Gabaix and Landier (2008), the rise of firm size is a major explanatory variable for the rise in CEO compensation in the U.S. as the most skilled CEOs are matched with the largest firms and earn the highest salaries. Firms with high growth opportunities also pay high

[6] As reported by Crawford, Nelson, and Rountree (2017), several comments on the SEC proposal actually urge the SEC to adopt a standard allowing or requiring the use of mean employee compensation.

level of compensation. Executive compensation is also positively related to operating performance (ROA). In addition, poor corporate governance is related to the high level of total compensation.

I use the natural logarithm of sales revenue to measure firm size. ROA is net income before taxes plus total compensation and benefits, scaled by total assets. I use market-to-book ratio to proxy Tobin's Q, which measures firm's growth opportunity. Leverage is the long-term debt divided by total assets. Firm risk is the standard deviation of daily stock returns each year. I also include corporate governance measurements such as board size, proportion of non-executive directors and the CEO-chairman duality. I winsorize all the firm-level variables at 1st and 99th percentiles to minimize the influence of outliers.

Country Characteristics

Primary independent variables of interest are cultural trait variables, country governance and income distribution variables. The cultural value characteristics derive from Hofstede (1980, 2001, and 2010), where national culture is characterized through a set of cultural value dimensions. All these dimensions are expected to potentially influence the CEO compensation and CEO-average worker pay gap. Although the cultural values are updated only three times by Hofstede, as Becker (1996) argues, cultural values change very slowly over time.

The six measurements as updated in Hofstede (2010) are: power distance index (PDI), individualism versus collectivism (IDV), masculinity versus femininity (MAS), uncertainty avoidance index (UAI), long term orientation versus short term normative orientation (LTO), and indulgence versus restraint (IND). Moreover, the dimensions were

statistically independent and occurred in all possible combinations, although some combinations were more frequent than others (Hofstede and Hofstede, 2010). A higher value indicates a higher degree of a certain measure.

For robustness, another measurement of cultural dimensions is from the GLOBE study, which develops nine cultural dimensions encompassing both actual society practices (‘‘as is’’) and values (‘‘should be’’) in different cultural settings. The nine cultural dimensions are uncertainty avoidance, power distance, institutional collectivism, in-group collectivism, gender egalitarianism, assertiveness, future orientation, performance orientation, and humane orientation (House, Hanges, Javidan, Dorfman, and Gupta, 2004). Among these nine dimensions, five (power distance, in-group collectivism, uncertainty avoidance, future orientation, and gender egalitarianism) basically match the similar cultural traits in Hofstede’s study.

The two measures of social equity environment are the Gini index and equitable wealth creation (EWC). The Gini index is from the World Bank. EWC gauges how formal and informal institutions collectively operate in a country in order to create wealth equitably. EWC from Judge et al. (2014) is a factor score based on economic wealth and economic equality for 48 countries.

Besides the two main sets of country-level variables, I also include several country governance control variables. For example, I use shareholder protection and legal origin (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998), and corruption measure obtained

from the World Bank.[7] I also include labor union variable (Atanassov and Kim, 2009) to proxy for the bargaining power of employees. Finally, I use GDP per capita and corporate tax rate (from KPMG website) as country controls. All variable definitions can be found in Appendix C.

Descriptive Statistics

Table 1 represents the summary statistics of CEO-worker pay ratio calculated by CEO total compensation divided by average employee remuneration from the Capital IQ People's Intelligence and Compustat North America and Compustat Global during 2002-2015. It presents CEO-worker pay ratio summary statistics by year.

The median of the pay ratio has increased in the first half (2002-2008) of the period, decreased during the financial crisis, and began to increase again afterward. The pay ratio increased before the financial crisis, reaching the peak in 2008 and has increased again until 2015. It is important that for the majority of firms in the sample, the average pay ratios are substantially lower than the levels popularized in the media. I also find that the pay ratio is significantly different for U.S. versus non-U.S. firms. The summary statistics of CEO-worker pay ratio of selected countries are shown in Appendix B. Since U.S. and U.K. firms count for 40% of the sample, I compare U.S. firms with non-U.S. firms in the robustness check section.

[7] The World Bank corruption measure captures "perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests."

Table 1. Summary Statistics of CEO-worker Pay Ratios by Year

Year	Obs.	Mean	Median	SD	P25	P75
2002	203	32.5	32.9	114.0	10.9	56.2
2003	948	35.5	35.1	95.3	11.1	54.2
2004	2,481	30.1	49.0	52.0	10.0	62.3
2005	3,115	29.2	48.5	71.3	11.1	55.6
2006	1,671	89.9	58.0	350.9	15.6	69.3
2007	2,555	91.8	89.8	561.6	19.4	92.0
2008	3,559	139.7	104.3	376.6	14.6	113.2
2009	4,106	69.9	91.3	212.6	14.9	92.9
2010	3,880	67.8	75.7	198.3	15.0	78.2
2011	4,081	72.8	71.3	284.8	14.9	74.1
2012	4,376	73.7	72.5	276.0	15.7	76.3
2013	4,341	71.5	82.0	241.9	15.5	91.8
2014	4,544	78.2	85.3	234.8	14.9	99.3
2015	4,565	85.6	87.1	212.5	15.0	89.1

Table 2 presents the summary statistics of both firm- and country-level characteristics that are potential explanatory variables of the relative pay and other control variables. The mean (median) values for the main cultural dimensions measures are: power distance 46.75 (39.20), individualism 69.68 (87.22), uncertainty avoidance 42.73 (45.08), long-term orientation 44.69 (49.88), and masculinity 42.14 (60.76), and indulgence 53.61 (66.74). Among the 44 countries, the countries with the highest score on power distance are Malaysia, while the one with the lowest score is Austria. The countries with the highest and lowest score on individualism are U.S. and Peru. The countries with the highest and lowest score on uncertainty avoidance are Greece and Singapore, respectively. The countries with the highest and lowest score on long-term orientation are South Korea and Puerto Rico, respectively. The countries with the highest and lowest score on masculinity are Japan and Sweden, respectively. The mean (median) values for the Gini index for income distribution are 39.1 (33.3); among the 44 countries, the countries with the highest and lowest number of Gini Index are South Africa and Denmark, respectively.

Table 2. Summary Statistics of Firm-level and Country-level Variables

	Obs.	Mean	Median	SD	Min	Max
Panel A: Firm-level variables						
Firm size	42,856	5.88	5.98	2.65	0.88	17.74
# of employees	43,694	10.78	5.88	37.14	0.01	633.08
ROA	43,545	0.03	0.10	0.98	-0.39	8.33
Return	41,715	0.03	0.01	0.49	-0.98	49.29
Tobin's Q	41,405	2.55	1.08	46.35	0.03	698.15
Firm risk	42,213	15.78	0.98	375.73	0.00	2949.90
Leverage	43,635	0.20	0.88	0.59	0.10	6.37
CEO pay slice	43,694	0.39	0.29	0.20	0.06	1.67
CEO-chair duality	43,694	0.20	0.00	0.39	0.00	0.98
Board size	43,694	4.70	7.84	4.31	2.94	45.08
% non-executive directors	43,694	51.25	66.35	57.82	31.85	87.81
Panel B: Country-level variables						
Culture						
Power distance	42,185	46.75	39.20	16.95	10.78	98.00
Individualism	42,185	69.68	87.22	24.11	12.74	89.18
Masculinity	42,185	42.14	60.76	14.11	4.90	98.00
Uncertainty avoidance	42,185	42.73	45.08	13.92	7.84	98.00
Long-term orientation	43,664	44.69	49.88	18.03	12.54	98.00
Indulgence	43,584	53.61	66.74	19.80	0.00	95.35
Institutions						
Rule of law	43,503	83.69	89.96	15.88	10.58	98.00
Shareholder protection	43,503	78.69	84.28	16.86	15.19	97.80
Legal origin	43,503	2.06	2.84	1.27	0.98	4.90
Control of corruption	43,694	33.12	33.61	73.70	2.94	93.79
Corporate tax rate	43,545	25.4	24.8	7.5	8.8	41.2
Labor union	43,694	0.31	0.42	0.82	0.19	0.71
Societal equity						
Gini	42,856	39.1	33.3	9.1	23.5	61.8
Equitable wealth creation	43,503	0.59	0.69	0.29	0.00	0.98
Egalitarianism	43,694	4.87	4.99	0.29	4.25	5.39
Controls						
Social Progress Index	43,694	76.9	81.1	11.7	41.6	86.4
GDP per capita	42,715	36,130	38,889	18,326	457	109,788
Market cap/GDP	42,405	263.6	118.6	216.6	5.9	2367.7

Empirical Results

I am firstly interested in knowing whether the domestic firm model or the country model is more effective in explaining the CEO-worker pay ratio. For this purpose, I estimated three sets of regression models: domestic firm model, country model and combined firm-and-country model. In the firm model, I revisit existing work for U.S. firms to examine how firm characteristics, CEO characteristics and board characteristics are related to total CEO compensation and the ratio of CEO-worker pay ratios. In the country model, I examine the impact of culture and social equity environment on CEO-average worker pay ratios, taking country governance and institutional variables as controls and with industry- and year- fixed effect. Then I combine firm-level and country-level to see the combined effects.

The Importance of Firm and Country Factors

I first evaluate the importance of firm- and country-level factors in determining the CEO-worker pay ratio.

Specifically, I estimate the following regressions:

(1) $y_{ijt} = \alpha_1 + \boldsymbol{\beta}'\boldsymbol{x_{ijt}} + \varepsilon_{ijt}$

(2) $y_{ijt} = \alpha_2 + \boldsymbol{\gamma}'\boldsymbol{c_{jt}} + \varepsilon_{ijt}$

(3) $y_{ijt} = \alpha_3 + \boldsymbol{\beta}'\boldsymbol{x_{ijt}} + \boldsymbol{\gamma}'\boldsymbol{c_{jt}} + \varepsilon_{ijt}$

where y_{ijt} is the firm i's CEO-worker pay ratio, x_i is a set of firm-specific variables, and c_{jt} is a set of country variables.

Model (1) is the domestic model that shows the regression of CEO-worker pay ratio on firm characteristics. Table 3 shows that the pay ratios are positively associated with firm

size and profitability. These results are consistent with the bargaining power hypothesis (Faleye et al., 2013). The pay ratio is larger for larger firms as executive skill requirements increases with firm size and profitability. However, it is somewhat surprising that the pay ratios are negatively related to firm risk. I can also see that when I use the absolute measure of pay ratio, the pay ratios are positively related to CEO-chair duality, indicating that CEOs with more power actually use it to raise their own compensation. In addition, I find that the CEO-worker pay ratio is positively related to CEO pay slice, which represents the tournament structure of the management team. Overall, the results in this section conform to existing work in terms of firm-specific factors influencing the level of CEO compensation.

Model (2) is a country model with all the Hofstede cultural dimensions. I include six cultural value variables as well as country institutional and governance variables. To examine the possible multicollinearity among cultural traits, I check the variance inflation factors (VIF) and find that the VIF indicators are less than 10, implying that multicollinearity is not a significant concern. Country-level culture and societal equity variables are significant and generally consistent with expectations.

Model (3) combines model (1) to model (2). With the adjusted R^2 of 0.30 in Table 3, this model outperforms the domestic model (1) with $R^2 = 0.21$, or the country model (2) with $R^2 = 0.10$. If I combine domestic model (1) with country dummies, R^2 increases by 0.11 compared to model (1). So, regardless of the version, the combined model improves over either the domestic firm model or the country model in terms of overall explanatory power.

Table 3. The Importance of Firm and Country Factors on CEO-worker Pay Ratio

	Dependent variable=CEO-worker pay ratio		
	(1)	(2)	(3)
Constant	1.561***	2.948***	2.402***
	(13.20)	(6.02)	(10.05)
Log (sales)	0.205***		0.268***
	(79.94)		(93.74)
ROA	0.003**		-0.002
	(2.37)		(-0.23)
Firm risk	-0.015***		-0.076**
	(-7.50)		(-2.44)
Leverage	0.020**		0.001
	(2.20)		(1.37)
Tobin's Q	0.896*		0.019**
	(1.91)		(2.15)
Board size	0.037***		1.163***
	(23.24)		(40.64)
CEO-chair duality	0.126***		0.126***
	(8.71)		(8.39)
CEO pay slice	0.977***		0.028***
	(35.35)		(17.42)
% non-executive directors	-0.350***		-0.758**
	(-3.32)		(-2.51)
Power distance (H)		0.008***	0.072***
		(7.39)	(3.63)
Individualism (H)		-0.005***	-0.039**
		(-5.06)	(-2.00)
Masculinity (H)		0.004***	0.014*
		(7.35)	(1.84)
Uncertainty avoidance (H)		-0.003***	-0.013**
		(-4.75)	(-2.16)
Long-term orientation (H)		0.005***	-0.001
		(10.22)	(-0.08)
Indulgence (H)		-0.003**	0.045*
		(-2.57)	(1.90)
Country-level controls	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes
Industry-fixed effect	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes
Observations	41,738	41,738	41,738
Adjusted R^2	0.21	0.10	0.30

Culture Variables Explaining the CEO-worker Pay Ratio

To see how different cultural traits have an impact on the pay ratio, I include each of them separately. The results of regressions of CEO-worker pay ratio on cultural values and other country-level variables are provided in Table 4. Models (1) through (6) in Panel A include power distance, individualism, uncertainty avoidance, long-term orientation, masculinity, and indulgence, respectively. In model (7), I include all the cultural variables together. All regressions include standard errors clustered by firm and country in addition to industry and year fixed effects "to correct for bias in standard errors" (Petersen, 2009).

In model (1), I can see that power distance, i.e., greater ease with power differential, is positively associated with the CEO-worker pay gap. In particular, there is a 2.8% increase in the pay ratio for one standard deviation increase in power distance. This result is consistent with the hypothesis that in a society with high power distance, managers seek to maximize their own wealth. And, given the CEO's bargaining advantage over the board, the CEO-worker pay ratio is larger in such society with high power distance. Haynes (2014) argues that, of several cultural traits, power distance remains among the most robust cultural correlate of CEO compensation.

Table 4. Main Results of the CEO-worker Pay Ratio on Cultural Variables (Hofstede)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country-level variables							
Power distance (H)	0.002**						0.006***
	(2.27)						(6.04)
Individualism (H)		0.004***					0.001
		(9.83)					(0.36)
Masculinity (H)			0.013***				0.014***
			(26.06)				(23.78)
Uncertainty avoidance (H)				-0.004***			-0.007***
				(-7.11)			(-10.48)
Long-term orientation (H)					-0.005***		-0.003***
					(-13.30)		(-6.34)
Indulgence (H)						0.002***	-0.001
						(5.31)	(-1.02)
Shareholder protection	-0.020***	-0.018***	0.004	-0.017***	-0.021***	-0.022***	0.006**
	(-6.70)	(-6.05)	(1.43)	(-5.81)	(-7.70)	(-8.13)	(2.04)
Legal origin	0.003	0.004	-0.005*	-0.006*	-0.008***	-0.004*	-0.025***
	(0.95)	(1.12)	(-1.70)	(-1.88)	(-3.44)	(-1.95)	(-6.76)
Control of corruption	0.001	0.004	0.011***	0.006**	0.009***	0.006***	0.024***
	(0.50)	(1.630	(4.33)	(2.40)	(4.10)	(2.76)	(8.62)
Corporate tax rate	0.032***	0.030***	0.009***	0.029***	0.034***	0.034***	0.006***
	(16.62)	(16.13)	(4.76)	(15.56)	(18.74)	(18.85)	(2.60)
Labor union	-0.005***	-0.009***	-0.002***	-0.002*	-0.005***	-0.004***	0.005***
	(-6.43)	(-10.36)	(-3.02)	(-1.77)	(-7.54)	(-6.23)	(4.28)
Log (GDP per capita)	0.051***	0.054***	0.050***	0.041***	0.061***	0.058***	0.039***
	(0.81)	(0.843)	(0.80)	(0.65)	(0.97)	(0.91)	(0.62)
Market cap/GDP	0.081	0.092	0.067	0.065	0.074	0.082	0.029
	(1.34)	(1.52)	(1.10)	(1.07)	(1.24)	(1.36)	(0.48)
Firm-level variables							
Firm size	0.251***	0.258***	0.268***	0.251***	0.257***	0.253***	0.271***
	(100.30)	(97.65)	(103.69)	(101.20)	(101.52)	(98.66)	(100.71)
ROA	0.012	0.016**	0.020**	0.012	0.014*	0.016**	0.019**
	(1.53)	(2.03)	(2.54)	(1.53)	(1.70)	(2.06)	(2.46)
Firm risk	-0.659**	-0.596**	-0.702**	-0.680**	-0.605**	-0.680**	-0.767**
	(-2.26)	(-2.11)	(-2.53)	(-2.28)	(-2.14)	(-2.31)	(-2.48)
Tobin's Q	0.001	0.001	0.001	0.000	0.0001	0.001	0.001
	(0.90)	(1.05)	(1.18)	(0.81)	(1.07)	(1.03)	(1.09)
Leverage	0.025**	0.0246*	0.024*	0.025**	0.020*	0.021*	0.023*
	(1.96)	(1.88)	(1.84)	(2.00)	(1.69)	(1.73)	(1.81)
CEO pay slice	0.959***	0.982***	1.036***	0.961***	1.006***	0.971***	1.062***
	(34.37)	(35.20)	(37.40)	(34.48)	(36.32)	(35.30)	(38.07)
CEO-chair duality	0.169***	0.165***	0.150***	0.174***	0.145***	0.162***	0.141***
	(11.81)	(11.60)	(10.63)	(12.23)	(10.26)	(11.37)	(9.86)
Board Size	0.026***	0.025***	0.023***	0.027***	0.026***	0.027***	0.025***
	(16.18)	(15.76)	(14.16)	(16.86)	(16.57)	(17.07)	(15.06)
% non-executive directors	0.082	0.113*	0.101*	0.059	0.096	0.089	0.063
	(1.36)	(1.86)	(1.67)	(0.980)	(1.610)	(1.468)	(1.04)
Constant	-0.023	-0.464***	-1.652***	0.094	0.276***	-0.055	-1.589***
	(-0.20)	(-4.38)	(-13.91)	(0.89)	(2.73)	(-0.55)	(-9.72)
Country-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42,326	42,305	42,317	42,317	43,302	43,324	42,276
Adjusted R^2	0.28	0.28	0.29	0.28	0.28	0.28	0.30

In model (2), the hypothesis on individualism correlated with CEO-average worker pay ratio is confirmed as the sign is significant and positive. In model (3), the positive sign of masculinity is consistent with the hypothesis that in masculine culture, people will attempt to register their highest performance and get promotion and extra reward (Goel and Thakor, 2008). In particular, there is a 19% increase in the pay ratio for one standard deviation increase in masculinity.

Uncertainty avoidance is hypothesized to be negatively associated with pay ratio, and the results in model (4) shows there is a 53% decrease in the pay ratio for one standard deviation increase in uncertainty avoidance. In model (5), the coefficient of long-term orientation is significantly negative; indicating that in a society with a long-term horizon, the relative pay is smaller. This is consistent with the hypothesis that in such culture, there will be less corporate risk-taking, resulting in less equity compensation and smaller pay gap. In model (6), the coefficient of indulgence is significantly negative, indicating that in a society with higher degree of indulgence, the pay gap will be smaller. This result is consistent with the notion that people care less about tournament prizes and the likelihood that their performance will be the maximum will be lower.

Model (7) includes all the six cultural dimensions. Except for indulgence, the coefficients of all the other variables remain statistically significant and of the same signs as in models with cultural traits separately. In addition, corruption control index shows a positive correlation with pay ratio. I also see that the labor union variable is negatively associated with pay ratio, which confirms the notion that labor unions can increase the bargaining power of rank-and-file employees and thus increase the compensation of lower-

level workers. I also notice that GDP per capita is positively associated with CEO-worker pay ratio. Overall, I find that country-level variables especially culture play a significant role in determining the CEO-worker pay ratios across countries.

Disclosure Bias

Since not all firms disclose staff expense and number of employees, which is necessary to compute the pay ratio, there is potential sample selection bias. I use Heckman (1979) selection model to address the self-selection bias; this procedure also controls for potential endogeneity problem due to omitted variables. The first-stage model concerns disclosure choice – does the firm disclose staff expense and number of employees or not? The dependent variable in the probit model is equal to one for a firm that discloses these staff data and zero for a firm that does not report either of these variables. The second stage then examines the effects of the independent variables on the pay ratio, using the fitted disclosure choice indicator.

The results of the Heckman selection model are shown in Table 5. Model (1) is country model, and Model (2) is combined firm and country model. The results presented here use the inverse Mills ratio from the first-stage probit model. The average truncation effect is computed as lambda × average mills value =1.936*0.117 = 0.226. This gives by how much conditional pay ratios are shifted up due to the selection or truncation effect. In the firm model, the magnitudes of the coefficients are similar to those reported in Table 4. The CEO-worker pay ratio is positively related to firm size, profitability, and weak corporate governance. In the country model, the signs of the coefficients are similar to those reported in Table 5, except that the coefficient of individualism becomes negative,

and the coefficient of indulgence becomes insignificant. The other cultural variables and Gini index remain significant with the same sign. In the combined model, I find that, consistent with my hypotheses, the pay ratio is significant and positively associated with power distance, individualism, and masculinity, and significant and negatively associated with uncertainty avoidance and long-term orientation.

Table 5. Controlling for the Disclosure of Employee Compensation Using Heckman Selection Model

Panel A		
1st stage: Disclosure of staff expense and # of employees		
Firm size	0.009***	0.067***
	(8.22)	(53.00)
ROA	-0.027***	0.013***
	(-27.45)	(4.43)
Rule of law	0.031***	-0.008***
	(30.93)	(-6.21)
Regulatory quality	0.108***	-0.017***
	(95.21)	(-15.75)
Government effectiveness	0.001***	0.022***
	(3.54)	(20.42)
Control of corruption	-0.420***	-0.533***
	(-10.95)	(-13.02)
Log (GDP per capita)	0.800***	0.779***
	(15.11)	(14.63)
Constant	3.734***	-4.312***
	(38.92)	(-26.53)
Mills		
Lambda	-1.713	1.936
Observations	147,573	143,313

Table 5. (continued)

Panel B		
2nd stage: CEO-worker pay ratio on firm- and country-level variables		
	(1)	(2)
Power distance (H)	0.007***	6.77e-07
	(5.54)	(0.00)
Individualism (H)	-0.004***	0.014***
	(-3.32)	(12.59)
Masculinity (H)	0.010***	0.015***
	(13.20)	(23.47)
Uncertainty avoidance (H)	-0.002***	-0.006***
	(-2.61)	(-8.97)
Long-term orientation (H)	0.005***	-0.005***
	(9.10)	(-10.43)
Indulgence (H)	0.001	-0.009***
	(0.89)	(-8.49)
Firm size		0.412***
		(123.00)
ROA		0.041***
		(4.43)
Firm risk		-7.06e-05**
		(-2.14)
Tobin's Q		0.001**
		(2.13)
Leverage		0.005
		(0.73)
CEO pay slice		1.736***
		(68.25)
CEO-chair duality		0.095***
		(5.85)
Board size		0.028***
		(17.41)
% non-executive directors		0.358
		(1.24)
Shareholder protection	0.001	0.008**
	(0.07)	(2.09)
Legal origin	0.015***	-0.033***
	(4.98)	(-8.81)
Control of corruption	-0.034***	0.047***
	(-11.71)	(15.76)
Corporate tax	0.032***	0.020***
	(15.30)	(9.13)
Labor union	-0.004***	-0.013***
	(-4.64)	(-10.88)
Log (GDP per capita)	0.576***	0.333***
	(8.56)	(4.56)

Societal Equity Orientation

It is arguable that the Gini index used an explanatory variable above is subject to endogeneity bias due to possible reverse causality because as high CEO-worker pay ratio is a contributing factor for income inequality. I address this endogeneity issue by estimating a two-stage model. Model (2) reports the second-stage results with the fitted value of the Gini coefficient and the same set of firm and country variables used in Tables 3 and 4. In the first stage, Gini coefficient estimated as a function of unemployment rate, population, GDP, creditor rights protection, shareholder rights protection. The results are robust.

If certain countries exhibit cultural characteristics that foster income inequality, they would struggle to achieve a higher degree of economic equality. I then examine whether the relation between pay ratio and societal equity environment is influenced in the presence of certain cultural factors, and whether the relation between pay ratio and culture is influenced by societal environment. I regress pay ratio on the interaction of Gini index and the measures of culture, as well as on the interaction of Equitable Wealth Creation and country governance. The results of Table 6 show that when power distance is more acceptable, the influence of societal equity orientation is less on explaining pay ratios. Similarly, I find that when the society is more tolerant on risk and uncertainty, the influence of societal equity environment is less on explaining pay ratios. Additionally, when equitable wealth creation is used in lieu of Gini, the sign of the coefficient of EWC is the opposite of Gini, as expected; and when the degree of control of corruption is higher, the effect of social equity orientation is great in explaining pay ratios.

Table 6. The Effect of Societal Equity on CEO-worker Pay Ratio

	(1)	(2)	(3)	(4)	(5)
Gini	0.004***		0.237***		
	(2.07)		(15.25)		
Gini (endogenous)		0.208***			
		(4.62)			
Equitable wealth creation				-0.875***	
				(-4.17)	
Egalitarianism					-0.015***
					(-6.78)
Power distance			0.044***		
			(8.38)		
Individualism			0.053***		
			(11.68)		
Masculinity			0.005		
			(0.90)		
Uncertainty avoidance			-0.004		
			(-0.87)		
Long-term orientation			0.050***		
			(9.87)		
Gini*power distance			-0.001***		
			(-8.60)		
Gini*individualism			-0.002***		
			(-12.23)		
Gini*masculinity			-0.001		
			(-0.76)		
Gini*uncertainty avoidance			-0.001		
			(-0.99)		
Gini*long-term orientation			-0.001***		
			(-8.82)		
EWC* Shareholder protection				0.003	
				(0.38)	
EWC*Legal origin				0.002	
				(0.22)	
EWC*Control of corruption				-0.014**	
				(-2.30)	
Constant	0.015***	0.007***	0.439***	-1.743**	1.365***
	(6.43)	(8.34)	(3.37)	(-2.52)	(3.72)
Country-level controls	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes
Industry-fixed effect	Yes	Yes	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	42,473	42,531	43,110	43,110	43,110
Adjusted R^2	0.21	0.16	0.15	0.14	0.18

Robustness Tests

Estimating CEO and Average Worker Compensation Separately

The pay ratio variable consists of two components: the CEO compensation in the numerator and the average-worker compensation in the denominator. Hence an increase in the pay ratio can be explained by either an increase in CEO compensation, or a decrease in average-worker compensation, or both. In this section, I examine CEO compensation and average worker compensation separately to see which of the two factors are responsible for the reported results on pay ratio above.

The results are reported in Table 7. In column (1), I find that CEO total is positively associated with power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence, and negatively with shareholder protection, and control of corruption. In column (2), in contrast to CEO total compensation, the average worker pay is negatively related to individualism, although it is positively associated with masculinity, uncertainty avoidance and long-term orientation, and indulgence. This shows that of the six Hofstede cultural traits, the CEO-worker pay ratio is most significantly related to the degree of individualism. This uncovers a striking result that Individualism raises CEO compensation while lowering the average worker pay. Five other cultural traits work in the same direction for CEO and worker compensation, although the net results are clearly stronger for CEO comp rather than worker pay.

Table 7. Estimating CEO Compensation and Average Worker Compensation Separately

	Dependent variable= CEO compensation (1)	Dependent variable= Average worker compensation (2)
Power distance (H)	0.008***	0.014***
	(7.34)	(12.33)
Individualism (H)	0.004***	0.002*
	(3.92)	(1.82)
Masculinity (H)	0.025***	0.027***
	(46.03)	(48.52)
Uncertainty avoidance (H)	-0.004***	-0.004***
	(-6.83)	(-6.16)
Long-term orientation (H)	-0.007***	-0.013***
	(-15.52)	(-24.76)
Indulgence (H)	0.020***	0.016***
	(17.36)	(14.72)
Gini Index	0.017***	0.015***
	(14.26)	(12.16)
Shareholder protection	-0.049***	-0.036***
	(-17.07)	(-13.71)
Legal origin	0.067***	0.051***
	(22.07)	(17.00)
Control of corruption	-0.022***	-0.028***
	(-9.01)	(-11.33)
Corporate tax rate	0.422	0.120**
	(1.10)	(2.20)
Log (GDP per capita)	-0.173***	-0.179***
	(-7.43)	(-7.87)
Market cap/GDP	-0.001	0.06
	(-0.02)	(1.20)
Constant	18.670***	17.061***
	(82.85)	(77.36)
Country-level controls	Yes	Yes
Firm-level controls	Yes	Yes
Industry-fixed effect	Yes	Yes
Year-fixed effect	Yes	Yes
Observations	42,081	42,081
Adjusted R^2	0.25	0.28

Alternative Measures of Cultural Dimensions

Table 8 presents the regression of relative pay on alternative measures of culture and income distribution. I use five measures from the GLOBE study (House et al., 2004) —power distance, in-group collectivism, gender egalitarianism, uncertainty avoidance, and future orientation—which are comparable to the five of the six measures I used from Hofstede (power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation). Since the scores in the GLOBE study were provided for collectivism rather than for individualism, the collectivism score is reverse-coded for same directional interpretation as in Hofstede. In models (1)-(5), I include each of the GLOBE cultural traits ("as is") separately, and in model (6), I include all the cultural variables together along with income distribution variable, social progress variables and instructional controls. The results are largely consistent with those reported above for comparable Hofstede variables: the coefficient of power distance remains positive, while the coefficients of future orientation and uncertainty avoidance remain negative.

Table 8. Alternative Measures of Culture: GLOBE

	(1)	(2)	(3)	(4)	(5)	(6)
Country-level variables						
Power distance (GLOBE)	-0.002***					0.005***
	(-2.83)					(5.39)
In-group Collectivism(GLOBE)		0.007***				0.007***
		(15.21)				(6.43)
Gender egalitarianism (GLOBE)			0.015***			0.014***
			(27.87)			(22.72)
Uncertainty avoidance (GLOBE)				-0.002***		-0.003***
				(-4.99)		(-5.97)
Future orientation (GLOBE)					-0.008***	-0.007***
					(-18.99)	(-13.69)
Constant	0.649***	-0.039	-1.176***	0.666***	1.119***	-1.091***
	(4.11)	(-0.25)	(-7.24)	(4.36)	(7.75)	(-5.51)
Country-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42,452	42,452	42,452	42,452	42,452	43,355
Adjusted R^2	0.29	0.29	0.31	0.29	0.30	0.31

US vs. Non-US Firms

Given the large proportion of U.S. firm data in the sample, and the differences in disclosure practices around the globe regarding equity compensation (Balsam, 2013), I re-estimated model (1) of Table 3 for sub-sample of U.S. and non-U.S. firms separately. The results in Panel A of Table 9 show that the pay ratio increases with firm size and profitability in both samples. I also find that the CEO- average worker pay ratios are positively related to CEO pay slice in both samples. The results are also similar for CEO duality and board size in the U.S. and non-US firm samples. The only difference between the two samples pertains to firm risk, which is positive for U.S. firms but negative for non-U.S. firms.

I also re-estimated Table 4 for non-US firms. Model (1) in Panel B is the regression result using Table 4 model (7). The results in model (1) of Table 9 Panel B show that consistent with the results in Table 4, CEO-worker pay ratio in non-US countries increases with power distance, individualism, masculinity, and decreases with uncertainty avoidance and long-term orientation. I also conduct Heckman selection model to address the self-selection bias using the same variables as in Table 5. The results in model (2) remain robust.

Table 9. Comparison of US and Non-US Firms

Panel A: Firm-level variables		
	(1)	(2)
	US	Non-US
Firm size	0.398***	0.169***
	(101.12)	(62.89)
ROA	0.027**	0.019
	(2.46)	(1.41)
Firm risk	0.003***	-0.000***
	(2.99)	(-9.46)
Tobin's Q	0.004**	0.001**
	(2.43)	(2.40)
Leverage	0.001	4.66e-04
	(0.74)	(0.03)
CEO pay slice	1.938***	0.890***
	(45.64)	(32.63)
CEO-Chair duality	0.109***	0.045**
	(6.18)	(2.49)
Board size	0.011***	0.045***
	(3.88)	(25.71)
% non-executive directors	-0.946***	-0.758**
	(-3.11)	(-2.51)
Constant	0.256	1.811***
	(0.82)	(13.09)
Industry-fixed effect	Yes	Yes
Year-fixed effect	Yes	Yes
Country-fixed effect	No	Yes
Observations	10,802	22,715
Adjusted R^2	0.51	0.37
Panel B: Country-level variables		
	(1)	(2)
	Non-US	Non-US (Heckman)
Power distance (H)	0.001***	0.017***
	(3.69)	(6.21)
Individualism (H)	0.002***	0.014***
	(3.55)	(4.21)
Masculinity (H)	0.001***	0.008***
	(20.43)	(3.80)
Uncertainty avoidance (H)	-0.006***	-0.012***
	(-2.21)	(-7.61)
Long-term orientation (H)	-0.015***	-0.005***
	(-2.99)	(-5.85)
Indulgence (H)	0.001	-0.032
	(1.18)	(-1.52)
Constant	8.950***	10.232***
	(59.91)	(35.96)

Table 9. Panel B (continued)

Country-level controls	Yes	Yes
Firm-level controls	Yes	Yes
Industry-fixed effect	Yes	Yes
Year-fixed effect	Yes	Yes
Observations	33,697	33,697
Adjusted R^2	0.18	NA

Other Robustness Tests

In the main empirical testing, the measure of average employee pay is staff expense divided by the number of employees. I also use two alternative measures of CEO-pay ratio: (1) I exclude the CEO compensation from total staff expense, and the number of employees reduce 1 correspondingly; and (2) I exclude the sum of the top 5 executive compensation and the number of employees minus 5 correspondingly. The results (not shown) are consistent with the earlier results no matter which measures I use.

I test another key country-level factor, egalitarianism, which is defined as "the belief that all people are of equal worth and should be treated equally in society" (Schwartz, 2001). I use this variable as an alternative measure of societal equity, and the Egalitarianism scores is from Siegel, Licht, and Schwartz (2011). I conduct the estimation using the same models as in Table 6. The results (not shown) confirm the earlier results in Table 6: the higher Egalitarianism scores, the larger the CEO-worker pay ratio.

Conclusions

The pay gap between CEOs and average employees has recently been the subject of much media and political attention. In this study, I examine the determinants of the CEO-worker pay ratios for firms around the globe. The empirical results in this study indicate that the degree to which the pay ratio is influenced not only by firm characteristics but by country-level factors such as culture and societal equity orientation as well as institutions.

Specifically, I find that the CEO-worker pay ratio in the same firm is positively associated with the degree of power distance, individualism, and masculinity of the national culture, and negatively with uncertainty avoidance and long-term orientation, after controlling for firm-specific variables and country institutional factors; the effect of indulgence is less robust. The pay ratio is also significantly related to societal equity orientation measures. Various analyses uphold the robustness of these results.

This is the first comprehensive study of its kind that focuses on the determinants of the CEO-worker pay ratio in the same firm using the comprehensive firm-level data for 44 countries for 2002-2015. As such, this chapter contributes to the literature in several ways. First, it contributes to existing work on executive compensation by considering the relative income between the top and average workers, and by quantifying the effect of culture around the world. Second, it also adds to the literature on income disparity by documenting the effect of societal equity measures, and by considering the effect of formal and informal institutional factors. Third, the present study brings societal disparity literature of Stiglitz (2012) and Picketty (2014) and the traditional corporate governance literature on executive

compensation together, and does it with global data covering 44 countries. Hopefully, the results reported in this chapter provide a more and global comprehensive understanding of the nexus between formal and informal institutional factors and the relative compensation framework of public listed firms.

CHAPTER 2

THE IMPACT OF THE CEO-WORKER PAY RATIO ON FIRM VALUE

Introduction

For fiscal years beginning on or after January 1, 2017, U.S. public companies must disclose the total compensation of their median employee and chief executive officer, followed by the ratio of the two, i.e., the pay ratio. The CEO-employee pay ratio which has been covered closely in the media, has stirred controversy among labor activists and has been used in political platforms. It is also an issue with bond rating agencies and corporate governance advisors who have incorporated pay disparity into their ratings and recommendations, albeit disparity within the executive suite (Plath, 2008). Although there is a large literature on CEO compensation (Murphy, 1999; Dow and Raposo, 2005; Gabaix and Landier, 2008; Frydman and Jenter, 2010), little systematic analysis has been done on the impact of the pay ratio on firm value, and those few studies present conflicting results, suggesting additional analysis is necessary. Thus, my goal in this paper is to shed further light on this issue.

Social comparison and equity theory (Bloom and Michel, 2002; Siegel and Hambrick, 2005; Wade, O'Reilly, and Pollock, 2006; Fredrickson, Davis-Blake, and Sanders, 2010) suggest that the perceived lack of pay equity adversely affects employee morale, collaboration, and information sharing, which then leads to poor performance and increased turnover, reducing firm value. Rent extraction theory suggests that high CEO pay ratios can reflect CEO rent extraction in firms with weak corporate governance, which is associated with lower firm value (Bebchuk, Cohen, and Ferrell, 2009).

In contrast, tournament theory (Rosen, 1986; Lazear and Rosen, 1981) suggests that the incentives provided by pay gaps motivate employees to work harder to get promotions and the ensuing increased compensation. Also, efficient contracting theory suggests that executive compensation arrangements are used to secure CEO talent. Therefore, high CEO pay ratios can be a reflection of firm's ability to secure CEO talent, which is associated with better firm performance.

Not surprisingly, given the validity of the underlying theories, empirical evidence has been found to support both viewpoints. That is, some studies show that firm value or performance increases with the pay ratio (Mueller, Ouimet, and Simintze, 2017; Burns, Minnick, and Starks, 2017; Kale, Reis, and Venkateswaran, 2009; Banker, Bu, and Mehta, 2016), while others show that firm value/performance decreases with the pay ratio (Bebchuk, Cremers, and Peyer, 2011; Shin, Kang, Hyun, and Kim, 2015; Newton, 2015).

This paper extends the existing literature by showing that both positive and negative predictions are valid under certain condistions. Using linear, nonlinear, and piecewise, regression analysis I find, consistent with tournament theory and efficient contracting, that up to a certain point, increases in the pay gap are associated with increases in firm value. However, I find that consistent with equity theory and rent extraction theory, that past that point, increases in the pay gap are associated with decreases in firm value. I then show that this inflection point varies in a predictable fashion by industry and firm characteristics.

I examine the relation between firm value, proxied for by Tobin's Q, and the pay ratio, using the population of Compustat firms that meet the data requirements over 1997–2015. My primary measure of the pay ratio is the ratio of total CEO compensation to

average employee pay, where total CEO compensation is ExecuComp variable TDC1 and average employee pay is calculated as total labor expense (Compustat variable XLR) divided by the number of employees (Compustat variable EMP). However, since disclosure of total labor expense is not required, I suffer a significant reduction in sample size because of this requirement. Further my sample suffers from self-selection bias in that only firms that choose to disclose remain in my sample. Thus, to both increase the sample size, and to mitigate the impact of selection bias, I recalculate the pay ratio, and rerun my analysis using industry average worker pay from the Bureau of Labor Statistics (BLS).

I conduct the empirical tests using three types of regression analysis. I begin with a linear regression and find that there is a significant association between firm value and pay ratio. However, this association differs depending upon whether I use Compustat or BLS data to calculate the pay ratio. To be precise, I find a significant negative association between firm value and the pay ratio when I use Compustat data, while I find a significant positive association between firm value and the pay ratio when I use the BLS data. I discuss this discrepancy below. Second, I do a nonlinear regression by including both the pay ratio variable and its quadratic term. Here I find consistent results regardless of whether I use Compustat or BLS data. In particular, I find that up to a certain point, increases in the pay gap are associated with increases in firm value; this is consistent with tournament theory and efficient contracting theory. However, I find that past that point, increases in the pay gap are associated with decreases in firm value; this is consistent with equity theory and rent extraction theory. Third, I do a piecewise regression analysis by including four indicator variables for the different percentiles ranks of pay ratios (e.g., below 10^{th}

percentile, 10th percentile to 50th percentile, 50th percentile to 90th percentile and above 90th percentile) to further account for a potential nonlinear relation. I generally find a positive association between firm value and the pay ratio, however that ratio is weak for firms in the lowest decile, and turns negative for firms in the highest decile. This result is consistent with the prediction that firm value and the CEO-worker pay ratio exhibit a non-linear (inverted-U shape) relationship.

I then show that the optimal pay ratio, or the inflection point, varies in a predictable fashion by industry and firm characteristics, as firms require different levels of information sharing, collaboration, and cooperation. For example, technology intensive firms will have larger task interdependence and a greater need to collaborate, and thus a large pay disparity can damage innovation in those firms (Siegel and Hambrick, 2005). Therefore, I expect that high-tech firms will have a lower inflection point than low-tech firms. For the same reason, I hypothesize and observe that the relationship between the pay ratio and firm value in human-capital-intensive firms will have a lower inflection point as opposed to physical-capital-intensive firms. Finally, I find that multinational firms have a higher inflection points than purely domestic firms since the employees of domestic firms are more likely to be knowledgeable about and less tolerant with higher CEO compensation (Faleye, Reis, and Venkateswaran, 2013).

Next, following Bebchuk et al. (2011), I decompose the CEO-employee pay ratio into pay disparity within the executive suite and pay disparity between the executive suite and the average employee. I find that my results are driven mainly by the ratio of executive pay to average employee pay.

This paper continues with the next section which further reviews the literature and develops my hypothesis. Then the following two sections describe my empirical models and data and provide the empirical analysis. I conclude in the last section.

Literature Review on Pay Ratio

Research on the Executive Pay Ratio

Researchers have examined the impact of the gap between the CEO and the other named executive officers. Burns, Minnick, and Starks (2017) conclude that firm value increases with the CEO tournament structure (measured by CEO pay gap, CEO pay slice and CEO pay ratio). However, they find this effect does not hold in all geographic regions (countries). They also state that, "Steeper tournaments can be more effective at improving firm value in countries that value competition, power, and fairness in income." Their overall finding is consistent with prior research by Kale, Reis, and Venkateswaran (2009) and Lee, Lev, and Yeo (2008). However, this line of research contradicts the findings of Bebchuk, Cremers, and Peyer (2011) and Siegel and Hambrick (2005), which found that larger ratios had a negative impact on firm value and performance. The latter paper is particularly interesting in that the authors argue that a higher pay ratio is more detrimental in high-technology firms which ties into the point above, that the optimal pay ratio is not the same for all firms.

Research on the Broader Pay Ratio

Given that disclosure of the pay ratio is not yet mandated, researchers have only begun to examine the impact of the pay gap at levels below the top five executives. Banker,

Bu, and Mehta (2016) who use data from China, which they validate on a small sample of US firms for which data was available, suggest that an increasing pay ratio leads to better firm performance. In contrast, Shin, Kang, Hyun, and Kim (2015) and Newton (2015) find that higher pay gaps lead to poorer performance. Only Crawford, Nelson, and Rountree (2017) who look exclusively at US commercial banks and find that firms with extreme pay ratios are riskier and perform worse, begin to address the nonlinearity of the relationship. To be precise they find "pay disparity increases firm performance up to a point, but as pay ratios rise above this level performance begins to decline."

While some papers examine the aggregate impact on firm value or performance, others look at facets that can affect firm performance. For example, Wade, O'Reilly, and Pollock (2006) and Bloom and Michel (2002) suggest that when lower level managers feel underpaid relative to the CEO they are more likely to leave the firm. Perhaps, the most interesting paper is Mahy, Rycx, and Volral (2011). While they don't look at the pay ratio per se, using data from Belgium the authors find that wage dispersion at first has a positive effect on employee productivity. The effect is nonlinear, however, as increases in beyond an inflection point lead to productivity decreases. Further adding to the richness of the study, as well as to the complexity of finding optimal dispersion, this inflection point varies with firm characteristics.

Hypothesis Development

As stated above, both tournament and equity theory are well developed internally consistent theories. However, their predictions are contradictory. For example, the competition among executives/employees as a result of the incentives provided by the tournament leads to less collaboration among competitors in the tournament. Thus, while the pay differential does provide benefits as it provides incentives for the individual to exert effort to win the tournament, there are also costs associated with the competitive nature of the tournament which leads to less collaboration and cooperation. In addition, if the pay differential is a reflection of efficient contracting, then large pay ratio will lead to better firm performance and higher firm value. As I expect that some level of pay differential is necessary, I postulate that the relationship between the CEO pay ratio and firm performance is nonlinear, following up and extending the research of Crawford et al. (2017). Specifically, I believe that firm performance will increase with the pay ratio up to a point, after which it will begin to decline.

H1: The relationship between the pay ratio and firm value is nonlinear.

While Crawford et al. (2017) limit their study to commercial banks, my analysis will incorporate a broad swath of industries, allowing us to test cross-sectional variation in this relationship and building on the work of Siegel and Hambrick (2005) and Burns et al. (2017). In particular, Siegel and Hambrick (2005) show that the adverse impact of the vertical pay disparity, to be much greater in high technology firms where collaboration is more important. According to Siegel and Hambrick (2005), technology intensiveness increases task interdependence and the need to collaborate. As a higher pay ratio increases

competition amongst employees and reduces their collaboration, my expectation is that the optimal pay ratio or inflection point will be lower for high-tech as opposed to low-tech firms.

H2a: High-tech firms have a lower inflection point than low-tech firms.

Human-capital-intensive firms may require more collaboration and cooperation than physical-capital-intensive firms. As such, tradeoffs between competition and collaboration differ between human-capital-intensive and physical-capital-intensive firms. My expectation is that the optimal pay ratio or inflection point will be lower in human-capital-intensive firms, as opposed to physical-capital-intensive firms.

H2b: Human-capital-intensive firms have a lower inflection point than physical-capital-intensive firms.

Multinational firms, because they operate in multiple countries, cultures, and time zones, have a greater need for information sharing, collaboration, and cooperation. For the same reason as in the high-tech firms, the damage of large pay disparity for multinational firms will be higher than for domestic firms. As a higher pay ratio increases competition amongst employees and reduces their collaboration, my expectation is that the optimal pay ratio or inflection point will be lower for multinational as opposed to purely domestic firms. However, since employees of domestic firms are more likely to be knowledgeable about and less tolerant with higher CEO compensation (Faleye, Reis, and Venkateswaran, 2013), I also expect that multinational firms have a higher inflection point than domestic firms. Then it becomes an empirical question to test.

H2c: Multinational firms have a higher inflection point than domestic firms.

Sample and Variable Construction

Sample Construction

Since the primary variable of interest is the CEO pay ratio, I start with CEO compensation data for the period 1997-2015.[8] I obtain CEO compensation from Standard & Poor's ExecuComp. ExecuComp provides detailed information on executive compensation data collected directly from each company's annual proxy. I obtain the staff expense and number of employees and other financial information from Standard & Poor's Compustat, industrial segment data from the Standard & Poor's Compustat Industrial Segment, and stock return information from CRSP. I also use the RiskMetrics database, with coverage of directors of S&P 500, S&P MidCap, and S&P SmallCap firms for board and corporate governance information. Consistent with the prior literature, I eliminate financial firms and utilities.

Variable Construction

CEO-worker Pay Ratio

The test variable in this study is the CEO-to-worker pay ratio. It is calculated as CEO total compensation (ExecuComp variable: TDC1) divided by mean worker pay.[9] I calculate mean worker pay two ways. My primary measure of mean worker pay is calculated as total labor expense (Compustat variable: XLR) divided by the total number of employees (Compustat variable: EMP). However, since firms are not required to

[8] I use as an alternative measure of mean employee pay, industry-level worker pay from the Bureau of Labor Statistics. This data starts from 1997 so I use that starting date for all my analyses.

[9] In addition, I construct an alternative pay ratio using CEO cash pay, where cash compensation consists of salary and cash bonus.

disclose either labor expense or number of employees, my sample size is reduced and furthermore, is subject to self-selection bias, as firms effectively self-select into my sample. To control for both issues I use as an alternative measure of mean worker pay, the industry-level mean worker pay from the Bureau of Labor Statistics.

Dependent Variable

The dependent variable of the study is Tobin's Q. Tobin's Q is measured as the market value of assets divided by the book value of assets measured at a firm's fiscal year end. The market value of assets is defined as the market value of equity plus the book value of assets minus the book value of equity. The denominator of Q is the book value of assets. In the baseline regression, I also include the lagged Tobin's Q as a control variable.

Control Variables

I begin with the control variables used by Bebchuk, Cremers and Peyer (2011) in their test of the empirical association between CEO pay slice and Tobin's Q. These controls include the natural logarithm of book value, insider ownership, the ratio of capital expenditures to assets (Capex/assets), leverage, R&D, missing R&D (Koh and Reeb, 2015), firm age, a dummy variable indicating whether CEO ownership is greater than 20%, CEO tenure, and a dummy variable indicating if the CEO was appointed from outside the firm. I also include the Managerial Ability Score from Demerjian, Lev, and McVay (2012) as a measure of CEO ability. I include the entrenchment index (Eindex) of Bebchuk, Cohen, and Ferrell (2009) to control for the level of shareholder rights or management entrenchment. I also include a dummy variable indicating whether the firm is domestic or multinational. I use three variables to proxy the skills and relative bargaining power of the

rank-and-file employees which while I expect will affect the pay ratio, can also affect firm value. The first one is the ratio of physical capital to the number of employees, as capital-intensive operations generally require higher employee skills (Faleye, Reis, and Venkateswaran, 2013). The second variable is workforce education, measured by both the percentage of full-time employees who hold at least a bachelor's degree at the two-digit SIC industry level, obtained from U.S. Bureau of Census, and the percentage of the population who hold at least a bachelor's degree in the region, obtained from the BLS. These variables proxy for employee productivity, as according to Faleye et al (2013), higher skilled employees will have higher productivity. The third measure is industry concentration which is proxied by revenue-based Herfindahl index as the more concentrated the industry, the fewer outside opportunities. Each of these variables is measured contemporaneous with Tobin's Q, and all continuous variables are winsorized at the 1st and 99th percentiles to minimize the influence of outliers.

Summary Statistics

Table 10 provides the summary statistics. The statistics are based on a panel data set of 9,817 firm-year observations between 1997 and 2015. The mean CEO-worker pay ratio is 56.20, which is lower than the number reported in popular press, e.g., 373 (Melby 2016). The mean CEO pay slice is 0.43, is slightly higher than the 0.36 reported by Bechuk et al. (2011). Tobin's Q has a mean (median) value of 1.21 (1.13). The average firm in the sample is large, with logarithm of book value of 7.26. Since the sample is from publicly traded U.S. companies in the S&P 1500 Index, this is not surprising. I omit discussion of the remaining variables for brevity.

Table 10. Summary Statistics

	Mean	SD	Median	P25	P75
Pay ratio	56.20	150.11	20.40	10.79	100.04
Cash pay ratio	22.36	57.63	16.91	3.61	69.02
Industry adjusted pay ratio	8.32	103.43	0.00	-6.09	16.25
Tobin's Q	1.21	9.09	1.13	0.92	1.68
Log (book value)	7.26	1.85	7.13	6.16	8.55
ROA	0.08	0.11	0.05	0.03	0.13
Institutional ownership	0.32	0.27	0.25	0.09	0.46
Insider ownership	0.27	0.15	0.25	0.17	0.36
Capex/assets	0.10	2.86	0.16	0.14	0.28
Leverage	0.20	0.16	0.18	0.08	10.11
R&D	0.02	0.16	0.00	0.00	0.03
R&D missing	0.41	0.62	0.42	0.00	0.57
Firm age	26.90	12.10	22.10	6.00	41.60
CEO outsider	0.06	0.43	0.06	0.04	0.80
Eindex	2.68	1.26	3.00	2.00	4.00
CEO ownership>=20% (%)	0.24	0.42	0.00	0.00	0.10
CEO tenure	6.50	10.80	5.70	5.20	7.80
STD of return	3.70	3.60	3.60	1.80	4.20
Capital intensity per employee	0.04	0.06	0.03	0.01	0.05
Workforce education (industry)	0.23	0.17	0.26	0.20	0.36
Workforce education (region)	0.29	0.06	0.31	0.20	0.35
Industry concentration	0.05	0.13	0.06	0.02	0.07
Multinational dummy	0.11	0.30	0.00	0.00	0.00
Headquarter_blue state dummy	0.42	0.11	0.48	0.31	0.51
Corporate tax rate	0.21	0.36	0.25	0.12	0.48

Empirical Analysis

Baseline regression

To provide evidence on my hypotheses I conduct the following regression to examine the effects of CEO pay ratio on firm value:

$$Firm\ value = f(CEO\ pay\ ratio, firm\ characteristics, CEO\ characteristics, corporate\ governance, employee\ characteristics)$$

Table 11 examines the relation between CEO pay ratio and subsequent firm value. Three alternative measures of the pay ratio are used in the regressions. The first measure is the pay ratio calculated using total CEO compensation (ExecuComp TDC1) divided by mean employee pay, which is calculated as total labor expense (Compustat XLR) divided by total employees (Compustat EMP). The second measure is the industry-adjusted pay ratio, which is calculated by subtracting the annual industry median pay ratio from the unadjusted pay ratio. As noted above, disclosure of labor expense is not mandatory, thus reducing my sample size for the first two measures. Perhaps a bigger issue is the selection bias, whereby only the firms choosing to disclose enter my sample. Thus, my third measure utilizes industry average worker pay from the BLS as the denominator of the pay ratio. I get the industry average worker pay from Bureau of Labor Statistics (BLS).

Table 11. Regression of Firm Value on CEO-worker Total Pay Ratio

	Total pay ratio		Industry adjusted pay ratio		BLS	
	(1)	(2)	(3)	(4)	(5)	(6)
Pay ratio	0.017**	0.068**	0.017**	0.054**	-0.013**	0.065**
	(2.16)	(2.20)	(2.16)	(2.19)	(-3.20)	(2.22)
Pay ratio^2		-0.0001**		-0.0001**		-0.0001**
		(-2.19)		(-2.18)		(-2.21)
Tobin's Q $_{t-1}$	4.655**	4.861**	4.655**	4.879**	4.290**	4.570**
	(2.16)	(2.17)	(2.16)	(2.17)	(2.16)	(2.17)
Log (book value)	0.720***	0.696***	0.720***	0.691***	0.866***	0.840***
	(2.61)	(2.61)	(2.61)	(2.61)	(2.59)	(2.59)
ROA	1.332**	1.314**	1.332**	1.307**	0.962**	0.969**
	(2.24)	(2.24)	(2.24)	(2.24)	(2.21)	(2.21)
Institutional ownership	-0.075	-0.064	-0.075	-0.066	-0.101	-0.089
	(-1.44)	(-1.33)	(-1.44)	(-1.35)	(-1.55)	(-1.47)
Capex/assets	-0.947*	-0.936*	-0.947*	-0.936*	-0.714*	-0.702*
	(-1.85)	(-1.84)	(-1.85)	(-1.85)	(-1.73)	(-1.73)
Leverage	-0.001**	-0.001**	-0.001**	-0.001**	0.000	-0.000
	(-2.32)	(-2.31)	(-2.31)	(-2.32)	(0.18)	(-0.58)
R&D	0.001	-0.001	0.001	-0.000	0.001	0.000
	(0.43)	(-0.27)	(0.43)	(-0.04)	(0.78)	(0.08)
R&D missing	0.002	0.004	0.002	0.003	0.001	0.002
	(1.03)	(1.43)	(1.03)	(1.34)	(0.46)	(1.25)
Firm age	0.118	0.088	0.118	0.062	0.703***	0.717***
	(0.50)	(0.36)	(0.50)	(0.25)	(2.60)	(2.58)
CEO outsider	-0.717**	-0.803**	-0.710**	-0.965**	-0.940**	-0.764**
	(-2.22)	(-2.22)	(-2.22)	(-2.22)	(-2.04)	(-2.02)
Eindex	-0.003	-0.004	-0.003	-0.003	0.012	0.011
	(-0.01)	(-0.02)	(-0.01)	(-0.01)	(0.05)	(0.05)
CEO ownership>=20%	0.005**	0.005***	0.005**	0.005***	0.006**	0.005**
	(2.58)	(2.60)	(2.58)	(2.60)	(2.48)	(2.50)

Table 11. (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
CEO tenure	0.311	0.134	0.311	0.106	0.718	0.696
	(0.84)	(0.87)	(0.84)	(0.87)	(0.19)	(0.11)
STD of return	6.642**	7.905**	6.642**	7.107**	5.863**	7.431**
	(2.09)	(2.10)	(2.09)	(2.09)	(2.08)	(2.08)
Capital intensity per employee	0.046	0.044	0.046	0.044	0.175*	0.187*
	(0.47)	(0.45)	(0.47)	(0.46)	(1.83)	(1.88)
Workforce education (industry)	9.650**	9.624**	9.650**	9.538**	7.619**	7.911**
	(2.03)	(2.03)	(2.03)	(2.02)	(2.28)	(2.28)
Industry concentration	0.033	0.086	0.033	0.084	0.310	0.429
	(1.52)	(1.52)	(1.28)	(1.28)	(1.25)	(1.25)
Multinational dummy	1.745**	1.553**	1.745**	1.458**	2.222**	2.298**
	(2.30)	(2.30)	(2.30)	(2.30)	(2.35)	(2.35)
Managerial ability score	0.886	0.710	0.886	0.597	0.952	0.994
	(1.28)	(1.28)	(1.28)	(1.27)	(1.30)	(1.30)
Constant	-8.475**	-8.614**	-6.559*	-8.078**	14.073*	13.719*
	(-2.22)	(-2.23)	(-1.93)	(-2.17)	(1.92)	(1.91)
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,817	9,817	9,817	9,817	12,906	12,906
Adjusted R^2	0.35	0.35	0.35	0.35	0.37	0.37
Inflection point		327		257		315

In the initial specification, I examine the linear relationship between firm value and CEO pay ratio, presenting the results in models (1), (3) and (5). In model (5), I actually see a negative relation between Tobin's Q and the pay ratio, while in the models (1) and (3) I observe a positive relationship. While these mixed results are consistent with the prior literature which itself is mixed, I am not necessarily troubled by it, as my question of interest is whether the relationship is non-linear, which I test in my second specification where I add the pay ratio^2 term.

Models (2), (4) and (6) of Table 11 present the results for this second specification. In each column I find a positive and significant coefficient on the linear term and a negative and significant coefficient on the squared term. The findings confirm my expectation that the relation between firm value and the pay ratio is nonlinear. They are consistent with firm value initially increasing with increases in the pay ratio, and after an inflection point, beginning to decrease.[10] The inflection points of pay ratio are quite high, ranging from 257 to 327, all of which are beyond the 75th percentile for the pay ratio. While I hesitate to make normative prescriptions based upon this evidence, it is consistent with political pressure reducing CEO pay and the pay ratio below an unconstrained optimum for most firms.

Turning briefly to my control variables I find the signs and significance of many of my variables are susceptible to changes in the definition of my test variable. Only four variables are consistently positive across all six columns, lagged Tobin's Q, Log (book

[10] The inflection point is calculated by taking the derivative of the dependent variable with respect to the pay ratio in the regressions that includes both the pay ratio and the pay ratio^2.

value), ROA, and the standard deviation of stock returns. Several are insignificant in all columns, e.g., Institutional and Insider Ownership, while others provide mixed levels of significance. As all have been drawn from prior literature and are only being used as controls, I omit further discussion.

Cash pay ratio regression

Two possible nonexclusive explanations for the rather high inflection points observed in Table 11 is that rank-and-file employees either do not consider or heavily discount non-cash pay, and/or they are more acceptable of pay differentials based upon performance. To examine these possibilities, I rerun my analysis using CEO cash compensation, where I replace TDC1 in my numerator with the sum of CEO Salary plus Bonus. I present the results in Table 12. In general, my results and inferences are comparable to those using total compensation as the numerator of the ratio.[11] In models (1), (3), and (5), I see a positive relation between Tobin's Q and the cash pay ratio. In models (2), (4) and (6), I find a positive and significant coefficient on the linear term and a negative and significant coefficient on the squared term. The findings confirm my expectation that the relation between firm value and the pay ratio is nonlinear. The major difference between the two tables is in the inflection point, which ranges from 133 to 158 in Table 12, as opposed to 257 to 327 in Table 11. This evidence is consistent with employees being less tolerant of disparities in cash compensation.

[11] I acknowledge that labor expense (Compustat XLR) incorporates charges for noncash compensation such as stock options and share grants. To that extent the cash pay ratio is biased downward, adding noise to my analysis.

Table 12. Regression of Firm Value on CEO-worker Cash Pay Ratio

	Cash pay ratio		Industry adjusted cash pay ratio		BLS	
	(1)	(2)	(3)	(4)	(5)	(6)
Pay ratio	0.055**	0.142**	0.055**	0.124**	0.030**	0.082**
	(2.42)	(2.27)	(2.42)	(2.31)	(2.10)	(2.29)
Pay ratio^2		-0.0004**		-0.0005**		-0.0002**
		(-1.99)		(-1.99)		(-2.23)
Tobin's Q $_{t-1}$	4.715**	4.863**	4.715**	4.869**	4.212**	4.297**
	(2.17)	(2.18)	(2.17)	(2.18)	(2.17)	(2.18)
Log (book value)	0.722***	0.715***	0.722***	0.713***	0.875***	0.875***
	(2.61)	(2.61)	(2.61)	(2.61)	(2.59)	(2.59)
ROA	1.387**	1.380**	1.387**	1.378**	0.989**	0.990**
	(2.23)	(2.23)	(2.23)	(2.23)	(2.21)	(2.21)
Institutional ownership	-0.081	-0.079	-0.081	-0.079	-0.098	-0.095
	(-1.48)	(-1.47)	(-1.48)	(-1.47)	(-1.53)	(-1.50)
Capex/assets	-0.931*	-0.930*	-0.931*	-0.932*	-0.723*	-0.717*
	(-1.84)	(-1.84)	(-1.84)	(-1.85)	(-1.74)	(-1.73)
Leverage	-0.001**	-0.001**	-0.001**	-0.001**	0.000	0.000
	(-2.34)	(-2.32)	(-2.34)	(-2.32)	(0.23)	(0.03)
R&D	-0.003	-0.003	-0.003	-0.003	0.013	0.013
	(-0.01)	(-0.01)	(-0.01)	(-0.01)	(0.05)	(0.05)
R&D missing	0.002	0.001	0.002	0.001	0.002	0.001
	(0.89)	(0.50)	(0.89)	(0.52)	(0.91)	(0.73)
Firm age	0.002	0.003	0.002	0.002	0.000	0.001
	(0.89)	(1.21)	(0.89)	(1.19)	(0.28)	(0.49)
CEO outsider	0.128	0.179	0.128	0.177	-0.799***	-0.852***
	(0.54)	(0.77)	(0.54)	(0.76)	(-2.66)	(-2.67)
Eindex	-0.005	-0.007	-0.005	-0.006	-0.089	-0.061
	(-1.22)	(-1.22)	(-1.22)	(-1.22)	(-1.04)	(-1.04)
CEO ownership>=20%	0.005**	0.006**	0.005**	0.006**	0.006**	0.006**
	(2.52)	(2.52)	(2.52)	(2.52)	(2.46)	(2.46)

Table 12. (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
CEO tenure	0.108	0.104	0.107	0.103	0.344	0.434
	(1.08)	(1.09)	(1.08)	(1.09)	(1.21)	(1.21)
STD of return	8.799***	8.245***	8.799***	8.229***	3.634***	3.472***
	(2.79)	(2.81)	(2.79)	(2.81)	(3.02)	(3.03)
Capital intensity per employee	0.427	0.879	0.427	0.804	-0.050	-0.768
	(0.78)	(0.73)	(0.78)	(0.72)	(-0.51)	(-0.62)
Workforce education (industry)	10.029**	14.685**	15.029**	14.626**	8.217**	7.983**
	(2.29)	(2.28)	(2.29)	(2.28)	(2.38)	(2.36)
Industry concentration	0.416	0.432	0.463	0.506	0.670	0.623
	(0.98)	(0.95)	(0.98)	(0.94)	(1.26)	(1.25)
Multinational dummy	1.273**	1.212**	1.273**	1.140**	2.183**	2.159**
	(2.22)	(2.22)	(2.22)	(2.21)	(2.29)	(2.28)
Managerial ability score	0.053	0.059	0.053	0.060	0.184*	0.192*
	(0.53)	(0.59)	(0.53)	(0.59)	(1.86)	(1.91)
Constant	-9.034**	-9.546**	-6.561*	-8.550**	12.276*	12.311*
	(-2.20)	(-2.26)	(-1.83)	(-2.15)	(1.86)	(1.87)
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,817	9,817	9,817	9,817	12,906	12,906
Adjusted R^2	0.35	0.35	0.35	0.35	0.37	0.37
Inflection point		158		133		145

In summary, I have found evidence consistent with my first hypothesis that firm value and the pay ratio demonstrate a non-linear (inverse U shape) relation. While initially, firm value first increases with increases in the pay ratio, after the inflection point additional increases in the pay ratio are counterproductive, i.e., they lead to firm value decreases. The results are robust to multiple measures of the pay ratio.

Endogeneity – two-stage least squares regression

Both Tobin's Q and the pay ratio can also be influenced by the same, potentially omitted, variables, resulting in endogeneity. To address this issue, I use a two-stage procedure where the instrumental variables (IVs) are: a dummy variable indicating whether the headquarters of the firm is in blue (Democratic) state or red (Republican) state, and the unionization in the industry, and the state minimum wage. I use these instruments as they are correlated with the pay ratio but uncorrelated with the error term in the baseline equation. For example, location of corporate headquarters (in blue or red state), which is likely where top executives also reside, can impact corporate culture as well as the tolerance for high pay and pay disparities.

In the first stage, I regress both pay ratio and pay ratio^2 on the IVs and other control variables. I elect to use the unadjusted pay ratio calculated using reported labor expense as my conclusions drawn above are invariant to the use of industry adjustment or BLS data. As we can see from the first stage regression reported in Table 13, the blue state dummy is positively and significantly associated with pay ratio and pay ratio^2, while the unionization variable and state minimum wage variable are significantly negatively associated with the pay ratio, and significantly positively associated with the pay ratio^2. The second stage

estimation results are comparable to that reported in Table 11, i.e., the coefficient on pay ratio is positive and significant, while that on pay ratio^2 is negative and significant. The inflection point is comparable (100), if relatively lower than that observed in Table 11 at 327.

I also conduct the IV estimation for cash pay ratio (not reported). In the first stage regression, the blue state dummy is positively and significantly associated with pay ratio, and the unionization and state minimum wage are significantly negatively associated with the pay ratio. The second stage estimation results are comparable to that reported in Table 12, i.e., the coefficient on pay ratio is positive and significant, while that on pay ratio^2 is negative and significant. The inflection point is comparable (86), which is lower than that observed in Table 12 at 158. In sum, I conclude that the results are robust to the use of two-stage least squares.

Table 13. Effect of CEO-worker Pay Ratio on Firm Value (2SLS)

	First stage		Second stage	
	Total pay ratio	Total pay ratio^2	Tobin's Q	
Pay ratio			0.093**	0.199**
			(2.24)	(2.28)
Pay ratio^2				-0.001**
				(-2.17)
Headquarter_blue state dummy	14.658***	368.769***		
	(5.04)	(3.97)		
Unionization	-57.607***	714.857***		
	(-7.71)	(4.26)		
State minimum wage	-0.895***	186.585**		
	(-4.26)	(2.43)		
Tobin's Q $_{t-1}$	5.536***	17.286***	5.445**	1.289**
	(5.93)	(4.90)	(2.20)	(2.23)
Log (book value)	1.388***	57.911***	0.777***	0.703**
	(4.29)	(3.26)	(2.63)	(2.21)
ROA	0.901	-392.831	1.116*	1.016
	(0.02)	(-0.16)	(1.72)	(1.07)

Table 13. (continued)

	First stage		Second stage	
	Total pay ratio	Total pay ratio^2	Tobin's Q	
Institutional ownership	-0.029*	-25.585***	0.016	0.001
	(-1.83)	(-3.71)	(0.07)	(0.58)
Capex/assets	0.003***	1.545***	-0.293**	-0.001**
	(2.63)	(2.81)	(-2.23)	(-2.35)
Leverage	0.044***	12.725***	-0.002**	1.049**
	(3.89)	(3.03)	(-2.36)	(2.56)
R&D	-0.070***	-23.744***	0.002	-9.431**
	(-6.94)	(-5.87)	(1.04)	(-2.17)
R&D missing	-0.107	16.863	-0.000	-0.141
	(-0.87)	(0.35)	(-0.18)	(-0.67)
Firm age	-3.567	731.564	0.940**	0.007**
	(-1.46)	(1.49)	(2.52)	(2.46)
CEO outsider	1.450***	715.513***	-0.429**	0.221***
	(3.68)	(4.01)	(-2.17)	(2.89)
Eindex	0.023***	7.379***	-0.118	51.122**
	(9.55)	(6.57)	(-0.58)	(2.05)
CEO ownership>=20%	-0.001***	0.274***	0.007**	0.059
	(-6.27)	(4.84)	(2.46)	(0.64)
CEO tenure	0.477	189.766	0.290	2.246
	(1.10)	(0.90)	(0.24)	(1.46)
STD of return	-1.882	-593.536	7.885**	7.250**
	(-0.28)	(-0.75)	(2.23)	(2.21)
Capital intensity per employee	-6.513	-939.670	-2.111	-2.059
	(-1.04)	(-1.36)	(-0.39)	(-0.42)
Workforce education (industry)	-15.713**	-478.587***	6.999*	7.290*
	(-2.52)	(-3.10)	(1.85)	(1.88)
Industry concentration	21.325***	514.443***	-0.747	1.679
	(3.00)	(3.02)	(-0.39)	(0.87)
Multinational dummy	7.399	611.579	12.265**	6.637*
	(1.10)	(0.68)	(2.23)	(1.84)
Managerial ability score	-2.696	-787.434	1.989	2.637
	(-0.36)	(-0.82)	(1.27)	(1.56)
Year-fixed effect	Yes	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes	Yes
Observations	9,817	9,817	9,817	9,817
Adjusted R^2	0.24	0.13	0.36	0.36
Inflection point				100

Piecewise Regression

The above results are consistent with the relationship between firm value and the CEO-worker pay ratio being non-linear. To further probe this relationship, I run a piecewise linear regression partitioning the pay ratio variable into four indicator variables as follows:

Payratio P10 = 1 if pay ratio is below 10^{th} percentile; zero otherwise.

Payratio P10_50 = 1 if pay ratio is between 10^{th} percentile and 50^{th} percentile; zero otherwise.

Payratio P50_90 = 1 if pay ratio is between 50^{th} percentile and 90^{th} percentile; zero otherwise.

Payratio P90 = 1 if pay ratio is above 90^{th} percentile; zero otherwise.

The results from Table 14 are consistent with those reported in Tables 11 through 13, in that the relationship between firm value, as proxied for by Tobin's Q, and the pay ratio is nonlinear. In particular they provide evidence consistent with firm value increase as the pay ratio increases from low levels, i.e., as it moves from *Payratio P10 to Payratio P10_50*. Interestingly, pay ratios above the median do not appear to be associated with increases in firm value, i.e., the coefficient on *Payratio P50_90* is insignificantly different from zero, and that at extremely high levels, lead to decreases in firm value, i.e., the coefficient on *Payratio P90* is negative and significant. The results in Table 14 again confirms the hypothesis that the relationship between firm value and CEO-worker pay ratio is nonlinear.

Table 14. Piecewise Regression of Firm Value on CEO-worker Pay Ratio

	(1)	(2)
Payratio P10	0.399**	1.343***
	(2.33)	(2.743)
Payratio P10_50	0.405***	3.447***
	(2.83)	(2.692)
Payratio P50_90	0.062	0.553
	(0.27)	(2.620)
Payratio P90	-0.655***	-0.363*
	(-4.70)	(-1.673)
Tobin's Q $_{t-1}$		2.265**
		(2.00)
Log (book value)		1.988**
		(2.05)
ROA		0.258***
		(2.82)
Institutional ownership		-3.045
		(-1.61)
Capex/assets		-0.448
		(-0.09)
Leverage		-0.586**
		(-2.14)
R&D		-2.884
		(-1.22)
R&D missing		11.188**
		(2.14)
Firm age		9.562
		(1.56)
CEO outsider		-2.989
		(-0.13)
Eindex		9.925**
		(2.03)
CEO ownership>=20%		-1.346**
		(-2.14)
CEO tenure		0.468**
		(2.15)
STD of return		6.890**
		(2.24)
Capital intensity per employee		0.077
		(1.33)
Workforce education (industry)		1.873
		(1.36)
Industry concentration		8.832
		(0.60)
Multinational dummy		3.457**
		(2.10)
Managerial ability score		4.609
		(1.30)
Year- and firm-fixed effect	Yes	Yes
Observations	9,817	9,817
Adjusted R^2	0.20	0.38

How do firm characteristics affect the relationship between firm value and CEO pay ratio?

Hypotheses 2a through 2c predicts that firm characteristics affect the relationship between the pay ratio and firm performance. To examine this issue, I re-estimate the first regression from Table 11, after portioning the sample into different groups, namely high-tech vs. low-tech firms, human-capital-intensive vs. physical-capital-intensive firms, and domestic vs. multinational firms. The partition of high vs. low tech firms follows in spirit Siegel and Hambrick (2005) and uses the ratio of R&D to sales, while that for human-capital- intensive firms vs. physical-capital-intensive firms is based upon the definitions of the two industries; while multinational vs. domestic is based on the Compustat indicator variable, "IDBFLAG", i.e., multinationals are coded as B and domestic coded as D.

I investigate the nonlinearity and inflection point for each partition separately. Table 15 splits the sample into high-tech and low-tech firms. I do this by using the ratio of R&D to sales and splitting my sample at the median, i.e., firms with a ratio above the median are considered high tech, below the median, low tech.

As we can see from Table 15, both high-tech and low-tech firms have an inverse U shape relationship between firm value and CEO-worker pay ratio. Siegel and Hambrick (2005) show that the adverse impact of the vertical pay disparity between executive levels to be much greater in high technology firms where collaboration is more important. Consistent with Siegel and Hambrick (2005), my findings show that the inflection point for low technology firms, 302, is larger than the inflection point for high technology firms, 209. This result is also consistent with H2a.

Table 15. High-tech vs. Low-tech Firms

	High-tech	Low-tech
Pay ratio	0.418**	1.208***
	(6.65)	(2.76)
Pay ratio^2	-0.001**	-0.002**
	(-7.22)	(-2.26)
Tobin's Q $_{t-1}$	4.097***	3.850**
	(5.48)	(2.20)
Log (book value)	0.679***	0.453**
	(5.90)	(2.06)
ROA	2.820***	1.810***
	(3.24)	(6.83)
Institutional ownership	-0.097	0.069
	(-1.55)	(1.42)
Capex/assets	-0.144	0.499
	(-0.20)	(0.99)
Leverage	-0.318**	-0.393***
	(-2.46)	(-3.67)
R&D	-0.006***	-0.000*
	(-5.77)	(-1.66)
R&D missing	0.003	-0.004***
	(1.47)	(-5.07)
Firm age	-0.002	0.004***
	(-1.07)	(5.41)
CEO outsider	0.611	0.893
	(0.77)	(1.08)
Eindex	-0.872***	-0.245*
	(-3.22)	(-1.68)
CEO ownership>=20%	0.950***	0.063
	(3.80)	(1.50)
CEO tenure	-0.101	0.001***
	(-0.31)	(6.07)
STD of return	0.002***	8.317***
	(6.32)	(4.60)
Capital intensity per employee	0.012	-0.002
	(1.53)	(-0.13)
Workforce education (industry)	0.203***	1.163*
	(5.98)	(1.88)
Industry concentration	-0.626	-2.545
	(-0.71)	(-1.55)
Multinational dummy	1.229	1.420*
	(0.42)	(1.81)
Managerial Ability Score	0.835	1.777
	(1.46)	(1.24)
Constant	2.839***	-1.316
	(3.70)	(-1.03)
Year-fixed effect	Yes	Yes
Firm-fixed effect	Yes	Yes
Observations	4,908	4,908
Adjusted R^2	0.18	0.24
Inflection point	209	302

Table 16 splits the sample into human-capital-intensive firms and physical-capital-intensive firms. Human-capital-intensive firms are assumed to require more cooperation, communication, and collaboration than physical-capital-intensive firms. Consistent with this, I find the inflection point lower for human-capital-intensive firms than for physical-capital-intensive firms. For both types of firms, the inverse U shape holds, i.e., I find a positive and significant coefficient on the pay ratio and a negative and significant coefficient on the pay ratio^2. In particular, human-capital-intensive firms have an optimal pay ratio of 248, and physical-capital-intensive firms have an optimal pay ratio of 418.

Table 17 splits the sample into multinational and domestic firms. I expect that multinational firms can either have a higher or a lower inflection point than domestic firms. On the one hand, the need for communication and coordination are larger for MNCs than for purely domestic firms. On the other hand, employees of domestic firms are more likely to be knowledgeable about their US-based CEO's compensation relative to international workers. In both columns I observe the nonlinear relationship I observe for the full sample. Consistent with hypothesis 3c, I observe that the inflection point for multinational corporations is higher than it is for purely domestic corporations. In particular, multinational firms have an optimal pay ratio of 426, and domestic firms have an optimal pay ratio of 313.

Table 16. Human-capital-intensive vs. Physical-capital-intensive Firms

	Human capital intensive	Physical capital intensive
Pay ratio	0.496***	0.380***
	(5.60)	(6.91)
Pay ratio^2	-0.001***	-0.001***
	(-4.30)	(-5.26)
Tobin's Q $_{t-1}$	3.311***	0.361***
	(4.78)	(4.23)
Log (book value)	0.166***	0.382***
	(3.15)	(7.65)
ROA	6.303***	1.026***
	(4.16)	(3.68)
Institutional ownership	-0.030	0.001
	(-1.10)	(0.23)
Capex/assets	0.004	-0.001
	(1.03)	(-0.66)
Leverage	-0.027***	-0.112***
	(-4.71)	(-4.04)
R&D	0.000***	-0.000
	(6.18)	(-1.07)
R&D missing	1.220	0.147
	(1.05)	(0.42)
Firm age	0.004***	0.001***
	(5.00)	(3.89)
CEO outsider	0.391	0.189
	(1.27)	(1.34)
Eindex	-0.531	-0.733***
	(-1.33)	(-4.73)
CEO ownership>=20%	0.278	0.522
	(0.79)	(1.39)
CEO tenure	0.001***	0.001***
	(5.70)	(6.65)
STD of return	5.176***	2.279**
	(6.88)	(1.99)
Capital intensity per employee	-0.463	-0.571*
	(-1.31)	(-1.88)
Workforce education (industry)	0.117***	0.020***
	(4.16)	(4.63)
Industry concentration	0.699	0.336
	(0.19)	(0.27)
Multinational dummy	2.586**	0.162
	(2.11)	(1.45)
Managerial Ability Score	1.982*	0.825
	(1.92)	(1.08)
Constant	-2.614***	3.312***
	(-2.97)	(9.44)
Year-fixed effect	Yes	Yes
Firm-fixed effect	Yes	Yes
Observations	2,062	7,755
Adjusted R^2	0.15	0.34
Inflection point	248	418

Table 17. Domestic vs. Multinational Firms

	Multinational	Domestic
Pay ratio	0.852***	1.253***
	(2.33)	(10.63)
Pay ratio^2	-0.001**	-0.002***
	(-2.23)	(-10.18)
Tobin's Q $_{t-1}$	0.565***	1.646*
	(3.98)	(1.86)
Log (book value)	0.282***	1.447***
	(8.02)	(4.55)
ROA	2.704***	2.995***
	(4.91)	(3.07)
Institutional ownership	0.433	-3.320
	(1.47)	(-1.31)
Capex/assets	1.779*	-1.459
	(1.89)	(-1.62)
Leverage	-0.048***	-0.793***
	(-5.06)	(-3.07)
R&D	0.029	0.113**
	(1.13)	(1.97)
R&D missing	-0.018	-0.83
	(-1.05)	(-1.22)
Firm age	0.008	0.093
	(0.82)	(0.56)
CEO outsider	1.016	-0.869
	(1.04)	(-0.75)
Eindex	0.167*	-0.542
	(1.82)	(-0.99)
CEO ownership>=20%	1.315	0.481
	(0.96)	(1.25)
CEO tenure	0.013	0.014*
	(1.05)	(1.80)
STD of return	4.228***	1.425
	(4.16)	(1.13)
Capital intensity per employee	-1.689	0.933
	(-0.02)	(1.37)
Workforce education (industry)	0.031***	1.350**
	(4.00)	(2.18)
Industry concentration	0.274	0.986
	(0.33)	(0.15)
Managerial ability score	0.322***	1.216
	(3.01)	(1.52)
Constant	2.101***	0.555
	(6.90)	(0.26)
Year-fixed effect	Yes	Yes
Firm-fixed effect	Yes	Yes
Observations	6,027	3,790
Adjusted R^2	0.30	0.13
Inflection point	426	313

Decomposition of CEO-worker pay ratio

Following Bebchuk et al. (2016), I decompose the CEO-employee pay ratio into the pay disparity within the executive suite and the pay disparity between the executive suite and the average employee to see which, if either, drives the results. I decompose the pay ratio as follows:

$$\frac{CEO\ pay}{Avg.worker\ pay} = \frac{CEO\ pay}{Avg.top\ 5\ executive\ pay} \times \frac{Avg.top\ 5\ executive\ pay}{Avg.worker\ pay}$$

I have several takeaways from Table 18. First disparity within the executive suite appears to have a negative association with Tobin's Q, as the coefficient on the CEO/executive pay ratio is negative and marginally significant, while that on its square term is insignificant. Second the disparity between the average executive and average employee resembles the nonlinear relationships documented above, i.e., the coefficient on the executive/employee pay ratio is positive and significant, while that on its square term is negative and significant. Thus, evidence is consistent with the nonlinearity in the pay ratio documented above being attributable to the ratio of average executive pay to the average employee pay.

Table 18. Decomposition of the Pay Ratio

	Tobin's Q
CEO to Executives pay ratio	-0.128**
	(-2.32)
(CEO to Executives pay ratio) ^{2}	-0.622
	(-1.52)
Executives to worker pay ratio	0.308**
	(1.99)
(Executives to worker pay ratio)^2	-0.001***
	(-3.86)
Tobin's Q $_{t-1}$	1.482***
	(2.81)
Log (book value)	0.862***
	(7.52)
ROA	5.983***
	(8.60)
Institutional ownership	0.912
	(1.25)
Capex/assets	0.021
	(1.03)
Leverage	-0.327*
	(-1.79)
R&D	0.696*
	(1.89)
R&D missing	-0.707
	(-0.10)
Firm age	0.189
	(0.03)
CEO outsider	-0.882
	(-1.12)
Eindex	0.358
	(0.49)
CEO ownership>=20%	-0.124***
	(-3.80)
CEO tenure	1.932
	(0.29)
STD of return	6.548***
	(3.75)
Capital intensity per employee	0.205
	(0.68)
Workforce education	2.705***
	(4.61)
Industry concentration	38.757***
	(6.74)
Constant	1.134***
	(2.70)
Year-fixed effect	Yes
Firm-fixed effect	Yes
Observations	9,817
Adjusted R^2	0.79

Conclusions

In this study, I examine the consequences of the CEO-employee pay ratio on firm value over the 1997 to 2015 period. I find that the relation between firm value and the pay ratio demonstrates an inverse-U shape. Specifically, firm performance appears to initially increase with increases in the pay ratio, but once it hits the inflection point, further increases in the pay ratio are associated with decreases in firm value. My results are robust to controlling for the endogenous nature of pay ratios and a variety of other sensitivity tests. I also show that the optimal pay ratio or inflection point differs by firm characteristics, i.e., human-capital-intensive firms have a lower inflection point than physical-capital-intensive firms. In my final analysis I decompose the pay ratio into that within the executive suite, and that between the executive suite and the rank-and-file employees, finding that a large part of my results can be attributable to the disparity between the pay of the executive suite and that of the rank and file.

CHAPTER 3

INTERNATIONAL ACQUISITION AND CEO COMPENSATION

Introduction

Executive compensation, more specifically CEO compensation has been the subject of growing attention from politicians, the media, the academy, and the public over the past few decades. There is evidence that executives have been gambling long-term stability in favor of achieving short-term financial goals, especially in the recent financial crisis. Some analysts believe this focus on short-term goals has been driven primarily by compensation packages that gave incentives to CEOs to take more risks than was optimal for shareholders (Fahlenbrach and Stulz, 2011).

Earlier empirical studies have shown that there is little association between pay and performance (Bebchuk and Fried, 2003; Murphy, 1999). During the financial crisis, it appeared that there was a growing disconnect between performance-based compensation and the actual value added to the corporation by its executives. Instead, firm size was seen as a more important factor in determining the level of executive compensation (Gabaix and Landier, 2008). The insensitivity of CEO compensation to firm performance reflects imperfect labor markets, and can be attributable to agency cost: "There is a good reason to believe that the agent (manager) will not always act in the best interests of the principal" (Jensen and Meckling, 1976, p. 308). Based on the agency theory, it has been argued that executives tend to link their compensation to the factors they can control, such as firm size (Kroll, Simmons, and Wright, 1990; Wright, Kroll, and Elenkov, 2002).

Additionally, acquisitions have become increasingly popular among companies as a means of growth and a quick way to increase firm size. International acquisition in particular is increasingly becoming the preferred mode of international growth. As a result, successful acquisitions may give CEOs a good reason to increase their compensation, and it is often a ready-made strategy that CEOs utilize to influence their compensation via an increase in firm size, even if in some cases the shareholders' interests are damaged through inefficient overinvestment behavior. MacFadyen (2010) notes, "The companies of these (highest-paid) CEOs have one thing in common: they use mostly acquisitions for personal gains."

A recent stream of research has started to explore compensation in M&As. Current literature suggests that top executives play an important role in initiating and implementing acquisitions, and therefore acquisition is regarded as an important factor influencing executives' compensation (Yim, 2013). As a result, corporate acquisitions can be driven by managerial interests, which can come in the form of enlarged compensation package following an acquisition. Notably, Gristein and Hribar (2004) finds that the increased bonus after acquisition is driven more by CEO power, and less by the effort in completing the bid, or the maximization of shareholder wealth.

There are two competing theories that provide explanations for the motives behind CEO-backed acquisitions. On the one hand, the agency theory attributes acquisitions to CEO hubris or overconfidence, setting the primary motivation for acquisition as empire building. This view posits acquisition as opportunistic behavior for personal gain, which implies that (1) post-acquisition CEO compensation would be higher, and (2) the

acquisition may hurt the benefit of shareholders. Consistent with this view, prior literature show that CEOs increase their compensation and are financially better off after acquisitions regardless of the success or failure of post-acquisition firms (Bliss and Rosen, 2001; Grinstein and Hribar, 2004; Harford and Li, 2007). In addition, Fu, Lin, and Officer (2013) concluded that CEO compensation is the main driver of acquisitions.

On the other hand, the competing theory, stewardship theory (Donaldson and Davis, 1991), suggests that managers especially CEOs manage corporate resources for the long-term interest of the firm. This theory posits that CEOs are motivated to stewards of corporate resources, and will look to strengthen them for the good of the firm's long-term value rather than personal benefit (Lane, Canella, and Lubatkin, 1998). From this point of view, acquisitions may not have an impact on CEO compensation, and should not necessarily increase CEO compensation.

Prior literature on the impact of acquisitions on CEO compensation focuses on mainly domestic acquisitions (Datta, Iskandar-Datta, and Raman, 2001; Girma, Thompson, and Wright, 2006; Grinstein and Hribar, 2004; Kroll et al., 2010). However, few studies have included the difference between international acquisitions and domestic acquisitions with the exception of two (Guest, 2009; Ozkan, 2012) which use very small sample in UK and limited compensation measures. As international acquisitions and domestic acquisitions have different impacts on performance (Conn et al., 2005), the impact of acquisition on CEO compensation will differ as well. Typically, international acquisitions are usually larger than domestic acquisitions, and are more complex to manage due to differences between institutions in different countries (Duru and Reeb, 2002), and may also

create opportunities for self-serving CEOs. Based on the matching theory (Rosen, 1992), international acquisitions should lead to greater increases in CEO compensation than domestic acquisitions.

In this chapter, I investigate how both domestic and international acquisitions have an impact on CEO compensation. The answer to this question will enable us to see which of the two views—agency theory or stewardship theory—better explains CEO behavior as it relates to acquisitions. I also compare international and domestic acquisitions in terms of their impact on CEO compensation, and the extent to which acquisitions made by CEOs in international vs. domestic acquisitions increase CEOs' personal benefits at the expense of other shareholders. In addition, I explore whether transaction characteristics, such as deal size, and the industry relatedness of the acquirer and target, affect post-acquisition CEO compensation. For example, investment in an unrelated firm increases industry diversification, which increases complexity and requires different managerial skills. Therefore, we expect that CEO compensation in the post-acquisition period would increase more in the case of unrelated acquisitions compared to related acquisitions.

For empirical analysis, I use acquisition data for both international acquisitions and domestic acquisitions for 1995 to 2016 from SDC Platinum. I limit the sample of firms for which CEO compensation data are available from ExecuComp. The SDC Platinum M&A database provides the data at firm level in relation to M&As deals and financial information, while the ExecuComp provides the data at the firm level of CEO compensation. I also obtain firm-level data from Compustat. In the empirical analysis, I control for firm-specific and board-specific characteristics that are found to influence CEO

compensation in prior studies. In all, I find that acquisitions have a positive and significant effect on the level of CEO total compensation and incentive compensation comparing the pre- and the post-acquisition period. When I classify my sample into domestic and international acquisitions, I find that CEOs that preside over international acquisitions receive a higher increase in their compensation following the acquisition compared to domestic.

This study contributes to the literature in several ways. First, it provides direct empirical evidence on the effect of acquisitions on CEO compensation with a large database based on US firms, which helps us advance our understanding on the impact of acquisition on managerial compensation. Second, this chapter adds to the literature on the comparison of international acquisition and domestic acquisition in terms of their impact on CEO compensation, which has been lacking in existing work (Guest, 2009; Ozkan, 2012). I also examine the entire universe of international and domestic acquisitions for US firms as reported in the SDC M&A database for 1995-2016, and report interesting new findings. Specifically, I show that international acquisitions affect CEO compensation packages following acquisitions differently than domestic acquisitions in ways consistent with the complexity and matching theories: in summary, the increase in CEO compensation is larger after international acquisitions than after domestic acquisitions. Third, I show that deal characteristics such as size and relatedness have significant impact on the post-acquisition CEO compensation.

The rest of the chapter proceeds as follows. The next section provides a review of literature on corporate acquisitions and CEO compensation, and develops hypotheses. The

Then I describe the data characteristics, sample characteristics, and empirical methodology. After that, I present my empirical results. The last section concludes.

Literature Review and Hypothesis Development

Acquisition and CEO Compensation

The traditional incentive alignment view suggests that executive compensation packages should be designed to align managers' interests with those of the shareholders (Jensen and Meckling, 1976), as CEOs should be rewarded for their skills and company performance. In reality, CEO compensation is largely decided by the board based on CEO pay levels among peer firms of similar size and industry. Prior research has also found firm size to be the factor with the most influence on the total level of compensation (Bizjak, Lemon, and Naveen, 2008; Core, Holthausen, and Larcker, 1999; Duffhues and Kabir, 2008).

In contrast, the rent extraction view suggests that executives become entrenched and influence their own compensation, especially when directors are weak and ineffective in exercising their monitoring responsibilities (e.g., Barkema and Pennings, 1998; Bebchuk and Fried, 2004; Bebchuk, Fried, and Walker, 2002; Core et al., 1999; Finkelstein and Hambrick, 1989). As a result, executives can use their power to influence their compensation arrangements and to extract rent.

Mueller (1969) and Shleifer and Vishny (1988) have argued that CEOs engage in acquisitions for the sake of their private benefit. If so, acquisition is value-destructing, and ought to be more concentrated in firms with greater agency costs and those with weak

governance (Fu et al., 2013), less independent boards (Paul, 2007), and a smaller CEO pay slice among the top five executive team members (Bebchuk, Cremers, and Peyers, 2011). From this perspective, acquisition is seen as a way for CEOs to increase their compensation through empire-building (Andrade, Mitchell, and Stafford, 2001).

The literature on executive compensation following M&As indeed shows that more powerful CEOs receive significantly larger post-acquisition bonuses (Gristein and Hribar, 2004; Coakley and Iliopoulou, 2006). Datta et al. (2001) find a positive relationship between the equity-based compensation of executives and company stock price performance following acquisitions. Harford and Li (2007) show a detachment between CEO pay and company performance after acquisitions; CEOs of bidding firms are still better off despite the fact their shareholders are worse off for US firms. Guest (2009) finds that CEOs are rewarded equally for bad and good acquisitions, and the acquiring firms' strength of corporate governance does not have a significant impact on CEO post-acquisition compensation using a sample of UK firms.

Prior literature holds that CEOs use acquisitions to increase firm size in order to increase their compensation (Bodolica and Spraggon, 2009; Grinstein and Hribar, 2004; Jaggi and Dorata, 2006). The role of firm size is also supported indirectly by the finding that CEO compensation is greater for acquiring firms than meeting targets (Anderson, Becher, and Campbell, 2004; Bliss and Rosen, 2001; Bugeja et al., 2012; Grinstein and Hribar, 2004; Harford and Li, 2007; Masulis, Wang, and Xie, 2009). Especially if a CEO's pay is linked to the firm size, he or she is more motivated to grow the firm rapidly (DeYoung, Evanoff, and Molyneux, 2009). Weak governance is one of the main causes of

agency problems (Bertrand and Mullainathan, 2003; Masulis, et al., 2009), as are ineffective monitoring by the board, and powerful, entrenched CEOs. Effective monitoring and lower CEO power lead to smaller post-acquisition bonuses (Grinstein and Hribar, 2004) and higher sensitivity of CEO compensation to acquisition success (Wright et al., 2002). These studies support the argument made by the agency theory about CEOs' opportunistic behavior with regard to acquisitions. In addition, acquisition may create opportunities for self-serving CEOs. Therefore, one should expect that post-acquisition CEO compensation is higher than pre-acquisition CEO compensation.

In contrast, stewardship theory suggests that there is cooperative behavior between managers and shareholders (Lane et al., 1998). Supporting this competing theory, Martin and Davis (2010) argue that CEOs seek acquisitions to improve their ability to manage risky and complex situations; as such, these scholars view learning, not hubris as the main motivation behind acquisitions. Girma et al. (2006) suggests that the impact of an acquisition on CEO compensation is based on the success of the acquisition, and they documented that CEOs who made value-enhancing acquisitions received significantly higher cash payments than their counterparts with wealth-reducing acquisitions.

Based on these two competing views, my objective is to see whether agency view or stewardship would better explain the post-acquisition CEO compensation. My first hypothesis is as follows.

H1: Acquisitions lead to higher CEO compensation through the increase in firm size, complexity, and opportunism.

International Acquisition vs. Domestic Acquisition

Prior literature focuses on domestic acquisitions when examining the domestic acquisition (Guest, 2009). However, acquisitions are not homogeneous in their effect on CEO compensation. Therefore, international acquisitions and domestic acquisitions could have a quite different impact on CEO compensation. Generally, international acquisitions are usually larger than domestic acquisitions. International acquisitions also increase the complexity of firms due to cultural differences, information asymmetry, geographic dispersion, and exchange rates (Duru and Reeb, 2002), and may also create opportunity for self-serving CEOs. Based on the matching theory (Rosen, 1992), international acquisitions should lead to greater increases in CEO compensation than domestic acquisitions.

The existing work on the comparison of international and domestic acquisition is based on small samples of UK acquirers and incomplete compensation data, with mixed results. Regarding international acquisition on CEO compensation, Ozkan (2012) shows that foreign acquisitions lead to higher CEO compensation than domestic acquisitions using a sample of 147 total acquisitions by UK firms, while Guest (2009) find no evidence of higher CEO cash compensation in international acquisitions compared to domestic acquisitions. In my study, I use a large, comprehensive global acquisition sample of US firms and examines whether and how CEO compensation has changed in level and composition after international compensation vs. domestic compensation.

In sum, international acquisitions increase firm size, complexity, and/or the scope of international operations (Ramcharran, 2002). In addition, since international acquisition is one avenue for firms to become multinational firms (MNCs). The peer group effect of

these MNCs can also lead to an increase in CEO compensation after international acquisitions. Therefore, my second hypothesis is as follows.

H2: CEO compensation should be greater following international acquisitions than domestic acquisitions.

Data, Sample, Variable Construction, and Methodology

Data and Sample

The acquisition data used in this study is obtained from the Securities Data Corporation's (SDC) Platinum database. I select all domestic and international acquisitions by US firms that took place between 1995 and 2016. There were also companies with either more than one international acquisition or more than one domestic acquisition. These were excluded as they create duplicate observations in our sample. The financial data for listed firms are from the Compustat North America database. The executive compensation data were obtained from Standard & Poor's ExecuComp, which includes compensation data for top management teams for S&P 1,500 firms. The CEO tenure and board compensation committee data were obtained from the same database. We focused on individuals classified as CEOs by ExecuComp, which also gives the dates when the CEO assumed office and when the CEO left office.

Descriptive statistics from the sample are presented in Table 19. As shown in the Panel A of Table 19, international acquisitions are generally well distributed throughout the sample period. The sample includes 1,581 cases of international acquisitions and 6,892 domestic acquisitions. I create a matching sample of firms based on firm size, profitability,

and leverage, which consists of 22,446 firm-year observations for no acquisitions in the sample period 1995-2016. Panel B of Table 19 provides the mean values of the variables used in the analyses for the sample of acquisitions, and lists international acquisitions and domestic acquisitions separately as well. Panel C of Table 19 provides the actual mean values of CEO compensation for sub-samples.

Table 19. Distribution of Acquisitions Sample over Time
Panel A: Number of international and domestic acquisitions samples

Year	No Acquisitions	Acquisitions	IA	DA	Total
1995	769	207	49	158	976
1996	732	213	46	167	945
1997	731	235	60	175	966
1998	725	227	64	163	952
1999	659	250	69	181	910
2000	687	234	58	176	920
2001	764	200	55	145	963
2002	749	229	60	169	978
2003	777	224	49	174	1,001
2004	734	223	64	158	956
2005	700	228	62	166	929
2006	756	233	68	166	989
2007	829	227	62	165	1,056
2008	1,488	576	70	528	2,064
2009	1,590	450	55	410	2,040
2010	1,466	552	68	502	2,018
2011	1,396	606	82	544	2,002
2012	1,321	645	86	577	1,966
2013	1,363	576	67	535	1,939
2014	1,292	626	73	578	1,918
2015	1,183	666	156	563	1,849
2016	1,165	593	158	492	1,758
Total	22,446	8,220	1,581	6,892	30,096

Table 19. (continued)

Panel B: Descriptive statistics of mean values of compensation and firm variables Compensation variables are in US dollars (thousands). Firm and deal size are in US dollars (millions).

Variable	All Firms	All Acquisitions	IA	DA
Total comp.	5,399	6,625	7,393	6,485
Cash comp.	983	1,089	1,218	1,066
Incentive comp.	2,189	2,785	3,155	2,717
ROA	0.10	0.12	0.12	0.12
Firm size	16,372	28,625	42,750	26,025
Tenure	7.93	8.14	7.42	8.31
Deal size	39,155	39,155	148,297	521

Panel C: Comparison of mean CEO compensation for acquisitions and no-acquisition firm samples. Compensation variables are in US dollars (thousands).

	Mean		Difference
	ACQ	No-ACQ	
Total Comp.	5,334	4,867	1,757***
Cash Comp.	1,090	936	153***
Incentive Com.	2,785	1,931	854***
	Post	Pre-ACQ	
Total Comp.	5,918	5,022	896***
Cash Comp.	1,001	921	80***
Incentive Comp.	2,657	1,985	672***
	IA	DA	
Total Comp.	7,393	6,484	909***
Cash Comp.	1,218	1,066	153***
Incentive Comp.	3,155	2,717	437***

Panel C shows that firms with acquisitions have greater CEO compensation than those without acquisition. Within the acquisition sample, firms that engaged in international acquisitions have a higher CEO compensation level than those engaged in domestic acquisitions in the post-acquisition period. I also compare between pre and post-acquisition CEO compensation, and find that total compensation, cash compensation, and inventive compensation are all higher in the post-acquisition period.

Variable Construction

I use the difference between pre-acquisition and post-acquisition CEO compensation in natural logs as the primary dependent variable. I define post-acquisition compensation as the compensation for the first year following the acquisition, and pre-acquisition as the compensation for the one year before the acquisition. In particular, I tabulate total compensation, cash compensation, as well as incentive-based compensation. For independent variables, I use an indicator variable for all acquisitions, an indicator variable for international acquisition, and an indicator variable for domestic acquisition. Further, I control for deal characteristics such as relatedness and deal size. The relatedness indicator variable is equal to one if the acquirer and target are from the same industry at SIC 2-digit level. Appendix D presents detailed definitions of all empirical variables used. I control for firm performance (ROA), firm size (log of total assets), CEO tenure, and whether the CEO is on the compensation committee. In the Heckman test, additional variables were used in the first stage including the CEO age and tenure, options, and the leverage of the acquirer.

Empirical Results

The Effect of Acquisition on the Change in CEO compensation

I first examine the effect of all acquisitions on the change (pre- vs. post-acquisition) in CEO compensation Table 20. This table estimates the effect of acquisitions on changes in CEO compensation, in total, cash and incentive-based in a multivariate context. The data include all firms with and without acquisitions. The dependent variable is CEO compensation one year after the acquisition. The key variable of interest is ACQ, which is an indicator variable that has a value of one if the firm has an acquisition, and has a value of zero if the firm has no acquisition. All regressions include fixed effects for the year of acquisition and for the industry of the acquiring firms. Models (1) to (3) examines three versions of CEO compensation: total compensation, cash compensation, and incentive compensation.

I find that the coefficients of the acquisition indicator (ACQ) are positive and statistically significant at 1% for the change in CEO total compensation in model (1), and for the change in incentive-based compensation in model (3). These findings indicate that, controlling for all other factors, acquiring companies have both higher levels of total compensation and incentive-based CEO compensation than non-acquisition companies. The coefficient of ACQ is insignificant for the change in cash compensation. These results are consistent with the expectation that acquisitions increase CEO compensation. Regarding the control variables, I find that ROA, and firm size affect CEO compensation positively, as expected. Therefore, CEOs use acquisitions to increase firm size to increase their compensation. Further, I find that CEO tenure has a significant effect on cash

compensation and incentive compensation. CEO's membership in the compensation committee has a significant negative effect on total compensation and cash compensation. In all, the results in Table 20 are consistent with H1 which states that acquisitions lead to higher CEO compensation.

Table 20. The Effect of Acquisition on Changes in CEO Compensation: Pre- vs. Post-Acquisitions

	ΔTotal comp.	ΔCash comp.	ΔIncentive comp.
	(1)	(2)	(3)
ACQ	0.063***	0.010	0.156***
	(3.18)	(1.16)	(3.04)
ROA	0.523***	0.336***	3.671***
	(3.87)	(4.71)	(4.23)
Firm size	0.233***	0.128***	0.351***
	(2.99)	(3.52)	(3.14)
CEO tenure	0.001	0.005***	0.048***
	(1.51)	(6.88)	(5.24)
Comp. Committee	-0.291***	-0.196***	0.006
	(-3.04)	(-3.43)	(1.24)
Constant	5.765***	5.773***	4.367***
	(5.22)	(4.91)	(3.12)
Industry-fixed effect	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes
Observations	26,160	26,052	11,890
Adjusted R^2	0.20	0.15	0.32

Endogeneity – Heckman Selection Model

One could argue that there is a possible endogeneity issue regarding how acquisitions influence CEO compensation, as whether to engage in acquisitions could be a function of CEO compensation. To address endogeneity and sample selection bias concerns, I use the Heckman selection model. In the first stage, it is a model of whether to engage in acquisitions using explanatory variables such as executive options, CEO age, CEO tenure. In the second stage, it is the estimation of the effect of acquisition on CEO compensation. In the second stage, the same set of variables used in CEO compensation equations along with the selection bias correction coefficient (Lambda) is used.

Table 21 presents the results of the Heckman selection model. The second stage results are presented first, followed by the first stage. The first-stage estimates the logit regression for the likelihood of acquisitions, and the likelihood of international acquisitions. For the likelihood of acquisition model, I use options, CEO age, and leverage as independent variables. For the likelihood of international acquisition model, I use options, CEO age, leverage, and CEO tenure as independent variables.

The first three columns estimate the effect of acquisitions on CEO compensation, and all firms with and without acquisition are used. The last three columns estimating the effect of international acquisitions on CEO compensation, and only the acquisition firms are used. All dependent variables are measured as the compensation difference between one-year pre-acquisition and one-year post-acquisition. In terms of the compensation measures, I use the total compensation, cash compensation, and incentive compensation.

The results in the first three columns are generally consistent with the main results. In models (1) to (3), I find that the coefficients of ACQ (acquisition) are positive and significant on total compensation and incentive compensation, while negative and insignificant on the cash compensation. ROA and firm size affect CEO compensation positively as shown earlier results. CEO's membership in the compensation committee has a significant negative effect on total compensation and cash compensation. CEO tenure has a positive effect on CEO cash compensation and incentive compensation.

The results in the last three columns are generally consistent with the hypothesis that international acquisition has a larger impact on the change in CEO compensation. In models (4) to (6), I find that the coefficients of IA (international acquisition) are positive and significant on all three compensation measures. ROA and firm size affect CEO compensation positively as shown earlier results. CEO tenure has a mixed effect on different CEO compensation measures: positive on cash and incentive compensation, and negative on total compensation. CEO's membership in the compensation committee has a significant negative effect on total compensation and cash compensation.

Table 21. Endogeneity Test Using Heckman Selection Model: The Impact of Acquisitions (ACQs) and International Acquisitions (IAs)

Second Stage	Impact of ACQs			Impact of IAs		
	ΔTotal comp.	ΔCash comp.	ΔIncentive comp.	ΔTotal comp.	ΔCash comp.	ΔIncentive comp.
	(1)	(2)	(3)	(4)	(5)	(6)
ACQ	0.143***	0.017	0.372***			
	(6.01)	(1.04)	(3.75)			
IA				0.144***	0.067**	0.213***
				(3.07)	(3.89)	(3.60)
ROA	0.817***	0.488***	4.373***	1.470***	1.073***	5.128***
	(5.73)	(5.98)	(5.21)	(3.10)	(2.98)	(3.22)
Firm size	0.190***	0.123***	0.288***	0.290***	0.198***	0.317***
	(3.42)	(3.11)	(3.17)	(5.37)	(5.17)	(6.11)
CEO tenure	-0.001	0.004***	0.052***	-0.004***	0.003***	0.057***
	(-1.04)	(5.01)	(6.32)	(-4.02)	(4.13)	(3.38)
Comp. Committee	-0.334***	-0.241***	-0.006	-0.294***	-0.212***	-0.047
	(-4.46)	(-5.21)	(-1.53)	(-4.53)	(-4.40)	(-7.44)
Lambda	0.718***	-0.231*	-0.563**	0.686***	-0.158*	-0.049
Constant	6.021***	5.807***	4.631***	5.301***	5.228***	4.389***
	(4.04)	(3.39)	(3.19)	(5.22)	(4.65)	(3.11)
Industry-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,160	26,052	21,890	8,820	8,409	7,017
Adjusted R^2	0.12	0.08	0.16	0.22	0.16	0.19
First Stage	Likelihood of ACQs			Likelihood of IAs		
Options	0.0956*	0.444***	-0.262	0.338***	0.485***	-0.300
	(1.81)	(2.98)	(-1.55)	(3.64)	(4.12)	(-1.08)
CEO age	-0.183***	-0.458***	-0.501	-0.480***	-0.386***	0.177
	(-5.62)	(-5.84)	(-0.71)	(-5.05)	(-5.64)	(1.62)
Leverage	0.164***	-0.508***	-1.259	0.425***	-0.474***	-0.757***
	(4.12)	(-6.46)	(-0.86)	(6.89)	(-7.20)	(-5.14)
CEO tenure				0.001	0.026	-0.992**
				(1.09)	(1.27)	(-2.05)

Comparison of International Acquisitions and Domestic Acquisitions

As mentioned in the literature review section, international acquisitions and domestic acquisitions differ significantly. Therefore, I want to explore whether the impact of international acquisitions is different from domestic acquisitions.

Table 22 estimates the effect of international acquisitions vs. domestic acquisitions on changes in CEO compensation in the change of CEO total compensation. I use two indicator variables to identify international acquisition or domestic acquisition. The data for models (1) and (2) include only firms with acquisitions. Model (3) includes data for all firms (acquisitions and non-acquisitions). The dependent variable is the difference of pre- and post-acquisition CEO compensation.

The positive coefficient of the IA indicator in model (1) shows that firms with international acquisitions have larger CEO total compensation change than firms with domestic acquisitions. This is consistent with my second hypothesis. I then examine the impact of international acquisition and domestic acquisition by using the entire sample of companies. The results of the analysis can be found in model (3). The coefficients of both international acquisition indicator and domestic acquisition indicator are significant and positive for CEO total compensation, with the magnitudes of the coefficients greater for international acquisitions. This is consistent with my prediction that CEO compensation increases after acquisition, and the effect is larger for international acquisitions.

Table 22. The Effect of IAs vs. DAs on the Changes in CEO Compensation

	ΔTotal comp.		
	(1)	(2)	(3)
IA	0.058*		0.153***
	(1.83)		(3.97)
DA		0.035*	0.145***
		(1.89)	(5.58)
ROA	0.857***	1.268***	0.851***
	(4.12)	(3.95)	(4.23)
Firm size	0.404***	0.349***	0.346***
	(3.69)	(3.79)	(4.16)
CEO tenure	-0.003**	-0.006**	-0.003**
	(-2.12)	(-2.16)	(-2.26)
Comp. committee	-0.243***	-0.171***	-0.238***
	(-4.45)	(-4.01)	(-3.55)
Constant	4.962***	4.913***	2.172***
	(5.91)	(6.05)	(6.32)
Industry-fixed effect	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes
Observations	8,220	8,220	26,160
Adjusted R^2	0.35	0.34	0.37

The Effect of Deal Characteristics

I also examine the effects of deal characteristics such as industry relatedness of acquirers and targets, and deal size on the change in CEO compensation. The results are shown in Table 23. I use the sample of acquisition for this analysis. The dependent variables are CEO compensation one year after the acquisition. All regressions include fixed effects for the year of acquisition and for the industry of the acquiring firms. This table estimates the effect of deal characteristics on the changes in total, cash, and incentive-based CEO compensation (acquisition firms only) in a multivariate context. The key variables of interest are relatedness and deal size.

Models (1) to (3) in Table 23 examines three versions of CEO compensation: total compensation, cash compensation, and incentive compensation. I find that deal

characteristics have an impact on CEO compensation. In particular, in model (1), the coefficient of relatedness is negative and statistically significant at 5% on cash CEO compensation, indicating that related acquisitions lead to lower cash CEO compensation than unrelated acquisitions. However, the coefficients on cash compensation and incentive compensation are negative but insignificant. This is consistent with the notion that CEO compensation should be higher after unrelated acquisitions because of the additional degree of complexity stemming from industry diversification. The coefficient of deal size is positive and statistically significant on CEO total compensation, but insignificant with regard to cash and incentive compensation, indicating that CEO total compensation increases with deal size.

Table 23. The Effect of Deal Characteristics on the Change in CEO Compensation

	ΔTotal comp.	ΔCash comp.	ΔIncentive comp.
	(1)	(2)	(3)
Relatedness	-0.062	-0.059*	-0.129
	(-1.45)	(-1.93)	(-1.17)
Deal size	0.028**	0.016	0.006
	(2.19)	(1.04)	(1.25)
ROA	0.992**	0.672***	0.242***
	(3.85)	(4.25)	(3.60)
Firm size	0.419***	0.267***	0.438***
	(3.18)	(3.84)	(3.36)
CEO tenure	-0.002	0.002	0.056***
	(-1.19)	(1.26)	(3.73)
Comp. committee	0.029	0.003	0.187
	(1.22)	(1.45)	(1.17)
Constant	4.552***	4.801***	4.150***
	(5.15)	(5.12)	(4.66)
Industry-fixed effect	Yes	Yes	Yes
Year-fixed effect	Yes	Yes	Yes
Observations	3,839	3,835	3,808
Adjusted R^2	0.51	0.48	0.47

Conclusions

In this chapter, I examine the impact of acquisition on CEO compensation. Agency theory suggests that CEOs behave according to their own interests rather than serving the interests of shareholders, which implies that post-acquisition CEO compensation is higher than pre-acquisition CEO compensation. The competing theory, stewardship theory suggests that CEOs can be motivated to steward corporate resources towards serving the long-term corporate interests, which implies that post-acquisition CEO compensation. Using a sample of US acquiring firms from 1995-2016, I find that acquisitions lead to higher CEO compensation, comparing one-year pre- and post-acquisition, which is consistent with agency theory. I also find that international acquisitions lead to higher CEO compensation than domestic acquisitions, which is consistent with matching theory as international acquisitions are more complex. This study contributes to the literature on acquisition and on CEO compensation by providing direct empirical evidence on the effect of acquisitions on CEO compensation with a large database based on US firms, and confirming the matching theory by showing that international acquisitions lead to higher CEO compensation than domestic acquisitions.

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APPENDICES

APPENDIX A.

NUMBER OF FIRM-LEVEL OBSERVATIONS

This table presents the number of firm-level observations for which we have executive compensation data. Panel A shows the country distribution of all the firm-level observations in the full sample. Panel B shows the industry distribution of all the firm-level observations in the full sample. Industry breakout is by 2-digit SIC code, where 0 is agriculture, forestry and fisheries, 1 is mining and construction, 2 is consumer manufacturing, 3 is electrical and industrial manufacturing, 4 is transportation and utilities, 5 is trade, 6 is finance, insurance, and real estate, 7 is commercial services, 8 is private price services and 9 is public administration.

PANEL A: OBSERVATIONS BY COUNTRY

	Year														
Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Australia	0	16	41	61	17	128	208	226	196	208	208	214	282	291	1,805
Austria	0	0	0	2	4	3	10	11	9	15	10	13	30	41	107
Azerbaijan	0	0	0	0	0	0	7	0	0	1	1	1	2	2	12
Bangladesh	0	0	0	0	0	0	0	0	1	1	2	4	5	5	13
Belgium	0	0	0	3	1	8	13	28	11	21	17	28	28	29	158
Brazil	0	2	0	1	1	0	0	1	7	1	1	2	0	0	16
Canada	7	9	21	13	50	58	57	58	56	63	246	345	333	361	1,316
China	0	1	2	15	6	56	130	127	160	227	217	233	265	278	1,439
Cyprus	0	0	0	1	0	0	6	4	1	2	3	3	3	3	23
Denmark	0	0	1	3	11	6	7	18	13	18	21	18	25	24	141
Finland	0	0	5	33	5	28	64	74	49	55	55	48	54	58	470
France	7	21	48	114	36	61	74	57	102	149	176	160	236	216	1,241
Germany	0	2	10	64	18	56	116	154	119	149	149	131	130	121	1,098
Hong Kong	0	0	4	107	85	271	346	491	542	546	532	577	674	669	4,175
Iceland	0	0	1	1	0	1	4	8	5	4	4	4	5	2	37

APPENDIX A. PANEL A. (CONTINUED)

India	4	2	11	34	51	270	374	584	541	507	539	438	415	402	3,780
Indonesia	0	0	0	0	0	0	3	0	4	0	5	3	1	3	16
Ireland	2	12	47	43	11	23	43	40	34	47	40	43	34	38	421
Israel	1	2	3	3	1	0	7	8	11	12	10	16	16	21	90
Italy	4	14	30	70	27	35	34	43	78	58	84	85	51	57	613
Japan	0	0	0	0	0	0	0	0	1	4	4	6	6	2	22
Jordan	0	0	0	0	0	1	1	0	4	2	1	3	1	2	13
Lithuania	0	0	0	0	0	0	1	1	0	2	2	2	4	3	12
Luxembourg	2	2	6	9	6	2	8	15	4	10	13	10	8	10	95
Malaysia	0	14	21	37	15	21	11	13	13	13	17	14	13	17	202
Malta	0	0	0	1	0	0	1	2	1	2	1	1	1	1	10
Netherlands	4	17	55	132	34	88	103	103	66	79	79	79	59	69	898
New Zealand	1	1	0	1	1	2	4	15	12	13	10	13	12	14	85
Norway	2	2	9	33	8	30	72	69	78	53	63	61	58	52	538
Pakistan	0	0	2	3	7	13	26	40	0	0	0	0	0	2	91
Philippines	0	0	6	6	2	2	4	2	1	1	1	1	2	2	28
Poland	0	0	0	0	7	5	10	6	11	17	20	20	17	16	113
Portugal	0	0	0	3	2	4	1	0	4	17	18	21	16	16	86
Russia	0	0	0	2	1	2	4	2	3	0	2	1	3	2	20
Singapore	0	5	17	31	7	10	19	8	7	10	17	18	23	15	172
Slovenia	0	0	0	1	1	6	0	4	6	8	5	7	7	6	45
South Africa	0	20	62	53	25	54	141	132	158	137	140	149	195	183	1,266
Spain	0	0	3	5	4	4	7	6	12	12	10	11	10	10	84
Sweden	0	5	12	92	34	28	70	74	61	73	70	73	73	73	665
Switzerland	1	5	8	11	10	13	20	96	86	87	97	100	102	99	636
Taiwan	0	0	2	3	1	3	2	1	0	1	1	1	1	1	16
Ukraine	0	0	0	0	0	0	2	0	2	5	3	5	3	3	20

APPENDIX A. PANEL A. (CONTINUED)

UK	80	400	694	864	309	241	688	742	616	631	669	597	579	560	7,110
United States	88	396	1,360	1,260	873	1,022	861	843	795	822	815	786	765	785	10,687
Total	203	948	2,481	3,116	1,671	2,555	3,560	4,107	3,879	4,081	4,375	4,351	4,543	4,565	44,425

PANEL B: OBSERVATIONS BY INDUSTRY

	Year														
SIC	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
1	0	0	2	8	2	4	11	16	12	12	12	16	9	10	114
2	0	1	1	1	0	0	2	1	1	2	1	0	0	1	11
7	0	4	2	2	1	1	2	2	4	3	2	5	5	5	38
8	0	0	2	1	1	2	1	4	4	1	3	2	3	3	27
9	0	0	0	0	0	0	2	4	3	3	2	2	1	2	19
10	0	13	30	36	30	73	133	112	114	121	178	202	206	212	1,460
12	0	0	3	6	2	10	13	13	18	18	15	19	23	22	162
13	0	3	32	56	9	37	76	66	79	85	119	133	133	1311	2,139
14	0	0	2	6	5	6	13	11	13	13	11	13	14	12	119
15	1	19	40	54	16	20	45	50	40	39	49	43	58	58	532
16	1	1	10	18	3	12	36	43	35	58	62	48	43	43	413
17	0	0	1	6	0	2	6	7	11	11	15	18	20	22	119
20	5	25	50	78	29	73	100	154	135	138	167	154	165	167	1,440
21	0	6	9	12	6	6	12	12	9	8	7	7	7	9	110
22	1	7	10	17	10	26	45	61	48	50	55	55	53	55	493
23	0	7	9	20	13	24	35	54	61	56	59	52	78	78	546
24	0	1	5	8	2	7	8	10	11	15	19	21	18	18	143
25	0	1	4	4	4	4	9	8	20	11	17	17	14	15	128
26	1	3	15	19	11	32	49	59	63	59	65	64	71	62	573
27	5	19	42	74	27	30	54	79	66	60	69	75	75	65	740

APPENDIX A. PANEL B. (CONTINUED)

28	7	50	89	139	86	153	243	337	319	312	322	331	326	314	3,028
29	4	6	17	12	13	26	26	34	27	31	31	29	29	32	317
30	2	7	13	25	7	30	32	53	62	53	66	60	72	68	550
31	1	0	7	10	3	10	13	20	20	15	25	27	26	29	206
32	0	12	30	29	14	30	53	70	62	61	70	73	80	86	670
33	3	5	23	43	13	39	70	94	100	112	108	94	91	123	918
34	5	7	16	37	12	15	37	55	49	49	61	53	55	59	510
35	6	7	37	69	32	98	143	190	169	192	178	176	180	162	1,639
36	6	25	52	87	45	125	199	223	217	220	237	226	238	213	2,113
37	0	10	25	56	25	47	74	95	76	93	101	99	98	90	889
38	2	20	38	52	25	43	79	89	81	85	85	96	103	99	897
39	0	2	1	5	7	18	25	40	38	43	38	45	61	68	391
40	2	5	11	17	9	12	15	11	15	10	13	9	11	10	150
41	1	3	10	10	6	4	9	17	11	13	12	9	10	12	127
42	3	11	33	31	20	27	27	26	23	39	34	35	28	36	373
43	1	1	19	29	6	13	35	46	49	32	46	39	35	30	381
45	3	19	34	56	20	32	45	53	41	43	53	48	52	50	549
46	0	0	0	3	1	0	0	0	0	0	1	2	2	2	11
47	0	8	26	30	12	27	38	48	36	56	56	52	64	60	513
48	4	32	48	92	72	65	98	109	112	114	115	120	131	100	1,212
49	4	28	29	67	27	50	85	84	89	96	100	114	107	109	989
50	7	25	36	47	27	48	83	95	90	102	104	95	117	98	974
51	6	8	22	29	11	30	43	35	41	35	50	45	58	56	469
52	2	6	7	11	3	8	13	14	9	11	13	7	5	9	118
53	1	10	13	17	7	9	13	20	23	23	24	30	26	25	241
54	2	3	7	13	3	9	17	15	20	25	20	33	30	26	223
55	0	4	14	18	4	8	12	14	20	18	19	20	23	19	193

APPENDIX A. PANEL B. (CONTINUED)

56	2	8	14	20	15	16	11	29	17	23	23	22	26	20	246
57	1	12	12	16	6	12	12	18	11	19	18	12	20	23	192
58	10	32	85	84	64	68	67	67	78	74	72	68	72	72	913
59	8	16	18	26	17	21	32	39	33	51	45	49	54	50	459
60	36	252	932	826	579	666	567	552	513	510	511	496	476	421	7,337
61	3	18	36	29	32	41	33	32	31	34	41	38	37	33	438
62	7	14	42	47	45	55	54	46	43	64	57	57	63	45	639
63	2	8	14	16	16	22	21	17	19	14	22	23	22	21	237
64	0	0	15	21	10	13	22	9	13	10	10	8	8	15	154
65	0	3	10	9	7	4	3	3	6	4	5	6	7	8	75
67	2	6	7	10	15	16	13	16	8	13	17	20	23	10	176
70	0	7	6	9	5	9	15	22	25	25	34	32	36	27	252
72	1	1	4	8	0	1	2	5	7	7	9	11	15	9	80
73	32	70	175	299	91	138	308	345	293	350	361	362	381	295	3,500
75	0	2	5	7	3	2	4	8	4	3	2	5	4	6	55
76	0	2	0	5	0	0	0	0	0	0	0	0	0	2	9
78	0	1	15	14	5	13	26	26	28	26	25	24	31	30	264
79	0	13	22	38	10	28	42	42	43	42	43	48	46	45	462
80	8	19	52	48	33	38	41	49	47	50	53	45	51	49	583
81	0	1	2	0	0	0	1	1	0	1	1	1	2	2	12
82	2	3	5	8	0	3	8	15	11	11	12	12	11	13	114
83	2	2	0	3	1	0	0	0	0	0	0	0	0	2	10
87	1	25	66	92	23	24	68	85	70	79	77	73	77	72	832
89	0	2	7	5	1	0	3	2	1	1	1	1	1	3	28
99	0	7	11	16	12	18	25	25	31	23	25	25	25	33	276
Total	203	948	2,481	3,116	1,671	2,554	3,560	4,107	3,879	4,081	4,374	4,351	4,542	4,565	44,425

APPENDIX B.

CEO-WORKER PAY RATIOS FOR SELECTIVE COUNTRIES

The table presents the CEO-worker pay ratio of selected countries in year 2015 and over the entire sample period (2002-2015).

Country	GDP per capita (2015, USD)	Pay ratio (2015)	2002-2015				
			Mean	Median	SD	P25	P75
Australia	56,324	90.1	66.5	15.5	258.4	8.0	39.9
Brazil	8,538	115.0	99.3	110.1	52.9	64.8	119.1
Canada	43,248	159.4	74.8	21.4	264.0	10.8	50.7
China	7,924	64.5	64.4	19.1	227.7	9.3	45.0
France	36,248	107.6	102.4	25.1	433.5	10.8	57.4
Germany	41,219	112.5	104.6	24.4	429.1	11.5	49.7
India	1,581	89.3	80.2	22.1	328.7	11.8	47.9
Indonesia	3,346	22.1	12.7	11.4	7.1	6.3	18.4
Italy	29,847	79.6	82.4	25.6	352.0	11.4	53.4
Japan	32,477	39.8	25.8	30.6	58.2	4.4	42.9
Netherlands	44,433	225.4	112.0	19.7	513.1	10.6	43.1
New Zealand	37,808	78.7	31.3	20.5	27.4	12.2	42.6
Norway	74,734	98.7	72.9	11.9	288.9	7.7	28.8
Russia	9,057	94.5	336.7	32.4	553.5	13.1	373.3
Singapore	52,888	349.8	157.3	26.6	666.9	12.6	58.0
Spain	25,831	91.6	61.3	32.2	64.9	11.7	92.2
Switzerland	80,214	182.5	139.0	21.0	560.9	10.6	49.3
UK	43,734	178.4	123.2	16.8	297.3	9.2	33.6
United States	55,836	401.5	105.6	28.9	269.5	7.2	40.0

APPENDIX C.
CHAPTER 1 VARIABLE DEFINITIONS

Dependent Variables	Definition	Source
CEO compensation	Sum of salary, bonus, other annual compensation, restricted stock awards, stock grants, long term incentive plan, and all other compensation, in thousands of US dollars	Capital IQ People's Intelligence
Average worker pay	Staff expense in millions of US dollars divided by the # of employees (where staff expense includes salary, pension, retirement, profit sharing, provision for bonus and stock options, and other employee benefits)	Compustat North America and Compustat Global
CEO-average worker pay ratio	CEO compensation total divided by average employee pay	
Firm-level Variables	**Definition**	**Source**
Firm size	The natural logarithm of sales	Compustat North America and Compustat Global
Firm risk	Standard deviation of daily stock returns over a year	CRSP and Compustat Global
ROA	EBITDA/Assets	Compustat North America and Compustat Global
Leverage	Long term debt divided by total assets	Compustat North America and Compustat Global
Tobin's Q	Market value of equity plus the book value of assets minus the sum of book value of common equity and deferred taxes, all divided by the book value of assets	Compustat North America and Compustat Global
CEO pay slice	The total CEO compensation divided by the sum of total compensation of the top five executives	Capital IQ People's Intelligence
% non-executive directors	The proportion of directors who are not executives of the board size	Capital IQ People's Intelligence
CEO-Chair duality	Equals one when the CEO also serves as board chair, zero otherwise	Capital IQ People's Intelligence
Board size	Total number of directors on the board	Capital IQ People's Intelligence

APPENDIX C. (CONTINUED)

Country-level Variables	Definition	Source
Power Distance (H)	The degree to which the less powerful members of a society accept and expect that power is distributed unequally	Hofstede's website
Individualism versus Collectivism (H)	A preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families	Hofstede's website
Masculinity versus Femininity (H)	A preference in society for achievement, heroism, assertiveness and material rewards for success	Hofstede's website
Uncertainty Avoidance Index (H)	The degree to which the members of a society feel uncomfortable with uncertainty and ambiguity	Hofstede's website
Long-term Orientation versus Short Term Normative Orientation (H)	Societies who score high encourage thrift and efforts in modern education as a way to prepare for the future	Hofstede's website
Indulgence versus restraint (H)	A society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun	Hofstede's website
Shareholder protection	The shareholder protection measures include on one-share–one-vote rules, a series of anti-director rights, and mandatory dividends. The scale is from 0 to 8, with a higher score indicating greater shareholder protection.	La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1998)
Legal origin	Identifies the legal origin of the Company Law or Commercial Code of each country. There are five possible origins: (1) English Common Law; (2) French Commercial Code; (3) German Commercial Code; (4) Scandinavian Commercial Code; and (5) Socialist/Communist laws.	La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1998)
Control of corruption	It captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Bank

APPENDIX C. (CONTINUED)

Gini Index	A Gini coefficient close to zero expresses equality, while close to one expresses inequality	World Bank
Equitable wealth creation	The higher the score, the more equitable wealth is distributed	Judge, Fainshmidt, and Brown (2014)
Egalitarianism	The belief that all people are of equal worth and should be treated equally in society	Siegel, Licht, Schwartz (2011)
Corporate tax rate	Highest nominal rate on corporate income and gains in the country	KPMG
Labor union	Assesses the legal protection of labor unions and the regulation of collective disputes (measured at the country level, time invariant)	Atanassov and Kim (2009)
Competitive Index	Competitiveness is defined as the set of institutions, policies and factors that determine the level of productivity of a country	World Economic Forum
Market cap/GDP	The total dollar market value of all of a company's outstanding shares divided by the GDP of the country	QUANDL.com
Rule of law	It captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1998)
Power Distance (GLOBE)	The degree to which members of a collective expect power to be distributed equally	GLOBE study (House et al, 2004)
In-group Collectivism (GLOBE)	The degree to which individuals express pride, loyalty, and cohesiveness in their organizations or families	GLOBE study (House et al, 2004)
Uncertainty Avoidance (GLOBE)	The extent to which a society, organization, or group relies on social norms, rules, and procedures to alleviate unpredictability of future events	GLOBE study (House et al, 2004)
Gender Egalitarianism (GLOBE)	The degree to which a collective minimizes gender inequality	GLOBE study (House et al, 2004)
Future Orientation (GLOBE)	The extent to which individuals engage in future-oriented behaviors such as delaying gratification, planning, and investing in the future	GLOBE study (House et al, 2004)

APPENDIX D.
CHAPTER 3 VARIABLE DEFINITIONS

Variable	Description
ΔTotal comp.	Total comp. is the total compensation of CEO one year following the acquisition. It is comprised of salary, bonus, total value of restricted stock granted, total value of stock options granted (valued by Black-Scholes), long-term incentive payment compensation, all in thousands of US dollars. ΔTotal comp. is the natural log of the difference of Total comp. between the pre-acquisition period and post-acquisition period.
ΔCash comp.	Cash comp. is the annual base salary and bonus earned by the CEO one year following the acquisition in thousands of US dollars. ΔCash comp. is the natural log of the difference of Cash comp. between the pre-acquisition period and post-acquisition period.
ΔIncentive comp.	Incentive comp. is stocks and options part of the CEO compensation for one year following the acquisition, in thousands of US dollars. ΔIncentive comp. is the natural log of the difference of Incentive comp. between the pre-acquisition period and post-acquisition period.
ACQ	Value of 1 if the company is involved in an acquisition, and 0 otherwise
IA	Value of 1 if the acquisition is international and 0 otherwise
DA	Value of 1 if the acquisition is domestic and 0 otherwise
Relatedness	Value of 1 if the acquirer and target are at the same 4-digit industry and 0 otherwise
Deal size	Natural log of the amount that the acquirer paid for the target company in million US dollars
ROA	Earnings before interest, taxes, and depreciation (EBITDA) scaled by total assets
Firm size	Natural log of total assets in million US dollars
CEO tenure	The number of years that the executive worked as CEO in that company
Comp. committee	Value of 1 if the CEO is in the board compensation committee, and 0 otherwise
Options	Natural log of the total value of stock options granted to CEO in thousands of US dollars (valued by Black-Scholes)
CEO age	Age of the CEO at the time of the acquisition
Leverage	Total liabilities scaled by total assets