Are US CEOs Paid More?
New International Evidence*

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Abstract

This paper challenges the widely accepted stylized fact that CEOs in the United States are paid significantly more than their foreign counterparts. Using CEO pay data across 14 countries with mandated pay disclosures, we show that the US pay premium is economically modest and primarily reflects the performance-based pay demanded by institutional shareholders and independent boards. Indeed, we find no significant difference in either level of CEO pay or the use of equity-based pay between US and non-US firms exposed to international and US capital, product, and labor markets. We also show that US and non-US CEO pay has largely converged in the 2000s. The findings are robust to alternative methods for adjusting the risk of equity-based pay.

JEL classification: G32, G34, G38

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1 Introduction

One of the most widely accepted stylized facts in the executive compensation literature is that chief executive officers (CEOs) in the United States are paid significantly more than their foreign counterparts (e.g., Abowd and Bognanno (1995), Abowd and Kaplan (1999), and Murphy (1999)). According to the Towers Perrin (2006) survey, US CEOs earn, on average, approximately double the pay of non-US CEOs. The alleged differences in international pay practices have often been interpreted as evidence that US pay is excessive. Indeed, Bebchuk, Fried and Walker (2002) cite the US versus foreign CEO pay gap as evidence for the "managerial power" hypothesis that US CEOs set their own pay levels.

Although the "pay divide" between the United States and the rest of the world is widely accepted, attempts to document empirically the magnitude and determinants of the US pay premium have been plagued by international differences in rules regulating the disclosure of executive compensation. Studies of the US pay premium have largely been based on aggregate cash pay, small-sample comparisons where individual data are available or countrywide estimates provided by consulting firms. The exception is the comparison between US and UK firms, where CEO-level pay disclosure is mandated since 1995. Conyon and Murphy (2000) show that US CEOs earned almost 200% more than UK CEOs in 1997, after controlling for industry, firm size, and a variety of firm and individual characteristics. Conyon, Core and Guay (2011) show that the US versus UK pay premium had fallen to 40% by 2003 and potentially disappears after adjusting for the risk associated with undiversified CEO equity portfolios. Additionally, Conyon, et al. (2011) find a larger US pay gap when they use a 2003 sample of 40 continental European firms that voluntarily adopt US pay disclosures. Their study, however, leaves open the question of why equity-based pay is more common in the US than in Europe.

Our paper uses data from the recently expanded disclosure rules to conduct an international comparative analysis of CEO pay in 14 countries requiring detailed individual disclosure of CEO pay by 2006. Our sample includes compensation data for CEOs in 1,648 US and 1,615 non-US firms, representing nearly 90% of the market capitalization of publicly

traded firms in these countries. Our sample includes firms from both Anglo-Saxon and continental European countries, which have significant differences in corporate governance arrangements.

We show that the conventional wisdom is wrong. We find that the US pay premium is economically modest: US CEOs earn an average of 26% more than their foreign counterparts in 2006, far less than the 100% or 200% premiums documented in the (limited) academic research. In reaching this estimate of the premium, we control not only for the usual firm-specific characteristics (e.g., industry, firm size, stock price volatility and performance, growth opportunities) but also for two sets of characteristics that systematically differ across countries: ownership and board structure. Compared to non-US firms, US firms tend to have higher institutional ownership and more independent boards, factors that we find to be associated with both higher pay and increased use of equity-based pay. In addition, shareholdings in US firms tend to be less dominated by "insiders" (such as large-block family shareholders), factor associated with lower pay and reduced use of equity-based compensation. While institutions typically press for tighter links between pay and shareholder performance as a monitoring mechanism, firms with large blockholders do not need to rely as much on (expensive) incentive pay. Moreover, to the extent that insider-ownership is high because of CEO ownership, such executives are primarily rewarded and motivated by their ownership and not their pay. We also control for the effects of CEO characteristics (e.g., age, tenure, education, past experience), concluding that these factors do not help explain international differences in pay.

We also find that US CEOs receive a higher fraction of their compensation in the form of stock and options. Risk-averse CEOs will naturally demand a pay premium for accepting the increased risk of equity-based pay (e.g., Hall and Murphy (2002)). Our 26% US pay premium estimate is therefore not the appropriate measure of international pay differences from the perspective of risk-averse and undiversified CEOs who presumably do not hedge the risk of their pay packages and who are directly or indirectly forced to hold a undiversified portfolio (laden with unvested company stock and options). We estimate risk-adjusted CEO pay using two alternative approaches: (1) the riskless amount of compensation CEOs would accept in exchange for their risky compensation (Hall and Murphy (2002)); and (2) observed compensation less the risk premium CEOs would demand for holding an undiversified portfolio (Conyon, et al. (2011)). We find that risk adjustments reduce but do not eliminate observed US pay premiums unless we also control for differences in ownership and board structures.

We then explore the factors contributing to the convergence of CEO pay practices internationally. Many of the firms in our non-US sample compete in the global market for capital, customers, and managerial talent. We show that there is not a significant difference in CEO pay between US firms and non-US firms exposed to international markets. We classify non-US firms as "Internationalized" if they are included in the Morgan Stanley Capital International (MSCI) All Country World Index or have a high fraction of shares held by foreign investors. Similarly, the difference is insignificant when US firms are compared with non-US firms that have a high fraction of foreign sales and internationally diverse boards. Additionally, we show that for "Americanized" non-US firms exposed to US capital markets (firms cross-listed in US exchanges and with a high fraction of shares held by US institutions) and product and labor markets (firms that have acquired assets in the US and firms with a high fraction directors who also sit on boards of US firms) the CEO pay is similar to that of US CEOs.

We argue that these non-US firms implement US-style compensation packages to attract global managerial talent, customers and investors. Foreign firms attempting to attract executives in competition with equivalent US firms will need to offer packages that are competitive with US levels, including large grants of stock and options and high overall levels of expected total compensation. Moreover, companies cross-listed on US exchanges benefit from "bonding" themselves to legal, regulatory, and capital market requirements of the US (Doidge, Karolyi and Stulz (2004)). One of those mechanisms could be implementing US-style compensation packages that align executive incentives more with shareholder interests through more equity-based pay, which could be important in attracting US and other foreign minority investors. This is direct evidence that market forces lead to the convergence of non-US CEO pay to US levels.

Finally, we also consider the convergence of US and non-US pay based on a time-series of available data from 2003 to 2008.[1] We show that the US pay premium declined almost monotonically from 2003 (58%) to 2007 (2%), before rebounding slightly in 2008 (14%). We analyze the time series of the determinants of CEO pay and conclude that an increase in institutional ownership, especially by foreign-based institutions, seems to be the main factor associated with the convergence in CEO pay to US levels over time.

Overall, our evidence is inconsistent with the view that US CEO pay is "excessive" when compared to that of their foreign counterparts (as in Bebchuk, et al. (2002) and others),

[1] The time series evidence relies on a smaller sample because of time trends in disclosure rules.

but rather reflects tighter links between CEO pay and shareholder performance in US firms. First, we show that the US pay premium is modest after controlling for firm, ownership, board, and CEO characteristics. Second, we demonstrate that it is misleading to examine cross-sectional or cross-country differences in the *level* of pay in isolation, without also examining differences in the *structure* of pay, namely the use of equity-based compensation. In fact, the firm, ownership, and board characteristics associated with higher pay are those associated with a larger fraction of equity-based pay. Third, we find that CEO pay levels and the use of equity-based compensation are positively related to variables routinely used as proxies for better monitoring and better governance, namely institutional ownership and board independence. If US firms had poor governance, we would expect US CEOs to pay themselves higher "safe" base salaries instead of self-imposing higher performance-based pay. Fourth, our findings suggest that the observed US CEO pay premium reflects compensating differentials for the equity-based pay increasingly demanded by internationally diverse boards and shareholders. We find evidence that foreign and US institutional shareholders are linked to a greater use of equity-based pay and higher pay levels in non-US firms in which they invest. Finally, the convergence of US and non-US CEO pay levels since 2003 seems to be explained by the convergence of ownership structures and globalization of capital markets.

We proceed as follows. Section 2 summarizes prior evidence on international pay differences and describes our data sources. Section 3 analyzes the level and structure of 2006 CEO pay in the 14 countries with mandated pay disclosures, including an analysis of "risk-adjusted" equity-based pay. Section 4 examines the impact of internationalization and Americanization of CEO pay for non-US firms. Section 5 analyzes time trends in observed US premiums from 2003 to 2008. Section 6 concludes the paper.

2 Background and Data Sources

2.1 The US pay premium: What we thought we knew

Whereas the US has required detailed disclosures on executive compensation since the 1930s (with significantly expanded disclosure rules introduced in 1978, 1993, and 2006), the majority of other countries have historically required reporting at most the aggregate cash

compensation for the top-management team, with no individual data and little information on the prevalence of equity or option grants.[2]

Indeed, much of what we know about international differences in CEO pay has been based on Towers Perrin's biennial *Worldwide Total Remuneration* reports, utilized by Abowd and Bognanno (1995), Abowd and Kaplan (1999), Murphy (1999), and Thomas (2008) and others. These international comparisons are not based on "data" per se, but rather depict the consulting company's estimates of "competitive" pay for a representative CEO in an industrial company with an assumed amount in annual revenues, based on questionnaires sent to consultants in each country. While crudely controlling for industry and firm size, it is impossible using these surveys to control for other factors that might explain the US pay premium, such as ownership and board structure, as well as for individual CEO characteristics.

Studies of the US pay premium using CEO-level data have largely been limited to comparisons between the US and Canada (which mandated US-style pay disclosures in 1993) or the UK (since 1995).[3] Based on data from 1993 to 1995, Zhou (2000) shows that US CEOs earned more than double their Canadian counterparts. Conyon and Murphy (2000) show that US CEOs earned almost 200% more than UK CEOs in 1997, after controlling for industry, firm size, and a variety of firm and individual characteristics (though not ownership or board structure), while Conyon, et al. (2011) show that the US versus UK pay premium (before adjusting for the risk associated with undiversified portfolios) had fallen to 40% by 2003.

The disclosure situation has improved over the past decade. Regulations mandating disclosure of executive pay were introduced in Ireland and South Africa in 2000 and in Australia in 2004. In May 2003, the European Union (EU) Commission issued an "Action Plan" recommending that all listed companies in the EU report details on individual compensation packages, and that EU member countries pass rules requiring such disclosure. By 2006, seven EU members (in addition to the United Kingdom and Ireland) had mandated CEO-level disclosure: Belgium, Denmark, France, Germany, Italy, Netherlands, and

[2] Studies on aggregate executive pay include Kaplan (1994) (Japan), Conyon and Schwalbach (2000) (Germany), Kato and Long (2005) (China), Kato, Kim and Lee (2006) (Korea) and Fernandes (2008) (Portugal).

[3] Prior to the Greenbury Commission Report (Greenbury (1995)), UK firms had to disclose cash compensation for individual CEOs, but not details on equity-pay arrangements.

Sweden.[4] In addition, although not in the EU, Norway also adopted EU-style disclosure rules, and Switzerland demanded similar disclosure for the "highest-paid" executive.

2.2 Data sources

In this paper, we use data from the recently expanded disclosure rules to conduct a comprehensive international comparative analysis of the compensation for CEOs in all countries with detailed individual disclosure of CEO pay.[5] Although we present time-series evidence from 2003–2008, we focus primarily on 2006 compensation to avoid temporary pay fluctuations associated with the 2007–2009 global financial crisis. Table 1 reports the sample size and sources for the data, as well as summary statistics for the level and structure of CEO pay in each country.

Our primary data source on compensation for US CEOs is Standard and Poor's (S&P's) ExecComp database, while our primary source for CEOs of firms based outside the United States is BoardEx, compiled by the UK-based firm Management Diagnostics Limited. Together, these two sources (identified as "BoardEx & Exec" in Table 1) account for 2,899 of the 3,263 firms in our sample. BoardEx is the leading database on board composition of publicly listed firms, and includes detailed biographic information on individual executives and board members in nearly 50 countries, including countries that do not have mandatory disclosure requirements for executive compensation. In addition to providing biographic information, BoardEx also includes detailed compensation data for top executives – including salaries, other pay, bonuses, payouts under long-term plans, option grants, and share grants.

To supplement the BoardEx data, we manually collect 2006 pay data from company filings for the largest firms in countries with pay-disclosure requirements but low BoardEx coverage, using annual reports, proxy statements (or their equivalent, such as management information circulars in Canada), and SEC Form 20F for foreign companies that are cross-listed in the United States. Specifically, we built a sample of firms in each country to ensure that we could cover at least the 30 largest publicly listed firms in that country ranked by market capitalization, or a cumulative 80% of that country's stock market capitalization in 2006. For Australia, Canada, and South Africa (where BoardEx has coverage on board composition and biographical information but scanty pay data), we manually collect

[4] We drop Denmark from our sample since, after imposing a minimum firm size threshold, there are too few publicly traded Danish firms to provide a meaningful individual analysis.

[5] We use the term "CEO" to refer to the highest-ranking executive, regardless of whether the firm uses the term "chief executive officer" or another designation such as "managing director" or "executive chairman."

compensation data. For our manually collected data, we value stock grants using the grant-date market value and option grants using the grant-date Black-Scholes value.[6] Ultimately, as reported in Table 1, 364 firms with manually collected data are included in our final sample.

For US firms, we use ExecuComp rather than data from BoardEx to maintain comparability with the existing literature on US CEO pay. However, two aspects of BoardEx's compensation calculation deserve special mention. First, instead of providing grant-date values for stock option grants, as in ExecuComp and our manually collected data, BoardEx computes the value of options granted using the closing stock price on the last trading day of the fiscal year rather than the stock price on the grant date. Since 2006 was a generally positive year for stock markets in the countries included in our study, valuing options using fiscal year-end stock prices (a la BoardEx) produces a slightly higher value than using grant-date prices. Second, for performance share plans (in which the number of restricted shares awarded is based on realized performance), BoardEx computes the value based on the maximum (rather than the target or minimum) shares that can be awarded under the plan, again multiplied by the end-of-fiscal-year closing stock price. In unreported results, we find that measuring pay for US CEOs using BoardEx rather than ExecuComp does not alter the main findings of our study.

We exclude firms without complete compensation data, and also exclude firms that cannot be matched to Datastream/Worldscope, which is our source for firm financial and stock market data. We match the firms in our sample to Datastream using CUSIP codes for U.S. firms and SEDOL or ISIN codes for non-U.S. firms, and finally manually using company names. Finally, to reduce the impact of BoardEx's oversampling of small UK firms, we restrict our analysis to companies with 2005 revenues in excess of $100 million. As reported in Table 1, after these exclusions, our final sample consists of 1,648 US CEOs and 1,615 CEOs from 13 countries outside the US. Our sample firms accounted for approximately 90% of the market capitalization of all Datastream-covered firms in the US, and 83% of the market capitalization of all Datastream-covered firms in the 13 non-US countries.

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[6] In valuing options, we use the company-reported fair value if available, and otherwise follow ExecuComp's pre-2006 valuation methodology as closely as possible. In particular, options are valued using the Black and Scholes (1973) formula with the following inputs: (1) standard deviation of 60-month stock returns (or as many months as possible) for the volatility; (2) average three-year dividend yield; (3) risk-free rate on government bonds issued in each country with a maturity approximating 70% of the option maturity; (4) exercise price equals market price; and (5) expiration date of 70% of the full maturity (as a partial adjustment for early exercise).

In our analyses of CEO pay in Table 1 (and all our regression analyses below), we exclude 116 US and 135 non-US CEOs serving in their first year to avoid data anomalies reflecting compensation for multiple positions for CEOs promoted internally, and partial-year compensation and signing bonuses or grants for CEOs hired from outside. Therefore, our analyses below are based on a final sample of 1,532 US CEOs and 1,480 non-US CEOs.[7]

Table 1 also reports the summary statistics of the level and structure of CEO pay in each country. All monetary values are converted into US dollars using the relevant exchange rate as of the close of the year. We find our primary findings to be unaffected when we use the purchasing power parity (PPP) factor in 2006 to adjust CEO pay or measure total pay relative to the average worker wage in each country. As shown in Table 1, the average and median pay for US CEOs ($5.5 million and $3.3 million, respectively) is about double the average and median pay for non-US CEOs ($2.8 million and $1.6 million, respectively). Salaries account for 28% of total pay for CEOs in the US, a smaller portion of than in any other country. The average across the other countries is 46%. Similarly, equity-based pay (consisting of restricted stock, stock options, and performance shares) account, on average, for 39% of total pay for US CEOs, a higher percentage than in any other country. The non-US average is 22%. The differences in the level and structure of pay for US versus non-US CEOs in Table 1 are all highly statistically significant.

3 The Level and Structure of Pay for US and Non-US CEOs

3.1 The US pay premium

The summary statistics in Table 1 suggest that US CEOs receive about double the pay of their foreign counterparts, but this calculation does not control for industry and especially firm size, documented to be an important determinant of the level of executive compensation (Baker, Jensen and Murphy (1988), Kostiuk (1990) and Murphy (1999)). In addition to industry and firm size, we consider four groups of potential controls: firm characteristics empirically known to affect the level of CEO pay based on prior evidence in US studies; ownership characteristics known to be systematically different in US versus non-US firms; board characteristics also systematically different in US versus non-US firms; and individual CEO characteristics. Detailed descriptions and data sources for these variables are included in Appendix A, and summary statistics by country are provided in Appendix B. We

[7] In unreported results, we find that including the CEOs serving in their first year in our tests does not affect our findings. The findings are also unaffected when we exclude financials and utilities due to different pay practices in those sectors.

winsorize some firm-level variables (leverage, Tobin's Q, and stock return volatility) at the 1% level.

Table 2 reports averages for the control variables in US and non-US firms, along with the *t*-statistic testing the difference in means between the two samples. As shown in the table, the US firms in our sample are not significantly larger than the non-US firms, but are less leveraged and have higher stock price volatilities and Tobin's Q. In addition, insider ownership (by executives, directors, and large blockholders) is significantly lower in the United States, while institutional ownership is significantly higher in the United States. American boards are slightly smaller and significantly more independent, but are much more likely to have CEOs who also assume the title of Chairman. In terms of CEO characteristics, when compared to non-US CEOs, the US CEOs tend to be older, more experienced, better educated, and more likely to have been promoted into their positions rather than hired externally.

Table 3 presents results examining the US pay premium after controlling for firm, ownership, and board characteristics. In columns (1)–(4), we estimate the following cross-sectional regression on 2006 CEO pay levels:

$$\text{Log (Total Pay}_i) = \alpha + \beta_1 \text{ (US dummy)} + \beta_2 \text{ (Firm characteristics}_i) + \beta_3 \text{ (Industry dummies)} + \varepsilon_i \quad (1)$$

Our main variable of interest is the "US dummy," which evaluates the pay-level differential of US-based top executives over those from other countries. The OLS regression includes fixed effects for 12 Fama-French industries, and standard errors are clustered at the country level to take into account the fact that residuals may not be independent within a country.[8]

Column (1) of Table 3 reports the results from estimating equation (1) controlling only for industry and prior-year sales, similar in spirit to the survey-based estimates from Towers Perrin.[9] There is a strong theoretical justification for a positive relation between CEO pay and firm size. Rosen (1981) and Rosen (1982) argue that the marginal product of managerial ability increases with firm size, so that it is optimal to assign the most talented managers to the largest firms. Such "assortative matching" produces equilibrium wages that are convex in ability, such that small increases in ability can lead to large increases in wages. Gabaix and Landier (2008) extend Rosen's model by showing that the equilibrium wage of a CEO will

[8] A concern with OLS regressions is that the distribution of CEO pay may be skewed. Our main results are unchanged when we use median regressions (untabulated), which is also more robust to the presence of outliers.

[9] We obtain similar findings when we measure firm size using total assets or market capitalization.

depend not only on firm size, but also on the size distribution of all firms in the relevant market: as the average firm becomes larger, competition for scarce managerial talent will bid up compensation.

In column (1) of Table 3, the CEO pay-firm size elasticity is 0.406 (with a t-statistic of 17.44), which is in line with estimates in prior studies. The R^2 of 0.35 indicates that more than a third of the variation in CEO compensation across the 14 countries is explained by size, industry, and whether or not the firm is located in the US. The coefficient on the US dummy of 0.582 (with a t-statistic of 4.14) implies that predicted CEO pay is 79% (i.e., $e^{0.582}$ - 1) higher in the United States than in other countries after controlling for size and industry.[10]

In column (2) of Table 3 we introduce other (prior-year) firm-level characteristics routinely used in CEO pay regressions and similar to those used in the US-UK comparisons by Conyon and Murphy (2000) and Conyon, et al. (2011): leverage, Tobin's Q, stock-return volatility, and stock returns. CEO pay is typically expected to be positively related to Tobin's Q, using the latter as either a measure of investment opportunities (requiring a more capable CEO and riskier pay, both which will increase pay), or an indicator of past performance (leading to a higher level of pay for CEOs contributing to that performance). The volatility of stock returns is typically expected to be positively related to pay, since CEOs may demand risk premiums for serving in riskier environments.[11] Similarly, leverage increases the riskiness of equity-based compensation, also leading to risk premiums and higher levels of CEO pay. Finally, stock returns are included to capture the expected effect of prior-year performance on current pay levels.[12]

As shown in column (2) of Table 3, CEO pay is positively and significantly related to leverage, Tobin's Q, and stock returns (as expected), and negatively and significantly related

[10] We obtain a similar estimate of the US pay premium when using propensity score matching methods. We match each non-US firm to a US firm by industry and a "propensity-score" estimated using a probit regression that gives the likelihood that a firm with given characteristics is from outside the US.

[11] In fact, the relation between volatility and pay is theoretically ambiguous. If the volatility reflects noise in the CEO's effect on firm performance, then higher volatility will lead to lower pay-performance sensitivities, which can lead to either higher or lower variability of CEO pay (which in turn will affect expected pay); see Lazear and Rosen (1981). However, if the volatility reflects volatility in CEO marginal productivities, CEOs in more volatile environments will have higher pay-performance sensitivities and higher average pay (Zábojník (1996), Prendergast (2002) and Edmans and Gabaix (2011)). In addition, our definition of total compensation includes the Black-Scholes value of options, providing a potential mechanical link between volatility and pay.

[12] The coefficient on this variable does not measure the relation between pay and performance (since that would require either a time-series of data on realized compensation and measures of the portfolio of stock and option holdings).

to the volatility of stock returns. Moreover, the coefficient on the US dummy of 0.629 in column (2) suggests an implied US pay premium of 88%, which is higher than the 79% premium when controlling only for sales and industry. Therefore, the US pay premium is apparently not explained by differences in capital structure, growth opportunities, performance, and volatility.

Column (3) of Table 3 includes controls for ownership structure. As we have noted in Table 2, insiders hold a larger fraction of the shares in non-US firms than in US firms, reflecting the relative importance of family- or government-controlled firms outside of the United States (La Porta, et al. (1999)). We expect a negative relation between CEO pay and insider ownership for two reasons. First, to the extent that insider ownership is high because of CEO ownership, such executives are primarily rewarded and motivated by their ownership and not their compensation. Second, to the extent that insider ownership is high because of large blockholders, they can monitor and direct the activities of executives without relying on (expensive) incentive compensation.

While insider ownership is higher outside the United States, Table 2 shows that institutions hold a significantly larger fraction of the shares in US firms than in non-US firms. We expect that institutions will press for tighter links between pay and shareholder performance (which will generally raise pay), and therefore expect a positive relation between CEO pay and institutional ownership. Hartzell and Starks (2003) focus on the level and concentration of institutional holdings (the fraction held by the top five institutions) and find that higher institutional holdings are associated with higher use of equity-based compensation, which they interpret as evidence that institutions play a monitoring role.

As shown in column (3) of Table 3, CEO pay is negatively related to insider ownership, and positively related to institutional ownership. In particular, the coefficients on the ownership variables suggest that a 10% increase in insider and institutional holdings is associated with an 8% decrease and 3% increase in CEO pay, respectively. Coupled with our results in columns (5) and (6) (discussed below) that the use of equity-based incentive compensation decreases with insider holdings and increases with institutional holdings, these results are consistent with the interpretation that insider holdings substitute for equity-based pay, while institutions press for higher pay for performance. Moreover, controlling for ownership structure reduces the coefficient on the US dummy to 0.268, implying a reduction in the US pay premium from 88% in column (2) to 31% in column (3).

Although both insider ownership and institutional ownership are significant determinants of the level of CEO pay, untabulated results suggest that institutional ownership

accounts for most of the decline in the estimated US pay premium between column (2) and column (3) of Table 3. In particular, adding only insider ownership to column (2) reduces the coefficient on the US dummy variable from 0.629 to 0.495 (suggesting a reduction in the US pay premium from 88% to 64%), while adding only institutional ownership reduces the coefficient from 0.629 to 0.330 (a reduction in the US pay premium from 88% to 39%).

Column (4) of Table 3 includes controls for board structure, also seen in Table 2 to differ significantly between US and non-US firms.[13] The theoretical prediction of the effect of the composition of the board on CEO pay is somewhat ambiguous, depending on whether a heavier reliance on independent and experienced boards will reduce pay through more effective monitoring, or increase pay through increased reliance on incentive compensation. As shown in column (4), we find that CEO pay is positively related to both the fraction of independent directors on the board, and to the average number of boards on which directors sit.[14] Controlling for board structure (in addition to firm and ownership characteristics) reduces the coefficient on the US dummy to 0.230, implying a US pay premium of 26%. Adding only board-structure variables to column (2) reduces the US pay premium from 88% to 66%.

Figure 1 shows the distribution of predicted CEO pay across different countries for a hypothetical firm with $1 billion sales. Panel A, in the spirit of the Towers Perrin estimates, controls only for firm size and industry, based on the specification in column (1) of Table 3 with the "US dummy" replaced by a set of 14 country dummies. Panel B controls for industry, firm characteristics, ownership, and board characteristics, based on the specification in column (4) of Table 3. The pay composition percentages are defined as the average composition across all CEOs for each country based on Table 1. Panel A shows that US CEOs earn substantially more than non-US CEOs controlling only for size and industry. However, in Panel B, after controlling for firm, ownership, and board characteristics, we find effective parity in CEO pay levels among Anglo-Saxon nations (United States, United Kingdom, Ireland, Australia, and Canada) and also Germany, Italy and Switzerland.

In addition, we also consider differences in individual CEO characteristics as suggested by Table 2, such as age, tenure, external hire dummy and college degree dummy. Column (1)

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[13] The sample size for column (4) is approximately 10% smaller than in column (1), reflecting observations dropped when BoardEx board data are unavailable. The results in columns (1)–(3) are not affected when restricting the sample to the 2,714 firms in column (4).

[14] Core, Holthausen and Larcker (1999) also find that CEO pay increases with a measure of outside board memberships (which they interpret as directors being "too busy" to monitor the CEO). They also find that CEO pay decreases with the fraction of insiders on the board, which is consistent with our results in Table 3.

of Table 4 analyzes differences in pay levels and structures for US and non-US CEOs after controlling for CEO characteristics, in addition to all the firm, ownership, and board characteristics (coefficients not shown) as in column (4) of Table 3. We measure CEO characteristics based on employment histories and personal attributes contained in BoardEx. The sample size is slightly reduced because individual CEO characteristics are not available for some of our hand-collected compensation data in Canada, Australia, and South Africa. Data definitions for these variables are provided in Appendix A. Column (1) shows that the CEO characteristics, taken individually and jointly using an *F*-test, are not significantly related to the level of CEO pay. The implied US pay premium of 25% in column (1) of Table 4 is essentially unchanged compared to the 26% premium estimated in column (4) of Table 3. Given the statistical insignificance of CEO characteristics — coupled with the reduction in available observations — we ignore CEO characteristics throughout the remainder of the paper.

3.2 The US equity pay premium

One of the primary determinants of CEO expected pay levels is the riskiness of the pay package, which is only captured indirectly by firm and industry characteristics in equation (1). As discussed in detail in Section 3.3. below, we expect that CEOs at companies with riskier pay will receive higher expected levels of pay to compensate for the increased risk. In columns (5) and (6) of Table 3, we estimate the following cross-sectional Tobit regression on 2006 pay structures:

$$\frac{\text{Equity Pay}_i}{\text{Total Pay}_i} = \alpha + \beta_1 (\text{US dummy}) + \beta_2 (\text{Firm characteristics}_i) + \beta_3 (\text{Industry dummies}) + \varepsilon_i \quad (2)$$

where "Equity Pay" is defined as the grant-date value of stock and options, and firm characteristics are the same as in column (4) of Table 3. Similar to columns (1)–(4) of Table 3, the Tobit regressions include controls for 12 Fama-French industries with standard errors clustered at the country level. As in our earlier regressions, our main variable of interest is the "US dummy," which evaluates the difference in the use of incentive pay for US and non-US CEOs; we call the coefficient on this dummy variable the "US equity pay premium".

Column (5) of Table 3, which controls only for industry and firm size, suggests a US equity pay premium of 22%. This is slightly larger than the 17% implied from the summary statistics in Table 1, where equity-based pay accounted for 39% and 22% of total pay for US and non-US firms, respectively. However, after controlling for firm, ownership, and board

characteristics in column (6) of Table 3, the US equity pay premium falls to a statistically insignificant 6%, implying only a relatively modest increased use of equity-based pay for US CEOs. Moreover, column (6) shows that the firm characteristics associated with higher pay are generally also associated with a higher use of performance-based compensation. Importantly, both the level of CEO pay and the use of incentive compensation are positively related to institutional ownership and the fraction of independent directors, and negatively related to insider ownership. Combined with results in columns (3) and (4), these findings suggest that the reduction in the US pay premium comes from the performance-based pay demanded by institutional shareholders and more independent boards.

Columns (7) and (8) of Table 3 decompose equity pay into its components: compensation in the form of stock and stock options. We find that there is no statistically significant difference between US and non-US CEOs in terms of use of stock but there is a significantly higher use of stock options for US CEOs, even after controlling for firm, ownership and board characteristics.

Column (2) of Table 4 analyzes the differences in US and non-US pay structures after controlling additionally for individual CEO characteristics. Older CEOs receive less of their compensation in the form of stock and options, while more educated CEOs receive more equity-based pay; none of the other CEO characteristics are significantly related to the structure of pay. The coefficient on the US dummy remains insignificant.

3.3 Risk-adjusted CEO pay

In comparing the level of CEO pay across companies and countries, it is important to distinguish between two different valuation concepts: the cost to the company of granting the compensation and the value to the CEO from receiving that compensation. Our measure of total compensation is meant to approximate the grant-date *opportunity cost* to shareholders of the CEO's pay package. However, it does not approximate the *value* of the package from the perspective of a risk-averse and undiversified CEO who presumably does not hedge the risk of the package. Although the 2006 pay differences for US versus non-US CEOs are economically modest after controlling for firm, ownership, and board characteristics, the results in Table 3 nonetheless suggest that US CEOs are paid more than their foreign counterparts, and receive a greater share of their compensation in equity-based compensation. Since risk-averse CEOs will naturally demand a "risk premium" for accepting stock or stock options in lieu of safer forms of compensation, it is possible that the US pay premium reflects a compensating differential for the increased risk of US pay packages.

Indeed, Conyon, et al. (2011) conclude that adjusting for risk plausibly explains the observed 2003 pay differences between US and UK CEOs.

While there is general agreement that risk-averse CEOs will demand a premium for accepting risky compensation, there is no single accepted methodology on how to measure the risk premium. Following Lambert, Larcker and Verrecchia (1991), Hall and Murphy (2002) propose measuring the value of non-tradable stock or options to an undiversified risk-averse CEO as the amount of riskless cash compensation the CEO would exchange for the stock or options, based on various assumptions regarding CEO risk aversion and outside wealth. Applying this method to our data allows us to create a measure of "risk-adjusted CEO pay" that can be compared across companies and countries.

As an alternative experiment, Conyon, et al. (2011) propose measuring the risk premium that CEOs would demand when the CEO is directly or indirectly forced to hold a undiversified portfolio (laden with company stock and options) rather than an unconstrained portfolio with the same expected value. The risk premium is defined as the amount of riskless cash compensation that would make the CEO indifferent between holding the undiversified portfolio (with the cash) and an unconstrained portfolio (based again on various assumptions regarding CEO risk aversion and outside wealth). Risk-adjusted pay under this framework is defined as observed total compensation less the estimated risk premium.

The difference between these two approaches for measuring risk-adjusted pay is best illustrated by a CEO who receives a base salary and no other forms of compensation. Under the Hall and Murphy (2002) approach, the CEO's risk-adjusted pay is simply his (unadjusted) base salary. Under the Conyon, et al. (2011) approach, the CEO's risk-adjusted pay is his base salary less the risk premium expected for holding an undiversified portfolio.

Which of these two approaches is "right" depends, in part, on how the CEO acquired his portfolio of company stock and options. Suppose, for example, that as a condition of employment, the CEO is required to use personal funds to purchase company shares. In this case, the company will need to pay a risk premium to the CEO on top of what would otherwise be a competitive pay package to compensate for the CEO's shareholding requirement. At the other extreme, suppose the CEO's outstanding options were the result of generous grants made with only slight reductions in other components of (already competitive) pay. In this case, there is no reason for the CEO to expect to be paid an ongoing risk premium for holding an undiversified portfolio.

3.3.1 Hall-Murphy risk adjustment

Following Hall and Murphy (2002), suppose that a CEO has non-firm-related wealth of w, holds a portfolio $S(\cdot)$ of company shares and options, and is granted n options to buy n shares of stock at exercise price X in T years. Assuming that w is invested at the risk-free rate, r_f, and that the realized stock price at T is P_T, the CEO's wealth at time T is given by:[15]

$$W_T \equiv w(1+r_f)^T + s(P_T) + n \times max(0, P_T - X). \quad (3)$$

If, instead of the option, the CEO were awarded V in cash that he invested at the risk-free rate, his wealth at time T would be:

$$W_T^V \equiv (w+V)(1+r_f)^T + s(P_T). \quad (4)$$

Assuming that the CEO's utility over wealth is $U(W)$, we can define the CEO's value of n options as the "certainty equivalent" V that equates expected utilities (3) and (4):

$$\int U(W_T^V) f(P_T) dP_T \equiv \int U(W_T) f(P_T) dP_T. \quad (5)$$

Solving (5) numerically requires assumptions about the form of the utility function, $U(W)$, and the distribution of future stock prices, $f(P_T)$. We follow Hall and Murphy (2002) in assuming that the CEO has constant relative risk aversion ρ, so that $U(W) \equiv ln(W)$ when $\rho=1$, and $U(W) \equiv \frac{1}{1-\rho} W^{1-\rho}$ when $\rho \neq 1$. We adopt the Capital Asset Pricing Model and assume that the distribution of stock prices in T years is lognormal with volatility σ and expected return value equal to $(r_f + \beta(r_m - r_f) - \sigma^2/2)T$, where β is the firm's systematic risk and r_m is the return on the market portfolio.[16]

To solve for certainty-equivalent values, we extract BoardEx and ExecuComp data on the "total wealth" of the CEO (defined as the market value of stock held plus the intrinsic "in-the-money" value of options held at fiscal year-end). We manually collect similar data for firms in Australia, Canada, and South Africa. We make several simplifying assumptions. First, we assume that both restricted stock and option grants have a vesting term of five years (equal to the average and median "expected term" for option grants in our US sample).

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[15] Cai and Vijh (2005) assume (more realistically but less tractably) that that safe wealth is invested in a portfolio of riskless assets and the market portfolio; Conyon, Core and Guay (2011) also allow investment in the market portfolio in their risk premium estimates.

[16] For tractability, we assume that the distribution of future stock prices is the same whether the executive receives options or cash. If the grant provides incentives that shift the distribution, and if the shift is not already incorporated into stock prices as of the grant date, we will underestimate both the cost and value of the option.

Second, we assume that the CEO holds shares equal to total wealth divided by the year-end share price, and further assume that these shares will be held for exactly five years.[17] We find that US CEOs have substantially more wealth tied up in their firms, with stock and option holdings being on average over nine times their compensation, while the equivalent multiple is only three for non-US CEOs. Assuming that US CEOs are no less risk-averse than their foreign counterparts, these wealth data suggest larger risk adjustments for US CEOs than non-US CEOs, which in turn will reduce the estimated US pay premium. For other inputs, we assume a market risk premium of 6.5%, use local risk-free rates for seven- to ten-year government bonds and, for each firm, we get the three-year dividend yield and standard deviation calculated using the last 36 months of stock returns. Finally, following Hall and Murphy (2002), we assume that CEOs have relative risk-aversion parameters of 2 or 3, and that each CEO has "safe wealth" equal to the greater of $5 million or four times the current cash compensation.

Panel A of Table 5 shows how the observed US premium decreases when CEO pay is measured on a risk-adjusted basis following the Hall and Murphy (2002) methodology. Columns (1) and (2) of Table 5 replicate columns (1) and (4) from Table 3 using unadjusted pay but for a somewhat smaller sample, reflecting cases where we are unable to compute risk-adjusted pay because of lack of data on CEO wealth. The dependent variable in columns (3)-(6) is the logarithm of risk-adjusted pay, assuming constant relative risk-aversion (rra) coefficients of 2 and 3. After controlling for firm, ownership, and board characteristics, the implied US pay premium falls from 27% (with no risk adjustment in column (2)) to statistically insignificant premiums of 14% and 10% in columns (4) (rra = 2) and (6) (rra = 3), respectively. Importantly, in columns (3) and (5) in Table 5 we show that the US pay premium remains economically and statistically sizeable at 55% and 46% when we risk-adjust pay but do not control for differences in firms' shareholder base and board structure.

Panel A of Figure 2 shows that the international distribution of predicted 2006 CEO *risk-adjusted* pay, following the Hall and Murphy (2002) methodology, adjusting only for sales and industry, for a hypothetical firm with $1 billion sales based on the specification in column (3) of Table 5, with the "US dummy" replaced by a set of 14 country dummies. The figure shows that the US estimated pay using the "certainty equivalence" approach is $2.1 million, which is statistically higher than non-US average risk-adjusted pay of $1.46 million.

[17] For US CEOs, we know not only the exact number of shares held at year-end, but also the portfolio of outstanding options (number of options, exercise prices, and expiration terms). To be consistent with the BoardEx data, we estimate shares held by dividing the year-end value plus intrinsic value for options by the share price, but our results are robust to using full information for US CEOs.

Panel B of Figure 2 shows risk-adjusted pay levels per country controlling for firm, ownership, and board characteristics, based on the specification in column (4) of Table 5. CEO pay in the US is significantly less than CEO pay in the UK and Australia, and insignificantly different from CEO pay in Canada, Italy, Ireland and Switzerland.

3.3.2 Conyon-Core-Guay risk adjustment

Following Conyon, et al. (2011), we now define risk-adjusted CEO pay as the dollar amount of compensation minus the riskless cash compensation the CEO would demand in exchange for holding his "total wealth" (defined as the market value of stock held plus the intrinsic "in-the-money" value of options held at fiscal year-end) for one more year instead of liquidating it. Specifically, we take a CEO that has non-firm-related wealth of w and holds a portfolio $S(\cdot)$ of company shares equal to "total wealth" divided by the year-end share price. We calculate the "certainty equivalent" V that the CEO would need to be awarded in cash to be indifferent between holding the firm shares or liquidating the firm's share holdings. We assume that w and V are invested at the risk-free rate, r_f, that the realized stock price at T=1 is P_1, and that the CEO's wealth at time T=1 is $W_1 \equiv (w+V)(1+r_f) + s(P_1)$. If, instead, the CEO were able to liquidate the firm's share holdings and invest in the risk-free asset the CEO's wealth at time T=1 would be $Z_1 = (w + s(P_0))(1 + r_f)$. We then calculate the "certainty equivalent" V that equates the expected utility $\int U(W_1) f(P_1) dP_1 = U(Z_1)$ assuming the same power utility function, $U(W_1)$, and the distribution of future stock prices, $f(P_1)$ as in our implementation of Hall and Murphy (2002) above. Risk-adjusted CEO pay is then defined as the dollar amount of compensation minus the riskless cash compensation V for holding the CEO's portfolio of firm's shares.

The certainty equivalents are estimated numerically assuming that the CEO has constant relative risk aversion (rra) of 2 or 3 and assumptions similar to Panel A columns (3)-(6) in terms of safe wealth and the distribution of stock prices (risk-free, beta, equity risk premium) but over an horizon of one year. Columns (1)-(4) of Panel B of Table 5 present the results. We also consider the median risk premium for holding incentives that Conyon, et al. (2011) estimate in their Table 5, which corresponds to a risk premium of 5.8% of beginning-of-year portfolio stock and options (which we measure as "total wealth"), in alternative to the CEO-specific calculation. In this case, we calculate risk-adjusted pay by subtracting 5.8% of CEO's "total wealth". Columns (5)-(6) of Panel B of Table 5 present the results.[18]

[18] We obtain consistent results (untabulated) when we subtract 7.6%, 8.5% and 11% of CEO's "total wealth" based on all the certainty equivalent discounts estimates for the hypothetical median CEO in Table 5 of Conyon, Core and Guay (2011).

In columns (1), (3) and (5) we find that the implied US pay premium remains economically and statistically sizeable at 72%, 51% and 41% when we risk-adjust pay but do not control for differences in firms' characteristics. After controlling for firm, ownership, and board characteristics we find an economically modest implied US pay premium of 30% in column (2) and statistically insignificant premiums of 18% and 0% in columns (4) and (6).

Panels C and D of Figure 2 show the international distribution of predicted 2006 CEO *risk-adjusted* pay for a hypothetical firm with $1 billion sales following the Conyon, et al. (2011) method, based on the specifications in column (1) and (2) of Panel B of Table 5. Panel D of Figure 2 shows that, after we control for ownership and board structure, the US estimated risk-adjusted CEO pay is at par with peer executives elsewhere.

The conclusions from Table 5 (and Figure 2) are robust to the risk adjustment method as well as to alternative definitions of safe wealth, equity premiums, and option terms: under all specifications, the implied US pay premium is monotonically decreasing in risk aversion, and becomes insignificant at relatively low levels of risk aversion after controlling for firm, ownership, and board characteristics. Calculating more precise estimates of risk-adjusted compensation for individual CEOs requires data unavailable to us, including details of CEO outside wealth and measures of individual risk aversion. Nonetheless, we consider the results in Table 5 to be consistent with Conyon, et al. (2011)'s conclusion that part of the US pay premium reflects compensating differentials for the higher risk of US pay packages. These risk adjustments, however, reduce but do not eliminate observed US pay premiums unless we also control for differences in ownership and board structures.

The result that expected pay is higher in firms with more equity-based compensation, even after adjusting for risk, is not surprising since optimal contracts must compensate for effort as well as risk. Consider the simplest agency model where the CEO produces output, y, by providing costly effort, and receives a salary plus a linear share of output: $w = s + by$. Holding constant the volatility of output, the expected level of pay will increase with "b" for two reasons: a compensating differential for risk and a compensating differential for increased effort. The intuition of this result holds moving beyond effort: the benefit of providing equity-based incentives must reflect getting the CEO to take some actions that he would not have taken otherwise (e.g., downsizing, shareholder distributions, selling the firm). Unless he is truly indifferent between the various actions (in which case the equity-based pay will merely direct his activities), he will require a compensating differential for taking the actions that he otherwise would not have taken. Thus, conceptually, risk is only part of the reason expected pay will increase with more-extensive use of equity-based pay.

Moreover, the compensating differential story assumes that CEOs are pegged to their reservation utilities, as would be assumed under efficient contracting theories. The evidence from the 1990s stock-option explosion in the United States suggests that options were often layered on top of existing pay packages, and were not granted in lieu of other safer forms of compensation. Bebchuk, et al. (2002) consider this fact as evidence for their managerial-power hypothesis. But this hypothesis does not explain why the increase in pay would come in the form of equity and why it would come during a time when boards were becoming more and not less independent and CEOs were becoming less and not more powerful. Alternatively, Murphy (2002) attributes the growth in stock options (and total pay) to executives and directors who, for a variety of reasons, did not understand (or make decisions based upon) the true opportunity cost of options, leading to oversized option grants and higher levels of pay. Murphy (2012) tries to reconcile these various paradigms, focusing on the role of government intervention and concluding that – in introducing plans that tie pay more strongly to performance as demanded by shareholders – directors routinely agree to pay more than necessary to compensate for the increased risk.

3.4 Are CEO pay determinants different for US and non-US firms?

The estimates for the US pay and equity premiums in Table 3 and 4 are based on a pooled regression where we restrict the coefficients on the firm, industry, ownership, and board controls to be the same across all countries. Table 6 explores differences across US and non-US firms in terms of the determinants of the level and structure of CEO pay. Columns (1)-(2) and (4)-(5) use the same specifications as in column (4) and (6), respectively, of Table 3 but without including the US dummy as a regressor. The *p*-values in columns (3) and (6) are based on regressions with interactions of each variable with the US dummy and indicate the significance of the difference between the US coefficients in columns (1) and (4) with the corresponding non-US coefficients in columns (2) and (5). In comparing columns (1) and (2), the relation between CEO pay and firm size and leverage is significantly stronger in the US, while the relation between CEO pay and Tobin's Q is significantly weaker. CEO pay is positively related to board size outside of the US (but not in the US), while CEOs also serving as board chairs and firms with more independents on the board of directors receive higher pay in the US (but not outside the US). In comparing columns (4) and (5), the fraction of pay delivered in the form of stock or options is positively related to board independence in the US, but not outside the US. Country fixed effects estimates (untabulated) using the sample of non-US firms are similar to those in columns (2) and (5).

The estimated coefficients in Table 6 suggest an alternative way to evaluate the US premium without restricting the regression coefficients to be the same for US and non-US firms. For each US CEO, we use that CEO's firm, industry, ownership, and board characteristics to compute the CEO's hypothetical pay (using the coefficients from the non-US regression in column (2) of Table 6), thus measuring the expected pay of that same CEO if he were in a non-US firm with the same characteristics. The implied US premium can be measured as the percentage difference between the actual and hypothetical pay for the US CEOs. The actual (US) pay exceeded the hypothetical (non-US) pay for 70% of the US CEOs, with an average implied US pay premiums of 40%. Similarly, we compare the hypothetical pay for non-US CEOs (using the coefficients from the US regression in column (1) of Table 6) to the actual pay to estimate the implied US premium for non-US CEOs. We find that the hypothetical (US) pay exceeded the actual (non-US) pay for 59% of the non-US CEOs, with an average implied US pay premiums of 21%. These numbers suggest that our finding of a positive US CEO pay premium of 26% in column (4) of Table 3 is not driven by our assumption of equal coefficients.

We have shown that the US CEO pay premium is economically modest when we control for firm, ownership and board characteristics, but without including country-level variables routinely used in international studies of corporate governance to measure differences in the economic, law, and institutional environment of each country. The limited number of countries in our sample (14) limits the statistical degrees of freedom for reliably identifying country-level determinants of pay practices. In unreported analysis, we find that CEO equity-based pay (and total pay) is more prevalent in common-law countries (La Porta, et al. (1998)) like the United States as well as the United Kingdom, Australia, Canada, Ireland and South Africa. CEO pay is also higher in countries with stronger investor protections and private control of self-dealing (Djankov, et al. (2008)). We also consider different aspects of a country's regulatory environment. We find a positive association between CEO equity-based pay (and total pay) and the levels of compensation disclosure and director liability (La Porta, Lopez-De-Silanes and Shleifer (2006)); note that the United States scores high in both indices. We find that equity-based pay is lower in countries with friendlier collective labor laws and countries where labor unions are more powerful (Botero, et al. (2004)), such as in Continental European countries (e.g., France and Germany).

4 The Internationalization (and Americanization) of CEO Pay

Many of the companies in our non-US sample are large multinational corporations competing in the global market for capital, customers, and managerial talent. In this section, we analyze the extent to which such global competition affects the level and structure of CEO pay outside the United States. In particular, we analyze whether the US pay and equity pay premiums exist when US firms are compared to non-US multinationals. We use two approaches to identify multinationals: internationalization (foreign institutional ownership, foreign investor demand, foreign sales, and the international diversity of the board of directors) and Americanization (US institutional ownership, US cross-listings, US acquisitions, and directors with US board experience).[19]

4.1 CEO pay in internationalized firms

Panel A of Table 7 shows how internationalization affects the level and structure of CEO pay in non-US companies. The regressions include the firm, ownership, and board characteristics in Table 3, except that institutional ownership is now separated into two components: domestic and foreign institutional ownership. The regressions include four measures of internationalization: (1) foreign institutional ownership; (2) a dummy variable indicating whether the firm is included in the 1,500-firm MSCI All Country World Index (routinely used as a benchmark for global equity mutual funds and used here as a proxy for foreign investor demand); (3) foreign sales as a fraction of total sales; and (4) the number of different nationalities represented on the board of directors divided by the total board size.

Column (1) of Table 7 shows that the positive relation between CEO pay and institutional ownership documented in Table 5 is driven by foreign ownership. Overall, pay levels are positively and significantly related to all four internationalization variables. CEO pay is positively correlated to foreign institutional ownership, MSCI index membership, fraction of foreign sales and the board's international diversity. The fraction of total compensation awarded in the form of stock and options is positively related to both domestic and foreign institutional ownership; the difference in the two coefficients is not significant. In addition, the fraction of equity pay is 5.8% higher for firms in the MSCI index; the use of equity pay is not significantly related to foreign sales or the board's international diversity.

[19] In contemporary work to our paper, Gerakos, Piotroski and Srinivasan (2010) find that CEO pay in 416 UK firms is positively related to US sales, US acquisitions, and US cross listings. Carter, Lynch and Zamora (2009) analyze 223 publicly traded European firms and find that the level of CEO pay and the use of incentive pay is positively related to the fraction of directors who sit on US boards.

Figure 3 plots the implied US pay and equity pay premiums for subsets of non-US firms based on our four internationalization variables. The US premiums are derived by estimating equation (1) for pay premiums (in Panel A) and equation (2) for equity pay premiums (in Panel B) after controlling for firm, ownership, and board characteristics and using all US CEOs and subsets of non-US CEOs. The subsets for foreign institutional ownership, foreign sales, or board international diversity are defined based on whether each variable is above the 75th percentile for non-US firms, while the subsets for MSCI membership are based on whether the firm is included in the MSCI index. As shown in Panel A, the US pay premium is insignificant for all subsets of "internationalized" firms, and significantly positive for all subsets of "non-internationalized" firms. Panel B shows that US equity pay premium is insignificant for all subsets of internationalized firms.

4.2 CEO pay in Americanized firms

Panel B of Table 7 analyzes how the level and structure of CEO pay in non-US companies is affected by explicit exposure to US capital, product, and labor markets (as opposed to exposure to "foreign" markets generally). The regressions again include the firm, ownership, and board characteristics in Table 3. In addition, the regressions include four measures of Americanization: (1) US institutional ownership to measure the differential effect of US and non-US ownership; (2) a dummy variable indicating whether the firm is cross-listed on US exchanges, which we use as a proxy for demand by US investors;[20] (3) the total acquisitions of US companies between 1996–2005, expressed as a percentage of market capitalization, as a proxy for exposure to US product and labor markets; and (4) the fraction of directors who also sit on boards of companies headquartered in the US, as a proxy for exposure to US pay practices.

As shown in column (3) of Table 7, the level of pay for non-US CEOs is positively and significantly related to US institutional ownership, but not to institutional ownership from other countries: a 10% increase in US institutional ownership is associated with approximately a 16% (i.e., $0.1(e^{0.967}-1)=0.16$) increase in CEO pay. In addition, CEO pay is 21% higher (i.e., $e^{0.188}-1=0.21$) in firms cross-listed on US exchanges, and also higher for non-US companies acquiring US firms (and, presumably, a US-based work force) as well as with boards where directors also serve on the board of US firms. Column (4) shows that the use of equity pay in non-US firms is higher in firms cross-listed on US exchanges, higher in

[20] Data on non-US firms listed on US exchanges (Level 2 and 3 ADRs) are obtained from the major depository institutions: Citibank, Bank of New York Mellon, JP Morgan, and Deutsche Bank. We also add cases of non-US firms with ordinary listings on US exchanges (as is the case with several Canadian firms).

firms with more institutional ownership (but there is no statistical difference between US and non-US ownership), and higher in firms that made more US acquisitions. Equity pay, however, is not higher in firms where directors have more US board experience.

Figure 4 plots the implied US premiums for subsets of non-US firms based on our four Americanization variables, defined again by estimating the US dummy variables in equations (1) or (2) after controlling for firm, ownership, and board characteristics and using all US CEOs and subsets of non-US CEOs. The subsets for US institutional ownership, US acquisitions, and US board exposure are defined based on whether each variable is above the 75th percentile for non-US firms, while the subsets for cross-listings are based on whether the firm is cross-listed on US exchanges. As shown in Figure 4, the US pay premium (Panel A) is insignificant for all subsets of Americanized firms, and significantly positive for all subsets of non-Americanized firms.

The results from Figure 4 imply that the differences in the level and structure of CEO pay for US and non-US firms are driven by non-US firms with low exposure (or no exposure) to US capital, product, or labor markets. To put it differently: after controlling for firm, ownership, and board characteristics, there is no discernible difference between the pay of US CEOs and non-US firms that are cross-listed in the US, have high levels of US institutional ownership, own operations in the US, or have board members who also sit on US boards.

4.3 Why do Americanized firms adopt US pay practices?

Non-US firms may adopt US-style pay packages to compete directly for talent in the global managerial labor market. The "competitive pay package" for US executives has evolved to include large grants of stock and options and high overall levels of expected total compensation. Foreign firms attempting to attract executives in competition with equivalent US firms will need to offer packages that are competitive with US levels. This explanation for US-style pay packages in non-US firms is limited by the fact that very few companies outside the United States appoint executives from the United States (perhaps precisely because they are so costly).[21] However, while few non-US firms hire American CEOs, US

[21] Carter, Lynch and Zamora (2009), for example, analyze 223 European companies over five years and identify only nine American-born CEOs.

firms are increasingly hiring non-native CEOs, which in turn affect competitive packages for CEOs outside the United States who might be attracted by US firms.[22]

Potentially more interesting are our results related to exposure to the US capital market. In particular, we find that companies with higher US institutional investment and cross-listed on US exchanges adopt US-style packages. In a survey paper, Karolyi (2010) identifies the key trade-off that firms face when they cross-list their stocks on the U.S. stock market to have access to a larger capital market versus the additional regulatory and legal burdens that come with the listing. Stulz (1999) and the empirical work that have followed it (e.g., Doidge, et al. (2004)) suggest that cross-listing firms benefit from "bonding" themselves to an increased level of disclosure and scrutiny in order to comply with US SEC regulations and US GAAPs. One of those mechanisms could be implementing US-style compensation packages that align executive incentives more with shareholder interests. This would predict that cross-listed firms use more equity-based pay and this could be an important factor to attract US and other foreign minority shareholders.[23] Another possibility is that CEOs of cross-listed firms would demand higher pay to compensate for the additional legal risk associated with the exposure to the US securities law (Gerakos, et al. (2010)). However, this last channel would not predict that the increase in pay for CEOs would come in the form of increased grants of equity-based pay but rather in increases in "safe" base salary.

In a similar vein, US shareholders could demand performance-based executive compensation as a prerequisite of investment. Consistent with this explanation is our result that the adoption of US-style packages is especially likely when the directors also sit on US boards (with more direct exposure to US shareholders). A more cynical explanation — also consistent with our data — is that CEOs outside the United States use their US-based investors as an "excuse" to increase the level of their pay by adding stock and options (often without reducing base salaries or other forms of safer pay). Since our primary purpose here is to develop and document the facts, we leave their interpretation to interesting future research.

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[22] See, for example, Hymowitz, "Foreign-Born CEOs Are Increasing in U.S., Rarer Overseas," *Wall Street Journal* (2004). Even when firms outside the US are not competing with US firms for CEO-level talent, exposure to the US labor market for lower-level managers can affect the pay practices for firms subject to such exposure. For example, after its 1999 acquisition of Chrysler, Daimler-Benz (renamed Daimler-Chrysler until its 2007 Chrysler divestiture) adopted a new executive pay system heavily based on stock options and bonuses explicitly to bridge the pay gap between its US and German executives. Similarly, in 2000, Europe's largest software company, SAP, adopted US-style options to stop senior executives from leaving the company's US division. See Bulkeley, "DaimlerChrysler to Equalize Pay of German, U.S. Execs," *Bloomberg News* (1999) and Benoit, "SAP vote may spell German rethink," *Financial Times* (2000).

[23] Ferreira and Matos (2008) show that institutional ownership by US and other foreign institutions increases significantly following a US cross-listing.

5 Time Trends in the US CEO Pay Premium, 2003 –2008

In this section, we study the convergence of US and non-US pay, based on a time-series of available data from 2003 to 2008. Panel A of Table 8 presents estimates of the US CEO pay and equity pay premiums by year, obtained from estimating the regressions separately for each year controlling only for industry and size. The US pay premium estimate of 79% in 2006 is identical to that in column (1) from Table 3 (converted into percentages using $e^{US\ Dummy}$ -1), and is based on our sample consisting of 1,532 US firms and 1,480 non-US firms. The estimates for the other years are based on smaller samples ranging between 781 and 997 non-US firms per year. The smaller sample reflects time trends in disclosure rules and BoardEx coverage, and the fact that our hand-collected sample (focused primarily on Canada, Australia, and South Africa) covered only the 2006 fiscal year. We find that the US pay premiums fell over the 2003-2008 period, especially after 2005. However, the estimates for the both the US pay and equity pay premiums adjusting only for firm size are significant in every year.

Panel B of Table 8 shows year-by-year results when we control for firm, ownership, and board characteristics. The US pay premium estimate of 26% for 2006 is identical to that of column (4) of Table 3. The estimates for the US pay premium are smaller every year relative to Panel A, thus we confirm that controlling for ownership and board structure helps to explain the US pay premium. In addition, in 2007 and 2008, the pay premiums are statistically insignificant (at 2% and 14%). This indicates that there have been no significant differences between pay levels of US and non-US CEOs since 2006. Similarly, there is no statistical difference between US and non-US firms in the use of equity-based pay for 2006 and 2007, although there is modest gap in 2008. These time trends indicate that there has been a significant convergence of CEO pay between US and non-US firms.

Regressions in Panel B of Table 8 allow for different slope coefficients in each year and different firm samples in each year as the coverage of firms changes over time. Therefore, it is difficult to compare US pay premium estimates across years because of different slopes and different samples. First, we examine whether the observed convergence over time in US and non-US CEOs pay level is due to changes in slopes. Panel C presents estimates of the US pay premium by year from a pooled regression using the whole sample of years, which imposes constant slopes across years. We still find that the US pay premium drops from 2003 to 2008 and conclude that the convergence in pay is not due to changes in slopes of the determinants of pay.

Second, we examine the effect of using different samples across year in the estimates of the US pay premium. Panel D of Table 8 presents estimates of yearly regressions using a sample of firms for which there are data on CEO pay (and control variables) for every year from 2003 to 2008. The constant sample consists of 898 US firms and 513 non-US firms. The estimated US pay premium is more moderate for this set of firms in 2003 and is insignificant in more recent years, which is consistent again with a time convergence of CEO pay to US levels.

Finally, we estimate the US pay premium using both a pooled regression and a fixed sample of firms. Panel E of Table 8 presents estimates that can be directly compared across years. We observe a downward trend in the US pay premium over the sample period, and there are no significant differences between pay levels of US and non-US CEOs after 2005. This finding suggests that it is time variation in firm characteristics that explains the decline in the US CEO pay gap.

In untabulated results, we analyze the time series of the determinants of CEO pay and conclude that an increase in institutional ownership seems to be the main factor associated with the time convergence in CEO pay levels. The average institutional ownership in non-US firms increases from 18% to 34% over the sample period. Foreign ownership is a major contributor for this increase in institutional ownership with an increase from 6% to more than 15%. Other firm and board characteristics do not exhibit significant trends. We conclude that the convergence of US and non-US CEO pay levels since 2003 seems to be associated with the convergence of ownership structures and globalization of capital markets.

6 Conclusion

The high pay of US CEOs relative to their foreign counterparts has been cited as evidence of excesses in US pay practices. Our results, based on the first comprehensive study of CEO pay across firms in 14 countries with mandated disclosure rules, challenge the view that the level and structure of pay for US CEOs is systematically different from the pay of non-US CEOs.

First, we show that the alleged US pay premium, after controlling for firm, ownership and board characteristics, is economically modest. The premium has declined substantially since 2003 (58%), becoming economically modest by 2006 (26%) and statistically insignificant by 2007 (2%). We establish that international differences in corporate

governance in terms of companies' ownership and board structures are important in cross-country studies of CEO pay level and mix.

Second, it is misleading to examine cross-sectional or cross-country differences in the level of pay in isolation, without also examining differences in the structure of pay. The ownership and board characteristics associated with higher pay are also those associated with a larger fraction of pay awarded in the form of stock options or restricted stock. We find that CEO pay levels and the use of equity-based pay are positively related to proxies routinely used for better governance, namely institutional ownership and independent boards.

Third, we show that risk adjustments reduce but do not eliminate observed US pay premiums unless we also control for differences in ownership and board structures. The result that expected pay is higher in firms with more equity-based compensation, even after adjusting for risk, is not surprising. Under the efficient contracting paradigm, CEOs must be compensated not only for bearing more risk but also for exerting more effort (or, more broadly, for taking actions that he would not take in the absence of equity-based compensation). Similarly, under perceived cost paradigm, in introducing plans that tie CEO pay more strongly to performance as demanded by shareholders, directors routinely agree to pay more than necessary to compensate for the increased risk. In both cases, risk alone will be insufficient to explain pay cross-sectional or international pay differences.

Finally, we find convergence toward US pay practices by non-US firms that have a higher fraction of foreign sales and shares held by foreign institutional investors and internationally diverse boards. Similarly, we find that CEO pay in non-US firms is no different (compared to US firms) in the non-US firms that are cross-listed on a US exchange, have a high presence of US institutions as shareholders, have US operations or have directors who also serve on US boards. Our results indicate that US-style equity-based compensation is increasingly exported to non-US firms that are exposed to foreign (and, particularly US) capital, product, and managerial labor markets. These findings suggest an increasingly important international managerial labor market for CEOs.

References

Abowd, John, and Michael Bognanno, 1995, International Differences in Executive and Managerial Compensation, in R. Freeman, and L. Katz, eds.: *Differences and Changes in Wage Structures* (The University of Chicago Press).

Abowd, John M., and David S. Kaplan, 1999, Executive Compensation: Six Questions That Need Answering, *Journal of Economic Perspectives* 13, 145-168.

Baker, George P., Michael C. Jensen, and Kevin J. Murphy, 1988, Compensation and Incentives: Practice vs. Theory, *Journal of Finance* 43, 593-616.

Bebchuk, Lucian A., Jesse M. Fried, and David I. Walker, 2002, Managerial Power and Rent Extraction in the Design of Executive Compensation, *University of Chicago Law Review* 69, 751-846.

Black, Fischer, and Myron S. Scholes, 1973, The Pricing of Options and Corporate Liabilities, *Journal of Political Economy* 81, 637-654.

Botero, Juan, Simeon Djankov, Rafael La Porta, Florencio Lopez-De-Silanes, and Andrei Shleifer, 2004, The Regulation of Labor, *Quarterly Journal of Economics* 119, 1339-1382.

Cai, Jie, and Anand Vijh, 2005, Executive Stock and Option Valuation in a Two State-Variable Framework, *Journal of Derivatives*, 9-27.

Carter, Mary Ellen, Luann J. Lynch, and Valentina Zamora, 2009, The Americanization of CEO Pay in European Firms, Working Paper, Boston College.

Conyon, Martin J., John E. Core, and Wayne R. Guay, 2011, Are US CEOs Paid More Than UK CEOs? Inferences From Risk-Adjusted Pay, *Review of Financial Studies* 24, 402-438.

Conyon, Martin J., and Kevin J. Murphy, 2000, The Prince and the Pauper? CEO Pay in the United States and United Kingdom, *Economic Journal* 110, F640-F671.

Conyon, Martin J., and Joachim Schwalbach, 2000, Executive Compensation: Evidence from the UK and Germany, *Long Range Planning* 33, 504-526.

Core, John, Robert Holthausen, and David Larcker, 1999, Corporate Governance, Chief Executive Officer Compensation, and Firm Performance, *Journal of Financial Economics* 51, 371-406.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-De-Silanes, and Andrei Shleifer, 2008, The Law and Economics of Self-Dealing, *Journal of Financial Economics* 88, 430-465.

Doidge, Craig, G. Andrew Karolyi, and René Stulz, 2004, Why are foreign firms that are listed in the U.S. worth more?, *Journal of Financial Economics* 71, 205-238.

Edmans, Alex, and Xavier Gabaix, 2011, The Effect of Risk on the CEO Market, *Review of Financial Studies* 24, 2822-2863.

Fernandes, Nuno, 2008, EC: Board Composition and Firm Performance: The Role of Iindependent Board Members, *Journal of Multinational Financial Management* 18, 30-44.

Ferreira, Miguel, and Pedro Matos, 2008, The Colors of Investors' Money: The Role of Institutional Investors Around the World, *Journal of Financial Economics* 88, 499-533.

Gabaix, Xavier, and Augustin Landier, 2008, Why has CEO Pay Increased So Much?, *Quarterly Journal of Ecoonomics* 123, 49-100.

Gerakos, Joseph J., Joseph D. Piotroski, and Suraj Srinivasan, 2010, Do US Market Interactions Affect CEO Pay? Evidence from UK Companies?, Working Paper, University of Chicago.

Greenbury, Richard, 1995. *Directors' Remuneration: Report of a Study Group Chaired by Sir Richard Greenbury* (Gee Publishing, London).

Hall, Brian J., and Kevin J. Murphy, 2002, Stock Options for Undiversified Executives, *Journal of Accounting and Economics* 33, 3-42.

Hartzell, Jay, and Laura Starks, 2003, Institutional Investors and Executive Compensation, *Journal of Finance* 58, 2351-2374.

Kaplan, Steven, 1994, Top Executive Rewards and Firm Performance: A Comparison of Japan and the U.S., *Journal of Political Economy* 102, 510-546.

Karolyi, G. Andrew, 2010, Corporate Governance, Agency Problems and International Cross-listings: A Defense of the Bonding Hypothesis.

Kato, Takao, Woochan Kim, and Ju-Ho Lee, 2006, Executive Compensation and Firm Performance in Korea, Working Paper, Korea Development Institute.

Kato, Takao, and Cheryl Long, 2005, Executive Compensation, Firm Performance, and Corporate Governance in China: Evidence from Firms Listed in the Shanghai and Shenzhen Stock Exchanges, Working Paper, IZA.

Kostiuk, Peter, 1990, Firm Size and Executive Compensation, *Journal of Human Resources* 25, 90-105.

La Porta, Rafael, Florencio Lopez-De-Silanes, and Andrei Shleifer, 2006, What Works in Securities Laws?, *Journal of Finance* 61, 1-32.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1998, Law and Finance, *Journal of Political Economy* 106, 1113-1155.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1999, Corporate Owenrship Around the World, *Journal of Finance* 54, 471-517.

Lambert, Richard A., David F. Larcker, and Robert E. Verrecchia, 1991, Portfolio Considerations in Valuing Executive Compensation, *Journal of Accounting Research* 29, 129-149.

Lazear, Edward P., and Sherwin Rosen, 1981, Rank-Order Tournaments as Optimum Labor Contracts, *Journal of Political Economy* 89, 841-64.

Murphy, Kevin J., 1999, Executive Compensation, in Orley Ashenfelter, and David Card, eds.: *Handbook of Labor Economics* (North Holland).

Murphy, Kevin J., 2002, Explaining Executive Compensation: Managerial Power vs. the Perceived Cost of Stock Options, *University of Chicago Law Review* 69, 847-869.

Murphy, Kevin J., 2012, Executive Compensation: Where we are, and how we got there, in George Constantinides, Milton Harris, and René Stulz, eds.: *Handbook of the Economics of Finance*, forthcoming.

Prendergast, Canice, 2002, The Tenuous Trade-off between Risk and Incentives, *Journal of Political Economy* 110, 1071-1102.

Rosen, Sherwin, 1981, The Economics of Superstars, *American Economic Review* 71, 845-858.

Rosen, Sherwin, 1982, Authority, Control, and the Distribution of Earnings, *Bell Journal of Economics* 13, 311-323.

Stulz, René, 1999, Globalization, Corporate Finance, and the Cost of Capital, *Journal of Applied Corporate Finance* 12, 8-25.

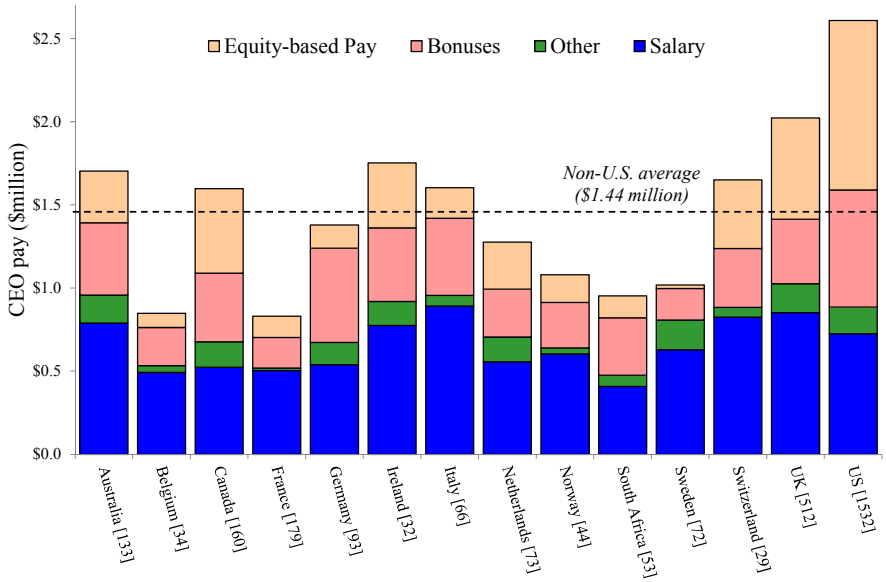
Thomas, Randall S., 2008, International Executive Pay: Current Practices and Future Trends, Working Paper, Vanderbilt University Law School.

Zábojník, Ján, 1996, Pay-performance Sensitivity and Production Uncertainty, *Economic Letters* 53, 291-296.

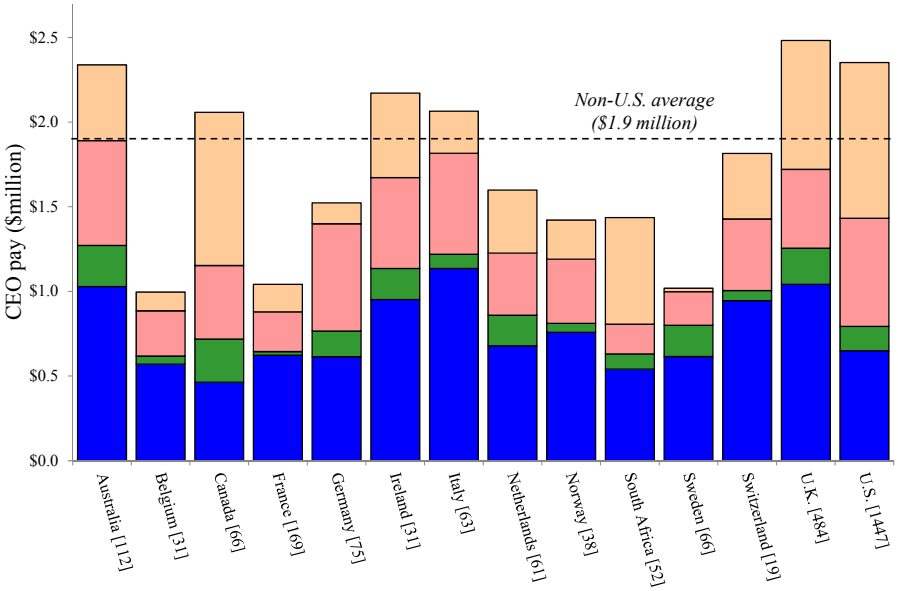
Zhou, Xianming, 2000, CEO Pay, Firm Size, and Corporate Performance: Evidence from Canada, *Canadian Journal of Economics* 33, 213-251.

Figure 1 Predicted level and structure of 2006 CEO pay for firms with $1 billion in revenues

Panel A. Controlling for sales and industry



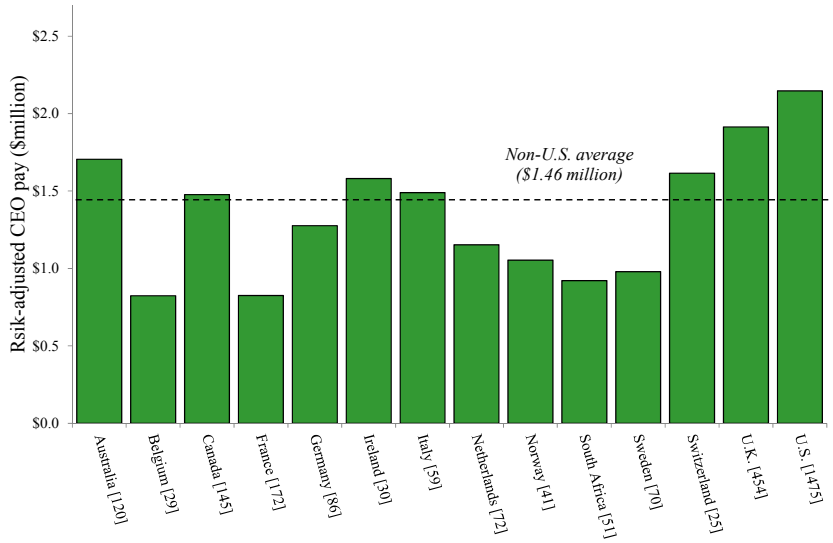
Panel B. Controlling for sales, industry, and firm, ownership, and board characteristics



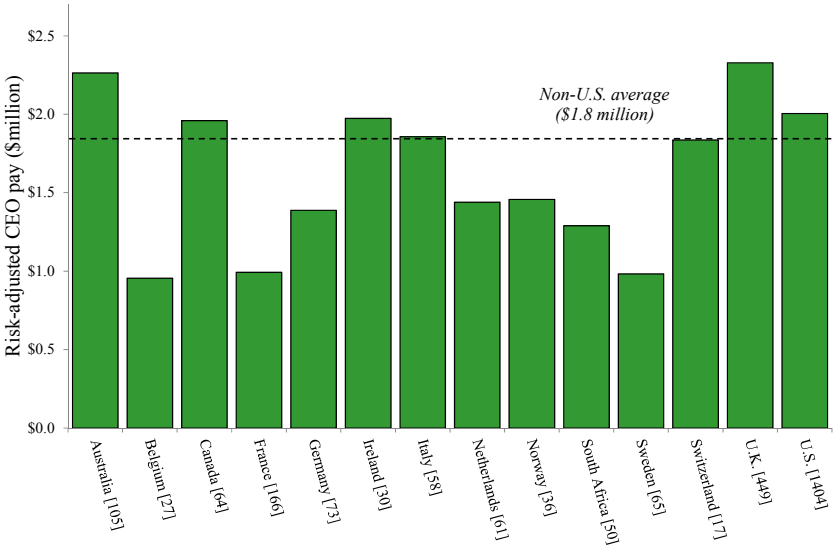
Note: The figure compares estimated 2006 CEO pay for a CEO running a hypothetical firm with $1 billion in sales on an "average" industry. Panel A controls for sales and industry (as in column (1) of Table 3). Panel B controls for sales, industry, and firm, ownership, and board characteristics (as in column (4) of Table 3). The "non-US average" is weighted by the number of firms in each country. The pay composition percentages are defined as the average composition across all CEOs for each country from Table 1.

Figure 2 Predicted level of risk-adjusted 2006 CEO Pay for firms with $1 billion in revenues

Panel A. Hall-Murphy Risk Adjustment - Controlling for sales and industry



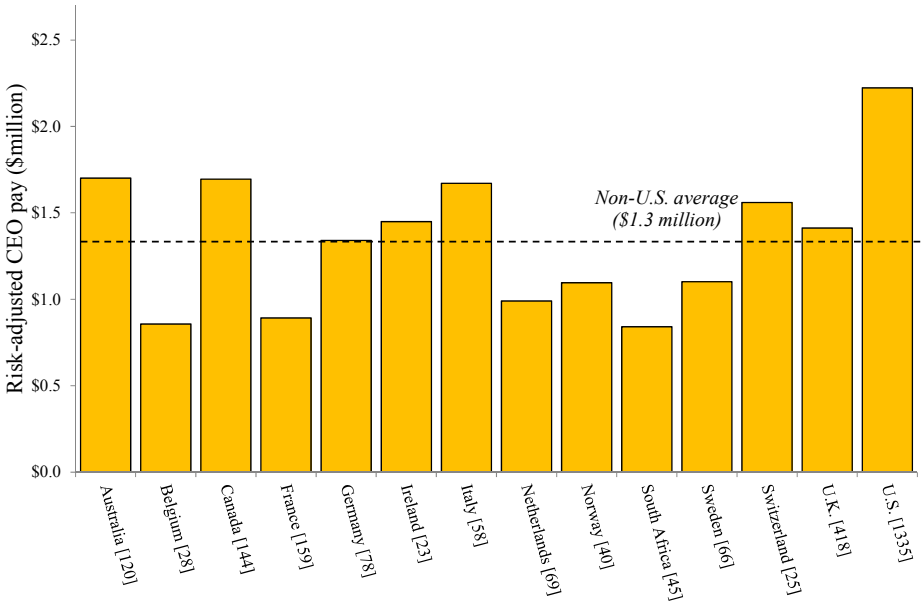
Panel B. Hall-Murphy Risk Adjustment - Controlling for sales, industry, and firm, ownership, and board characteristics



Note: The figure compares 2006 CEO risk-adjusted pay for a CEO running a hypothetical firm with $1 billion in sales on an "average" industry. Risk-adjusted pay is estimated using the Hall-Murphy (Panels A and B) and Conyon-Core-Guay (Panels C and D) certainty equivalence approaches. Relative risk aversion is 2 and safe wealth is the maximum between $5 million and four times total pay. Panels A and C control for sales and industry (as in Panel A column (3) and Panel B column (1) of Table 5). Panels B and D control for sales, industry, and firm, ownership, and board characteristics (as in Panel A column (4) and Panel B column (2) of Table 5).

Figure 2 (Cont.)

Panel C. Conyon-Core-Guay Risk Adjustment - Controlling for sales and industry



Panel D. Conyon-Core-Guay Risk Adjustment - Controlling for sales, industry, and firm, ownership, and board characteristics

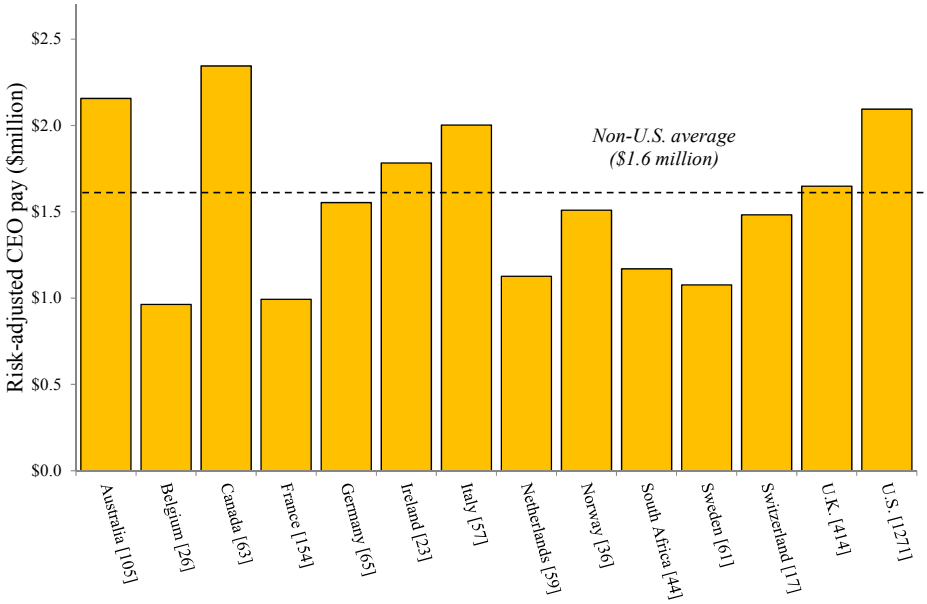
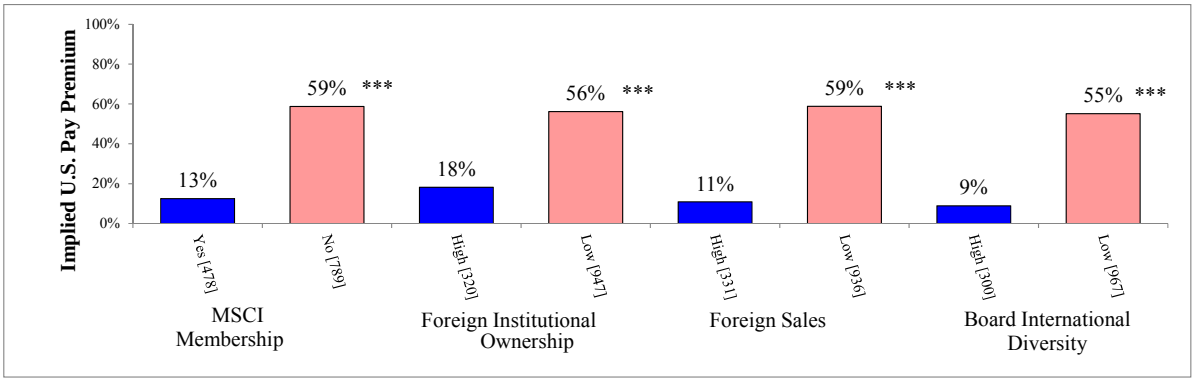
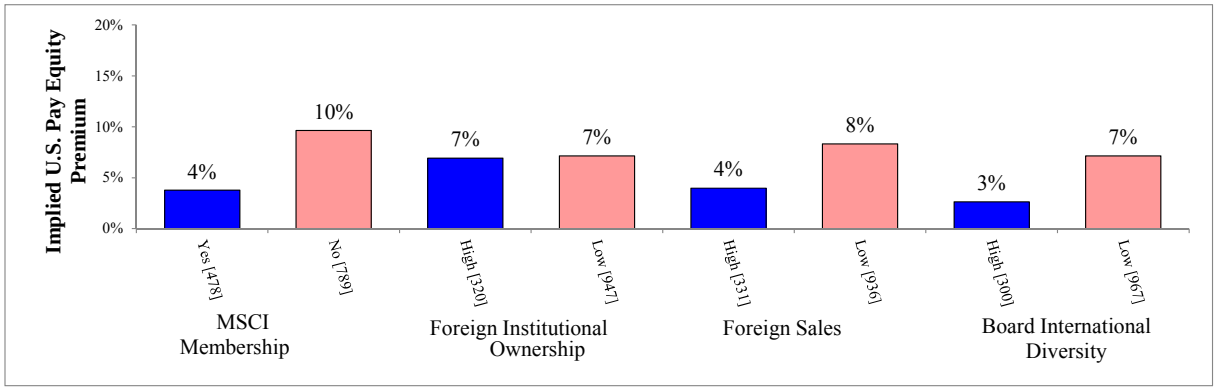


Figure 3 Implied differences in US versus non-US CEO pay for subsets of non-US firms based on measures of internationalization

Panel A. Implied US CEO Pay Premiums



Panel B. Implied US CEO Equity Pay Premiums



Note: The figure plots the US dummy variables in regressions similar to Table 3 column (4) for pay levels (converted into percentages) and column (6) for equity pay (in percentages), where the US sample is compared to two subsets of the non-US sample (number in brackets) based on the following measures of internationalization:

MSCI Membership: "Yes" indicates that the non-US firm is a member of the MSCI All-country World Index.

*Foreign Institutional Ownership: "*High" indicates that foreign institutional ownership is above the 75th percentile for non-US firms.

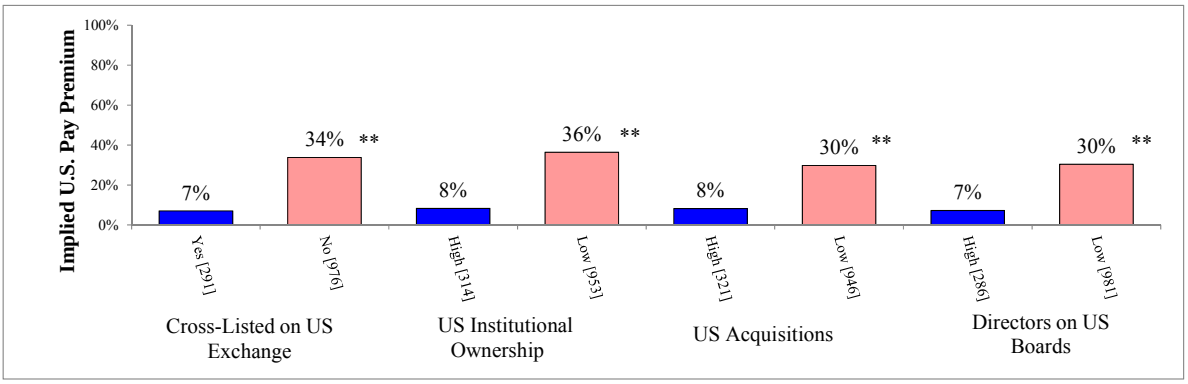
*Foreign Sales: "*High" indicates that firm's foreign sales (expressed as a percentage of total sales) are above the 75th percentile for non-US firms.

Board International Diversity: "High" indicates that the ratio of the number of different nationalities of directors to board size is above the 75th percentile for non-US firms.

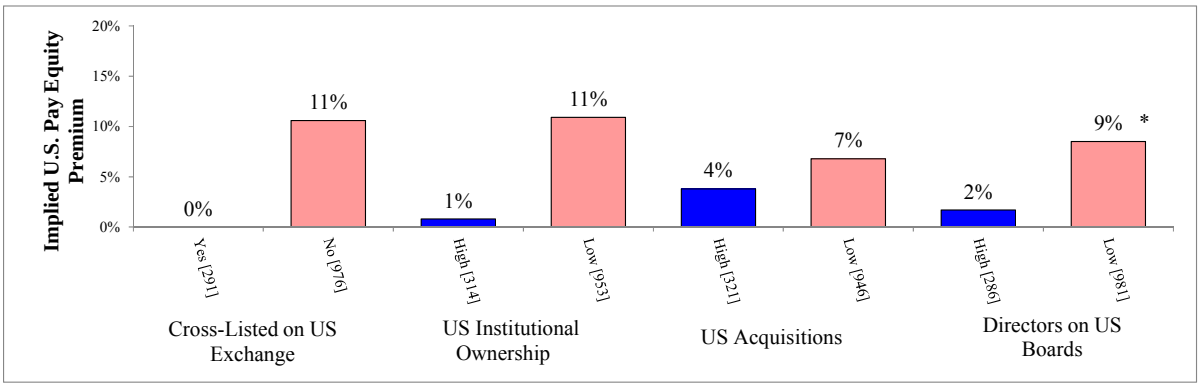
***, **, * indicates that the coefficient on the US dummy on each underlying regression depicted above is significant at the 1, 5, and 10% levels, respectively.

Figure 4 Implied differences in US vs. non-US CEO pay for subsets of non-US firms based on measures of internationalization

Panel A. Implied US CEO Pay Premiums



Panel B. Implied US CEO Equity Pay Premiums



Note: The figure plots the US dummy variables in regressions similar to Table 3 columns (4) for pay levels (converted into percentages) and column (6) for equity pay (in percentages), where the US sample is compared to two subsets of the non-US sample (number in brackets) based on the following measures of Americanization:

US Institutional Ownership: "High" indicates that US institutional ownership is above the 75th percentile for non-US firms.

Cross-Listed on US Exchange: "Yes" indicates that non-US firm is cross-listed on a US exchange.

US Acquisitions: "High" indicates that the volume acquisitions of US companies over the prior ten years (expressed as a percentage of market capitalization) is above the 75th percentile for non-US firms.

Directors on US Boards: "High" indicates that the fraction of directors of non-US firms who also sit on boards of US firms is above the 75th percentile.

***, **, * indicates that the coefficient on the US dummy on each underlying regression depicted above is significant at the 1, 5, and 10% levels, respectively.

Table 1 Sample size and level and structure of CEO pay by country

Country	Number of CEOs in Sample and Data Source			% of Market Cap	CEO Pay ($ million)		Mean Composition of CEO Pay			
	BoardEx & Exec	Corp. Filings	Total		Mean	Median	Salary	Other	Bonuses	Stock & Options
Australia	8	129	137	82%	$2.4	$1.7	46%	10%	26%	18%
Belgium	37	2	39	73%	1.6	0.9	58%	5%	27%	10%
Canada	7	166	173	79%	3.1	2.2	33%	10%	26%	32%
France	192	0	192	88%	2.4	0.9	61%	2%	22%	15%
Germany	106	0	106	78%	3.6	2.4	39%	10%	41%	10%
Ireland	32	1	33	98%	2.4	1.7	44%	8%	25%	22%
Italy	71	2	73	80%	5.2	2.7	56%	4%	29%	12%
Netherlands	80	1	81	92%	2.4	1.4	44%	12%	23%	22%
Norway	47	2	49	90%	1.7	1.0	56%	3%	25%	15%
S. Africa	6	50	56	80%	1.7	1.3	43%	7%	36%	14%
Sweden	83	1	84	90%	1.7	1.1	62%	18%	19%	2%
Switzerland	21	10	31	55%	6.1	2.3	50%	4%	21%	25%
UK	561	0	561	91%	2.9	1.7	42%	9%	19%	30%
Non-US	*1,251*	*364*	*1,615*	*83%*	*$2.8*	*$1.6*	*46%*	*8%*	*24%*	*22%*
US	1,648	0	1,648	90%	$5.5	$3.3	28%	6%	27%	39%
All 14 countries	*2,899*	*364*	*3,263*	*87%*	*$4.2*	*$2.3*	*37%*	*7%*	*25%*	*31%*

Notes: 2006 fiscal year CEO pay data extracted from S&P's ExecuComp database (US), BoardEx (non-US) (collectively "BoardEx & Exec" in the table), or hand-collected from corporate filings. "% of Market Cap" is computed for each country as the market capitalization of firms with CEO pay data divided by the total market capitalization of firms in Datastream. We exclude CEOs in their first years to compute the CEO pay statistics. CEO Pay is defined as the sum of salaries, bonuses (including all non-equity incentives), benefits, and grant-date values for stock options, restricted stock, and performance shares.

Table 2 Difference in US and non-US control variables

	US Firms	Non-US Firms	Difference *t*-statistic
A. FIRM CHARACTERISTICS			
Sales ($ billion)	5.713	5.615	0.16
Leverage	0.216	0.234	-2.76
Tobin's Q	2.043	1.769	6.17
Stock-return volatility	0.292	0.258	6.69
Stock return	0.114	0.320	-14.23
B. OWNERSHIP STRUCTURE			
Insider ownership	0.161	0.320	-20.29
Institutional ownership	0.801	0.228	63.23
C. BOARD STRUCTURE			
Board size	9.552	10.464	-6.48
Fraction of independent directors	0.831	0.551	43.87
CEO-chairman dummy	0.536	0.160	22.82
Avg. number of board positions	1.957	1.867	3.67
D. CEO CHARACTERISTICS			
CEO age	55.825	52.946	10.26
CEO external hire dummy	0.266	0.463	-11.08
CEO tenure (as CEO)	7.924	7.398	2.04
CEO other industry experience dummy	0.451	0.471	-1.04
Past experience as CEO dummy	0.349	0.340	0.51
CEO current board positions	1.627	1.677	-1.12
CEO college degree dummy	0.824	0.688	8.54

Notes: See Appendix A for variable definitions and data sources, and Appendix B for summary statistics by country. Firm, ownership, and board characteristics are measured using 2005 fiscal year data.

Table 3 Regressions of the level and structure of CEO pay on firm characteristics, ownership, and board structure

	OLS Regression				Tobit Regression			
	Dependent Variable: Ln(CEO Total Pay)				*Dependent Variable*: Equity Pay / Total Pay		Stock / Total Pay	Options / Total Pay
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
US dummy	0.582*** (4.14)	0.629*** (4.56)	0.268*** (2.84)	0.230** (2.40)	0.221** (2.84)	0.063 (0.98)	-0.047 (0.51)	0.217*** (2.48)
FIRM CHARACTERISTICS:								
Sales (log)	0.406*** (17.44)	0.402*** (19.47)	0.380*** (16.47)	0.315*** (9.75)	0.061*** (17.29)	0.037*** (6.82)	0.027*** (3.59)	0.029*** (4.94)
Leverage	–	0.434*** (2.89)	0.408*** (2.97)	0.402*** (2.93)	–	0.003 (0.04)	0.080* (0.75)	-0.098* (-5.75)
Tobin's Q	–	0.064** (2.51)	0.057*** (2.71)	0.056*** (2.87)	–	0.014** (2.30)	-0.008 (0.71)	0.024*** (5.72)
Stock-return volatility	–	-0.529*** (-6.33)	-0.492*** (-7.88)	-0.495*** (-7.09)	–	-0.190*** (-3.75)	-0.250*** (-5.49)	-0.080 (1.07)
Stock return	–	0.192*** (4.26)	0.190*** (5.60)	0.167*** (5.98)	–	0.008 (0.30)	0.001 (0.02)	-0.000 (-0.01)
OWNERSHIP STRUCTURE:								
Insider ownership	–	–	-0.803*** (-4.52)	-0.785*** (-3.68)	–	-0.358*** (-4.25)	-0.488*** (-3.14)	-0.046 (0.50)
Institutional ownership	–	–	0.422*** (8.00)	0.336*** (5.41)	–	0.162*** (3.75)	0.088** (2.68)	0.150* (1.82)
BOARD STRUCTURE:								
Board size	–	–	–	0.011 (1.32)	–	-0.004 (-0.76)	-0.007 (-1.40)	0.007 (0.91)
Fraction of independent directors	–	–	–	0.206** (1.96)	–	0.102 (1.42)	0.076 (1.43)	0.173* (1.84)
CEO-chairman dummy	–	–	–	0.058 (0.53)	–	-0.044 (-1.41)	-0.046 (-0.72)	-0.023 (0.89)
Avg. number of board positions	–	–	–	0.250*** (4.65)	–	0.088*** (4.76)	0.068** (2.99)	0.063** (2.09)
Observations	3,012	2,950	2,848	2,714	3,006	2,710	2,714	2,710
R-squared	0.35	0.37	0.39	0.43	–	–	–	–

Note: This table presents regressions of 2006 CEO pay level and structure. All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on 12 Fama-French industries. Variable definitions and sources are in Appendix A. Robust *t*-statistics in parentheses are based on standard errors clustered by country.

***, **, * denote that the coefficient is significant at the 1, 5, and 10% levels, respectively.

Table 4 Regressions of the level and structure of CEO pay on firm characteristics, ownership and board structure, and CEO characteristics

	OLS Regression	Tobit Regression
	Dependent Variable: Ln(CEO Total Pay)	*Dependent Variable*: Equity Pay / Total Pay
	(1)	(2)
US dummy	0.223**	0.050
	(2.21)	(0.76)
CEO CHARACTERISTICS:		
CEO age	-0.003	-0.004***
	(1.08)	(-4.99)
CEO external hire dummy	0.052	-0.006
	(0.95)	(0.64)
CEO tenure (as CEO)	0.002	-0.002
	(0.47)	(1.53)
CEO other industry experience dummy	0.031	0.019
	(1.57)	(1.25)
Past experience as CEO dummy	-0.004	-0.018**
	(0.10)	(-1.97)
CEO current board positions	-0.007	-0.010
	(0.27)	(-0.86)
CEO college degree dummy	0.106	0.038*
	(0.97)	(1.74)
Observations	2,553	2,552
R-squared	0.42	–

Note: This table presents regressions of 2006 CEO pay level and structure. The regressions include the same controls for firm characteristics, ownership structure, and board structure as in Table 3 column (4) (coefficients not shown) with additional controls for CEO characteristics. Regressions also include industry dummy variables based on 12 Fama-French industries. Variable definitions and sources are in Appendix A. Robust *t*-statistics in parentheses are based on standard errors clustered by country.

***, **, * denote that the coefficient is significant at the 1, 5, and 10% level, respectively.

Table 5 Regressions of the level of risk-adjusted CEO pay

	A. Dependent Variable: Hall-Murphy Risk-Adjusted Ln(CEO Pay)					
	No risk adjustment		*rra=2*	*rra=2*	*rra=3*	*rra=3*
	(1)	(2)	(3)	(4)	(5)	(6)
US dummy	0.571***	0.240**	0.439***	0.132	0.376***	0.097
	(4.22)	(2.38)	(3.23)	(1.28)	(2.83)	(0.97)
FIRM CHARACTERISTICS:						
Sales (log)	0.405***	0.315***	0.408***	0.313***	0.395***	0.303***
	(19.29)	(12.12)	(19.74)	(13.17)	(22.50)	(14.30)
Leverage		0.351**		0.335**		0.344***
		(2.28)		(2.45)		(2.61)
Tobin's Q		0.062**		0.039		0.033
		(2.33)		(1.28)		(1.06)
Stock-return volatility		-0.456***		-0.736***		-0.714***
		(-7.40)		(-12.12)		(-13.12)
Stock return		0.161***		0.077***		0.069**
		(5.98)		(2.64)		(2.41)
OWNERSHIP STRUCTURE:						
Insider ownership		-0.667***		-0.692***		-0.672***
		(-3.00)		(-3.20)		(-3.05)
Institutional ownership		0.342***		0.286***		0.246***
		(5.58)		(4.81)		(4.70)
BOARD STRUCTURE:						
Board size		0.012		0.013*		0.013**
		(1.52)		(1.73)		(2.00)
Fraction of independent directors		0.198**		0.222**		0.211**
		(1.98)		(2.27)		(2.35)
CEO-chairman dummy		0.051		0.042		0.042
		(0.51)		(0.41)		(0.39)
Avg. number of board positions		0.245***		0.226***		0.207***
		(5.36)		(4.72)		(4.32)
Observations	2,829	2,605	2,829	2,605	2,829	2,605
R-squared	0.37	0.46	0.38	0.46	0.37	0.45

Note: In Panel A risk-adjusted pay is estimated using the Hall-Murphy approach, defined as the amount of riskless cash compensation the CEO would exchange for his new stock and option grants, conditional on his wealth. In Panel B the risk-adjusted pay is estimated using the Conyon-Core-Guay approach, defined as the dollar amount of compensation minus the riskless cash compensation the CEO would demand in exchange for his wealth for one more year. The risk-adjusted accounting-based bonuses are assumed to be 80% of actual bonuses. The CEO's safe wealth is assumed to be the maximum between $5 million and four times total pay. Certainty equivalents are estimated numerically assuming that the CEO has constant relative risk aversion (rra) of 2 or 3, and assuming that the distribution of stock prices over the actual term of the options granted is lognormal with volatility σ and expected return value $(r_f + \beta(r_m - r_f) - \sigma^2/2)T$, where σ and β are determined using monthly stock-return data over 36 months, r_f is the country-specific average yield on government securities during the year of grant, and $r_m - r_f = 6.5\%$ is the market risk premium. Variable definitions and sources are in Appendix A. Regressions include industry dummy variables based on 12 Fama-French industries. Robust *t*-statistics in parentheses are based on standard errors clustered by country.

***, **, * denote that the coefficient is significant at the 1, 5, and 10% levels, respectively.

Table 5 (Cont.)

B. Dependent Variable: Conyon-Core-Guay Risk-Adjusted Ln(CEO Pay)

	rra=2	*rra=2*	*rra=3*	*rra=3*	*5.8% of Wealth*	*5.8% of Wealth*
	(1)	(2)	(3)	(4)	(5)	(6)
US dummy	0.540*** (7.01)	0.265** (2.64)	0.412*** (5.24)	0.164 (1.44)	0.344*** (3.12)	-0.001 (-0.00)
FIRM CHARACTERISTICS:						
Sales (log)	0.401*** (11.16)	0.332*** (6.93)	0.389*** (12.13)	0.320*** (7.11)	0.411*** (17.23)	0.355*** (10.38)
Leverage		0.223*** (3.32)		0.171** (2.49)		0.234** (2.79)
Tobin's Q		0.118*** (9.15)		0.119*** (9.69)		0.094*** (3.32)
Stock-return volatility		-0.705*** (-11.64)		-0.577*** (-7.88)		-0.101 (-1.26)
Stock return		0.112*** (3.34)		0.007 (0.22)		0.155*** (3.69)
OWNERSHIP STRUCTURE:						
Insider ownership		-0.367* (-1.83)		-0.337 (-1.66)		-0.435 (-1.73)
Institutional ownership		0.298** (2.89)		0.227* (1.84)		0.400*** (5.12)
BOARD STRUCTURE:						
Board size		0.011 (1.24)		0.016* (2.02)		0.006 (0.69)
Fraction of independent directors		0.116 (0.98)		0.206* (1.79)		0.184** (2.67)
CEO-chairman dummy		0.120 (1.60)		0.059 (0.89)		-0.018 (-0.18)
Avg. number of board positions		0.189*** (4.64)		0.179*** (3.94)		0.227*** (4.52)
Observations	2,608	2,395	2,475	2,266	2,471	2,263
R-squared	0.44	0.50	0.39	0.45	0.36	0.41

Table 6 Regressions of the level and structure of CEO pay on firm characteristics, ownership, and board structure with different slopes for US and non-US firms

	OLS Regression			Tobit Regression		
	Dependent Variable: Ln(CEO Total Pay)			*Dependent Variable*: Equity Pay / Total Pay		
	US Firms	Non-US Firms	*p*-value (1)-(2)	US Firms	Non-US Firms	*p*-value (4)-(5)
	(1)	(2)	(3)	(4)	(5)	(6)
FIRM CHARACTERISTICS:						
Sales (log)	0.367*** (9.07)	0.260*** (10.48)	0.001	0.033*** (3.19)	0.047*** (4.64)	0.199
Leverage	0.592*** (3.71)	0.194 (1.36)	0.015	0.110 (1.49)	-0.139 (-1.56)	0.002
Tobin's Q	0.031 (1.00)	0.097*** (3.74)	0.025	0.007 (1.07)	0.026* (1.90)	0.167
Stock-return volatility	-0.476*** (-2.85)	-0.496*** (-2.64)	0.916	-0.214*** (-2.71)	-0.110 (-0.85)	0.365
Stock return	0.209** (2.17)	0.157** (2.92)	0.347	0.046 (1.53)	-0.008 (0.15)	0.306
OWNERSHIP STRUCTURE:						
Insider ownership	-0.416*** (-3.07)	-0.907*** (-4.1)	0.044	-0.165*** (-2.88)	-0.415*** (-5.25)	0.001
Institutional ownership	0.277*** (3.35)	0.372* (1.91)	0.633	0.118*** (3.76)	0.293*** (3.50)	0.047
BOARD STRUCTURE:						
Board size	0.003 (0.17)	0.020** (2.29)	0.068	0.003 (0.84)	-0.006** (-1.21)	0.065
Fraction of independent directors	0.470*** (2.59)	0.076 (0.73)	0.002	0.253*** (3.84)	0.010 (0.15)	0.000
CEO-chairman dummy	0.179*** (5.27)	-0.204** (-2.26)	0.001	-0.016 (1.22)	-0.129*** (-2.61)	0.051
Avg. number of board positions	0.167*** (3.07)	0.302*** (5.21)	0.036	0.066*** (3.58)	0.097*** (3.29)	0.374
Observations	1,447	1,267		1,447	1,263	
R-squared	0.37	0.44		–	–	

Note: This table presents regressions of 2006 CEO pay level and structure. All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on 12 Fama-French industries. Columns (3) and (6) are run for a pooled regression using a sample of US and non-US firms that include interaction variables of all variables with US dummy and *p*-values indicating whether the coefficient of a variable for US firms is significantly different from the coefficient for non-US firms. Variable definitions and sources are in Appendix A. Robust *t*-statistics in parentheses are based on standard errors clustered by country (for non-US regressions) and by industry (for US regressions).

***, **, * denote that the coefficient is significant at the 1, 5, and 10% level, respectively.

Table 7 Regressions for non-US firms of CEO pay on whether the firm is internationalized or Americanized

Panel A. Internationalization Variables			*Panel B. Americanization Variables*		
	OLS	Tobit		OLS	Tobit
Dependent Variable:	Ln(CEO Pay)	Equity Pay / Total Pay	*Dependent Variable*:	Ln(CEO Pay)	Equity Pay / Total Pay
	(1)	(2)		(3)	(4)
Domestic inst. ownership	0.096 (0.39)	0.275*** (2.90)	Non-US inst. ownership	0.189 (0.67)	0.336*** (3.41)
Foreign inst. ownership	0.647*** (3.65)	0.311*** (4.77)	US inst. ownership	0.967*** (3.26)	0.301** (2.53)
Firm in MSCI dummy	0.206** (2.12)	0.058** (1.99)	US cross-listing dummy	0.188*** (2.78)	0.074** (2.14)
Foreign sales as % of total sales	0.168* (1.66)	0.051 (1.19)	US acquisitions	0.097*** (4.07)	0.024** (2.22)
Nationalities on board/board size	0.539** (3.02)	0.066 (0.84)	% of directors in US boards	0.674** (2.09)	-0.185 (-1.25)
Number of non-US firms	1,267	1,263		1,201	1,198
R-squared	0.53	–		0.53	–

Note: This table presents regressions of 2006 CEO pay level and structure. All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on 12 Fama-French industries and country dummies. The regressions include the same controls for firm characteristics, ownership structure, and board structure for non-US firms as in Table 3 column 4. We add controls for internationalization and Americanization. Variable definitions and sources are in Appendix A. Robust *t*-statistics in parentheses are based on standard errors clustered by country.

***, **, * denote that the coefficient is significant at the 1, 5, and 10% level, respectively.

Table 8 Time trends in US CEO Pay premium, 2003–2008

	2003	2004	2005	2006	2007	2008
Panel A. Year-by-Year Regressions: Adjusting Only for Sales						
Number of US firms	1,438	1,463	1,457	1,532	1,529	1,426
Number of non-US firms	781	887	975	1,480	997	908
Implied US pay premium	108%***	109%***	117%***	79%***	64%**	78%***
Implied equity pay premium	22%**	27%***	27%**	22%***	27%**	34%***
Panel B. Year-by-Year Regressions: Adjusting for Firm Ownership and Board Characteristics						
Number of US firms	1,273	1,361	1,396	1,447	1,367	1,308
Number of non-US firms	736	834	895	1,267	951	824
Implied US pay premium	58%***	53%**	59%**	26%**	2%	14%
Implied equity pay premium	16%***	21%***	19%**	7%	9%	15%***
Panel C. Pooled Regressions: Adjusting for Firm, Ownership and Board Characteristics						
Implied US pay premium	56%***	49%***	55%***	30%**	18%	23%**
Panel D. Constant Sample of Firms and Year-by-Year Regressions: Adjusting for Firm, Ownership and Board Characteristics						
Number of US firms	898	898	898	898	897	897
Number of non-US firms	513	513	513	513	514	514
Implied US pay premium	29%**	18%	30%	16%	-6%	24%*
Implied equity pay premium	7%	6%	5%	-5%	3%	20%***
Panel E. Constant Sample of Firms and Pooled Regressions: Adjusting for Firm, Ownership and Board Characteristics						
Implied US pay premium	36%**	32%*	27%	8%	-2%	12%

Note: This table presents regressions of CEO pay level and structure from 2003 to 2008. Panel A shows estimated US dummy coefficients from year-by-year regressions controlling for sales and industry dummies (the 2006 column for "Implied US Pay Premium" corresponds to column (1) of Table 3, converted into percentages). Panel B shows estimated US dummy coefficients from year-by-year regressions controlling for sales and industry dummies, firm, ownership and board characteristics (the 2006 column for "Implied US Pay Premium" corresponds to column (4) of Table 3). Panel C shows US dummy coefficients for pooled regressions (i.e. imposing constant slopes for 2003-2008). Panel D shows result from year-by-year regressions using the sample of firms for which there is CEO pay data in all years from 2003 to 2008. Panel E also uses a constant sample of firms (as Panel D) and imposes constant slopes for 2003-2008.

***, **, * denote that the coefficient is significant at the 1, 5, and 10% level, respectively.

Appendix A: Variables definition and data sources

A. CEO PAY	
Total Pay	Total CEO compensation in US$ (US firms: ExecuComp; non-US firms: BoardEx, corporate filings)
Salary	Salary in US$ (ExecuComp: salary; BoardEx: salary)
Other pay	Other compensation in US$ (ExecuComp: other compensation; BoardEx: other pay and pensions)
Bonuses	Non-equity incentive-plan compensation in US$ (ExecuComp: bonus plus target value of non-equity incentive-plan compensation; BoardEx: bonus)
Equity pay (stock and options)	Stock and options awards in US$ (ExecuComp: grant-date fair value of stock awards plus grant-date fair value of option awards; BoardEx: market value of shares plus long-term incentive plans plus Black-Scholes option value)
B. FIRM CHARACTERISTICS	
US dummy	Dummy that equals one if firm is headquartered in the US (Worldscope)
Sales (log)	Sales in thousands of US$ (Worldscope item 01001)
Leverage	Total debt divided by total assets (Worldscope item 03255 / item 02999)
Tobin's Q	Total assets (Worldscope item 02999) plus market value of equity (item 08001) minus book value of equity (item 03501) divided by total assets
Stock-return volatility	Annualized standard deviation of daily stock returns
Stock return	Stock return (Datastream item RI)
C. OWNERSHIP STRUCTURE	
Insider ownership	Number of closely held shares by insiders (shareholders who hold at least 5% of the outstanding shares such as officers and directors and immediate families, other corporations, or individuals) as a proportion of the number of shares outstanding (Worldscope item 08021)
Institutional ownership	Institutional ownership by all institutions as a percentage of market capitalization (Lionshares)
D. BOARD STRUCTURE	
Board size	Number of executive and non-executive directors (BoardEx)
Fraction of independent directors	Ratio of the number of independent directors to board size (BoardEx)
CEO-chairman dummy	Dummy that equals one if CEO is also the Chairman (BoardEx)
Avg. number of board positions	Ratio of the number of current board positions in other publicly listed firms by board members of the firm divided by board size (BoardEx)
E. CEO CHARACTERISTICS	
CEO age	Age of CEO in years (BoardEx)
CEO external hire dummy	Dummy that equals one if CEO is hired from outside the company (BoardEx)
CEO tenure (as CEO)	Number of years as top executive in the firm (BoardEx)
CEO other industry experience dummy	Dummy that equals one if CEO worked in a different industry in the past (BoardEx)
Past experience as CEO dummy	Dummy that equals one if CEO was top executive at a different firm in the past (BoardEx)

CEO current board positions	Number of current board positions of the CEO, including the sample firm (BoardEx)
CEO college degree dummy	Dummy that equals one if CEO has a bachelor's degree or higher (BoardEx)
F. INTERNATIONALIZATION VARIABLES	
Domestic institutional ownership	Institutional ownership by foreign institutions as a percentage of market capitalization (Lionshares)
Foreign institutional ownership	Institutional ownership by domestic institutions as a percentage of market capitalization (Lionshares)
Firm in MSCI dummy	Dummy that equals one if a firm is a member of the MSCI All-Country World Index (Bloomberg)
Foreign sales as % of total sales	International annual net sales (WS item 07101) as a proportion of net sales (Worldscope item 01001)
Nationalities on board / board size	Ratio of the number of different nationalities of directors to board size (BoardEx)
G. AMERICANIZATION VARIABLES	
Non-US institutional ownership	Institutional ownership by non-US based institutions as a percentage of market capitalization (Lionshares)
US institutional ownership	Institutional ownership by US based institutions as a percentage of market capitalization (Lionshares)
US cross-listing dummy	US cross-listing dummy, which equals one if a firm is cross-listed on a US exchange through an American Depositary Receipts programs or ordinary listings (US stock exchanges and depository banks)
US acquisitions	Total acquisitions of US companies between 1986 and 2005 as a fraction of a firm's market capitalization (SDC Platinum)
% of directors in US boards	Fraction of directors that also sit in a US firm board of directors (BoardEx)

Appendix B: Sample means of firm characteristics by country

	AU	BE	CA	FR	DE	IE	IT	NL	NO	ZA	SE	CH	UK	Non-US	US	All 14 countries
A. FIRM CHARACTERISTICS																
Sales ($ billion)	2.66	3.37	4.31	8.50	13.71	2.32	7.90	9.39	3.52	3.04	3.35	9.81	4.39	*5.62*	5.71	*5.67*
Leverage	0.26	0.25	0.24	0.24	0.22	0.30	0.33	0.23	0.28	0.13	0.23	0.15	0.22	*0.23*	0.22	*0.22*
Tobin's Q	1.87	1.57	1.97	1.57	1.67	1.73	1.44	1.75	1.78	1.83	1.93	2.83	1.75	*1.77*	2.04	*1.91*
Stock-return volatility	0.25	0.21	0.25	0.25	0.27	0.30	0.22	0.24	0.35	0.26	0.24	0.22	0.26	*0.26*	0.29	*0.28*
Stock return	0.24	0.19	0.31	0.34	0.40	0.34	0.25	0.42	0.68	0.49	0.53	0.35	0.24	*0.32*	0.11	*0.21*
B. OWNERSHIP STRUCTURE																
Insider ownership	0.34	0.45	0.21	0.50	0.42	0.26	0.44	0.32	0.38	0.43	0.27	0.26	0.24	*0.32*	0.16	*0.24*
Institutional ownership	0.08	0.12	0.36	0.18	0.27	0.24	0.12	0.20	0.28	0.12	0.32	0.25	0.25	*0.23*	0.80	*0.52*
C. BOARD STRUCTURE																
Board size	8.69	10.50	12.03	10.93	17.62	11.34	13.20	9.30	10.30	15.27	10.74	10.68	8.41	*10.46*	9.55	*9.99*
Fraction of independent directors	0.60	0.51	0.72	0.49	0.67	0.49	0.48	0.56	0.69	0.63	0.57	0.73	0.50	*0.55*	0.83	*0.70*
CEO-chairman dummy	0.00	0.06	0.16	0.59	0.33	0.03	0.12	0.38	0.02	0.00	0.00	0.21	0.05	*0.16*	0.54	*0.36*
Avg. number of board positions	1.96	2.23	2.05	2.02	1.73	1.57	2.08	1.92	1.18	1.14	1.97	1.71	1.87	*1.87*	1.96	*1.91*
D. CEO CHARACTERISTICS																
CEO age	53.18	52.11	55.05	55.69	53.52	50.94	58.62	53.70	51.30	52.31	50.38	52.85	51.69	52.95	55.82	54.51
CEO external hire dummy	0.59	0.33	0.39	0.51	0.45	0.34	0.58	0.45	0.41	0.20	0.44	0.33	0.49	0.46	0.27	0.36
CEO tenure (as CEO)	7.46	7.98	8.47	9.39	6.08	8.26	8.95	5.55	5.79	7.92	5.79	6.53	7.25	7.40	7.92	7.69
CEO other industry experience dummy	0.35	0.44	0.39	0.48	0.59	0.38	0.56	0.44	0.59	0.58	0.46	0.58	0.47	0.47	0.45	0.46
Past experience as CEO dummy	0.35	0.33	0.54	0.43	0.36	0.25	0.56	0.21	0.30	0.25	0.31	0.42	0.29	0.34	0.35	0.35
CEO current board positions	1.30	2.48	1.73	2.50	2.16	1.28	2.73	1.42	1.16	1.02	1.62	1.38	1.39	1.65	1.62	1.63
CEO college degree dummy	0.73	0.89	0.66	0.78	0.80	0.78	0.87	0.63	0.76	0.22	0.90	0.70	0.62	0.69	0.82	0.76

	AU	BE	CA	FR	DE	IE	IT	NL	NO	ZA	SE	CH	UK	Non-US
E. INTERNATIONALIZATION VARIABLES														
Domestic institutional ownership	0.02	0.04	0.20	0.09	0.09	0.01	0.03	0.02	0.15	0.04	0.22	0.06	0.19	*0.13*
Foreign institutional ownership	0.06	0.08	0.17	0.09	0.18	0.23	0.09	0.17	0.14	0.08	0.10	0.19	0.06	*0.10*
Firm in MSCI dummy	0.47	0.41	0.44	0.25	0.39	0.53	0.41	0.37	0.32	0.71	0.43	0.56	0.25	*0.35*
Foreign sales as a % of total sales	0.22	0.26	0.30	0.39	0.43	0.48	0.24	0.53	0.48	0.18	0.49	0.55	0.31	*0.34*
Nationalities on board / board size	0.16	0.16	0.25	0.16	0.15	0.25	0.12	0.33	0.02	0.04	0.13	0.37	0.16	0.17
F. AMERICANIZATION VARIABLES														
Non-US institutional ownership	0.05	0.10	0.22	0.15	0.20	0.14	0.10	0.13	0.24	0.07	0.29	0.17	0.22	*0.18*
US institutional ownership	0.03	0.02	0.15	0.03	0.06	0.10	0.03	0.07	0.04	0.05	0.03	0.08	0.03	*0.05*
US cross-listing dummy	0.24	0.09	0.35	0.22	0.36	0.47	0.20	0.31	0.24	0.52	0.11	0.46	0.15	0.24
US acquisitions	0.32	0.24	0.23	0.24	0.30	0.27	0.40	0.25	0.20	0.18	0.26	0.18	0.38	*0.30*
% of directors in US boards	0.04	0.04	0.24	0.04	0.02	0.05	0.01	0.08	0.03	0.08	0.03	0.11	0.05	0.06

Note: This appendix presents sample means of firm characteristics as of 2005. Refer to Appendix B for variable definitions. Country codes are as follows: Australia (AU), Belgium (BE), Canada (CA), France (FR), Germany (DE), Ireland (IE), Italy(IT), Netherlands (NL), Norway (NO), South Africa (ZA), Sweden, Switzerland (CH), United Kingdom (UK), United States (US).