Are U.S. CEOs Paid More? New International Evidence

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This paper challenges the widely accepted stylized fact that chief executive officers (CEOs) in the United States are paid significantly more than their foreign counterparts. Using CEO pay data across fourteen countries with mandated pay disclosures, we show that the U.S. pay premium is economically modest and primarily reflects the performance-based pay demanded by institutional shareholders and independent boards. Indeed, we find no significant difference in either level of CEO pay or the use of equity-based pay between U.S. and non-U.S. firms exposed to international and U.S. capital, product, and labor markets. We also show that U.S. and non-U.S. CEO pay has largely converged in the 2000s. (*JEL* G32, G34, G38)

One of the most widely accepted stylized facts in the executive compensation literature is that chief executive officers (CEOs) in the United States are paid significantly more than their foreign counterparts (e.g., Abowd and Bognanno 1995; Abowd and Kaplan 1999; Murphy 1999). According to

the Towers Perrin (2006) survey, U.S. CEOs earn, on average, approximately double the pay of non-U.S. CEOs. The alleged differences in international pay practices have often been interpreted as evidence that U.S. pay is excessive. Indeed, Bebchuk, Fried, and Walker (2002) cite the U.S. versus foreign CEO pay gap as evidence for the "managerial power" hypothesis that U.S. CEOs set their own pay levels.

Although the "pay divide" between the United States and the rest of the world is widely accepted, attempts to document empirically the magnitude and determinants of the U.S. pay premium have been plagued by international differences in rules regulating the disclosure of executive compensation. Studies of the U.S. pay premium have largely been based on aggregate cash pay, small-sample comparisons where individual data are available, or countrywide estimates provided by consulting firms. The exception is the comparison between U.S. and U.K. firms, where CEO-level pay disclosure has been mandated since 1995. Conyon and Murphy (2000) show that U.S. CEOs earned almost 200% more than U.K. CEOs in 1997, after controlling for industry, firm size, and a variety of firm and individual characteristics. Conyon, Core, and Guay (2011) show that the U.S. versus U.K. pay premium had fallen to 40% by 2003 and potentially disappears after adjusting for the risk associated with undiversified CEO equity portfolios.

Our paper uses data from the recently expanded disclosure rules to conduct an international comparative analysis of CEO pay in fourteen countries requiring detailed individual disclosure of CEO pay by 2006. Our sample includes compensation data for CEOs in 1,648 U.S. and 1,615 non-U.S. firms, representing nearly 90% of the market capitalization of publicly traded firms in these countries. Our sample includes firms from both Anglo-Saxon and continental European countries, which have significant differences in corporate governance arrangements.

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

incentive pay. Moreover, to the extent that insider ownership is high because of CEO ownership, such executives are rewarded and motivated primarily by their ownership and not their pay. We also control for the effects of CEO characteristics (e.g., age, tenure, education, past experience), concluding that these factors do not help explain international differences in pay.

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

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

We argue that these non-U.S. firms implement U.S.-style compensation packages to attract global managerial talent, customers, and investors. Foreign firms attempting to attract executives in competition with equivalent U.S. firms will need to offer packages that are competitive with U.S. levels, including large grants of stock and options and high overall levels of expected total compensation. Moreover, companies cross-listed on U.S. exchanges benefit from "bonding" themselves to legal, regulatory, and capital market requirements of the United States (Doidge, Karolyi, and Stulz 2004). One of those mechanisms could be implementing U.S.-style compensation packages

that align executive incentives more with shareholder interests through more equity-based pay, which could be important in attracting U.S. and other foreign minority investors. This is direct evidence that market forces lead to the convergence of non-U.S. CEO pay to U.S. levels.

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

Finally, we address the concern that (endogenous) institutional ownership and board structure variables may be proxying for omitted firm characteristics also related to CEO pay. Using the 2003–2008 panel of firms, the results are robust to the inclusion of firm fixed effects, which controls for time-invariant unobserved firm heterogeneity. This evidence suggests that American-type shareholder-centric governance leads to higher (and more equity-based) CEO pay. Fixed effects, however, cannot fully address the omitted-variable problem if an unobserved time-variant firm characteristic is driving the relation between CEO pay and governance.

Overall, our evidence is inconsistent with the view that U.S. CEO pay is "excessive" when compared with that of their foreign counterparts (as in Bebchuk, Fried, and Walker 2002 and others). Rather, our findings reflect tighter links between CEO pay and shareholder performance in U.S. firms. First, we show that the U.S. pay premium is modest after controlling for firm, ownership, board, and CEO characteristics. Second, we demonstrate that it is misleading to examine cross-sectional or cross-country differences in the *level* of pay in isolation without also examining differences in the *structure* of pay—namely, the use of equity-based compensation. In fact, the firm, ownership, and board characteristics associated with higher pay are those associated with a larger fraction of equity-based pay. Third, we find that CEO pay levels and the use of equity-based compensation are positively related to variables routinely used as proxies for better monitoring and better governance—namely, institutional ownership and board independence. If U.S. firms had poor governance, we would expect U.S. CEOs to pay themselves higher "safe" base salaries instead of self-imposing higher performance-based pay. Fourth, our findings suggest that the observed U.S. CEO pay premium reflects compensating differentials for the equity-based pay increasingly demanded by internationally diverse boards and shareholders. We find evidence that foreign and U.S. institutional shareholders are linked to a greater use of equity-based pay and higher pay levels in non-U.S. firms in which they invest. Finally, the convergence of U.S. and

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

non-U.S. CEO pay levels since 2003 seems to be explained by the convergence of ownership structures and globalization of capital markets.

1. Background and Data Sources

1.1 The U.S. pay premium: What we thought we knew

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.[2]

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

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

The disclosure situation has improved over the past decade. Regulations mandating disclosure of executive pay were introduced in Ireland and South Africa in 2000 and in Australia in 2004. In May 2003, the European Union (EU) Commission issued an "Action Plan" recommending that all listed companies in the European Union report details on individual compensation packages, and that EU member countries pass rules requiring such disclosure. By 2006, six

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

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

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

Country	Number of CEOs in Sample and Data Source				CEO Total Pay ($ million)		Mean Composition of CEO Pay			
	BoardEx & Exec	Corp. Filings	Total	% of Market Cap	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%	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%
United Kingdom	561	0	561	91%	2.9	1.7	42%	9%	19%	30%
Non-U.S.	1,251	364	1,615	83%	$2.8	$1.6	46%	8%	24%	22%
U.S.	1,648	0	1,648	90%	$5.5	$3.3	28%	6%	27%	39%
All 14 countries	2,899	364	3,263	87%	$4.2	$2.3	37%	7%	25%	31%

2006 fiscal year CEO pay data extracted from S&P's ExecuComp database (U.S.), BoardEx (non-U.S.) (collectively "BoardEx & Exec" in the table), or hand-collected from corporate filings. "% of Market Cap" is computed for each country as the market capitalization of firms with CEO pay data divided by the total market capitalization of firms in Worldscope. We exclude CEOs in their first years to compute the CEO pay statistics. CEO Total 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.

EU members (in addition to the United Kingdom and Ireland) had mandated CEO-level disclosure: Belgium, France, Germany, Italy, the Netherlands, and Sweden. In addition, although not in the EU, Norway also adopted EU-style disclosure rules, and Switzerland demanded similar disclosure for the "highest-paid" executive.

1.2 Data sources

In this paper, we use data from the recently expanded disclosure rules to conduct a comprehensive international comparative analysis of the compensation for CEOs in all countries with detailed individual disclosure of CEO pay.[4] Although we present time-series evidence from 2003 to 2008, we focus primarily on 2006 compensation to avoid temporary pay fluctuations associated with the 2007–2009 global financial crisis. Table 1 reports the sample size and sources for the data, as well as summary statistics for the level and structure of CEO pay in each country.

Our primary data source on compensation for U.S. CEOs is Standard and Poor's (S&P's) ExecuComp database, while our primary source for CEOs of firms based outside the United States is BoardEx, compiled by the U.K.-based firm Management Diagnostics Limited. Together, these two sources (identified

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

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 it includes detailed biographic information on individual executives and board members in nearly fifty countries, including countries that do not have mandatory disclosure requirements for executive compensation. In addition to providing biographic information, BoardEx also includes detailed compensation data for top executives—including salaries, other pay, bonuses, payouts under long-term plans, option grants, and share grants.

To supplement the BoardEx data, we manually collect 2006 pay data from company filings for the largest firms in countries with pay-disclosure requirements but low BoardEx coverage, using annual reports, proxy statements (or their equivalent, such as management information circulars in Canada), and SEC Form 20F for foreign companies that are cross-listed in the United States. Specifically, we built a sample of firms in each country to ensure that we could cover at least the thirty largest publicly listed firms in that country ranked by market capitalization, or a cumulative 80% of that country's stock market capitalization in 2006. For Australia, Canada, and South Africa (where BoardEx has coverage on board composition and biographical information but scanty pay data), we manually collect 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.[5] Ultimately, as reported in Table 1, 364 firms with manually collected data are included in our final sample.

For U.S. firms, we use ExecuComp rather than data from BoardEx to maintain comparability with the existing literature on U.S. CEO pay. However, two aspects of BoardEx's compensation calculation deserve special mention. First, instead of providing grant-date values for stock option grants, as in ExecuComp and our manually collected data, BoardEx computes the value of options granted using the closing stock price on the last trading day of the fiscal year rather than the stock price on the grant date. Since 2006 was a generally positive year for stock markets in the countries included in our study, valuing options using fiscal year-end stock prices (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. In unreported results, we find that measuring pay for U.S. CEOs using BoardEx rather than ExecuComp does not alter the main findings of our study.

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[5] 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: (i) standard deviation of sixty-month stock returns (or as many months as possible) for the volatility; (ii) average three-year dividend yield; (iii) risk-free rate on government bonds issued in each country with a maturity approximating 70% of the option maturity; (iv) exercise price equals market price; and (v) expiration date of 70% of the full maturity (as a partial adjustment for early exercise).

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

   In our analyses of CEO pay in Table 1 (and all our regression analyses below), we exclude 116 U.S. and 135 non-U.S. 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 U.S. CEOs and 1,480 non-U.S. CEOs.[6]

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

2. The Level and Structure of Pay for U.S. and Non-U.S. CEOs

2.1 The U.S. pay premium
The summary statistics in Table 1 suggest that U.S. CEOs receive about double the pay of their foreign counterparts, but this calculation does not control for

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

industry and especially firm size, documented to be an important determinant of the level of executive compensation (Baker, Jensen, and Murphy 1988; Kostiuk 1990; Murphy 1999). In addition to industry and firm size, we consider four groups of potential controls: firm characteristics empirically known to affect the level of CEO pay based on prior evidence in U.S. studies, ownership characteristics known to be systematically different in U.S. versus non-U.S. firms, board characteristics also systematically different in U.S. versus non-U.S. firms, and individual CEO characteristics. Detailed descriptions and data sources for these variables are included in Table A1 (see Appendix), and summary statistics by country are provided in Table A2 (see Appendix). We winsorize some firm-level variables (leverage, Tobin's q, and stock return volatility) at the 1% level.

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

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

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

$$+ \beta_3 (\text{Industry dummies}) + \varepsilon_i.$$

Our main variable of interest is the "U.S. dummy," which evaluates the pay-level differential of U.S.-based top executives over those from other countries. The OLS regression includes fixed effects for twelve 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.[7]

Column (1) of Table 3 reports the results from estimating Equation (1) controlling only for industry and prior-year sales, similar in spirit to the survey-based estimates from Towers Perrin.[8] There is a strong theoretical justification

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

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

Table 2
Difference in U.S. and non-U.S. control variables

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

See Table A1 (see Appendix) for variable definitions and data sources, and Table A2 (see Appendix) for summary statistics by country. Firm, ownership, and board characteristics are measured using 2005 fiscal year data.

for a positive relation between CEO pay and firm size. Rosen (1981, 1982) argues that the marginal product of managerial ability increases with firm size, so it is optimal to assign the most talented managers to the largest firms. Such "assortative matching" produces equilibrium wages that are convex in ability, such that small increases in ability can lead to large increases in wages. Gabaix and Landier (2008) extend Rosen's model by showing that the equilibrium wage of a CEO will depend not only on firm size, but also on the size distribution of all firms in the relevant market: as the average firm becomes larger, competition for scarce managerial talent will bid up compensation.

In column (1) of Table 3, the CEO pay-firm size elasticity is 0.406 (with a t-statistic of 17.44), which is in line with estimates in prior studies. The coefficient on the U.S. dummy of 0.582 (with a t-statistic of 4.14) implies that predicted CEO pay is 79% (i.e., $e^{0.582} - 1$) higher in the United States than in other countries after controlling for size and industry.[9] The R^2 of 0.35 indicates that more than a third of the variation in CEO compensation across the fourteen countries is explained by size, industry, and whether or not the firm is located in the United States.

In column (2) of Table 3 we introduce other (prior-year) firm-level characteristics routinely used in CEO pay regressions and similar to those used in the U.S.-U.K. comparisons by Conyon and Murphy (2000) and

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[9] We obtain a similar estimate of the U.S. pay premium when using propensity score matching methods. We match each non-U.S. firm to a U.S. firm using a probit regression that gives the likelihood that a firm with given characteristics is from outside the United States.

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

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

This table presents regressions of 2006 CEO pay level and structure. All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on twelve Fama-French industries. Variable definitions and sources are in Table A1 (see Appendix). 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.

Conyon, Core, and Guay (2011): leverage, Tobin's q, stock-return volatility, and stock returns. CEO pay is typically expected to be positively related to Tobin's q, using the latter as either a measure of investment opportunities (requiring a more capable CEO and riskier pay, both which will increase pay) or an indicator of past performance (leading to a higher level of pay for CEOs contributing to that performance). The volatility of stock returns is typically expected to be positively related to pay, since CEOs may demand risk premiums for serving in riskier environments.[10] Similarly, leverage increases the riskiness of equity-based compensation, also leading to risk premiums and higher levels of CEO pay. Finally, stock returns are included to capture the expected effect of prior-year performance on current pay levels.[11]

As shown in column (2) of Table 3, CEO pay is positively and significantly related to leverage, Tobin's q, and stock returns (as expected), and negatively and significantly related to the volatility of stock returns. Moreover, the coefficient on the U.S. dummy of 0.629 in column (2) suggests an implied U.S. pay premium of 88%, which is higher than the 79% premium when controlling only for sales and industry. Therefore, the U.S. pay premium is apparently not explained by differences in capital structure, growth opportunities, performance, and volatility.

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

While insider ownership is higher outside the United States, Table 2 shows that institutions hold a significantly larger fraction of the shares in U.S. firms than in non-U.S. firms. We expect that institutions will press for tighter links between pay and shareholder performance (which will generally raise pay), and therefore we expect a positive relation between CEO pay and institutional

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

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

ownership. Hartzell and Starks (2003) focus on the concentration of institutional holdings (the fraction held by the top five institutions) and find that higher concentration is associated with higher use of equity-based compensation, which they interpret as evidence that institutions play a monitoring role.

As shown in column (3) of Table 3, CEO pay is negatively related to insider ownership, and positively related to institutional ownership. In particular, the coefficients on the ownership variables suggest that a 10% increase in insider and institutional holdings is associated with an 8% decrease and 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. Moreover, controlling for ownership structure reduces the coefficient on the U.S. dummy to 0.268, implying a reduction in the U.S. pay premium from 88% in column (2) to 31% in column (3).

Although both insider ownership and institutional ownership are significant determinants of the level of CEO pay, untabulated results suggest that institutional ownership accounts for most of the decline in the estimated U.S. pay premium between column (2) and column (3) of Table 3. In particular, adding only insider ownership to column (2) reduces the coefficient on the U.S. dummy variable from 0.629 to 0.495 (suggesting a reduction in the U.S. pay premium from 88% to 64%), while adding only institutional ownership reduces the coefficient from 0.629 to 0.330 (a reduction in the U.S. pay premium from 88% to 39%).

Column (4) of Table 3 includes controls for board structure, also seen in Table 2 to differ significantly between U.S. and non-U.S. firms.[12] The theoretical prediction of the effect of the composition of the board on CEO pay is somewhat ambiguous, depending on whether a heavier reliance on independent and experienced boards will reduce pay through more effective monitoring, or increase pay through increased reliance on incentive compensation. As shown in column (4), we find that CEO pay is positively related both to the fraction of independent directors on the board and to the average number of boards on which directors sit.[13] Controlling for board structure (in addition to firm and ownership characteristics) reduces the coefficient on the U.S. dummy to 0.230, implying a U.S. pay premium of 26%. Adding only board-structure variables to column (2) reduces the U.S. pay premium from 88% to 66%.

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

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

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

In addition, we also consider differences in individual CEO characteristics as suggested by Table 2, such as age, tenure, external hire dummy, and college degree dummy. Column (1) of Table 4 analyzes differences in pay levels and structures for U.S. and non-U.S. CEOs after controlling for CEO characteristics, in addition to all the firm, ownership, and board characteristics (coefficients not shown) as in column (4) of Table 3. We measure CEO characteristics based on employment histories and personal attributes contained in BoardEx. The sample size is slightly reduced because individual CEO characteristics are not available for some of our hand-collected compensation data in Canada, Australia, and South Africa. Data definitions for these variables are provided in Table A1 (see Appendix). 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 U.S. pay premium of 25% in column (1) of Table 4 is essentially unchanged compared with the 26% premium estimated in column (4) of Table 3. Given the statistical insignificance of CEO characteristics—coupled with the reduction in available observations—we ignore CEO characteristics throughout the remainder of the paper.

2.2 The U.S. equity pay premium

One of the primary determinants of CEO expected pay levels is the riskiness of the pay package, which is captured only indirectly by firm and industry characteristics in Equation (1). As discussed in detail in Section 2.3 below, we expect that CEOs at companies with riskier pay will receive higher expected levels of pay to compensate for the increased risk. In columns (5) and (6) of Table 3, we estimate the following cross-sectional Tobit regression on 2006 pay structures:

$$\frac{\text{Equity Pay}_i}{\text{Total Pay}_i} = \alpha + \beta_1 (\text{US dummy}) + \beta_2 (\text{Firm characteristics}_i) \qquad (2)$$

$$+ \beta_3 (\text{Industry dummies}) + \varepsilon_i,$$
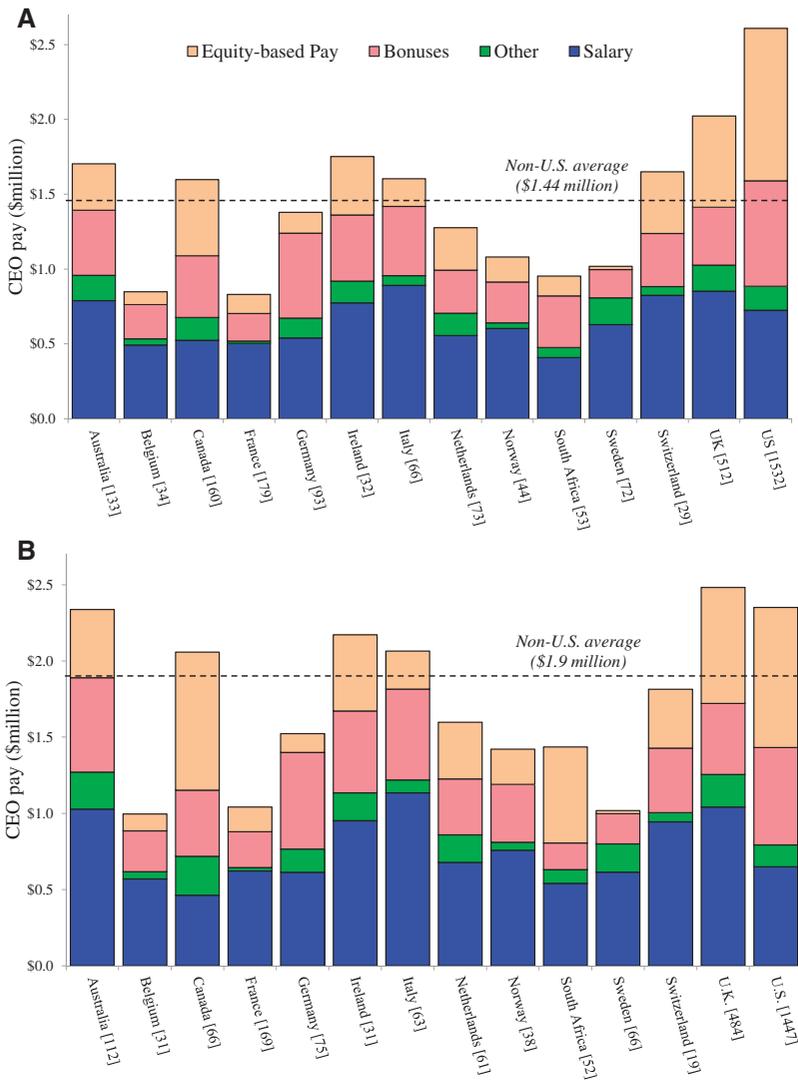
Figure 1
Predicted level and structure of 2006 CEO pay for firms with $1 billion in revenues
Panel A. Controlling for sales and industry. Panel B. Controlling for sales, industry, and firm, ownership, and board characteristics. The figure compares estimated 2006 CEO pay for a CEO running a hypothetical firm with $1 billion in sales on an "average" industry. Panel A controls for sales and industry (as in column (1) of Table 3). Panel B controls for sales, industry, and firm, ownership, and board characteristics (as in column (4) of Table 3). The "non-U.S. average" is weighted by the number of firms in each country. The pay composition percentages are defined as the average composition across all CEOs for each country from Table 1.

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

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

This table presents regressions of 2006 CEO pay level and structure. The regressions include the same controls for firm characteristics, ownership structure, and board structure as in Table 3, column (4) (coefficients not shown), with additional controls for CEO characteristics. Regressions also include industry dummy variables based on twelve Fama-French industries. Variable definitions and sources are in Table A1 (see Appendix). 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.

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

Column (5) of Table 3, which controls only for industry and firm size, suggests a U.S. equity pay premium of 22%. This is slightly larger than the 17% implied from the summary statistics in Table 1, where equity-based pay accounted for 39% and 22% of total pay for U.S. and non-U.S. firms, respectively. However, after controlling for firm, ownership, and board characteristics in column (6) of Table 3, the U.S. equity pay premium falls to a statistically insignificant 6%, implying only a relatively modest increased use of equity-based pay for U.S. CEOs. Moreover, column (6) shows that the firm characteristics associated with higher pay are generally also associated with a higher use of performance-based compensation. Importantly, both the level of CEO pay and the use of incentive compensation are positively related to

institutional ownership and the fraction of independent directors, and negatively related to insider ownership. Combined with the results in columns (3) and (4), these findings suggest that the reduction in the U.S. pay premium comes from the performance-based pay demanded by institutional shareholders and more independent boards.

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

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

2.3 Risk-adjusted CEO pay

In comparing the level of CEO pay across companies and countries, it is important to distinguish between two different valuation concepts: the cost to the company of granting the compensation and the value to the CEO from receiving that compensation. Our measure of total compensation is meant to approximate the grant-date *opportunity cost* to shareholders of the CEO's pay package. However, it does not approximate the *value* of the package from the perspective of a risk-averse and undiversified CEO who presumably does not hedge the risk of the package. Although the 2006 pay differences for U.S. versus non-U.S. CEOs are economically modest after controlling for firm, ownership, and board characteristics, the results in Table 3 nonetheless suggest that U.S. CEOs are paid more than their foreign counterparts and receive a greater share of their compensation in equity-based compensation. Since risk-averse CEOs will naturally demand a "risk premium" for accepting stock or stock options in lieu of safer forms of compensation, it is possible that part of the U.S. pay premium reflects a compensating differential for the increased risk of U.S. pay packages. Indeed, Conyon, Core, and Guay (2011) conclude that adjusting for risk plausibly explains the observed 2003 pay differences between U.S. and U.K. CEOs.

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

measure of "risk-adjusted CEO pay" that can be compared across companies and countries.

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

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

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

2.3.1 Hall-Murphy risk adjustment. Following Hall and Murphy (2002), suppose that a CEO has non-firm-related wealth of w, holds a portfolio $S(\cdot)$ of company shares and options, and is granted n options to buy n shares of stock at exercise price X in T years. Assuming that w is invested at the risk-free rate, r_f, and that the realized stock price at T is P_T, the CEO's wealth at time T is given by[14]

$$W_T \equiv w\left(1+r_f\right)^T + s(P_T) + n \times max\left(0, P_T - X\right). \tag{3}$$

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

$$W_T^V \equiv (w+V)\left(1+r_f\right)^T + s(P_T). \tag{4}$$

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

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

$$\int U\left(W_T^V\right) f(P_T) dP_T \equiv \int U(W_T) f(P_T) dP_T. \tag{5}$$

Solving (5) numerically requires assumptions about the form of the utility function, $U(W)$, and the distribution of future stock prices, $f(P_T)$. We follow Hall and Murphy (2002) in assuming that the CEO has constant relative risk aversion ρ, so that $U(W) \equiv ln(W)$ when $\rho = 1$, and $U(W) \equiv \frac{1}{1-\rho} W^{1-\rho}$ when $\rho \neq 1$. We adopt the capital asset pricing model and assume that the distribution of stock prices in T years is lognormal with volatility σ and expected return value equal to $(r_f + \beta(r_m - r_f) - \sigma^2/2)T$, where β is the firm's systematic risk and r_m is the return on the market portfolio.[15]

To solve for certainty-equivalent values, we extract BoardEx and ExecuComp data on the "total wealth" of the CEO (defined as the market value of stock held plus the intrinsic "in-the-money" value of options held at fiscal year-end). We manually collect similar data for firms in Australia, Canada, and South Africa. We make several simplifying assumptions. First, we assume that both restricted stock and option grants have a vesting term of five years (equal to the average and median "expected term" for option grants in our U.S. sample). Second, we assume that the CEO holds shares equal to total wealth divided by the year-end share price, and further assume that these shares will be held for exactly five years.[16] We find that U.S. CEOs have substantially more wealth tied up in their firms, with stock and option holdings being on average over nine times their compensation, while the equivalent multiple is only three for non-U.S. CEOs. Assuming that U.S. CEOs are no less risk averse than their foreign counterparts, these wealth data suggest larger risk adjustments for U.S. CEOs than non-U.S. CEOs, which in turn will reduce the estimated U.S. pay premium. For other inputs, we assume a market risk premium of 6.5% and use local risk-free rates for seven- to ten-year government bonds, and for each firm, we calculate the three-year dividend yield and standard deviation using the last thirty-six months of stock returns. Finally, following Hall and Murphy (2002), we assume that CEOs have relative risk-aversion parameters of two or three, and that each CEO has "safe wealth" equal to the greater of $5 million or four times the current cash compensation.

Panel A of Table 5 shows how the observed U.S. premium decreases when CEO pay is measured on a risk-adjusted basis following the

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[15] 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.

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

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

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

(*continued*)

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

Panel A of Figure 2 shows the international distribution of predicted 2006 CEO *risk-adjusted* pay, following the Hall and Murphy (2002) methodology, adjusting only for sales and industry, for a hypothetical firm with $1 billion sales

Table 5
Continued

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

In Panel A, risk-adjusted pay is estimated using the Hall-Murphy approach, defined as the amount of riskless cash compensation the CEO would exchange for his new stock and option grants, conditional on his wealth. In Panel B, the risk-adjusted pay is estimated using the Conyon-Core-Guay approach, defined as the dollar amount of compensation minus the riskless cash compensation the CEO would demand in exchange for his wealth for one more year. The risk-adjusted accounting-based bonuses are assumed to be 80% of actual bonuses. The CEO's safe wealth is assumed to be the maximum between $5 million and four times total pay. Certainty equivalents are estimated numerically assuming that the CEO has constant relative risk aversion (rra) of 2 or 3, and assuming that the distribution of stock prices over the actual term of the options granted is lognormal with volatility σ and expected return value $(r_f + \beta(r_m - r_f) - \sigma^2/2)T$, where σ and β are determined using monthly stock-return data over thirty-six 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 Table A1 (see Appendix). Regressions include industry dummy variables based on twelve Fama-French industries. Robust *t*-statistics in parentheses are based on standard errors clustered by country. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% levels, respectively.

based on the specification in column (3) of Table 5, with the "U.S. dummy" replaced with a set of fourteen country dummies. The figure shows that the U.S. estimated pay using the "certainty equivalence" approach is $2.1 million, which is statistically higher than non-U.S. average risk-adjusted pay of $1.46 million. Panel B of Figure 2 shows risk-adjusted pay levels per country controlling for firm, ownership, and board characteristics, based on the specification in column (4) of Table 5. CEO pay in the United States is significantly less than CEO pay in the United Kingdom and Australia, and insignificantly different from CEO pay in Canada, Italy, Ireland, and Switzerland.
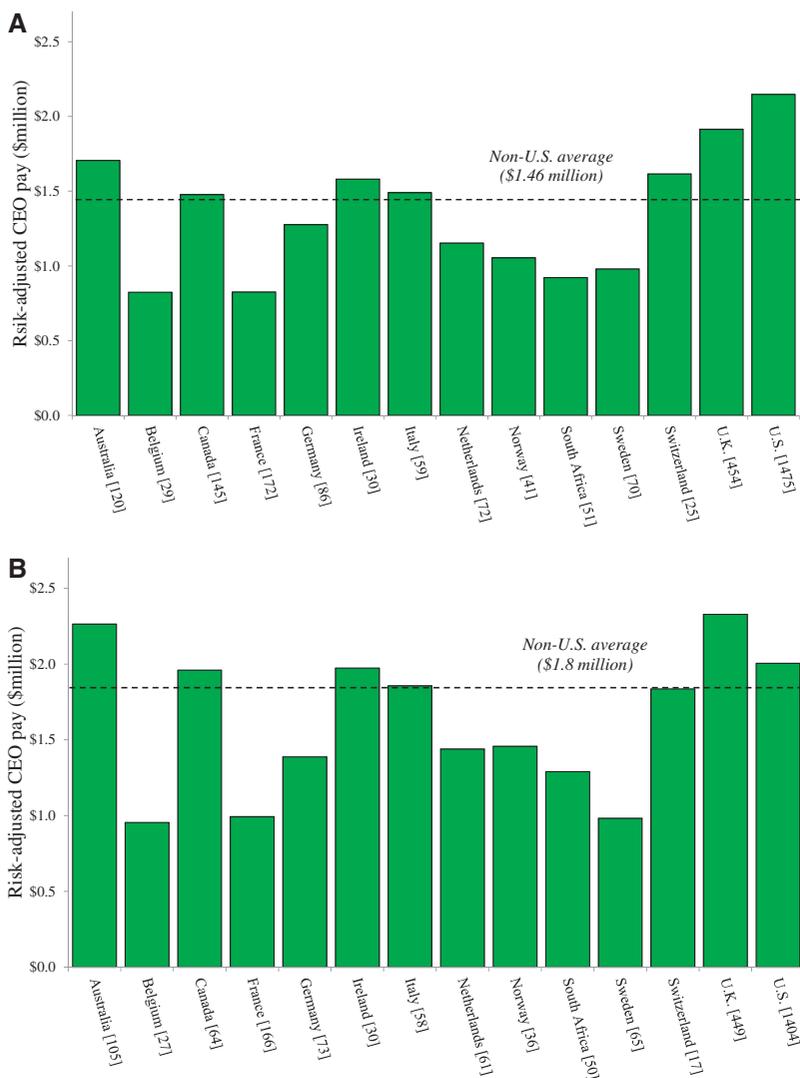
Figure 2
Predicted level of risk-adjusted 2006 CEO pay for firms with $1 billion in revenues
Panel A. Hall-Murphy Risk Adjustment—Controlling for sales and industry. Panel B. Hall-Murphy Risk Adjustment—Controlling for sales, industry, and firm, ownership, and board characteristics. The figure compares 2006 CEO risk-adjusted pay for a CEO running a hypothetical firm with $1 billion in sales on an "average" industry. Risk-adjusted pay is estimated using the Hall-Murphy certainty equivalence approach. Relative risk aversion is 2, and safe wealth is the maximum between $5 million and four times total pay. Panel A controls for sales and industry (as in Panel A, column (3), of Table 5). Panel B controls for sales, industry, and firm, ownership, and board characteristics (as in Panel A, column (4), of Table 5).

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

The certainty equivalents are estimated numerically assuming that the CEO has constant relative risk aversion (rra) of two or three and assumptions similar to Table 5, Panel A, columns (3)–(6), in terms of safe wealth and the distribution of stock prices (risk-free, beta, equity risk premium) but over a horizon of one year. Columns (1)–(4) of Panel B of Table 5 present the results. We also consider the median risk premium for holding incentives that Conyon, Core, and Guay (2011) estimate in their Table 5, which corresponds to a risk premium of 5.8% of beginning-of-year portfolio stock and options (which we measure as "total wealth"), as an alternative to the CEO-specific calculation. In this case, we calculate risk-adjusted pay by subtracting 5.8% of the CEO's "total wealth." Columns (5)–(6) of Panel B of Table 5 present the results.[17]

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

The conclusions from Table 5 are robust to the risk-adjustment method as well as to alternative definitions of safe wealth, equity premiums, and option terms: under all specifications, the implied U.S. pay premium is

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

monotonically decreasing in risk aversion, and becomes insignificant at relatively low levels of risk aversion after controlling for firm, ownership, and board characteristics. Calculating more precise estimates of risk-adjusted compensation for individual CEOs requires data unavailable to us, including details of CEO outside wealth and measures of individual risk aversion. Nonetheless, we consider the results in Table 5 to be consistent with Conyon, Core, and Guay's (2011) conclusion that part of the U.S. pay premium reflects compensating differentials for the higher risk of U.S. pay packages. These risk adjustments, however, reduce but do not eliminate observed U.S. pay premiums unless we also control for differences in ownership and board structures.

2.4 Are CEO pay determinants different for U.S. and non-U.S. firms?

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

The estimated coefficients in Table 6 suggest an alternative way to evaluate the U.S. premium without restricting the regression coefficients to be the same for U.S. and non-U.S. firms. For each U.S. CEO, we use the CEO's industry, firm, ownership, and board characteristics to compute the CEO's hypothetical pay (using the coefficients from the non-U.S. regression in column (2) of Table 6), thus measuring the expected pay of that same CEO if he were in a non-U.S. firm with the same characteristics. The implied U.S. premium can be measured as the percentage difference between the actual and hypothetical pay for the U.S. CEOs. The actual (U.S.) pay exceeded the hypothetical (non-U.S.) pay for 70% of the U.S. CEOs, with an average implied U.S. pay premium of 40%. Similarly, we compare the hypothetical pay for non-U.S. CEOs (using

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

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

This table presents regressions of 2006 CEO pay level and structure. All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on twelve Fama-French industries. Columns (3) and (6) are run for a pooled regression using a sample of U.S. and non-U.S. firms that include interaction variables of all variables with U.S. dummy and *p*-values indicating whether the coefficient of a variable for U.S. firms is significantly different from the coefficient for non-U.S. firms. Variable definitions and sources are in Table A1 (see Appendix). Robust *t*-statistics in parentheses are based on standard errors clustered by country (for non-U.S. regressions) and by industry (for U.S. regressions). ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% levels, respectively.

the coefficients from the U.S. regression in column (1) of Table 6) to the actual pay to estimate the implied U.S. premium for non-U.S. CEOs. We find that the hypothetical (U.S.) pay exceeded the actual (non-U.S.) pay for 59% of the non-U.S. CEOs, with an average implied U.S. pay premium of 21%. These numbers suggest that our finding of a positive U.S. CEO pay premium of 26% in column (4) of Table 3 is not driven by our assumption of equal coefficients.

We have shown that the U.S. CEO pay premium is economically modest when we control for firm, ownership, and board characteristics, but without including country-level variables routinely used in international studies of corporate governance to measure differences in the economic, law, and institutional environment of each country. The limited number of countries

in our sample (fourteen) limits the statistical degrees of freedom for reliably identifying country-level determinants of pay practices. In unreported analysis, we find that CEO equity-based pay (and total pay) is more prevalent in common-law countries (La Porta et al. 1998) like the United States as well as the United Kingdom, Australia, Canada, Ireland, and South Africa. CEO pay is also higher in countries with stronger investor protections and private control of self-dealing (Djankov et al. 2008). We also consider different aspects of a country's regulatory environment. We find a positive association between CEO equity-based pay (and total pay) and the levels of compensation disclosure and director liability (La Porta, Lopez-de-Silanes, and Shleifer 2006); note that the United States scores high in both indices. We find that equity-based pay is lower in countries with friendlier collective labor laws and countries where labor unions are more powerful (Botero et al. 2004), such as in continental European countries (e.g., France and Germany).

3. The Internationalization (and Americanization) of CEO Pay

Many of the companies in our non-U.S. 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 U.S. pay and equity pay premiums exist when U.S. firms are compared with non-U.S. multinationals. We use two approaches to identify multinationals: internationalization (foreign institutional ownership, foreign investor demand, foreign sales, and the international diversity of the board of directors) and Americanization (U.S. institutional ownership, U.S. cross-listings, U.S. acquisitions, and directors with U.S. board experience).[18]

3.1 CEO pay in internationalized firms

Panel A of Table 7 shows how internationalization affects the level and structure of CEO pay in non-U.S. companies. The regressions include the firm, ownership, and board characteristics in Table 3, except that institutional ownership is now separated into two components: domestic and foreign institutional ownership. The regressions include four measures of internationalization: (i) foreign institutional ownership; (ii) a dummy variable indicating whether the firm is included in the 1,500-firm MSCI All Country World Index (routinely used as a benchmark for global equity mutual funds and used here as a proxy for foreign investor demand); (iii) foreign sales as a

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

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

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

This table presents regressions of 2006 CEO pay level and structure. All control variables are measured at the end of the previous year. Regressions include industry dummy variables based on twelve Fama-French industries and country dummies. The regressions include the same controls for firm characteristics, ownership structure, and board structure for non-U.S. firms as in Table 3, column 4. We add controls for internationalization and Americanization. Variable definitions and sources are in Table A1 (see Appendix). 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.

fraction of total sales; and (iv) the number of different nationalities represented on the board of directors divided by the total board size.

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

Figure 3 plots the implied U.S. pay and equity pay premiums for subsets of non-U.S. firms based on our four internationalization variables. The U.S. premiums are derived by estimating the U.S. dummy variable in Equation (1) for pay premiums (in Panel A) and Equation (2) for equity pay premiums (in Panel B) after controlling for firm, ownership, and board characteristics and using all U.S. CEOs and subsets of non-U.S. 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-U.S. 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 U.S. pay premium is insignificant for
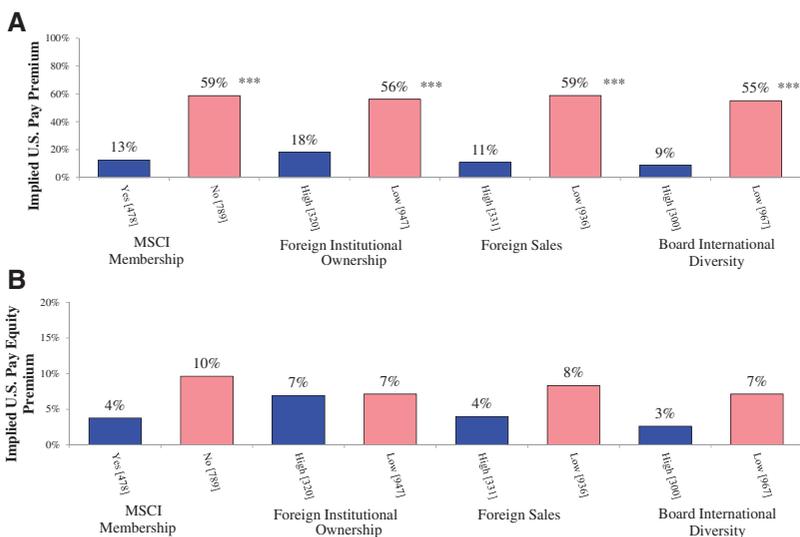
Figure 3
Implied differences in U.S. versus non-U.S. CEO pay for subsets of non-U.S. firms based on measures of internationalization
Panel A: Implied US CEO Pay Premiums. Panel B: Implied US CEO Equity Pay Premiums. The figure plots the U.S. dummy variables in regressions similar to Table 3, column (4), for pay levels (converted into percentages) and column (6) for equity pay (in percentages), where the U.S. sample is compared with two subsets of the non-U.S. sample (number in brackets) based on the following measures of internationalization: *MSCI Membership:* "Yes" indicates that the non-U.S. firm is a member of the MSCI All-Country World Index. *Foreign Institutional Ownership:* "High" indicates that foreign institutional ownership is above the 75th percentile for non-U.S. firms. *Foreign Sales:* "High" indicates that the firm's foreign sales (expressed as a percentage of total sales) are above the 75th percentile for non-U.S. 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-U.S. firms. ***, **, * indicate that the coefficient on the U.S. dummy on each underlying regression depicted above is significant at the 1%, 5%, and 10% levels, respectively.

all subsets of "internationalized" firms and significantly positive for all subsets of "non-internationalized" firms. Panel B shows that U.S. equity pay premium is insignificant for all subsets of internationalized firms.

3.2 CEO pay in Americanized firms

Panel B of Table 7 analyzes how the level and structure of CEO pay in non-U.S. companies are affected by explicit exposure to U.S. capital, product, and labor markets (as opposed to exposure to "foreign" markets generally). The regressions again include the firm, ownership, and board characteristics in Table 3. In addition, the regressions include four measures of Americanization: (i) U.S. institutional ownership to measure the differential effect of U.S. and non-U.S. ownership; (ii) a dummy variable indicating whether the firm is cross-listed on U.S. exchanges, which we use as a proxy for demand by

U.S. investors;[19] (iii) the total acquisitions of U.S. companies between 1996 and 2005, expressed as a percentage of market capitalization, as a proxy for exposure to U.S. product and labor markets; and (iv) the fraction of directors who also sit on boards of companies headquartered in the United States, as a proxy for exposure to U.S. pay practices.

As shown in column (3) of Table 7, the level of pay for non-U.S. CEOs is positively and significantly related to U.S. institutional ownership, but not to institutional ownership from other countries: a 10% increase in U.S. institutional ownership is associated with approximately a 16% (i.e., $0.1(e^{0.967} - 1) = 0.16$) increase in CEO pay. In addition, CEO pay is 21% higher (i.e., $e^{0.188} - 1 = 0.21$) in firms cross-listed on U.S. exchanges, and it is also higher for non-U.S. companies acquiring U.S. firms (and, presumably, a U.S.-based workforce) as well as with boards where directors also serve on the board of U.S. firms. Column (4) shows that the use of equity pay in non-U.S. firms is higher in firms cross-listed on U.S. exchanges, higher in firms with more institutional ownership (but there is no statistical difference between U.S. and non-U.S. ownership), and higher in firms that made more U.S. acquisitions. Equity pay, however, is not higher in firms where directors have more U.S. board experience.

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

The results from Figure 4 imply that the differences in the level and structure of CEO pay for U.S. and non-U.S. firms are driven by non-U.S. firms with low exposure (or no exposure) to U.S. 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 U.S. CEOs and non-U.S. firms that are cross-listed in the United States, have high levels of U.S. institutional ownership, own operations in the United States, or have board members who also sit on U.S. boards.

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[19] Data on non-U.S. firms listed on U.S. exchanges (Level 2 and 3 American depository receipts [ADRs]) are obtained by the major depository institutions: Citibank, Bank of New York Mellon, JPMorgan, and Deutsche Bank. We also add cases of non-U.S. firms with ordinary listings on U.S. exchanges (as for several Canadian firms).
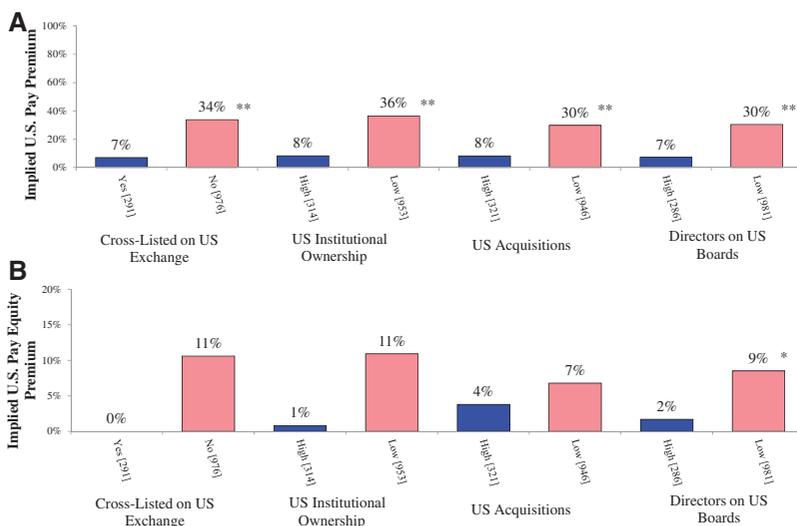
Figure 4
Implied differences in U.S. vs. non-U.S. CEO pay for subsets of non-U.S. firms based on measures of Americanization
Panel A: Implied U.S. CEO Pay Premiums. Panel B: Implied U.S. CEO Equity Pay Premiums. The figure plots the U.S. dummy variables in regressions similar to Table 3, column (4), for pay levels (converted into percentages) and column (6) for equity pay (in percentages), where the U.S. sample is compared with two subsets of the non-U.S. sample (number in brackets) based on the following measures of Americanization: *U.S. Institutional Ownership:* "High" indicates that U.S. institutional ownership is above the 75th percentile for non-U.S. firms. *Cross-Listed on U.S. Exchange:* "Yes" indicates that a non-U.S. firm is cross-listed on a U.S. exchange. *U.S. Acquisitions:* "High" indicates that the volume acquisitions of U.S. companies over the prior ten years (expressed as a percentage of market capitalization) are above the 75th percentile for non-U.S. firms. *Directors on U.S. Boards:* "High" indicates that the fraction of directors of non-U.S. firms who also sit on boards of U.S. firms is above the 75th percentile. ***, **, * indicate that the coefficient on the U.S. dummy on each underlying regression depicted above is significant at the 1%, 5%, and 10% levels, respectively.

3.3 Why do Americanized firms adopt U.S. pay practices?

Non-U.S. firms may adopt U.S.-style pay packages to compete directly for talent in the global managerial labor market. The "competitive pay package" for U.S. executives has evolved to include large grants of stock and options and high overall levels of expected total compensation. Foreign firms attempting to attract executives in competition with equivalent U.S. firms will need to offer packages that are competitive with U.S. levels. This explanation for U.S.-style pay packages in non-U.S. 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).[20] However, while few non-U.S. firms hire American CEOs, U.S. firms are increasingly hiring non-native CEOs, which

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

in turn affect competitive packages for CEOs outside the United States who might be attracted by U.S. firms.[21]

Potentially more interesting are our results related to exposure to the U.S. capital market. In particular, we find that companies with higher U.S. institutional investment that are cross-listed on U.S. exchanges adopt U.S.-style packages. In a survey paper, Karolyi (2010) identifies the key trade-off that firms face when they cross-list their stocks on the U.S. stock market to have access to a larger capital market versus the additional regulatory and legal burdens that come with the listing. Stulz (1999) and the empirical work that has followed it (e.g., Doidge, Karolyi, and Stulz 2004) suggest that cross-listing firms benefit from "bonding" themselves to an increased level of disclosure and scrutiny in order to comply with U.S. Securities and Exchange Commission (SEC) regulations and U.S. Generally Accepted Accounting Principles (GAAPs). One of those mechanisms could be implementing U.S.-style compensation packages that align executive incentives more with shareholder interests. This would predict that cross-listed firms use more equity-based pay, and this could be an important factor to attract U.S. and other foreign minority shareholders.[22] 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 U.S. securities law (Gerakos, Piotroski, and Srinivasan 2010). However, this last channel would predict that the increase in pay for CEOs would come not in the form of increased grants of equity-based pay but rather in increases in "safe" base salary.

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

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[21] See, for example, Hymowitz, "Foreign-born CEOs are increasing in U.S., rarer overseas," *Wall Street Journal* (2004). Even when firms outside the United States are not competing with U.S. firms for CEO-level talent, exposure to the U.S. 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 U.S. and German executives. Similarly, in 2000, Europe's largest software company, SAP, adopted U.S.-style options to stop senior executives from leaving the company's U.S. division. See Bulkeley, "DaimlerChrysler to equalize pay of German, U.S. execs," *Bloomberg News* (1999), and Benoit, "SAP vote may spell German rethink," *Financial Times* (2000).

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

4. Time Trends in the U.S. CEO Pay Premium, 2003–2008

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

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

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

Second, we examine the effect of using different samples across year in the estimates of the U.S. pay premium. Panel D of Table 8 presents estimates of yearly regressions using a sample of firms for which there are data on CEO pay (and control variables) for every year from 2003 to 2008. The constant sample consists of 898 U.S. firms and 513 non-U.S. firms. The estimated U.S. pay

Table 8
Time trends in U.S. CEO pay premium, 2003–2008

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

This table presents regressions of CEO pay level and structure from 2003 to 2008. Panel A shows estimated U.S. dummy coefficients from year-by-year regressions controlling for sales and industry dummies (the 2006 column for "Implied U.S. Pay Premium" corresponds to column (1) of Table 3, converted into percentages). Panel B shows estimated U.S. dummy coefficients from year-by-year regressions controlling for sales and industry dummies, firm, ownership, and board characteristics (the 2006 column for "Implied U.S. Pay Premium" corresponds to column (4) of Table 3). Panel C shows U.S. dummy coefficients for pooled regressions (i.e., imposing constant slopes for 2003–2008). Panel D shows results from year-by-year regressions using the sample of firms for which there is CEO pay data in all years from 2003 to 2008. Panel E also uses a constant sample of firms (as in Panel D) and imposes constant slopes for 2003–2008. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% levels, respectively.

premium is more moderate for this set of firms in 2003 and is insignificant in more recent years, which is consistent again with a time convergence of CEO pay to U.S. levels.

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

In untabulated results, we analyze the time series of the determinants of CEO pay and conclude that an increase in institutional ownership seems to be the main factor associated with the time convergence in CEO pay levels. The average institutional ownership in non-U.S. firms increases from 18% to 34% over the sample period. Foreign ownership is a major contributor for this

increase in institutional ownership, with an increase from 6% to more than 15%. Other firm and board characteristics do not exhibit significant trends. We conclude that the convergence of U.S. and non-U.S. CEO pay levels since 2003 seems to be associated with the convergence of ownership structures and globalization of capital markets.

5. Ownership, Governance, and CEO Pay

Our finding that the U.S. pay premium is modest occurs only in specifications where we control for institutional ownership and (to a lesser extent) insider ownership and board composition. This result, however, does not imply that institutional ownership and board structures *cause* high levels of CEO pay, since our (endogenous) ownership and governance variables may be proxying for, or correlated with, omitted factors also related to pay.

In this section, we analyze further the relation between our ownership and governance variables and the level and structure of CEO pay. We begin by exploring a variety of channels potentially linking ownership and governance to pay levels. We argue that institutional owners and independent boards demand higher-ability CEOs and impose more turnover and compensation risk, which in turn raises pay. Second, we show that the empirical relation between ownership, governance, and CEO pay holds when estimating separate regressions for U.S. and non-U.S. firms, suggesting that our control variables are not simply a substitute for the U.S. dummy in our previous analyses. Third, we show that the empirical relations hold in panel regressions with firm fixed effects, suggesting that our result is not driven by unobservable time-invariant firm characteristics. Finally, we argue (and cannot reject) that our results could be driven in part by time-varying omitted factors such as the increasing "professionalism" or Americanization of non-U.S. firms.

5.1 Why shareholder-centric governance might lead to higher CEO pay
The ownership and governance variables associated with higher CEO pay—institutional ownership and board independence—are routinely used as proxies for strong shareholder monitoring and good corporate governance. While it may seem counterintuitive that such "shareholder-centric" governance leads to higher (rather than lower) expected pay, the positive association can be both rational and efficient.

First, institutions and independent boards routinely press for tighter links between CEO pay and shareholder performance. As shown in Tables 3, 5, 6, and 7, institutional ownership (especially by U.S. institutions) is associated with more equity-based pay as well as higher total pay. In contrast, we find that insider ownership is associated with less equity-based pay and lower total pay. Table 6 also shows that equity-based and total pay are positively related to the fraction of independent directors in U.S. firms. Since risk-averse CEOs demand a "risk premium" for accepting stock or stock options in lieu of safer forms

of compensation, it follows that expected pay levels will be higher in firms with more equity-based pay. As shown in Table 5, adjusting for risk reduces but does not eliminate the positive relation between CEO pay and institutional ownership.[23]

Second, institutions and independent boards increase the risk of performance-related terminations, adding to the risk premium demanded by risk-averse CEOs. Prior studies like Weisbach (1988) show that the probability of CEO terminations following poor performance increases with the fraction of independent board members. In an international study covering firms in twenty-three countries between 2003 and 2008, Aggarwal et al. (2011) show that CEO turnover-performance sensitivity increases with the fraction of shares held by institutions using a similar sample to the one used in this paper. Lel and Miller (2008) document increased CEO turnover-performance sensitivities for non-U.S. firms that are cross-listed on U.S. exchanges, in line with our "Americanization" results in Section 3.

More broadly, Aggarwal et al. (2011) find a positive association between institutional ownership and a variety of shareholder-friendly governance attributes, namely board composition and anti-takeover provisions, and conclude that changes in institutional ownership drive subsequent changes in governance. These findings suggest that CEOs in firms with high institutional ownership are pressed to perform and are less able to enjoy the "quiet life" (Bertrand and Mullainathan 2003). Therefore, institutional ownership causes the CEO to take some actions that he would not have taken otherwise (e.g., working harder, downsizing, shareholder distributions, selling the firm). The CEO will naturally require a compensating differential for taking the actions that he otherwise would not have taken.

5.2 Do omitted variables explain both pay and shareholder-centric governance?

5.2.1 Shareholder-centric governance as a proxy for U.S. firms.
As suggested by Table 1, there are significant differences in ownership and governance characteristics between U.S. and non-U.S. firms, with U.S. firms exhibiting higher institutional ownership and more independent boards. Therefore, our finding that institutional ownership and board structure largely "explain" the U.S. pay premium might reflect the high correlations between these variables and the U.S. dummy variable, and not correlations between these variables and CEO pay.

In Section 2.4, we have explored differences across U.S. and non-U.S. firms in terms of the determinants of the level and structure of CEO pay. In comparing columns (1) and (2) of Table 6, we find that the relation between institutional

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[23] In untabulated results, we reestimated the regressions in columns (3) and (4) of Table 3 after including the Pay Mix (i.e., equity pay divided by total pay) as an additional explanatory variable. Including Pay Mix also reduced, but did not eliminate, the relation between ownership and pay.

ownership and both CEO pay and the use of equity-based pay is significantly positive for both U.S. and non-U.S. firms. CEO pay and the use of equity-based pay are positively related to board composition for U.S. firms (but not for non-U.S. firms). Overall, while the results in Table 6 reveal some differences in the determinants of the level and structure of CEO pay in U.S. and non-U.S. firms, our finding that the U.S. pay premium is modest after controlling for ownership and board characteristics does not appear to be driven by the correlation between these characteristics and the U.S. dummy variable.

5.2.2 Panel regressions with firm fixed effects. While the results in Tables 3, 5, 6, and 7 are consistent with the hypothesis that increases in institutional ownership and board independence lead to higher CEO pay, the results are also consistent with the existence of omitted variables correlated with ownership and board structure, as well as CEO pay. To the extent that these characteristics are specific to a firm, industry, or country but do not change over time, we can control for them with firm fixed effects using pooled cross-sectional time-series (panel) data.

Table 9 reports coefficients from ordinary least squares regressions, with and without firm fixed effects, based on the panel data described and analyzed in Section 4.[24] Columns (1) and (3) report coefficients from estimating regressions in Equations (1) and (2) with the 2003–2008 panel, after excluding the U.S. dummy but including year fixed effects. We find that both CEO pay and the fraction of equity-to-total pay are higher in firms with higher institutional ownership and board independence, and lower in firms with higher insider ownership, in the panel data.[25] Columns (2) and (4) include firm fixed effects to control for time-invariant factors specific to a particular firm. We find that increases in CEO pay are associated with increases in institutional ownership and board independence, and decreases in insider ownership. Increases in the use of equity-based pay are positively related to increases in institutional ownership and negatively related to increases in insider ownership, and weakly related to changes in board structure. While not disproving the existence of time-variant omitted factors correlated with ownership, board structure, and CEO pay, the fixed-effects results indicate that our ownership and board variables are not merely proxying for omitted time-invariant firm characteristics.

5.2.3 CEO pay and the rise of professional executives. The fixed-effects regressions in the prior section control for omitted time-invariant firm characteristics, but do not control for time-variant omitted factors that might be correlated with both CEO pay and shareholder-centric governance.

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[24] To facilitate the inclusion of firm fixed effects, the coefficients in columns (3) and (4) are based on ordinary least squares instead of Tobit regressions.

[25] We obtain similar results for insider and institutional ownership after restricting our sample to a balanced sample of firms with complete data over the six-year sample, but the coefficient on board structure becomes insignificant.

Table 9
Panel regressions of the level and structure of CEO pay, 2003–2008

	Dependent Variable:		*Dependent Variable*: Equity Pay / Total Pay	
	Ln(CEO Total Pay)			
	OLS	Firm Fixed Effects	OLS	Firm Fixed Effects
	(1)	(2)	(3)	(4)
Firm characteristics:				
Sales (log)	0.320***	0.232***	0.029***	0.026*
	(12.92)	(3.42)	(6.23)	(1.80)
Leverage	0.253***	−0.137	0.013	−0.061***
	(2.75)	(−1.35)	(0.45)	(−5.40)
Tobin's q	0.078***	0.042***	0.020***	0.004
	(3.64)	(4.77)	(8.75)	(0.57)
Stock-return volatility	−0.162***	−0.292***	−0.003	−0.039***
	(−3.97)	(−7.98)	(−0.11)	(−3.33)
Stock return	0.140***	0.167***	0.008	0.027***
	(8.66)	(21.15)	(1.01)	(4.36)
Ownership structure:				
Insider ownership	−0.830***	−0.113***	−0.218***	−0.026***
	(−4.02)	(−3.12)	(−12.85)	(−3.18)
Institutional ownership	0.441***	0.211***	0.129***	0.049***
	(3.43)	(3.34)	(3.34)	(5.09)
Board structure:				
Board size	0.008	−0.004	−0.005	−0.002
	(1.54)	(−0.67)	(−1.51)	(−0.64)
Fraction of independent directors	0.429***	0.186*	0.149***	0.008
	(3.07)	(1.85)	(2.95)	(0.29)
CEO-chairman dummy	0.106	0.053*	−0.012	−0.019***
	(1.30)	(1.73)	(−0.75)	(−6.36)
Avg. number of board positions	0.175***	0.344	0.041***	0.007
	(6.51)	(1.44)	(4.63)	(1.36)
Observations	13,659	13,659	13,655	13,655
R-squared	0.43	0.82	0.23	0.64

This table presents regressions of CEO pay level and structure from 2003 to 2008. All control variables are measured at the end of the previous year. Columns (1) and (3) include industry and year fixed effects, and columns (2) and (4) include firm and year fixed effects. Variable definitions and sources are in Table A1 (see Appendix). 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.

One potential time-variant omitted factor is the increasing importance of "professional executives" in firms outside the United States.

The early 1900s witnessed the emergence of large publicly traded corporations in the United States with complex management structures that often displaced owner-managed and family-founded enterprises (Wells 2010). Accompanying the rise in the widely held corporation was the emergence of "professional executives"—non-owners (or non-family members) hired to manage the firm's assets on behalf of dispersed shareholders. The conflicts arising between the owners of large publicly traded corporations and their hired executives is the "agency problem" explored by Berle and Means (1932) and Jensen and Meckling (1976). As documented by Murphy (forthcoming), attempts to mitigate these problems in the United States included restricted and qualified stock options (encouraged by favorable tax subsidies), stock appreciation rights and nonqualified stock options, restricted stock grants, performance shares, and myriad other equity-based pay plans. The lure

of exceptional rewards for exceptional performance attracted the best-and-brightest U.S. college graduates, and also facilitated the escalation of Masters of Business Administration programs in America's top universities. The relative importance of equity as a fraction of total compensation exploded in the 1990s, driven (in part) by the rise in shareholder activism and the increasing importance of institutional shareholders (who, by the 1990s, owned the majority of shares of large U.S. corporations).[26]

While firms outside the United States continue to be dominated by founding families and groups, there has been a nascent international trend toward "professional executives" and what we have called "Americanized" firms. In fact, Panel D of Table 2 shows that, as of 2006, CEOs of non-U.S. firms are more likely to be hired from outside than CEOs of U.S. firms. In addition, ownership structures have shifted substantially in the past decade in non-U.S. firms toward greater institutional ownership (Ferreira and Matos 2008; Aggarwal et al. 2011). The simultaneous rise in institutional ownership and hiring and motivating professional managers could indeed be a potential explanation for the correlation between CEO pay and institutional shareholdings.[27]

6. Conclusion

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

First, we show that the alleged U.S. pay premium, after controlling for firm, ownership, and board characteristics, is economically modest. The premium has declined substantially since 2003 (58%), becoming economically modest by 2006 (26%) and statistically insignificant by 2007 (2%). We establish that international differences in corporate governance in terms of companies' ownership and board structures are important in cross-country studies of CEO pay level and mix.

Second, we argue 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. The ownership and board characteristics associated with higher pay are also those associated with a larger fraction of pay awarded in the form of stock options or restricted stock. We find that CEO pay levels and the use of equity-based pay are positively related to proxies routinely

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[26] In addition to increased shareholder pressure for pay tied to stock-price performance, Murphy (forthcoming) attributes the rise in equity-based pay to changes in accounting rules, tax policies, disclosure rules, and listing requirements.

[27] We are grateful to the editor (Michael Weisbach) for suggesting this potential explanation for the correlation between CEO pay and institutional shareholdings.

used for better governance—namely, institutional ownership and independent boards. Unobserved firm heterogeneity does not explain the positive relation between CEO pay and shareholder-friendly governance, but we cannot rule out that the relation is explained by time-variant factors, such as the increasing importance of "professional executives."

Third, we show that risk adjustments reduce but do not eliminate observed U.S. pay premiums unless we also control for differences in ownership and board structures. The result that expected pay is higher in firms with higher institutional ownership and more independent boards, even after adjusting for the risk of equity-based pay, is not surprising. Institutions and independent boards increase the risk of performance-related terminations, adding to the risk premium demanded by risk-averse CEOs. Moreover, to the extent that institutions and independent boards force CEOs to work harder (or, more broadly, to take actions they would not take with less monitoring).

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

Appendix

Table A1
Variables definition and data sources

Variable	Definition
A. CEO pay	
Total Pay	Total CEO compensation in U.S.$ (U.S. firms: ExecuComp; non-U.S. firms: BoardEx, corporate filings)
Salary	Salary in U.S.$ (ExecuComp: salary; BoardEx: salary)
Other pay	Other compensation in U.S.$ (ExecuComp: other compensation; BoardEx: other pay and pensions)
Bonuses	Non-equity incentive-plan compensation in U.S.$ (ExecuComp: bonus plus target value of non-equity incentive-plan compensation; BoardEx: bonus)
Equity pay (stock and options)	Stock and options awards in U.S.$ (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)

(*continued*)

Table A1
Continued

Variable	Definition
B. Firm characteristics	
U.S. dummy	Dummy that equals one if firm is headquartered in the United States (Worldscope)
Sales (log)	Sales in thousands of U.S.$ (Worldscope item 01001)
Leverage	Total debt divided by total assets (Worldscope item 03255/item 02999)
Tobin's q	Total assets (Worldscope item 02999) plus market value of equity (item 08001) minus book value of equity (item 03501) divided by total assets
Stock-return volatility	Annualized standard deviation of daily stock returns
Stock return	Stock return (Datastream item RI)
C. Ownership structure	
Insider ownership	Number of closely held shares by insiders (shareholders who hold at least 5% of the outstanding shares such as officers and directors and immediate families, other corporations, or individuals) as a proportion of the number of shares outstanding (Worldscope item 08021)
Institutional ownership	Institutional ownership by all institutions as a percentage of market capitalization (Lionshares)
D. Board structure	
Board size	Number of executive and non-executive directors (BoardEx)
Fraction of independent directors	Ratio of the number of independent directors to board size (BoardEx)
CEO-chairman dummy	Dummy that equals one if CEO is also the chairman (BoardEx)
Avg. number of board positions	Ratio of the number of current board positions in other publicly listed firms by board members of the firm divided by board size (BoardEx)
E. CEO characteristics	
CEO age	Age of CEO in years (BoardEx)
CEO external hire dummy	Dummy that equals one if CEO is hired from outside the company (BoardEx)
CEO tenure (as CEO)	Number of years as top executive in the firm (BoardEx)
CEO other industry experience dummy	Dummy that equals one if CEO worked in a different industry in the past (BoardEx)
Past experience as CEO dummy	Dummy that equals one if CEO was top executive at a different firm in the past (BoardEx)
CEO current board positions	Number of current board positions of the CEO, including the sample firm (BoardEx)
CEO college degree dummy	Dummy that equals one if CEO has a bachelor's degree or higher (BoardEx)
F. Internationalization variables	
Domestic institutional ownership	Institutional ownership by foreign institutions as a percentage of market capitalization (Lionshares)
Foreign institutional ownership	Institutional ownership by domestic institutions as a percentage of market capitalization (Lionshares)
Firm in MSCI dummy	Dummy that equals one if a firm is a member of the MSCI All-Country World Index (Bloomberg)
Foreign sales as % of total sales	International annual net sales (Worldscope item 07101) as a proportion of net sales (Worldscope item 01001)
Nationalities on board / board size	Ratio of the number of different nationalities of directors to board size (BoardEx)
G. Americanization variables	
Non-U.S. institutional ownership	Institutional ownership by non-U.S.-based institutions as a percentage of market capitalization (Lionshares)
U.S. institutional ownership	Institutional ownership by U.S.-based institutions as a percentage of market capitalization (Lionshares)
U.S. cross-listing dummy	U.S. cross-listing dummy, which equals one if a firm is cross-listed on a U.S. exchange through an American Depositary Receipt programs or ordinary listings (U.S. stock exchanges and depository banks)
U.S. acquisitions	Total acquisitions of U.S. companies between 1986 and 2005 as a fraction of a firm's market capitalization (SDC Platinum)
% of directors on U.S. boards	Fraction of directors that also sit on a U.S. firm board of directors (BoardEx)

Table A2
Sample means of firm characteristics by country

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

(continued)

Table A2
Continued

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

This appendix presents sample means of firm characteristics as of 2005. Refer to Table A1 (see Appendix) for variable definitions. Country codes are as follows: Australia (AU), Belgium (BE), Canada (CA), France (FR), Germany (DE), Ireland (IE), Italy (IT), Netherlands (NL), Norway (NO), South Africa (ZA), Sweden (SE), Switzerland (CH), United Kingdom (UK), United States (US).

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