

# **The Pay Divide: (Why) Are US Top Executives Paid More?\***

Nuno Fernandes, IMD International  
Miguel A. Ferreira, Universidade Nova de Lisboa  
Pedro Matos, University of Southern California  
Kevin J. Murphy, University of Southern California

This Version: December 17, 2010

## **Abstract**

Using fiscal 2006 data on individual CEOs across the 14 countries with mandated pay disclosures, we confirm the stylized facts emanating from anecdotal accounts, small-sample studies, and estimates from consulting firms: US executives are paid significantly more than their foreign counterparts, and receive a greater share of their compensation in the form of stock options and restricted shares. However, we show that the US pay premium is modest after controlling for firm, ownership, and board characteristics, and is statistically insignificant after controlling for the risk of equity-based compensation. Moreover, we show that there is not a significant US pay premium (or significant differences in use of equity-based compensation) when US firms are compared to “Internationalized” non-US firms exposed to international capital and product markets, or to “Americanized” non-US firms exposed to US capital and managerial labor markets. Next, based on 2003-2008 time-series evidence, we show that US and non-US pay practices have largely converged over this period, possibly reflecting the international convergence in the accounting treatment of stock options. Finally, we argue that cross-country differences in the use of equity-based pay (and, in particular, the greater observed use in US firms) likely reflects idiosyncratic events and government intervention that either encouraged or discouraged the use equity incentives.

*JEL classification:* G32, G34, G38

*Keywords:* Executive compensation, CEO pay, International pay differences, Stock options, Corporate governance

---

\* We thank Wayne Ferson, Mariassunta Giannetti, Vidhan Goyal, Geoffrey Tate, Randall Thomas, and Jun Yang; seminar participants at Cal State Fullerton, CEMFI, Federal Reserve Board, Hong Kong University of Science and Technology, Michigan State University, National University of Singapore, Nanyang Technical University, Singapore Management University, University of British Columbia, UCSD, Universidad Carlos III, University of Southern California, and University of Virginia; and participants at the 2009 EFA Conference, 2009 UCLA-USC finance day and 2009 IDC Caesarea Conference for helpful comments. We thank Breno Schmidt, Paulo Falcão, and Pedro Henriques for outstanding research assistance. This research is supported by a research grant from the Fundação para a Ciência e Tecnologia (FCT/POCI 2010).

# **The Pay Divide: (Why) Are US Top Executives Paid More?**

Nuno Fernandes, Miguel A. Ferreira, Pedro Matos, and Kevin J. Murphy

## **1. Introduction**

Although the status of the United States as “the” preeminent economic superpower is being increasingly challenged by the European Union and emerging Asian economies, there is one area where American dominance seems fairly secure: top executive compensation. By many accounts, US executives are paid significantly more than their foreign counterparts, and receive a greater share of their compensation in the form of stock options, restricted shares, and performance-based bonuses (e.g., Abowd and Bognanno (1995); Abowd and Kaplan (1999); Murphy (1999); and Conyon and Murphy (2000)).

While the “pay divide” between the United States and the rest of the world has been widely accepted by academics, regulators, and the media, attempts to document empirically the precise magnitude and determinants of the alleged US “pay premium” have been plagued by international differences in rules regulating the disclosure of executive compensation. Whereas the United States 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. Cross-country 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.<sup>1</sup>

However, the disclosure situation has improved markedly in recent years. Canada, for example, adopted US-style disclosure rules in October 1993, and disclosure rules in the

---

<sup>1</sup> Single-country studies relying on aggregate executive pay (typically excluding equity-based pay) include Conyon and Schwalbach (2000) (Germany), Kaplan (1994) (Japan), Kato and Long (2005) (China), Fernandes (2008) (Portugal), and Kato, Kim and Lee (2006) (Korea). Cross-country studies such as Abowd and Bognanno (1995), Abowd and Kaplan (1999), Murphy (1999), and Thomas (2008) rely on Towers Perrin’s biennial *Worldwide Total Remuneration* reports. These international comparisons are not based on “data” per se, but rather depict the consulting company’s estimates of “typical” or “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. Studies based on data at the individual executive level have been limited to the US, Canada (e.g., Zhou (2000)), and the UK (e.g., Conyon and Murphy (2000); and Conyon, Core and Guay (2009)).

United Kingdom (UK) were expanded to include stock option and equity grants in 1997. 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. In practice, most large publicly listed European companies complied with the recommendations of the 2003 Action Plan by 2005 or 2006, regardless of whether compliance was mandated by their particular jurisdiction. Although not in the EU, Norway also adopted EU-style disclosure rules, and Switzerland demanded similar disclosure for the “highest-paid” executive.

In this paper, we use data from the recently expanded disclosure rules to conduct a comprehensive international comparative analysis of the compensation for chief executive officers (CEOs) in all countries with detailed individual disclosure of CEO pay.<sup>2</sup> Although we present some 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. Our 2006 sample includes compensation data for CEOs in 1,648 US and 1,615 non-US firms in 13 countries, representing nearly 90% of the market capitalization of all publicly traded firms in these 14 countries.

We find that US CEOs are, indeed, paid more than their counterparts in similar firms elsewhere in the world. We first document that US CEOs receive a total compensation that is, on average, nearly 100% higher than that received by their foreign counterparts, a figure that drops to 79% after controlling for firm size and industry. The implied US pay premium is even slightly higher after controlling for other firm-specific economic variables empirically documented to affect CEO pay, including stock price volatility and performance, Tobin’s Q, and capital structure. Thus, we conclude that economic variables (with the exception of firm size) routinely used in CEO pay regressions are not able to explain the US pay premium.

However, the US pay premium is reduced to 31% after controlling for the company’s ownership structure (insider and institutional ownership), and reduced further to a statistically significant but economically modest 26% after controlling for the structure of the board (particularly the fraction of independent directors on the board). Thus, the US pay

---

<sup>2</sup> We use the term “CEO” to refer to the highest-ranking executive in each firm, regardless of whether the firm uses the term “chief executive officer” or some other designation. For Switzerland, we assume that the “highest-paid executive” is the CEO, creating a potential upward bias in our Swiss data.

premium is explained in part by international differences in corporate governance, including dispersed ownership and more independent boards, both of which are more common in US firms. Finally, we control for the effects of CEO characteristics (e.g., age, tenure, education, past experience), concluding that these factors do not explain international differences in pay.

We also document that US CEOs receive a greater share of their compensation in risky forms such as stock options, restricted shares, and performance-based bonuses. It is therefore plausible that the observed US pay premium reflects a risk premium demanded by risk-averse and undiversified CEOs. We collect data on CEO wealth invested in the firm based on the value of stock and the intrinsic value of options held at year-end. Following Hall and Murphy (2002), we compute the amount of riskless cash compensation the executive would exchange for his risky compensation package. When we measure the CEO pay on a risk-adjusted basis, we find that the US pay premium falls to an insignificant premium of 14% (also controlling for firm, ownership, and board characteristics).

We next look at some of the forces behind the convergence of pay internationally. Many companies in our non-US sample are large multinational corporations, competing in the global market for capital, customers, and managerial talent. We first consider the level of internationalization of a firm, showing that pay for non-US CEOs is positively related to the fraction of revenues the firm has from foreign markets, as well as the fraction of shares held by foreign institutional investors and whether the firm is included in the Morgan Stanley Capital Index (MSCI), which attracts foreign investors. Additionally, we consider more directly the Americanization of pay, using different measures of a non-US firm's exposure to US markets. We show that pay for non-US CEOs is higher when the firm has more US institutional ownership, is cross-listed on a US exchange, has a US-based workforce and US customers (proxied by the acquisition of US subsidiaries), or has board members who also sit on the boards of US firms.

As evidence for the convergence of CEO pay practices, we show that the US pay premium becomes statistically insignificant when compared to internationalized and Americanized non-US firms in terms of their exposure to international and US capital, labor, and product markets. We argue that these non-US firms could be implementing US-style compensation packages to attract U.S. managerial talent, benefit from "bonding" themselves to US legal, regulatory, and capital market institutions, and compensate executives for the additional legal risk associated with US securities laws.

We also consider the convergence of US and non-US pay, based on a time-series of available data from 2003 to 2008. We show that the US pay premium declined almost

monotonically from 2003 to 2007 — becoming insignificant in 2007 — before rebounding slightly in 2008. Moreover, we show in a broader sample of firms (i.e., with and without CEO pay data) that non-US firms have become more internationalized over the time period, while there is little evidence that non-US firms have become more Americanized. We argue that international pressures — in particular, convergence in international accounting standards with respect to stock options expensing — have indirectly helped stem the growth in US pay, allowing the rest of the world to catch up.

The observed US pay premium has often been interpreted as reflecting excesses in US pay practices (Bebchuk et al. (2002)). Our results suggest a more nuanced conclusion, and are generally supportive of existing US pay practices. First, we show that the US pay premium is modest (about 25%) after controlling for firm, ownership, board, and CEO characteristics. Second, we show 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 (in particular, the use of equity-based compensation): with very few exceptions, the firm, ownership, and board characteristics associated with higher pay are precisely those associated with a larger fraction of pay conveyed in the form of stock options or restricted stock. 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 (e.g., institutional ownership and board independence). Fourth, we find evidence that US shareholders demand more equity-based pay and (incidentally) higher pay levels when investing in non-US firms. Overall, our results suggest that the observed US pay premium reflects compensating differentials for performance-based pay increasingly demanded by internationally diverse boards and shareholders.

Finally, our finding that the US pay premium largely disappears after controlling for the relative riskiness of US pay packages potentially “explains” the pay differences but naturally leads to another question: Why do US executives receive more equity-based compensation than their foreign counterparts? We consider (and largely dismiss) as explanations) a variety of agency-theoretic factors, suggesting that the differences across countries are largely driven by country-specific economic, legal, and environmental factors. We find evidence that securities markets and labor laws, and the overall quality of the institutional environment, are related to the level and structure of executive pay. Ultimately, we argue that the cross-country differences in the prevalence of equity-based compensation are primarily driven by government tax and accounting policies that either encouraged or discouraged the use of stock options and restricted stock. Since the events triggering the intervention have varied across countries, the resulting pay practices have been, to some

extent, path dependent in spite of international pressures toward convergence. For example, the factors leading to the US option explosion in the 1990s have not been repeated elsewhere in the world, and therefore the use of options (and equity-based pay in general) continues to be much higher in the United States.

We proceed as follows. Section 2 describes our data sources. Section 3 analyzes the level and structure of CEO pay in the 14 countries with mandated disclosure of CEO pay, including an analysis of “risk-adjusted” equity-based pay derived from certainty equivalents. Section 4 examines the impact of internationalization and Americanization of CEO pay for non-US firms, and Section 5 analyzes time trends in observed US premiums from 2003 to 2008. Section 6 examines various explanations for the relatively intensive use of equity-based pay within US firms, and Section 7 concludes the paper.

## **2. The data**

As of 2006, individual disclosure of CEO compensation (including details on equity-based pay) was mandated in 15 countries: the United States (since 1934), Canada (1993), the United Kingdom (1997), Ireland (2000), South Africa (2000), Australia (2004), and countries generally complying with the May 2003 EU Action Plan (including EU-members Belgium, Denmark, France, Germany, Italy, Netherlands, and Sweden, and non-EU members Norway and Switzerland).<sup>3</sup> 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. We focus on the individual identified by BoardEx as the highest-ranking executive in each firm, and use the term “CEO” to describe this executive, regardless of whether the firm uses “chief executive officer” or some other designation such as “managing director” or “executive chairman.” In addition to

---

<sup>3</sup> 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.

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 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 for the 2006 fiscal year. For Australia, Canada, and South Africa (where BoardEx has complete coverage on board composition and biographical information but scanty pay data), we manually collect 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.<sup>4</sup> Ultimately, as reported in Table 1, 364 firms with manually collected data are included in our final sample.

For US firms, we use ExecuComp compensation data 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, and bias our results *against* identifying a US pay premium. 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 (à 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. The bias here is small — since relatively few US

---

<sup>4</sup> 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 securities 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).

companies offered performance-share plans in 2006 — but nonetheless biases our results against finding a US premium. However, 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 (our source for firm financial and stock market data). Finally, to reduce the impact of BoardEx's oversampling of small UK firms, we restrict our analysis to companies with annual 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 United States. Our sample firms accounted for approximately 90% of the market capitalization of all Datastream-covered firms in the United States, and 83% of the market capitalization of all Datastream-covered firms in the 13 non-US countries.

In our analyses of CEO pay (both in Table 1 and 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.<sup>5</sup>

Table 1 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 fiscal 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 a smaller portion of total pay for CEOs in the United States (28%) than in any other country, while 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 executives, 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 executives in Table 1 are all highly statistically significant.

---

<sup>5</sup> In unreported results, we find that including the CEOs serving in their first year in our tests does not affect our primary findings. In addition, we find that the main findings in this study are unaffected when we exclude financials and utilities due to different pay practices in those sectors.

### 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, long documented to be the most important determinant of the level of executive compensation (Baker et al. (1988); Kostiuk (1990); and Murphy (1999)). To analyze cross-country differences in CEO pay after adjusting for size and industry, we regress the logarithm of 2006 Total Compensation on 14 country dummies, the logarithm of prior-year (fiscal 2005) Sales in US dollars, and 12 industry dummies.<sup>6</sup> We then take a hypothetical firm with \$1 billion sales in an “average” industry (formed by multiplying each estimated industry dummy variable by the proportion of our sample firms in each industry) and estimate the average CEO total pay for each country using the estimated coefficients on the 14 country dummy variables. This estimate for a hypothetical mid-sized firm is similar in spirit to the Towers Perrin’s estimates used in Abowd and Bognanno (1995) and Abowd and Kaplan (1999), although those estimates reflect the judgment of consultants and not actual data.

Figure 1 shows the size- and industry-adjusted total pay per country. Countries are sorted in descending order in terms of total estimated pay. US executives come at the top, with a CEO of a US company with \$1 billion in sales predicted to earn a total compensation of \$2.6 million annually in 2006. This is substantially more than what CEOs of similar firms located in other countries earn. The highest-paid countries are dominated by Anglo-Saxon nations such as the United States (#1), the United Kingdom (#2 at \$2.0 million), Ireland (#3 at \$1.8 million), Australia (#4 at \$1.7 million), and Canada (#7 at \$1.6 million). Switzerland (#5 at \$1.7 million) is the first continental European country in the top ranking of countries by total pay. The weighted average of all non-US countries in Figure 1 is \$1.55 million, suggesting a US pay premium of 68% (for a firm with \$1 billion in sales).

In addition to company size and industry, CEO pay may be affected by a variety of other characteristics that systematically differ across countries. In this section, we consider four groups of potential controls: firm characteristics empirically known to affect the level of

---

<sup>6</sup> We use 12 industry portfolios of Fama-French (Consumer Non-Durables, Consumer Durables, Manufacturing, Energy, Chemicals, Business Equipment, Telecom, Utilities, Shops, Healthcare, Money & Finance, Other). The mapping between 4-digit SIC codes and the 12 industries are available in Ken French’s website: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data\\_Library/det\\_12\\_ind\\_port.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html). The main findings in this paper are robust if we use two-digit SICs.

CEO pay (at least 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.

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 (including 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 whether the US pay premium from Figure 1 “survives” after controlling for lagged firm characteristics (beyond size and industry), ownership structures, and board characteristics. In columns (1)–(4), we estimate the following cross-sectional regression on 2006 pay levels:

$$\begin{aligned} \text{Log (Total Pay}_i) = & \alpha + \beta_1 (\text{US Dummy}) + \beta_2 (\text{Firm Characteristics}_i) \\ & + \beta_3 (\text{Industry dummies}) + \varepsilon_i \end{aligned} \quad (1)$$

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.<sup>7</sup>

Column (1) of Table 3 reports the results from estimating equation (1) controlling only for industry and prior-year sales.<sup>8</sup> This is similar to what we have used to estimate firm size and industry-adjusted pay in Figure 1 but now using just one country dummy for the United

---

<sup>7</sup> A concern with OLS regressions is that the distribution of executive pay may be heavily skewed. We address this concern using least-absolute deviation regression (median regression), which is also more robust to the presence of outliers. The results using median regressions are similar to those using OLS regressions.

<sup>8</sup> We obtain similar findings when we use total assets or market capitalization as alternative measures for firm size.

States. The  $R^2$  of 0.35 indicates that more than a third of the variation in compensation across CEOs in the 14 countries is explained by size, industry, and whether or not the firm is located in the United States. The coefficient on the US dummy of 0.582 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.<sup>9</sup>

In column (2) of Table 3 we introduce other firm-level characteristics routinely used in CEO pay regressions: leverage (the ratio of debt to assets), Tobin's Q (the ratio of the market value of assets to book value of assets), stock-return volatility, and stock returns. While there is strong theoretical justification for the positive relation between CEO pay and company size, the justification for including these additional variables is ambiguous and the motivation is often empirical rather than theoretical.<sup>10</sup> 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.<sup>11</sup> 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 positive) effect of prior-year performance on current pay levels.<sup>12</sup>

---

<sup>9</sup> We obtain a similar estimate of the US pay premium 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 United States.

<sup>10</sup> Rosen (1981) and Rosen (1982), for example, argues 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 (since the CEO is assigned to a larger firm). Gabaix and Landier (2008) extend Rosen's model by showing that the equilibrium wage of a CEO will 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, managerial marginal products increase and competition for scarce managerial talent will bid up compensation.

<sup>11</sup> 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), p. 852, for an often-overlooked derivation of this result. 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 (see, for example, Zábojník (1996) and Prendergast (2002)). In addition, our definition of total compensation includes the Black-Scholes value of options (which increases with volatilities), providing a potential mechanical link between volatility and pay.

<sup>12</sup> Researchers often justify using performance measures in CEO pay-level regressions as capturing the relation between pay and performance, but (following Murphy (1985) and Jensen and Murphy (1990)) capturing this relation requires (at least) time-series data and measures of the portfolio of stock and option holdings.

As shown in column (2) of Table 3, CEO pay is positively and significantly related to prior-year leverage, Tobin's Q, and stock returns (as expected), and negatively and significantly related to the volatility of stock returns (based on the standard deviation of daily returns over the prior year). Moreover, the coefficient on the US dummy of 0.629 in column (2) suggests an implied US pay premium of 88% (compared to 79% when controlling only for sales and industry). Therefore, the US pay premium is apparently not explained by cross-company and cross-country 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 of non-US firms than in US firms, while institutions hold a larger fraction of the shares in US firms. The theoretical prediction on the effect of insider ownership on CEO pay is ambiguous. For example, to the extent that concentrated insider ownership allows executives to extract rents from minority shareholders, we would expect CEO pay to be positively related to insider holdings. On the other hand, to the extent that concentrated insider ownership implies that (1) executives are primarily rewarded and motivated by their ownership and not their compensation, or (2) inside blockholders can monitor and direct the activities of executives without relying on (expensive) incentive compensation, we would expect a negative relation between CEO pay and insider ownership. Similarly, the theoretical prediction on the effect of institutional ownership on CEO pay is also ambiguous, since institutions can press for tighter links between pay and shareholder performance (which will generally raise pay) or press directly for lower levels of compensation.

As shown in column (3) of Table 3, CEO pay is negatively and significantly related to insider ownership, and positively and significantly related to institutional ownership. In particular, the coefficients on the ownership variables suggest that a 10 percentage point increase in insider and institutional holdings is associated with an 8% decrease and 4% 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.<sup>13</sup> Moreover, controlling for ownership structure reduces the coefficient on the US dummy to 0.268, implying a US pay premium of 31%.

Column (4) of Table 3 includes four controls for board structure, also seen in Table 2 to differ significantly between US and non-US firms.<sup>14</sup> The theoretical prediction of the effect of the composition of the board on CEO pay is again 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 and significantly related to both the fraction of independent directors on the board, and to the average number of boards on which each director sits (including the sample firm).<sup>15</sup> 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%.

Figure 2 shows the international distribution of predicted CEO pay for a hypothetical firm with \$1 billion sales after controlling for size, industry, firm characteristics, ownership, and board structure. We adopt the specification in column (4) of Table 3, with the “US dummy” replaced by a set of 14 country dummies. We then use estimated coefficients for size and other controls (measured at sample means), as well as country dummies, to estimate average Log(Total Compensation) by country. To allow a comparison with the size-adjusted results in Figure 1, we retain the same ordering of countries. As shown in Figure 2, while US pay levels remain well above those in Continental Europe (with the exception of Italy), there is effective parity in CEO pay levels among Anglo-Saxon nations (the United States, United Kingdom, Ireland, Australia, and Canada).

Column (1) of Table 4 analyzes differences in pay levels and structures for US and non-US CEOs after controlling for CEO characteristics (in addition to the untabulated firm, ownership, and board characteristics in column (4) of Table 3). We measure CEO characteristics based on employment histories and personal attributes contained in BoardEx.

---

<sup>13</sup> Hartzell and Starks (2003) focus on the concentration of institutional holdings (e.g., the fraction of institutional holdings held by the top five institutions) and find that higher concentrations are associated with higher use of equity-based compensation.

<sup>14</sup> The sample size for column (4) is approximately 10% smaller than in column (1), reflecting observations dropped when data are unavailable. The results in columns (1)–(3) are not affected when restricting the sample to the 2,714 firms in column (4).

<sup>15</sup> Based on a 1982–1984 sample of 205 US firms, Core, Holthausen and Larcker (1999) also find that CEO pay increases with a measure of outside board memberships (which they interpret as being due to directors being “too busy” to monitor the CEO). In addition, they find that CEO pay decreases with the fraction of insiders on the board, which is consistent with our results in Table 3.

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% is essentially unchanged from that in column (4) of Table 3. Given the insignificance of CEO characteristics — coupled with the reduction in available observations — we ignore CEO characteristics throughout the remainder of this paper.<sup>16</sup>

### 3.2. The US “Pay Mix” premium

One of the primary determinants of CEO expected pay levels — only captured indirectly by firm and industry characteristics in (1) — is the riskiness of the pay package. In particular, our measure of total compensation is meant to approximate the expected *opportunity cost* to shareholders of the CEO’s pay package. However, our measure 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 (see Section 3.4 below). All else being equal, 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:

$$\frac{RiskyPay_i}{TotalPay_i} = \alpha + \beta_1 (US\ Dummy) + \beta_2 (Firm\ Characteristics_i) + \beta_3 (Industry\ dummies) + \varepsilon_i \quad (2)$$

where “risky pay” is defined as the grant-date value of stock and options (“Equity Pay” in column (5)) or as Equity Pay plus the value of all short- and long-term bonuses (“Incentive Pay” in column (6)), and Firm Characteristics are the same as in column (4).<sup>17</sup> Similar to columns (1)–(4), 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 Pay Mix Premium.

As shown in columns (5) and (6) of Table 3, the firm characteristics associated with higher pay are generally also associated with a higher use of performance-based compensation. For example, both the level of CEO pay and the use of incentive

<sup>16</sup> Individual CEO characteristics are not available for our hand-collected data in Canada, Australia, and South Africa, so the results in Table 4 exclude these countries.

<sup>17</sup> For U.S. CEOs, bonuses include both discretionary bonuses and payouts from non-equity incentive plans.

compensation are positively related to sales, Tobin's Q, institutional ownership, the fraction of independent directors, and the average number of board positions per director; and negatively related to stock-return volatilities and insider ownership. However, even after controlling for firm characteristics, the use of incentive pay is higher in the United States than in other countries. In particular, the fraction of total pay awarded in the form of stock or options is 6.3% higher in the United States, while the fraction of total pay awarded in the form of stock, options, and bonuses is 9.1% higher.

Columns (2) and (3) of Table 4 analyze differences in US and non-US pay structures after controlling for individual CEO characteristics (in addition to firm, ownership, and board characteristics). Older CEOs receive less of their compensation in the form of stock, options, and bonuses, while more educated CEOs receive more equity-based pay; none of the other CEO characteristics are significantly related to the structure of pay.

### *3.3. Different slopes for different folks*

The estimates for the US Pay and Pay Mix Premiums in Tables 3 and 4 restrict the coefficients on the firm, industry, ownership, and board controls to be the same across all countries. Table 5 explores differences in US and non-US determinants of the level and structure of CEO pay; 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 and non-US coefficients. As shown in columns (1)–(3), the relation between CEO pay and company size and leverage is significantly higher in the United States, while the relation between CEO pay and Tobin's Q is significantly lower. CEO pay is positively related to board size outside of the United States (but not in the United States), while CEOs also serving as board chairs and firms with more independents on the board of directors receive higher pay in the United States (but not outside the United States). As shown in columns (4)–(5), the fraction of pay delivered in the form of stock or options is positively related to leverage and board composition in the United States, but not outside the United States.

The estimated coefficients in Table 5 suggest another 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 the 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)), thus measuring the expected pay of that same CEO if he were in a non-US firm with the same firm, industry, ownership, and board characteristics. The implied US premium

for US CEOs can be measured as the percentage difference between the actual and hypothetical pay for the US CEOs. Similarly, we compare the hypothetical pay for non-US CEOs (using the coefficients from the US regression in column (1)) to the actual pay for non-US CEOs to estimate the implied US premium for non-US CEOs.

Table 6 summarizes the implied US pay premiums based on the actual and hypothetical CEO pay for each of the 1,447 US and 1,267 non-US CEOs in our sample. The actual (US) pay exceeded the hypothetical (non-US) pay for 70% of the US executives, with average and median implied US pay premiums of 39.5% and 47.7%, respectively. Similarly, the hypothetical (US) pay exceeded the actual (non-US) pay for 59% of the non-US executives, with average and median implied US pay premiums of 21.3% and 18.5%, respectively. These numbers “span” the estimated premium of 26% from column (4) of Table 3, suggesting that our finding of a positive US pay premium is not driven by our assumption of equal coefficients in the Table 3 pay regressions.

### 3.4. *Risk-adjusted CEO pay*

Although pay differences for US versus non-US CEOs are relatively modest after controlling for firm, ownership, and board characteristics, the results in Table 3 confirm the basic finding of prior research: US CEOs are paid more than their foreign counterparts, and receive a greater share of their compensation in risky forms such as stock options, restricted shares, and performance-based bonuses. Since risk-averse executives will naturally demand a premium for accepting risky compensation, it is possible that the observed US pay premium reflects a compensating differential for the increased risk of US pay packages.

Lambert, Larcker and Verrecchia (1991) and Hall and Murphy (2002) propose measuring the value of a non-tradable option to an undiversified risk-averse executive as the amount of riskless cash compensation the executive would exchange for the option.<sup>18</sup> Suppose that an executive 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

---

<sup>18</sup> Meulbroek (2001) measures the value to cost “inefficiency” of options using a completely different (non-utility-based) but complementary approach. Her method enables her to make precise estimates of what she calls the “deadweight cost” of option grants without knowledge of the specific utility function or wealth holdings of executives. Her approach produces a lower bound estimate of the value to cost inefficiency since her goal is to isolate the deadweight cost owing to sub-optimal diversification, while abstracting from any additional deadweight cost from the specific structure of the compensation contract.

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 executive's wealth at time  $T$  is given by<sup>19</sup>

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

If, instead of the option, he 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 executive's utility over wealth is  $U(W)$ , we can define the executive'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 executive has constant relative risk aversion  $\rho$ , 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 (CAPM) and assume that the distribution of stock prices in  $T$  years is lognormal with volatility  $\sigma$  and expected value equal to  $(r_f + \beta(r_m - r_f) - \sigma^2/2)T$ , where  $\beta$  is the firm's systematic risk and  $r_m$  is the return on the market portfolio.<sup>20</sup>

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), and 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). Second, we assume that the CEO holds shares equal to total wealth divided by the year-end

---

<sup>19</sup> A more realistic assumption is that safe wealth is invested in a combination of riskless assets and the market portfolio; see Cai and Vijh (2005) for theoretical development and Conyon, Core and Guay (2009) for an application to US versus UK differences in CEO pay.

<sup>20</sup> 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.

share price, and further assume that these shares will be held for exactly five years.<sup>21</sup> 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 2006 compensation, while the equivalent multiple is only three for non-US CEOs. Assuming that US executives are no less risk-averse than their foreign counterparts, these wealth data suggest larger risk adjustments for US executives than non-US executives, 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 7- to 10-year government bonds and, for each firm, we get the 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.

Table 7 shows how the observed US premium decreases when CEO pay is measured on a risk-adjusted basis. Columns (1) and (4) replicate columns (1) and (4) from Table 3, 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 (2) and (5) is the logarithm of risk-adjusted pay, assuming a constant relative risk-aversion (rra) coefficient of 2, while in columns (3) and (6) the relative risk-aversion coefficient is 3. Controlling only for sales and industry, the implied US pay premium falls from 77% (with no risk adjustment in column (1)) to 55% with  $rra = 2$  in column (2) to 46% with  $rra = 3$  in column (3). After controlling for firm, ownership, and board characteristics, the implied US pay premium falls from 27% (with no risk adjustment in column (4)) to statistically insignificant premiums of 14% and 10% in columns (5) ( $rra = 2$ ) and (6) ( $rra = 3$ ), respectively.

The results in Table 7 are robust 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 executive outside wealth and measures of individual

---

<sup>21</sup> For U.S. executives, 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, however, 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 U.S. executives.

risk aversion. Nonetheless, we consider the results in Table 7 to be suggestive that a large part of the observed US pay premium reflects compensating differentials for the higher risk of US pay packages. The reduction in implied premiums after controlling for risk is consistent with the US versus UK results in Conyon, et al. (2009), who, using the Cai and Vijh (2005) approach and 2003 data, conclude that adjusting for risk explains about half of the higher pay for US CEOs.

#### **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 Pay Mix 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 among the board of directors) and Americanization (US cross-listings, US institutional ownership, US acquisitions, and directors with US board experience).<sup>22</sup>

##### *4.1. CEO pay in internationalized firms*

Panel A of Table 8 shows how internationalization affects the level and structure of CEO pay in 1,267 non-US companies. The regressions include the (untabulated) firm, industry, ownership, and board characteristics in Table 5, 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 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).

---

<sup>22</sup> There is some contemporary research examining this issue using smaller samples and fewer countries. 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 both the level of CEO pay and the use of incentive CEO pay is positively related to the fraction of directors who sit on U.S. boards. In addition, they find limited evidence that CEOs of European firms who are U.S. citizens (4% of their sample) earn higher base salaries (but not higher total salaries) than European CEOs who are not US citizens.

Column (1) of Table 8 shows that the positive relation between CEO pay and institutional ownership documented in column (2) of Table 5 is driven by foreign ownership. Overall, pay levels are positively and significantly related to all four internationalization variables. 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 World index; the use of equity pay is not significantly related to foreign sales or the board's international diversity.

#### 4.2. *CEO pay in Americanized firms*

Panel B of Table 8 analyzes how the level and structure of CEO pay in non-US companies is affected by explicit exposure to US capital, labor, and product markets (as opposed to exposure to “foreign” markets generally). The regressions again include the (untabulated) firm, industry, ownership, and board characteristics in Table 5, with institutional ownership separated into US and non-US components. 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 a US stock exchange (a proxy for demand by US investors);<sup>23</sup> (3) the total acquisitions of US companies between 1996–2005, expressed as a percentage of market capitalization (a proxy for exposure to US labor and product markets); and (4) the fraction of directors who also sit on boards of companies headquartered in the United States (a proxy for exposure to US pay practices).

As shown in column (3) of Table 8, 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 1% increase in US institutional ownership is associated with a 1% increase in CEO pay. In addition, CEO pay is 21% higher in firms cross-listed on US exchanges, and also higher for non-US companies acquiring US firms (and, presumably, US workers). Finally, boards of non-US companies where every director also serves on the board of a US firm pay their CEOs approximately double (i.e.,  $e^{0.674}-1=0.96$ ) compared to non-US companies where no board members sit on US boards. Column (4) shows that the use of equity pay in non-US firms is higher in firms cross-listed on US exchanges, and higher in firms with more institutional ownership (but there is no statistical difference between US and

---

<sup>23</sup> 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).

non-US ownership). Equity pay is not related to US acquisitions or to firms where directors have more US board experience.

Figure 3 plots the implied US Pay Premium and US Pay Mix Premium 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) or (2) (for Pay Mix 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 positive but insignificant for all subsets of internationalized firms, and significantly positive for all subsets of non-internationalized firms. The US Pay Mix Premium is significantly positive for the subset of internationalized firms based on foreign institutional ownership, but insignificant for the subsets of internationalized firms based on MSCI membership, board international diversity, and foreign sales. The results from Figure 3 imply that the differences in the level and structure of CEO pay for US and non-US firms observed in Section 3 are driven by non-US firms with low (or no) exposure to global capital, product, or labor markets.

Similarly, 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 the 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 a US exchange. As shown in Figure 4, the US Pay Premium (Panel A) and Pay Mix Premium (Panel B) are 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 observed in Section 3 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 United States, have high levels of US institutional ownership, own operations in the United States, or have board members who also sit on US boards.

#### 4.3. *Why do Americanized firms adopt US pay practices?*

The most obvious reason why non-US firms adopt US-style pay packages is to compete directly for talent in the US managerial labor market. Whether efficient or not, 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.<sup>24</sup> Foreign firms attempting to attract US executives will need to offer packages that are competitive in the United States. 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).<sup>25</sup> However, while few non-US firms hire American CEOs, US 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.<sup>26</sup>

Even when firms outside the United States 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.<sup>27</sup> Similarly, in 2000, Europe’s largest software company, SAP, adopted US-style options to stop senior executives from leaving the company’s US division.<sup>28</sup> It is easy to understand why companies are forced to adopt US-style pay practices for their US-based executives. It is less obvious, however, why the same companies adopt similar practices more broadly throughout the organization. Potential explanations include cultures of “internal pay equity” in which all employees of the

---

<sup>24</sup> The “efficient or not” qualifier is added to remain agnostic to whether the high observed levels for U.S. CEOs are the result of a competitive market equilibrium (Murphy and Zábojník (2007); and Gabaix and Landier (2008)), managerial influence over captive boards (Bebchuk, Fried and Walker (2002)), or an inefficient escalation in option grants driven by accounting considerations (Hall and Murphy (2003)).

<sup>25</sup> Carter, Lynch and Zamora (2009), for example, analyze 223 European companies over five years and identify only nine CEOs with American roots.

<sup>26</sup> See, for example, Hymowitz, “Foreign-Born CEOs Are Increasing in U.S., Rarer Overseas,” *Wall Street Journal* (May 25, 2004), p. B1 and Gross, “Send Us Your Tired, Your Poor, Your Business Executives: Why are big American companies hiring foreign-born CEOs?,” *Slate* (August 17, 2007).

<sup>27</sup> See Bulkeley, “DaimlerChrysler to Equalize Pay of German, U.S. Execs,” *Bloomberg News* (January 9, 1999); “DaimlerChrysler Proposes Stock Option Plan For Executives,” *Dow Jones International News* (March 3, 2000).

<sup>28</sup> Benoit, “SAP vote may spell German rethink,” *Financial Times* (January 17, 2000).

same rank and tenure receive comparable pay, coupled with the fact that very few senior executives outside the United States “complain” about accepting US-style packages.<sup>29</sup>

Potentially more interesting than our results related to exposure to the US labor market are our results that companies with higher US institutional investment and cross-listings on US exchanges also 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 be between 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, Karolyi and Stulz (2004) suggest that cross-listing firms benefit from “bonding” themselves to legal, regulatory, and capital market institutions of the new host country. One of those institutions 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. 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). This explanation does not address, however, why US shareholders might be systematically more focused on equity-based pay than are their foreign counterparts. 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.

---

<sup>29</sup> Shareholders outside the US *did* complain. For example, in the late 1990s, economics professor and shareholder activist Ekkehard Wenger sued and successfully delayed the adoption of options plans at Daimler-Benz, Volkswagen, and Deutsche Bank (Benoit, "SAP vote may spell German rethink," *Financial Times* (January 17, 2000)).

## 5. Is the US pay premium disappearing?

### 5.1. Time Trends in US Pay Premiums

The analyses in Sections 3 and 4 — based on data for the 2006 fiscal year — show that the observed differences between US and non-US CEO pay practices largely disappear after controlling for firm, ownership, and board characteristics, and disappear completely for non-US firms exposed to the international and US capital, product, and labor market. Table 9 presents evidence on time trends in pay practices and our proxies for internationalization and Americanization from 2003 to 2008.

Panel A of Table 9 reports annual estimates for the implied US Pay Premium and the US Pay Mix Premium based on the estimated US dummy variables in equation (1) (for pay levels) and (2) (for the ratio of equity to total pay) controlling for firm, ownership, and board characteristics. The estimates for 2006 are identical to those in columns (4) and (5) from Table 3, and are based on 1,447 US firms and 1,267 non-US firms from 13 countries. The estimates for the other years are based on smaller samples, reflecting 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.

As shown in the top row of Panel A of Table 9, the implied US Pay Premium declined from 58% in 2003 to 2% in 2007, rebounding slightly to 14% in 2008. The coefficient on the US pay premium is positive and statistically significant at least at the 5% level from 2003 to 2006, while the estimates for 2007 and 2008 are insignificant. Therefore, the results suggest that non-US pay levels have largely converged to US levels. Similarly, the second row shows that the implied US Pay Mix Premium (reflecting the higher use of equity-based pay in the United States) has also generally declined from 2003 to 2008; however, the Pay Mix Premium remains positive and significant (at the 5% level) throughout this period.

Panel B of Table 9, based only on non-US firms, shows the time trends in our internationalization variables from 2003 to 2008. The underlying data are not constrained by BoardEx or the availability of compensation information, and the number of firms in each year varies between 1,607 and 1,655 firms from 13 countries. As can be seen, levels of domestic and institutional ownership and all four internationalization variables (foreign institutional ownership, MSCI membership, foreign sales, and board international diversity) have generally increased over this time period, with the exception of a drop in foreign sales during the 2008 financial crisis. From Table 8 (columns (1) and (2)), we know that four internationalization variables are correlated with higher pay levels, while institutional

ownership and MSCI membership are correlated with higher use of equity-based pay. Therefore, the time trends in internationalization are consistent with the general convergence of pay levels and narrowing of differences in the structure of pay reported in Panel A of Table 9.

Similarly, Panel C of Table 9 shows the time trends in our Americanization variables for non-US firms in 2003–2008. As can be seen, levels of both US and non-US institutional ownership increased over this time period, while the prevalence of US cross listings and the fraction of directors also serving on US boards has remained relatively constant at about 20% and 5%, respectively. The importance of acquisitions of US entities (based on acquisitions over the prior ten years, scaled by market capitalization) peaked at 48% in 2003. Therefore, the general convergence of pay levels reported in Panel A of Table 9 does not appear to be driven by a trend toward non-US firms becoming more Americanized in the 2003–2008 period.

### 5.2. *“Accounting” for the convergence in pay practices*

While non-US firms have become more internationalized, US CEO pay practices have changed as well in the past decade. Figure 5 shows the predicted total compensation for a US CEO from 1993 to 2008 in an “average industry” firm with annual revenues of \$1 billion (in 2006-constant dollars). Similar to Figures 1 and 2, the predicted pay is estimated based on regression coefficients from annual regressions of the logarithm of total compensation on the logarithm of sales and 12 industry dummies for all CEOs in the ExecuComp database. Figure 5 shows that inflation-adjusted US CEO pay increased by nearly 70% from 1993 to 2001. After peaking in 2004, the predicted pay fell by nearly 10% by 2008, representing the first prolonged decline in CEO pay since the early 1970s (Murphy and Jensen (2010); and Frydman and Saks (2008)).<sup>30</sup>

Figure 5 also shows a shift in the composition of equity-based compensation of US CEOs. While stock options grew from 22.0% in 1993 to 42.1% in 2001, the use of options has consistently declined since 2001, falling to only 19.8% by 2008. In contrast, restricted shares have consistently increased to 25.6% of pay by 2008. Restricted stock is inherently less risky than stock options, and the compensating differential demanded by risk-averse CEOs is therefore lower for restricted stock than for options. Thus, it is not surprising that

---

<sup>30</sup> The predicted 2006 CEO pay of \$2.45 million (based only on regression coefficients from US data) differs slightly from the \$2.61 million estimate in Figure 1 (based on regression coefficients from pooled US and non-US data).

the historically observed increase in US CEO pay levels declined as those options were replaced by restricted stock.

Why did US firms move away from stock options and toward restricted stock? One potential explanation is the market-wide decline in stock prices in the early 2000s that left many outstanding options under water and lowered executive expectations regarding future increases in their company's stock prices. A more compelling explanation relates to changes in accounting treatment. Since 1972, US companies issuing restricted stock have recorded an accounting expense equal to the grant-date value of the shares amortized over their vesting period. However, firms granting options recorded an expense equal to the difference between the grant-date market price and the exercise price, which was effectively zero since virtually all options are awarded at-the-money. In 1995, the US Financial Accounting Standards Board (FASB) *recommended*, but did not require, that companies expense the "fair market value" of options granted (using Black-Scholes or a similar methodology), but only a handful of companies adopted it. More firms voluntarily expensed options after the accounting scandals in the early 2000s focused attention on the quality of accounting disclosures.<sup>31</sup> But the biggest changes came after July 2002 when the International Accounting Standards Board (IASB, the European counterpart to FASB) announced that companies using international standards should begin expensing options by January 1, 2005.<sup>32</sup> In December 2004, FASB conformed to the international rules by requiring all US firms to recognize an accounting expense equal to the grant-date value of the options amortized over the period when the option is not exercisable. The new rule became effective for most companies beginning fiscal 2006.

The jump in restricted stock grants shown in Figure 5 in 2006 suggests that the convergence in international accounting standards has contributed to the evolving convergence in CEO pay practices.

---

<sup>31</sup> In the summer of 2002, several dozen firms announced their intention to expense options voluntarily; more than 150 firms had elected to expense options by early 2003 (Aboody, Barth and Kasznik (2004)). By late 2004, about 750 companies had voluntarily adopted or announced their intention to expense options. See, for example, Hitt and Schlesinger, "Perk Police: Stock Options Come Under Fire in Wake Of Enron's Collapse – They're a Form of Pay, Say Critics, So Why Are They Not Treated as Expense? – Business Lobby Mobilizes," *Wall Street Journal* (March 26, 2002), p. A1.

<sup>32</sup> The IASB rule put additional pressure on FASB to mandate option expensing for US firms. See, for example, Ascarelli and Brown, "A Global Journal Report: Global Audit Panel Approves Change – Pressure Is Accumulating To Make Expensing Practice A Rule, not an Option, in U.S.," (July 17, 2002), p. A2; Reilly, "As IASB Unveils New Rules, Dispute With EU Continues," *Wall Street Journal* (March 31, 2004a), p. A2.; Reilly, "Foreign Firms to Expense Options --- New International Rule Pressures U.S. to Handle Stock Grants the Same Way," *Wall Street Journal* (February 19, 2004b), p. A2.

## 6. Why do US CEOs receive more equity-based compensation?

Our finding that the US pay premium largely disappears after controlling for the relative riskiness of US pay packages potentially “explains” the pay differences but naturally leads to another question: Why do US executives receive more equity-based compensation than their foreign counterparts?

While equity-based compensation has been a staple of US compensation contracts for more than a half-century, the use of equity-based pay outside the United States is a relatively recent phenomenon. Panel A of Table 10 shows how the importance of equity-based pay has changed over time in the United States and in nine European countries using Towers Perrin’s *Worldwide Total Remuneration* (WWTR) surveys for the selected years 1984, 1988, 1992, 1996, 1999, 2001, and 2003. The data for the years 1992 to 1996 are based on the Abowd and Kaplan (1999) analysis of the WWTR surveys. As shown in Panel A of Table 10, only France and the UK made extensive use of stock or options in the 1980s, and equity-based pay did not become common across Europe until the end of the 1990s. By 2003, Towers Perrin reports that equity-based pay accounts for between 10% and 20% of competitive pay for European CEOs, and for about half the pay of American CEOs.

The data in Panel A of Table 10 are not CEO pay “data” per se, but rather consulting company’s estimates of “typical” or “competitive” pay for a representative CEO in an industrial company, based on questionnaires sent to consultants in each country. In Panel B of Table 10, we provide our own estimates of equity-based pay for 2003–2008 based on actual grant-date values extracted from BoardEx (for Europe) and ExecuComp (for the United States). The actual averages for 2003 in Panel B are generally consistent with the consultant surveys in Panel A for the same year, increasing our confidence in both data sources. As shown in Panel B, the use of equity-based compensation has generally declined in continental Europe between 2003 and 2008, and has remained relatively constant in the United Kingdom at just under a third of total compensation. In contrast, the use of equity-based pay has increased in the United States.

Traditional agency theory suggests a finite number of factors that might explain a greater use of incentive-based pay among US executives. First, US CEOs may be less risk averse or have steeper marginal costs of effort than their non-US counterparts, but to our knowledge there is no theory or empirical work suggesting such international differences in risk-aversion coefficients. Second, performance of non-US firms might be measured with substantially more noise than for US firms, leading to lower pay-performance sensitivities and lower expected levels of pay. However, we find no evidence that cash flows or

shareholder returns are systematically more variable in our sample of non-US firms than in US firms. Extensions of the traditional model to incorporate differences in both ability and in the marginal productivity of CEO effort might help reconcile the data, but only given the additional assumptions that executives are more able and more productive in the United States. Overall, there are no compelling agency-theoretic explanations for the relative reliance on equity-based compensation in the United States.<sup>33</sup>

In unreported analysis, we attempt to explain international differences in the use of equity-based compensation by a variety of country-level variables routinely used in international studies of corporate governance to measure differences in the economic, law, and institutional environment of each country.<sup>34</sup> We find that CEO equity-based pay (and total pay) is more prevalent in common-law countries (La Porta, et al. (1998)) which in turn is largely defined by the United Kingdom and its former colonies, including (in our sample) Australia, Canada, Ireland, South Africa, and the United States, and 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 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). In contrast, differences in CEO pay are not explained by GDP per capita levels.

Ultimately, the cross-country differences in the prevalence of equity-based compensation may be driven by idiosyncratic events that in some cases encouraged, and in others discouraged, the use of stock options and restricted stock. For example, Murphy and Jensen (2010) show that America's reliance on stock options as the primary form of long-term compensation began in the 1950s as a result of tax policies designed to promote options, and declined in the late 1960s when the government reduced tax benefits. The early 1990s created a "perfect storm" for an explosion of option grants for not only executives but lower-level managers and employees. First, options were considered a "safe harbor" from the government's \$1 million cap on deductible compensation. Second, after years of speculation that companies would need to begin expensing their options on accounting statements, FASB

---

<sup>33</sup> Yermack (1995) shows that agency-theoretic variables have little explanatory value in predicting the use of equity-based compensation in a cross-section of US publicly traded firms.

<sup>34</sup> The limited number of countries in our sample (14) limits the statistical degrees of freedom for reliably identifying country-level determinants of pay practices.

reverted to the old accounting rules. Third, government policies and stock-exchange listing rules promoted broad-based grants. As noted in connection with Figure 5, the explosion in option grants continued unabated until the burst of the Internet bubble in 2000, followed by a series of accounting scandals that re-focused attention on the accounting treatment of options. Eventually, FASB mandated expensing, and companies moved away from options toward restricted stock.

Canyon, et al. (2010) provide an analogous description of the evolution of equity-based pay in Europe. For example, the widespread adoption of stock-option plans in Europe initially emerged as governments provided tax incentives to encourage their use in the United Kingdom (in 1982), France (1984), and Italy (1998). Controversies in the United Kingdom in the 1990s involving perceived option excesses at recently privatized utilities led to a shift from options to restricted stock; concerns over excessive executive pay led France to revoke its tax subsidies on options in 1995, and Italy to revoke its tax subsidies in 2006. In Germany, option plans were not even legalized until 1996, and were still challenged in a series of high-profile lawsuits brought by a maverick college professor. In 1999, the Spanish government increased taxes on stock options after it was revealed that the CEO of the recently privatized telephone company was about to make a fortune exercising options.

In each country, ebbs and flows in option grants followed government intervention, usually reflecting tax or accounting policies and often reactions to isolated events or situations. Since the triggering events vary across countries, the nature of the government intervention — and the subsequent use of stock options — has also varied. The “perfect storm” that triggered the US option explosion has not been repeated else in the world, and therefore the use of options (and equity-based pay in general) continues to be much higher in the United States.

## **7. Conclusion**

The observed US pay premium has often been interpreted as reflecting excesses in US pay practices. The relatively high pay of US CEOs relative to their foreign counterparts has been cited as evidence that US CEOs effectively set their own pay. Our results, based on the first comprehensive study of individual CEOs across a wide range of firms in 14 countries with mandated disclosure rules, suggest a more nuanced conclusion.

First, we have shown that the US pay premium is modest (about 25%) after controlling for firm, ownership, board, and CEO characteristics. Second, we have shown 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 (in particular, the use of equity-based compensation). We find that, with very few exceptions, the firm, ownership, and board characteristics associated with higher pay are precisely those associated with a larger fraction of pay awarded in the form of stock options or restricted stock. Moreover, using a plausible (albeit imperfect) certainty-equivalent approach to adjust for the riskiness of equity-based compensation, we find no significant differences in US and non-US CEO pay on a risk-adjusted basis (controlling also for firm, ownership, and board characteristics). 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, such as institutional ownership (especially US institutions) and the fraction of independent board members. In contrast with the entrenchment view of CEO pay set, our results suggest that the observed US pay premium might actually be the result of *good* governance and stronger ties between CEO pay and shareholder performance. Finally, we find implicit convergence toward US pay practices in non-US firms that have a higher fraction of revenues from foreign markets and shares held by foreign institutional investors, and with shares in the MSCI index. Similarly, we find that CEO pay is no different (compared to US firms) in non-US firms that are cross-listed on a US exchange or have a high fraction of US institutions as shareholders, US employees, US customers, or directors who also serve on US boards.

As suggested in Section 6, the intensive use of equity-based pay in the United States might well have been a historical accident, driven by government-imposed tax and accounting incentives that effectively subsidized stock options relative to other forms of compensation. While more recent policy changes have shifted US pay packages away from options toward restricted stock, the emphasis on equity-based compensation resonated with US shareholders and is firmly entrenched as the primary component of CEO pay in the United States. Our results indicate that US-style equity-based compensation is increasingly exported to non-US firms exposed to foreign (and, particularly US) capital, product, and managerial labor markets.

## References

- Aboody, David, Mary E. Barth, and Ron Kasznik, 2004, Firms' Voluntary Recognition of Stock-Based Compensation Expense, *Journal of Accounting Research* 42, 123-150.
- 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.
- Ascarelli, Silvia, and Ken Brown, 2002, "A Global Journal Report: Global Audit Panel Approves Change – Pressure Is Accumulating To Make Expensing Practice A Rule, not an Option, in U.S.," (July 17).
- 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.
- Benoit, Bertrand, 2000, "SAP vote may spell German rethink," *Financial Times* (January 17).
- 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.
- Bulkeley, Andrew, 1999, "DaimlerChrysler to Equalize Pay of German, U.S. Execs," *Bloomberg News* (January 9).
- Cai, Jie, and Anand Vihh, 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, (Boston College).
- Canyon, Martin J., John E. Core, and Wayne R. Guay, 2009, Are US CEOs Paid More Than UK CEOs? Inferences From Risk-Adjusted Pay, (Wharton).
- Canyon, Martin J., Nuno Fernandes, Miguel A. Ferreira, Pedro Matos, and Kevin J. Murphy, 2010, The Executive Compensation Controversy: A Transatlantic Analysis, (University of Southern California).
- Canyon, 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.

- Canyon, 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.
- “DaimlerChrysler Proposes Stock Option Plan For Executives,” 2000, *Dow Jones International News* (March 3).
- 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 Rene Stulz, 2004, Why are foreign firms that are listed in the U.S. worth more?, *Journal of Financial Economics* 71, 205-238.
- Fernandes, Nuno, 2008, EC: Board Composition and Firm Performance: The Role of Independent Board Members, *Journal of Multinational Financial Management* 18, 30-44.
- Gabaix, Xavier, and Augustin Landier, 2008, Why has CEO Pay Increased So Much?, *Quarterly Journal of Economics* 123, 49-100.
- Gerakos, Joseph J., Joseph D. Piotroski, and Suraj Srinivasan, 2010, Do US Market Interactions Affect CEO Pay? Evidence from UK Companies?, (University of Chicago).
- Gross, Daniel, 2007, “Send Us Your Tired, Your Poor, Your Business Executives: Why are big American companies hiring foreign-born CEOs?,” *Slate* (August 17).
- Hall, Brian J., and Kevin J. Murphy, 2003, The Trouble with Stock Options, *Journal of Economic Perspectives* 17, 49-70.
- Hartzell, Jay, and Laura Starks, 2003, Institutional Investors and Executive Compensation, *Journal of Finance* 58, 2351-2374.
- Hitt, Greg, and Jacob M. Schlesinger, 2002, “Perk Police: Stock Options Come Under Fire in Wake Of Enron’s Collapse – They’re a Form of Pay, Say Critics, So Why Are They Not Treated as Expense? – Business Lobby Mobilizes,” *Wall Street Journal* (March 26).
- Hymowitz, Carol, 2004, “Foreign-Born CEOs Are Increasing in U.S., Rarer Overseas,” *Wall Street Journal* (May 25).
- Jensen, Michael C., and Kevin J. Murphy, 1990, Performance Pay and Top Management Incentives, *Journal of Political Economy* 98, 225-265.
- Kaplan, Steven, 1994, Top Executive Rewards and Firm Performance: A Comparison of Japan and the U.S., *Journal of Political Economy* 102, 510-546.

- Kato, Takao, Woochan Kim, and Ju-Ho Lee, 2006, Executive Compensation and Firm Performance in Korea, (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, (IZA).
- 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.
- 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.
- Meulbroek, Lisa K., 2001, The Efficiency of Equity-Linked Compensation: Understanding the Full Cost of Awarding Executive Stock Options, *Financial Management*, 5-44.
- Murphy, Kevin J., 1985, Corporate Performance and Managerial Remuneration: An Empirical Analysis, *Journal of Accounting and Economics* 7, 11-42.
- Murphy, Kevin J., 1999, Executive Compensation, in Orley Ashenfelter, and David Card, eds.: *Handbook of Labor Economics* (North Holland).
- Murphy, Kevin J., and Jan Zábajník, 2007, Managerial Capital and the Market for CEOs, USC Working paper.
- Prendergast, Canice, 2002, The Tenuous Trade-off between Risk and Incentives, *Journal of Political Economy* 110, 1071-1102.
- Reilly, David, 2004a, "As IASB Unveils New Rules, Dispute With EU Continues," *Wall Street Journal* (March 31).
- Reilly, David, 2004b, "Foreign Firms to Expense Options --- New International Rule Pressures U.S. to Handle Stock Grants the Same Way," *Wall Street Journal* (February 19).
- 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.
- Thomas, Randall S., 2008, International Executive Pay: Current Practices and Future Trends, (Vanderbilt University Law School).

Yermack, David, 1995, Do Corporations Award CEO Stock Options Effectively?, *Journal of Financial Economics* 39, 237-269.

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.

**Table 1 Sample size and level and structure of 2006 CEO compensation by country**

Country	Number of CEOs in Sample, and Data Source			% of Market Cap	2006 CEO Pay (\$mil)		Mean Composition of 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%
<i>Non-US</i>	<i>1,251</i>	<i>364</i>	<i>1,615</i>	<i>83%</i>	<i>\$2.8</i>	<i>\$1.6</i>	<i>46%</i>	<i>8%</i>	<i>24%</i>	<i>22%</i>
US	1,648	0	1,648	90%	\$5.5	\$3.3	28%	6%	27%	39%
<i>All 14 countries</i>	<i>2,899</i>	<i>364</i>	<i>3,263</i>	<i>87%</i>	<i>\$4.2</i>	<i>\$2.3</i>	<i>37%</i>	<i>7%</i>	<i>25%</i>	<i>31%</i>

Notes: 2006 fiscal year compensation data extracted from S&P's ExecuComp database (US), BoardEx (Non-US) (collectively "BoardEx & Exec" in the table), or hand-collected from corporate filings, and excluding firms with less than \$100 million in 2005 revenues. "% of Market Cap" is computed for each country as the market capitalization of all firms with CEO pay data divided by the total market capitalization of all firms in Datastream/Worldscope. We exclude CEOs in their first years and those for whom annual revenues are not found in Worldscope 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 <i>t</i> -stat
<i>A. FIRM CHARACTERISTICS</i>			
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
<i>B. OWNERSHIP STRUCTURE</i>			
Insider ownership	0.161	0.320	-20.29
Institutional ownership	0.801	0.228	63.23
<i>C. BOARD STRUCTURE</i>			
Board size	9.552	10.464	-6.48
Fraction 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
<i>D. CEO CHARACTERISTICS</i>			
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 fiscal 2005 data.

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

Independent Variables	OLS Regressions for CEO Pay Levels				Tobit Regressions for CEO Pay Structures	
	<i>Dependent Variable:</i> Ln(2006 CEO Total Compensation)				<i>Dependent Variable:</i> <u>Equity Pay</u> Total Pay <u>Incentive Pay</u> Total Pay	
	(1)	(2)	(3)	(4)	(5)	(6)
US dummy	0.582*** (4.14)	0.629*** (4.56)	0.268*** (2.84)	0.230** (2.40)	0.063** (2.40)	0.091*** (5.08)
<i><u>FIRM CHARACTERISTICS:</u></i>						
Sales (log)	0.406*** (17.44)	0.402*** (19.47)	0.380*** (16.47)	0.315*** (9.75)	0.037*** (6.03)	0.036*** (8.39)
Leverage	–	0.434*** (2.89)	0.408*** (2.97)	0.402*** (2.93)	0.003 (0.07)	0.027 (0.97)
Tobin's Q	–	0.064** (2.51)	0.057*** (2.71)	0.056*** (2.87)	0.014** (2.09)	0.012** (2.51)
Stock-return volatility	–	–0.529*** (-6.33)	–0.492*** (-7.88)	–0.495*** (-7.09)	–0.190*** (-3.33)	–0.116*** (-3.05)
Stock return	–	0.192*** (4.26)	0.190*** (5.60)	0.167*** (5.98)	0.008 (0.39)	0.079*** (5.94)
<i><u>OWNERSHIP STRUCTURE:</u></i>						
Insider ownership	–	–	–0.803*** (-4.52)	–0.785*** (-3.68)	–0.358*** (-9.60)	–0.182*** (-7.45)
Institutional ownership	–	–	0.422*** (8.00)	0.336*** (5.41)	0.162*** (5.41)	0.120*** (5.80)
<i><u>BOARD STRUCTURE:</u></i>						
Board size	–	–	–	0.011 (1.32)	–0.004 (1.54)	0.003** (2.04)
Fraction of independent directors	–	–	–	0.206** (1.95)	0.102** (2.29)	0.097*** (3.29)
CEO-chairman dummy	–	–	–	0.058 (0.53)	–0.044*** (-2.70)	–0.000 (-0.01)
Avg. number of board positions	–	–	–	0.250*** (4.65)	0.088*** (7.36)	0.047*** (5.82)
Observations	3,012	2,950	2,848	2,714	2,710	2,710
R-squared	0.35	0.37	0.39	0.43	–	–

Note: All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on 12 Fama-French industries. "Equity Pay" includes stock and option grants; "Incentive pay" includes stock, options, and short- and long-term bonus payments. Variable definitions and sources are in Appendix A. Robust *t*-statistics (for OLS regressions) and *t*-statistics (Tobit specifications) 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 compensation on firm characteristics, ownership and board structure, and CEO characteristics

Independent Variables	OLS Regression	Tobit Regression	
	<i>Dependent Variable:</i>	<i>Dependent Variable:</i>	
	Ln(2006 CEO Total Compensation)	<u>Equity Pay</u> Total Pay	<u>Incentive Pay</u> Total Pay
	(1)	(2)	(3)
US dummy	0.223** (2.21)	0.050** (1.83)	0.102*** (5.08)
<i>CEO CHARACTERISTICS:</i>			
CEO age	-0.003 (1.08)	-0.004*** (-3.45)	-0.003*** (-4.49)
CEO external hire dummy	0.052 (0.95)	-0.006 (0.37)	-0.002 (0.20)
CEO tenure (as CEO)	0.002 (0.47)	-0.002 (1.53)	-0.001 (1.15)
CEO other industry experience	0.031 (1.57)	0.019 (1.27)	0.017 (1.63)
Past experience as CEO dummy	-0.004 (0.10)	-0.018 (1.10)	-0.007 (0.64)
CEO current board positions	-0.007 (0.27)	-0.010 (1.33)	-0.005 (0.94)
CEO college degree dummy	0.106 (0.97)	0.038** (2.00)	0.015 (1.14)
Observations	2,553	2,552	2,552
R-squared	0.42	-	-

Note: The regressions include the same controls for firm characteristics, ownership structure, and board structure as in Table 3 column (4) 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 (for OLS regressions) and *t*-statistics (Tobit specifications) 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 showing US and non-US differences in the level and structure of CEO compensation controlling for firm characteristics, ownership, and board structure**

Independent Variables	OLS Regression <i>Dependent Variable:</i>			Tobit Regression <i>Dependent Variable:</i>		
	Ln(2006 CEO Total Compensation)			<u>Equity Pay</u> Total Pay		
	US Firms	Non-US Firms	<i>p</i> -value	US Firms	Non-US Firms	<i>p</i> -value
	(1)	(2)	(3)	(4)	(5)	(6)
<i>FIRM CHARACTERISTICS:</i>						
Sales (log)	0.367*** (9.07)	0.257*** (9.95)	0.005	0.033*** (4.13)	0.043*** (4.52)	0.175
Leverage	0.592*** (3.71)	0.256** (2.16)	0.047	0.110** (2.15)	-0.076 (1.16)	0.055
Tobin's Q	0.031 (1.00)	0.078** (2.54)	0.026	0.007 (0.95)	0.020 (1.59)	0.734
Stock-return volatility	-0.476*** (-2.85)	-0.722*** (-4.66)	0.281	-0.214*** (-3.21)	-0.180* (-1.76)	0.895
Stock return	0.209** (2.17)	0.303*** (7.49)	0.337	0.046* (1.73)	0.056* (1.85)	0.688
<i>OWNERSHIP STRUCTURE:</i>						
Insider ownership	-0.416*** (-3.07)	-0.492*** (-3.30)	0.091	-0.165*** (-2.84)	- (-3.34)	0.836
Institutional ownership	0.277*** (3.35)	0.441* (1.76)	0.449	0.118*** (3.60)	0.322*** (4.76)	0.011
<i>BOARD STRUCTURE:</i>						
Board size	0.003 (0.17)	0.038*** (3.07)	0.066	0.003 (0.76)	0.010*** (2.76)	0.203
Fraction of independent directors	0.470*** (2.59)	0.170 (1.05)	0.280	0.253*** (3.49)	0.071 (1.14)	0.051
CEO-chairman dummy	0.179*** (5.27)	0.019 (0.24)	0.001	-0.016 (0.85)	-0.041 (1.08)	0.672
Avg. number of board positions	0.167*** (3.07)	0.305*** (7.23)	0.169	0.066*** (4.02)	0.101*** (5.48)	0.298
Observations	1,447	1,267		1,447	1,263	
R-squared	0.37	0.51		-	-	

Note: All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on 12 Fama-French industries. Non-US regressions include dummy variables for each country. Columns (3) and (6) are run for a pooled regression using 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 (for OLS regressions) and *t*-statistics (Tobit specifications) in parentheses. Standard errors are 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 6** Implied US pay premiums using US and non-US coefficients

	Mean	Median
<i>Panel A. US CEOs [n=1447]</i>		
US Premium:		
Percentage difference between actual pay and hypothetical pay (based on coefficients for non-US CEOs from Table 5, column (2)) for US CEOs	39.5%***	47.7%***
Percentage of US CEOs where difference > 0	70% (1013 of 1447)	
<i>Panel B. Non-US CEOs [n=1267]</i>		
US Premium:		
Percentage difference between hypothetical pay (based on coefficients for US CEOs from Table 5, column (1)) and actual pay for non-US CEOs,	21.3%***	18.5%***
Percentage of non-US CEOs where difference > 0	59% (751 of 1267)	

Note: Hypothetical pay in Panel A calculated by applying each US CEO's firm, industry, ownership, and board characteristics to the coefficients for regressions for non-US firms in column (2) in Table 5, while hypothetical pay in Panel B calculated by applying each non-US CEO's firm, industry, ownership, and board characteristics to the coefficients for regressions for US firms in column (1) in Table 5

\*\*\*, \*\*, \* denote that the difference is significant at the 1, 5, and 10% level, respectively, based on *t*-tests (for means) and Wilcoxon Z-scores (for medians).

**Table 7 Regressions of the level of risk-adjusted CEO pay on firm characteristics, ownership, and board structure**

	<i>Dependent Variable: Ln(2006 Risk-Adjusted CEO Total Compensation)</i>					
	<i>No risk adjustment</i>	<i>rra=2</i>	<i>rra=3</i>	<i>No risk adjustment</i>	<i>rra=2</i>	<i>rra=3</i>
	(1)	(2)	(3)	(4)	(5)	(6)
US dummy	0.571*** (4.22)	0.439*** (3.23)	0.376*** (2.83)	0.240** (2.38)	0.132 (1.28)	0.097 (0.97)
<i>FIRM CHARACTERISTICS:</i>						
Sales (log)	0.405*** (19.29)	0.408*** (19.74)	0.395*** (22.50)	0.315*** (12.12)	0.313*** (13.17)	0.303*** (14.30)
Leverage	–	–	–	0.351** (2.28)	0.335** (2.45)	0.344*** (2.61)
Tobin's Q	–	–	–	0.062** (2.33)	0.039 (1.28)	0.033 (1.06)
Stock-return volatility	–	–	–	–0.456*** (-7.40)	–0.736*** (-12.12)	–0.714*** (-13.12)
Stock return	–	–	–	0.161*** (5.98)	0.077*** (2.64)	0.069** (2.41)
<i>OWNERSHIP STRUCTURE:</i>						
Insider ownership	–	–	–	–0.667*** (-3.00)	–0.692*** (-3.20)	–0.672*** (-3.05)
Institutional ownership	–	–	–	0.342*** (5.58)	0.286*** (4.81)	0.246*** (4.70)
<i>BOARD STRUCTURE:</i>						
Board size	–	–	–	0.012 (1.52)	0.013* (1.73)	0.013** (2.00)
Fraction of independent directors	–	–	–	0.198** (1.98)	0.222** (2.27)	0.211** (2.35)
CEO-chairman dummy	–	–	–	0.051 (0.51)	0.042 (0.41)	0.042 (0.39)
Avg. number of board positions	–	–	–	0.245*** (5.36)	0.226*** (4.72)	0.207*** (4.32)
Observations	2,829	2,829	2,829	2,605	2,605	2,605
R-squared	0.37	0.38	0.37	0.46	0.46	0.45

Note: All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on 12 Fama-French industries. Risk-adjusted pay is estimated using the “certainty equivalence” approach, and is defined as the amount of riskless cash compensation the executive would exchange for his stock and option grants, conditional on his current stock and option holdings. The risk-adjusted value of accounting-based bonuses is assumed to be worth 80% of actual bonuses. The CEO's safe wealth is assumed to be the greater of \$5 million or four times total compensation. Certainty equivalents are estimated numerically assuming that the executive has constant relative risk aversion (rra) of 2 or 3, and assuming (using the Capital Asset Pricing Model) that the distribution of stock prices over the actual term of the options granted is lognormal with volatility  $\sigma$  and expected value  $(r_f + \beta(r_m - r_f) - \sigma^2/2)T$ , where  $\sigma$  and  $\beta$  are determined using monthly stock-return data over 48 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. 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 8 Regressions for non-US firms of the level and structure of CEO pay on firm characteristics, ownership, and board structure, and variables related to whether the non-US firm is internationalized or Americanized**

<i>PANEL A. INTERNATIONALIZATION VARIABLES</i>			<i>PANEL B. AMERICANIZATION VARIABLES</i>		
<i>Dependent Variable:</i>	Ln(2006 CEO Pay)	<u>Equity Pay</u> Total Pay	<i>Dependent Variable:</i>	Ln(2006 CEO Pay)	<u>Equity Pay</u> Total Pay
	(OLS) (1)	(Tobit) (2)		(OLS) (3)	(Tobit) (4)
Domestic institutional ownership	0.096 (0.39)	0.275*** (2.78)	Non-US institutional ownership	0.189 (0.67)	0.336*** (3.85)
Foreign institutional ownership	0.647*** (3.65)	0.311*** (3.09)	US institutional ownership	0.967*** (3.26)	0.301* (1.93)
Firm in MSCI dummy	0.206** (2.12)	0.058* (1.82)	US cross-listing dummy	0.188*** (2.78)	0.074** (2.33)
Foreign sales as fraction of total sales	0.168* (1.66)	0.051 (1.27)	US acquisitions	0.097*** (4.07)	0.024 (1.42)
Nationalities on board divided by board size	0.539** (3.02)	0.066 (1.11)	Fraction of directors in US boards	0.674** (2.09)	-0.185 (1.40)
# Non-US firms	1,267	1,263		1,201	1,198
R-squared	0.53	–		0.53	–

Note: The regressions include the same controls for firm characteristics, ownership structure, and board structure for non-US firms as in Table 5 column (2) (for CEO Pay) and Table 5 column (5) (for the fraction of pay in the form of equity). We add additional controls for internationalization and Americanization. All regressions include 12 Fama-French industry dummies and country dummies. Standard errors are clustered by country. Variable definitions and sources are in Appendix A. Robust *t*-statistics (for OLS regressions in columns (1) and (3)) and *t*-statistics (Tobit specifications in columns (2) and (4)) in parentheses.

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

**Table 9 Time trends in US pay premiums, US versus non-US reliance on equity-based pay, and measures of internationalization and Americanization, 2003–2008**

	2003	2004	2005	2006	2007	2008
<i>A. CEO PAY REGRESSION RESULTS</i>						
Implied US Pay Premium	58%	53%	59%	26%	2%	14%
Implied “Pay Mix” Premium	16%	21%	19%	6%	9%	15%
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
<i>B. INTERNATIONALIZATION VARIABLES (NON-US FIRMS)</i>						
Domestic institutional ownership	9%	9%	11%	13%	13%	17%
Foreign institutional ownership	6%	6%	8%	10%	12%	14%
Firm in MSCI dummy	26%	29%	32%	36%	37%	37%
Foreign sales as fraction of total sales	32%	33%	34%	34%	35%	28%
Nationalities on board divided by board size	18%	18%	17%	17%	20%	20%
Non-US firms in sample	1,655	1,630	1,607	1,636	1,611	1,634
<i>C. AMERICANIZATION VARIABLES (NON-US FIRMS)</i>						
Non-US institutional ownership	11%	12%	15%	18%	19%	22%
US institutional ownership	3%	4%	4%	5%	6%	8%
US cross-listing dummy	22%	23%	23%	23%	22%	21%
US acquisitions	48%	36%	32%	31%	27%	28%
Fraction of directors in US boards	6%	6%	6%	6%	6%	5%
Non-US firms in sample	1,655	1,630	1,607	1,636	1,611	1,634

Note: Panel A relies only on companies with CEO pay data available. Regressions are run separately for each year’s CEO compensation on lagged controls for firm characteristics, ownership structure, board structure, and industry dummies. The 2006 regression corresponds to that reported in column (4) of Table 3. Panels B and C rely on a larger sample of all companies where we have 2006 pay data (see Table 1), regardless of whether we have CEO pay data for earlier or subsequent years. All internationalization and Americanization variables are measured at the end of the previous year. Variable definitions and sources are in Appendix A.

**Table 10** Stock-based pay (as a percentage of total pay) in Europe and the United States

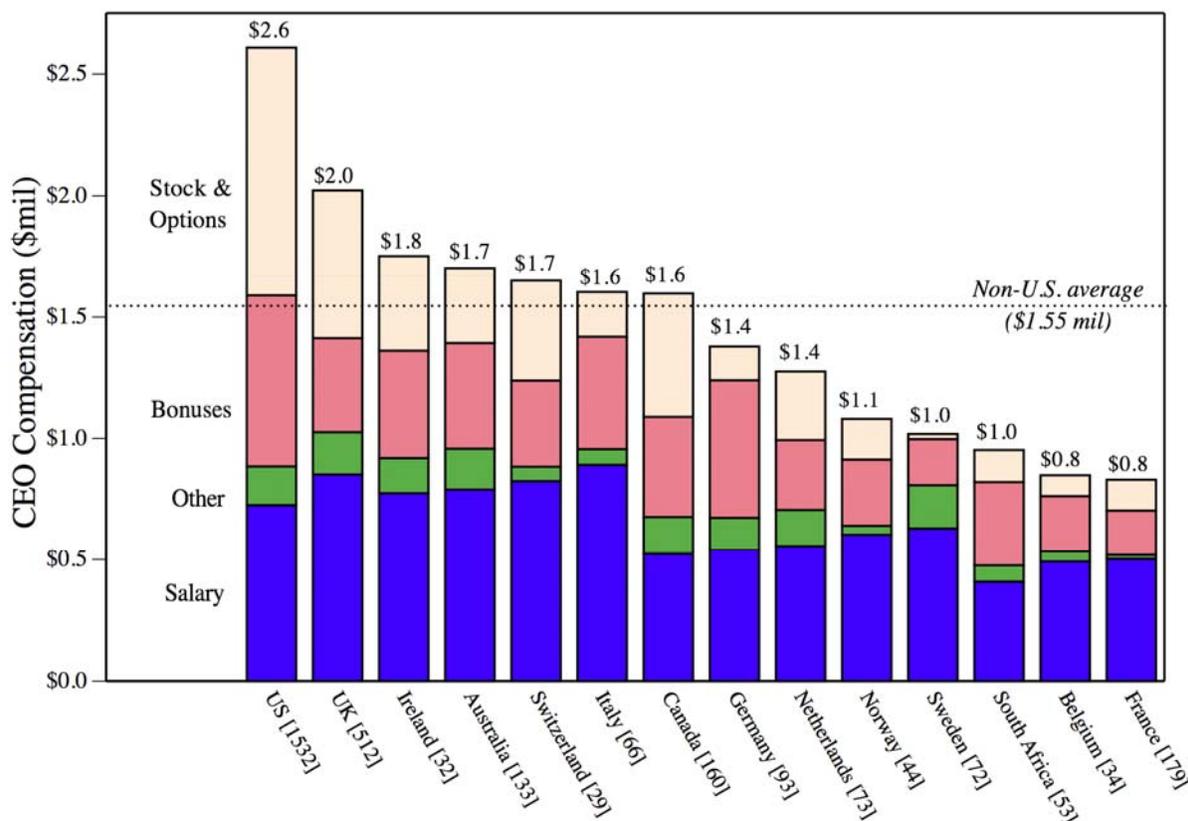
<i>Panel A: Towers Perrin consultant surveys 1984–2003</i>							
	1984	1988	1992	1996	1999	2001	2003
Belgium	0.0%	0.0%	0.0%	0.0%	3.2%	11.6%	11.2%
France	12.3%	13.3%	15.6%	14.6%	14.3%	15.1%	16.0%
Germany	0.0%	0.0%	0.0%	0.0%	9.7%	13.5%	18.0%
Italy	0.0%	0.0%	0.5%	4.0%	9.1%	17.2%	15.1%
Netherlands	0.0%	0.0%	0.0%	0.0%	14.6%	16.7%	15.8%
Spain	0.0%	0.0%	0.0%	0.0%	16.0%	17.9%	19.2%
Sweden	0.0%	0.0%	0.0%	0.0%	6.8%	11.0%	10.7%
Switzerland	1.9%	1.9%	3.4%	3.6%	1.8%	0.0%	19.2%
United Kingdom	14.5%	14.6%	15.7%	15.0%	16.6%	19.1%	20.8%
United States	16.9%	28.3%	32.3%	28.7%	25.5%	44.8%	48.3%

<i>Panel B: BoardEx (non-US firms) and ExecuComp (US firms)</i>							
	2003	2004	2005	2006	2007	2008	
Belgium	na	16.7%	8.6%	9.5%	7.7%	11.5%	
France	17.6%	15.9%	16.0%	17.2%	17.8%	13.9%	
Germany	12.5%	8.7%	9.4%	9.3%	9.4%	9.0%	
Italy	11.5%	10.6%	15.7%	13.1%	5.7%	8.6%	
Netherlands	19.3%	16.3%	20.1%	21.7%	18.2%	15.8%	
Spain	0.0%	1.2%	0.0%	0.8%	5.3%	2.9%	
Sweden	3.7%	1.3%	1.5%	1.8%	1.5%	1.3%	
Switzerland	30.2%	21.5%	20.1%	26.6%	17.1%	12.0%	
United Kingdom	27.7%	27.7%	29.7%	31.0%	34.1%	30.6%	
United States	40.7%	42.0%	41.4%	39.5%	43.0%	47.1%	

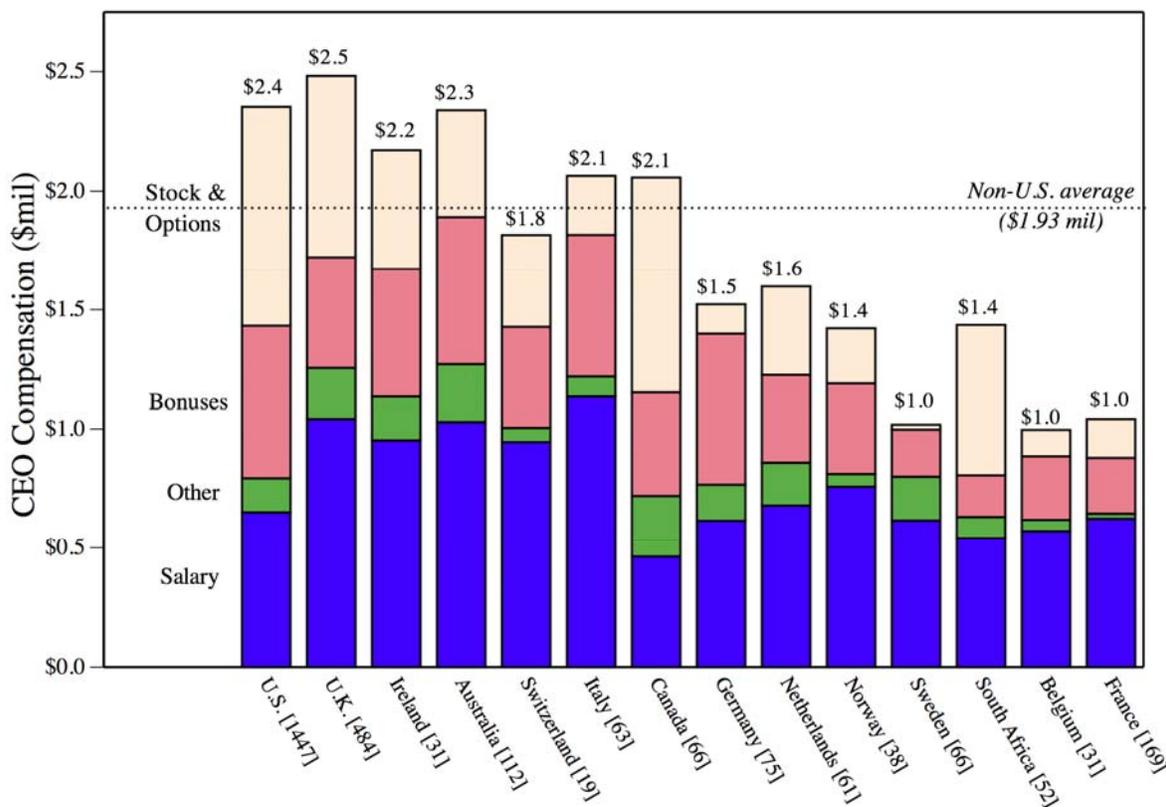
Note: Data in Panel A are from Perrin's Worldwide Total Remuneration reports (various issues), including 1984–1992 data reported by Abowd and Kaplan (1999). Data reflects Towers Perrin's estimate of competitive CEO pay for industrial companies with approximately US \$300 million in annual revenues. Stock-based pay includes the grant-date expected value of option grants and annualized targets from performance share plans. Data in Panel B are from BoardEx and ExecuComp. The percentages in the table are constructed by first computing the average ratio of equity-based pay to total compensation for each CEO, and then averaging across CEOs.

**Figure 1 2006 CEO pay after controlling for sales and industry**



Note: The figure compares 2006 CEO pay in each country controlling for firm size (sales) and industry. We regress the logarithm of total compensation on the logarithm of sales and 12 industry and 14 country dummies. For each country, we estimate the pay for a CEO running a hypothetical firm with \$1 billion in sales using the estimated coefficient for pay-size sensitivity and controlling for the “average” industry. Countries are sorted in descending order in terms of total estimated pay. The number of firms with compensation data in each country is shown in brackets. 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.

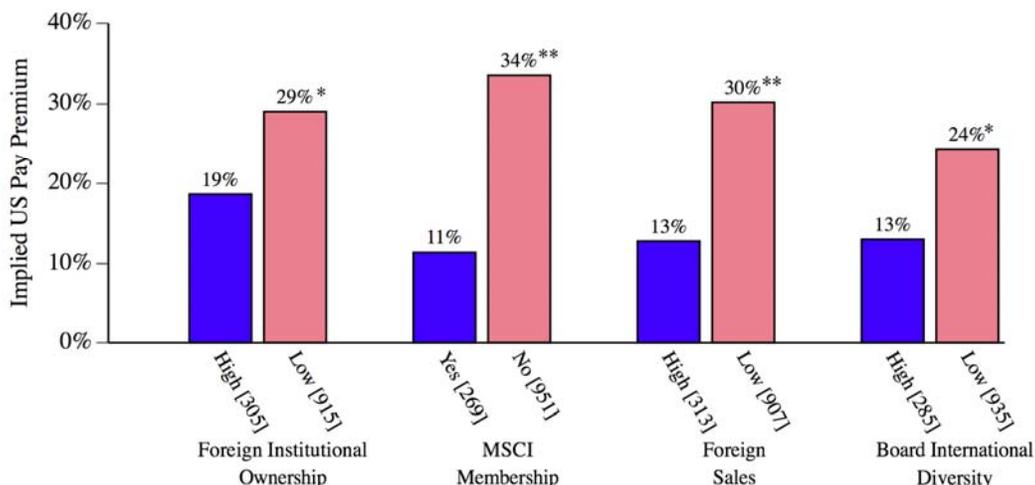
**Figure 2 2006 CEO pay after controlling for firm characteristics, ownership, and board structure**



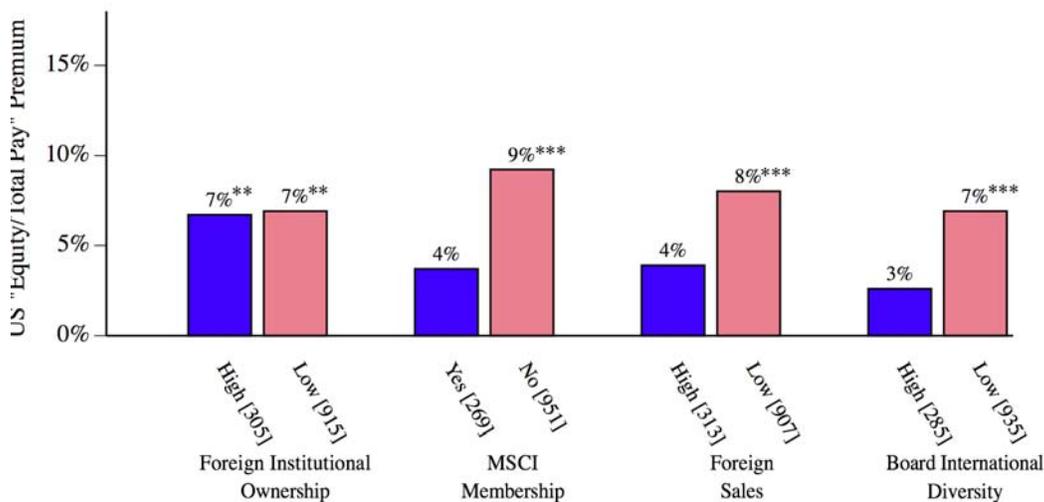
Note: The figure compares 2006 CEO pay in each country controlling for firm characteristics, ownership structure, and board structure from Table 3, column (4). We regress the logarithm of total compensation on the controls, 12 industry, and 14 country dummies. For each country, we estimate the pay for a CEO running a hypothetical firm with \$1 billion sales using the estimated coefficient for pay-size sensitivity and controlling for the average firm characteristics, ownership, board structure, and the “average” industry. Countries are sorted in the same order as in Figure 1. The number of firms with compensation data in each country is shown in brackets. The “non-US average” is weighted by the number of firms in each country.

**Figure 3 Implied differences in US versus non-US pay levels and structures for subsets of non-US firms based on measures of internationalization**

*Panel A. Implied US CEO Pay Premiums*



*Panel B. Implied US CEO Pay Mix Premiums*



Note: The figure plots the US dummy variables in regressions similar to Table 3 columns (4) (for pay levels, converted into percentages using  $e^{US\ Dummy}-1$ ) and column (6) (for pay mix, already in percentages), where the full US sample (approximately 1450 firms each year) is compared to two subsets of the non-US sample (number in brackets) based on the following measures of internationalization:

*Foreign Institutional Ownership:* “High” indicates that such holdings are above the 75th percentile for non-US firms.

*MSCI Membership:* “Yes” indicates that non-US firm is member of the MSCI All-country World Index.

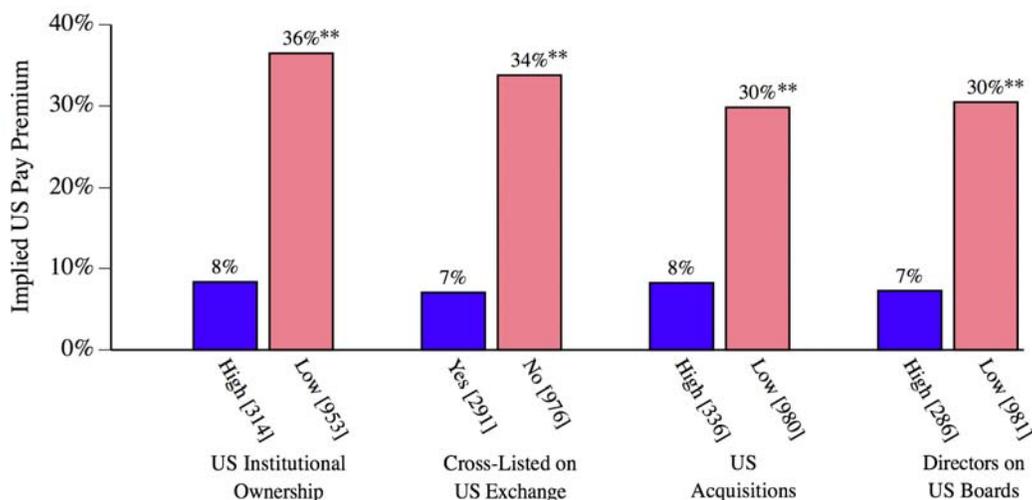
*Foreign Sales:* “High” indicates that firm’s foreign sales are above the 75th percentile for non-US firms.

*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.

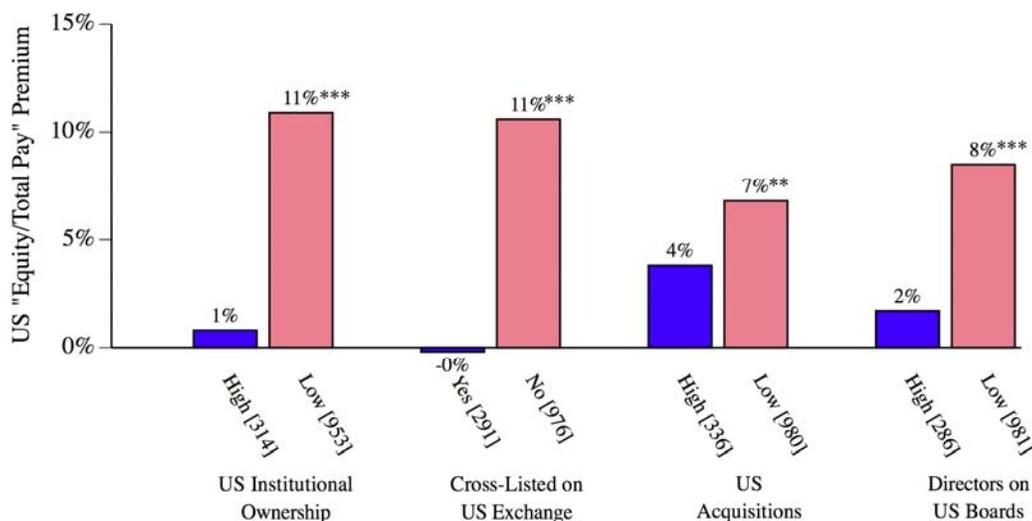
\*\*\*, \*\*, \* indicates that the coefficient on the US dummy on each underlying regression depicted above is significant at the 1, 5, and 10% levels, respectively.

**Figure 4 Implied differences in US vs. non-US pay levels and structures for subsets of non-US firms based on measures of Americanization**

*Panel A. Implied US CEO Pay Premiums*



*Panel B. Implied US CEO Pay Mix Premiums*

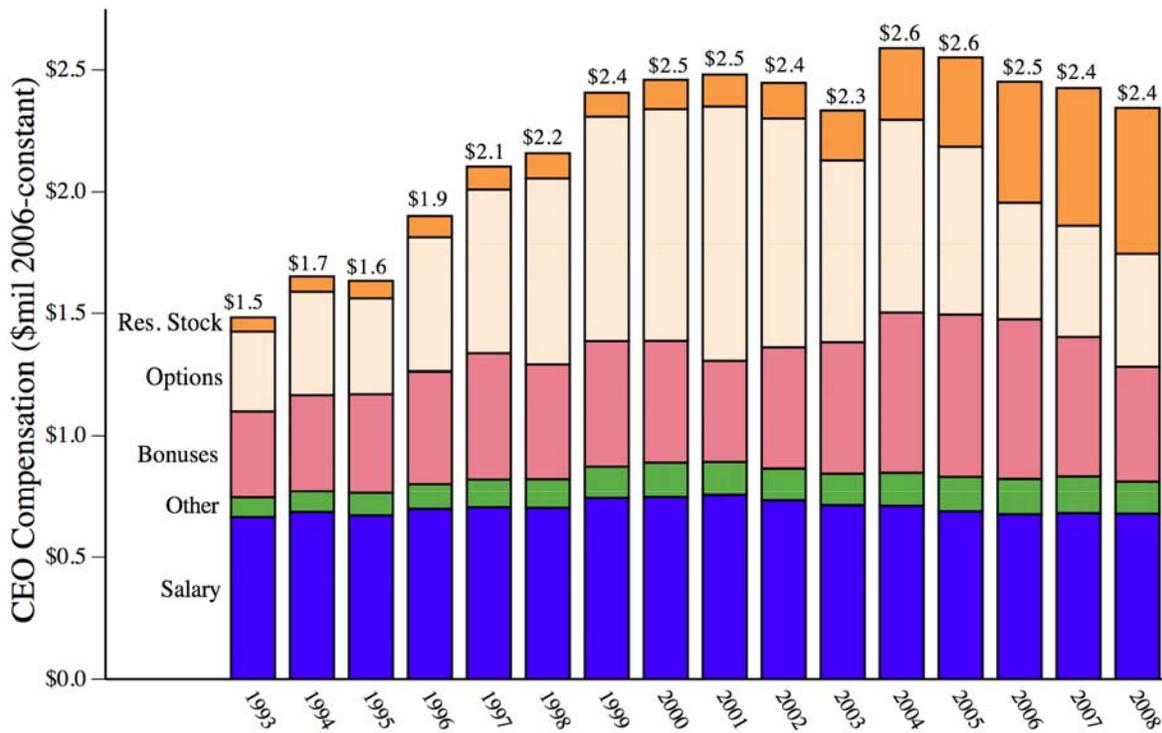


Note: The figure plots the US dummy variables in regressions similar to Table 3 columns (4) (for pay levels, converted into percentages using  $e^{US\ Dummy - 1}$ ) and column (6) (for pay mix, already in percentages), where the full US sample (approximately 1450 firms each year) is compared to two subsets of the non-US sample based on the following measures of Americanization:

- US Institutional Ownership:* “High” indicates that such holdings are 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 total 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 also sit on boards of US firms 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 5 US CEO pay after controlling for sales and industry, 1993–2008**



Note: The figure shows the time-trend in predicted pay (in 2006-constant dollars) for US CEOs after controlling for firm size (sales) and industry. We regress the logarithm of total compensation on the logarithm of sales and 12 industry dummies for all CEOs in the ExecuComp database, and estimate the pay for a CEO running a hypothetical firm with \$1 billion in sales (in 2006-constant dollars) using the estimated coefficient for pay-size sensitivity and controlling for the “average” industry. The pay composition percentages are defined as the average composition across all CEOs for each year.

## Appendix A: Variables Definition and Data Sources

---



---

<i>A. CEO COMPENSATION</i>	
Total compensation	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)
Incentive pay	Equity pay plus bonuses
<hr/>	
<i>B. FIRM CHARACTERISTICS</i>	
US dummy	Dummy that equals one if firm is headquartered in the United States (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	Sum of total assets (Worldscope item 02999) plus market value of equity (item 08001) minus book value of equity (item 03501) divided by total assets at end of previous year
Stock-return volatility	Annualized standard deviation of daily stock returns during the previous year (Datastream item RI)
Stock return	Stock return during the previous year (Datastream item RI)
<hr/>	
<i>C. OWNERSHIP STRUCTURE</i>	
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)
<hr/>	
<i>D. BOARD STRUCTURE</i>	
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)
<hr/>	
<i>E. CEO CHARACTERISTICS</i>	
CEO age	Age of CEO in years (BoardEx)
CEO external hired dummy	Dummy that equals one if CEO is hired from outside the company (BoardEx)
CEO tenure (as CEO)	Time as top executive in the firm (BoardEx)

CEO other industry experience dummy	Dummy that equals one if CEO has worked in a different industry in the past (BoardEx)
Past experience as CEO dummy	Dummy that equals one if CEO was top executive of a different firm in the past (BoardEx)
CEO current board positions	Number of current board positions of the CEO (BoardEx)
CEO college degree dummy	Dummy that equals one if CEO has a bachelor's degree or higher (BoardEx)
<hr/>	
<i>F. INTERNATIONALIZATION VARIABLES</i>	
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 fraction of total sales	International annual net sales (WS item 07101) as a proportion of net sales (Worldscope item 01001)
Nationalities on board divided by board size	Ratio of the number of different nationalities of directors to board size (BoardEx)
<hr/>	
<i>G. AMERICANIZATION VARIABLES</i>	
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 program or OTC listing in the United States (US stock exchanges and depository banks)
US acquisitions	Total acquisitions of US companies over the last 10 years as a fraction of a firm's equity market capitalization (SDC Platinum)
Fraction of directors in US boards	Fraction of directors that also sit in a US firm board of directors (BoardEx)
<hr/>	

## 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
<i>A. FIRM CHARACTERISTICS</i>																
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
<i>B. OWNERSHIP STRUCTURE</i>																
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
<i>C. BOARD STRUCTURE</i>																
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
<i>D. CEO CHARACTERISTICS</i>																
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 hired 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	<i>Non-US</i>
<i>E. INTERNATIONALIZATION VARIABLES</i>														
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
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	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
Board nationality mix	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
<i>F. AMERICANIZATION VARIABLES</i>														
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
Fraction 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 2006. Refer to Appendix B for variable definitions. Country codes are as follows: AU = Australia; BE = Belgium; CA = Canada; FR = France; DE = Germany; IE = Ireland; IT = Italy; NL = Netherlands; NO = Norway; ZA = S. Africa; SE = Sweden; CH = Switzerland; UK = United Kingdom; US = United States.