

How High Is US CEO Pay? A Comparison with UK CEO Pay

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Abstract

We examine US and UK CEO pay and incentives from 1997 to 2003. Pay is the total of cash pay, stock and option grants, and other pay. Controlling for firm characteristics, US CEOs have higher compensation and much higher incentives. In 2003, US CEO pay was 1.6 times UK CEO pay, as compared to about 2.2 times in 1997. US CEO incentives in 2003 were about 5.2 times UK CEO incentives, as compared to 8.4 times in 1997. These narrowing differences over time result from substantial increases in UK pay and incentives and flat US pay and incentives. Although US pay is higher than that of the UK, we argue that a portion of US CEOs' relatively greater pay is due to risk premiums related to their relatively greater equity incentives. Using reasonable estimates of these risk premiums, we find that, when normed by the larger amount of risky incentives held, US CEO pay does not appear large compared to that of the UK.

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1. Introduction

Since at least as early as the 1950s, the press and academic researchers have remarked on the high levels of US CEO pay and questioned whether these levels are consistent with share value maximization (e.g., Murphy, 1999). As these high levels have continued, there has been an increased willingness among academic researchers to suggest that US CEO pay practices reflect managerial rent-extraction (e.g., Core, Holthausen, and Larcker, 1999; Bebchuk and Fried, 2004; Bebchuk, Fried, and Walker, 2002; Jensen, Murphy, and Wruck, 2004). The purpose of this paper is to shed light on this issue by comparing CEO pay and incentives in the US with CEO pay and incentives in the UK, a country where excessive pay and managerial rent extraction are generally considered to be less problematic. Our paper uses data on US and UK CEO pay from 1997 to 2003, and extends related work by Conyon and Murphy (2000). We attempt to answer some of the questions raised in this earlier work, as well as to contribute to the contemporary debate about the suitability of US executive pay.

The suitability of corporate governance in general, and of executive compensation and incentives in particular, continues to be of much interest to both academics and practitioners. The recent spate of corporate scandals in the United States has once again focused attention on the pay received by those at the very top of organizations. Moreover, a growing body of academic research proposes that problems with US governance and CEO pay are so profound that overpayment of CEOs is not limited to a few bad apples, but that all CEOs in the US economy are overpaid (e.g., Bebchuk and Fried, 2004; Jensen, Murphy, and Wruck, 2004). If this conjecture is correct, within-country benchmarking can provide an indication of how compensation practices vary with the quality of governance within the US, but tells us little about

whether US executive compensation practices, as a whole, suffer from systemic poor governance and excessive pay. Instead it is necessary to compare US practices with those of other countries where compensation practices ex ante are expected to suffer from these problems to a lesser extent (e.g., Core, Guay, and Thomas, 2005; Holmstrom and Kaplan, 2003).

In this paper, we use the United Kingdom as a benchmark against which to examine whether CEO pay in the United States appears unusually high. These two economies share important governance features (such as active takeover markets, unitary board structures, etc.). However, the UK is generally considered to be less afflicted by problems of excessive executive compensation. For example, Conyon and Murphy (2000) show that, after controlling for economic determinants of pay, 1997 CEO compensation in the US is systematically higher than in the UK. However, Conyon and Murphy also find that greater equity incentives are imposed on US CEOs as compared to UK CEOs. Like Conyon and Murphy, we note that greater equity incentives imply greater risk premiums paid to executives. A key research question in our paper is whether greater risk premiums can explain some or all of the difference in pay between US and UK CEOs.

Using unique US and UK data for 1997 and 2003 we provide evidence that shows that, while a US pay premium still exists, UK CEO pay practices are becoming increasingly like, both in terms of level and structure, those observed in US firms. Further, we find that while equity holdings and incentives in the US have remained stable or even declined between 1997 and 2003, equity holdings and incentives have increased substantially in the UK over this period, on average by 100% or more. However, it remains the case in 2003, as in 1997, that US CEOs hold

substantially greater equity incentives than their UK counterparts. The median US CEO's equity incentives were about five times greater than that of the median UK CEO in 2003.

As noted above, executives will require greater pay to bear greater incentives. As such, we expect that a portion of US CEOs' relatively greater pay is due to their relatively greater equity incentives. The key research question in our paper is whether greater risk premiums can explain some or all of the difference in pay between US and UK CEOs. We note that total pay is the sum of pay for CEO skill plus a premium to compensate the CEO for bearing incentive risk. In order to interpret pay differences between US and UK CEOs, it is necessary to have separate estimates of pay for skill and the risk premium CEOs receive for holding equity.

To do this, we use methods similar to Cai and Vijh (2005), and estimate risk premiums for US and UK CEOs under various assumptions about CEO risk aversion and outside wealth. For a reasonable range of parameters, we find that the difference in required risk premiums (due to differences in incentive levels between US and UK CEOs) is likely to explain the majority of the differences in pay between the CEOs in these two economies. We conclude that critics of high US executive pay should give greater consideration to the incentives borne by US CEOs and the risk premiums that executives are likely to require to bear these incentives.

In the next section, we motivate the paper, review related literature, and describe our sample and data. In Section 3, we present univariate and multivariate comparisons of pay and incentives for the US and UK over time. In Section 4, we estimate risk premiums related to incentive holdings,

and examine whether US pay is high compared to UK pay once differences in incentives are controlled for. In the fifth section we offer concluding remarks and caveats to our conclusions.

2. Executive compensation in the US and UK: Motivation and data

Motivation and literature review

Recent research has suggested that US pay is “too high” and that CEOs are able to exploit existing governance arrangements and extract rents (Bebchuk and Fried, 2004; Bebchuk, Fried, and Walker, 2002). The claim that US CEO pay is “too high” begs the question – “too high compared to what?” If the pay of *every* CEO within an economy is considered “excessive,” then there is no within-economy control group to evaluate the compensation package of any given CEO. In this paper we compare US CEO pay to UK CEO pay. The US and UK are very similar economies, but as we describe below, the UK is generally considered to be less afflicted by problems of excessive executive compensation. As such, the UK can be usefully considered as a control group with which to compare US CEO compensation (Conyon and Murphy, 2000).

The extant research investigating international differences in CEO pay arrangements is sparse. Indeed, the majority of executive compensation papers are single country studies rather than research designed to probe cross-country differences in pay setting strategies. In this paper we build on Conyon and Murphy (2000) who also investigate differences in pay and incentives between these two countries, and found significant pay differences between the US and the UK for the fiscal year 1997. After controlling for size, sector and other firm and executive characteristics, they document that CEOs in the US earned 45% higher cash compensation and

190% higher total compensation (which include equity compensation such as stock options, etc.). Such large differences in compensation are surprising given the similarities in the governance structures of both countries. For instance, both economies have active takeover markets, single board internal control systems with remuneration committees, etc. Conyon and Murphy (2000) argue that the differences could be largely attributed to greater stock option awards in the US arising from institutional and cultural differences between the two countries. An alternative interpretation for the greater US pay is that pay-related governance problems are more severe in the US. As suggested by Conyon and Murphy, these problems may well be related to cultural differences and greater acceptance of option grants in the US. The UK's lower tolerance of income inequality may well act as a governance mechanism that constrains executive pay. Further, consistent with options contributing to an excessive pay problem, several researchers, such as Hall and Murphy (2002) and Jensen, Murphy and Wruck (2004), have recently argued that US compensation committees under-appreciate the full cost of options, and as a result over-pay executives with option grants.

However, Conyon and Murphy (2000) focus only on a cross section of firms in 1997 and so could not examine the time series behaviour of the US-UK CEO pay premium. Moreover, our main interest is in explaining US CEO pay by using the UK as a control group. We will establish that a standard measure of CEO pay, which includes the grant value of stock options, etc., is greater in the US compared to the UK. However, we will also show that CEOs' equity holdings in the US are significantly greater than in the UK and that this exposes US CEOs to greater risk. As such, we develop arguments suggesting that pay would be expected to be higher given this risk exposure. Moreover, it is precisely because of the international variation that exists in both CEO

pay and equity incentives that we can remark on the structure of US pay, CEO equity incentives and the exposure to compensation risk experienced by US CEOs.

Other research also examines differences between the US and the UK. Main, O'Reilly, and Crystal (1994) compare CEO cash compensation in 1990 between the US and UK but exclude (due to data limitations) any comparison of the structure of pay. Abowd and Kaplan (1999) present evidence on international differences in CEO compensation from 1984 to 1996 using data from twelve OECD countries. The source for their data is survey pay estimates from Towers Perrin, a compensation consulting company, for firms with sales revenues between \$200 and \$500 million. Abowd and Kaplan find that US CEO pay is considerably higher than other countries including the UK. In addition, they show that stock options, expressed as a fraction of CEO pay, had been increasing in the US but not elsewhere. Unlike Abowd and Kaplan our research uses actual data rather than estimates of CEO pay to investigate international CEO compensation differences. Also, unlike their research, we directly model these international differences in CEO pay controlling for other determinants such as firm size, risk, company performance and sector differences. Finally, Conyon and Murphy (2002) examine the prevalence of stock-based executive compensation in the US, the UK and other major European economies. They show that stock-based compensation makes up a higher fraction of total pay in the US than in any of the European economies studied, and that there has been a greater trend towards using more stock-based compensation in the US than these other economies. They report that trends in the use of stock-based pay in the non-US economies were only beginning to emerge (their data stopped in 1999), making it difficult to verify if a shift to stock-based pay was truly prevalent.¹

¹ Other research examining international differences in pay and governance includes Kaplan (1994, a,b) for the US relative to Japan and Germany and Conyon and Schwalbach (1999) for differences in European pay.

The data

Our goal in this paper is to compare US to UK CEO compensation in cross section and in time. While the US data are readily available in machine-readable form, the UK data requires hand-collection. Because of the costs of hand-collection, we limit ourselves to examining the year of the latest available data, 2003, and the year of the earliest available UK data, 1997.² The US data used in this study comes from the comprehensive Compustat Execucomp database. We report results based on 1663 CEOs in 1997 and 1495 CEOs in 2003. The sample includes firms in the S&P 500, the S&P MidCap 400, the S&P SmallCap 600 and companies in the S&P supplemental indices. We also report separately results based on 440 CEOs from the S&P 500 firms in 1997 and 459 CEOs from the S&P 500 firms in 2003. The S&P 500 firms are typically larger compared to the population of firms in the Execucomp database. The UK data are hand-collected from annual reports and accounts of UK firms (broadly equivalent to US DEF 14A proxy statements). We report results based on 235 CEOs in 1997 and 240 CEOs in 2003.³ These companies are drawn from the largest 250 UK publicly traded firms ranked by market capitalization in each of the years.⁴

² 1997 is the first year that UK companies were required to disclose data on stock option grants to top executives. For a similar reason, prior studies of US pay often begin at 1992 because this is the first year that US companies were required to disclose data on stock option grants to top executives.

³ The UK data for 1997 consists of the largest firms examined by Conyon and Murphy (2000). Conyon and Murphy also report results on about 300 smaller UK firms for a total of 510 firms.

⁴ Unfortunately, it is both labor and time intensive to collect UK executive compensation data. Although compensation disclosure in the UK was significantly expanded following the Greenbury (1995) and Hampel (1998) reports, the available data is typically not available electronically and needs to be hand-collected. Moreover, the information is not reported in the same tabular form across different companies making data collection more difficult. Currently, UK companies disclose information comparable to those available for US executives including exercise prices, maturity terms, options granted and information on stock options outstanding.

Executive pay

Executive compensation in both the UK and the US contain the same basic elements. CEOs in both countries receive base salaries and are eligible to receive annual bonuses usually based on accounting performance. CEOs in both countries also typically receive stock options, which are rights to purchase shares of stock at a pre-specified “exercise” price for a pre-specified term. CEOs also receive restricted stock. In the US, restricted stock grants typically vest with the passage of time (but not with performance criteria). In the UK, by contrast the vesting of restricted stock is typically tied to the attainment of certain performance objectives.

Stock options are an important component of CEO pay, and we value them at the firm's economic cost of making the grant. The economic cost to the firm of granting an option to an employee is the opportunity cost the firm forgoes by not selling the option in the open market. A good approximation to this is the price of the option given by the Black-Scholes (1973) formula. The value of a European call option paying dividends is $c = Se^{-qt}N(d_1) - Xe^{-rt}N(d_2)$, where $d_1 = \{\ln(S/X) + (r-q+\sigma^2/2)t\} / \sigma\sqrt{t}$, $d_2 = d_1 - \sigma\sqrt{t}$, and S is the stock price; X the exercise price; t the maturity term; r the risk-free interest rate; q the dividend yield and σ the volatility of returns. $N(\cdot)$ is the cumulative probability distribution function for a standardized normal variable. In our empirical work we define *total pay* for the firm's CEO as the sum of salary, bonus, benefits, stock options (valued on the date of the grant using the Black-Scholes formula), restricted stock grants (valued at 100% of performance contingent awards) and other compensation.⁵

3. Results -- US and UK executive pay and incentives

⁵ In the case of the United States we use variable item TDC1 from the ExecuComp database. For the UK we calculate total pay from information contained in the annual reports.

Executive pay

Figure 1a shows both the level (top) and composition (bottom) of the CEO compensation in the S&P 500 firms between 1992 and 2003. The data are reported in 2003 constant dollars. The height of the bar is the mean (outside bar) and median (inside bar) of total CEO pay in each year. The figure illustrates that average CEO pay in the US increased throughout the 1990s and reached a peak in 2000 of about \$14.8 million, whereas median pay peaks in 2001 at about \$7.9 million. The compensation data are positively skewed; the average is higher than the median – especially at the peak of CEO pay in the late 1990s and early 2000s. Note, however that the average pay of \$8.8 million for our 2003 sample year is only slightly higher than the average pay of \$8.1 million for our 1997 sample year.

The bottom half of the figure shows the percentage of CEO pay comprised of salaries (the dot-dash line) and stock options (the continuous line). In 1992, the base salary accounted for approximately 37% of the \$3.7 million average total compensation received by US CEOs. Stock options (valued at grant date using the Black-Scholes method) accounted for a relatively modest 22% of total pay. The figure clearly illustrates that stock options became the single most important element of CEO pay in the 1990s for S&P 500 firm CEOs, whereas salaries declined in importance. Since about year 2000 CEO pay has fallen. Base salaries still account for about one fifth of total CEO pay, but the percentage of pay received in the form of stock options has fallen to just over one third, although it still remains the largest element of pay in 2003. The patterns in the basic US data are similar to those shown in Jensen, Murphy, and Wruck (2004): (1) the level of executive compensation increased dramatically in the 1990s, and (2) since 2000 US CEO pay

has fallen back to levels observed in the mid 1990s, with options representing a still significant but declining fraction of total pay.⁶

Figure 1b presents some time series data on cash pay for both the UK and US from 1997 to 2003. Since we do not have share option or long-term incentive pay for years other than 1997 and 2003 in the UK, we report not total pay, but cash pay⁷ (measured as the total of salaries, bonuses, benefits and other cash pay). The figure shows that in the US, CEO cash pay has followed a similar trend to that of total pay observed in Figure 1a, i.e., a general increase to a peak in 2000, followed by a steady decline since then. In the UK however, there has been no such decline, total cash pay has continued to increase across the whole of the period. This is important to note since the rest of the paper focuses on only two points in time: 1997 and 2003. It does of course remain a possibility that total UK pay could have peaked between 1997 and 2003 had equity compensation (options or restricted stock) increased and then fell back during this time period. However we are aware of no evidence of this and believe the pattern of total UK pay mirrors the pattern of total cash compensation in that both have shown a year-on-year increase across the whole of the 1997 to 2003 period.

Table 1 provides statistics on our sample of US and UK CEO firms for the fiscal years 1997 and 2003. Figures for the average, median and the 25th and 75th percentiles are given. We provide evidence for all the firms in the Execucomp database, the S&P500 firms and the largest 250 UK firms. The table illustrates two points: (1) US CEO pay has not increased substantially from

⁶ In median total pay, we observe a similar, but less pronounced, time-series pattern.

⁷ For the UK, the 1997 data and 2003 are the hand-collected data from annual report and accounts. The 1999, 2000, and 2001 are based on data supplied by Hemmington Scott. The US data is derived from ExecuComp. Note that the monetary numbers shown in Figure 1b are in pounds.

1997 to 2003, while UK CEO pay has; and (2) American CEOs earn more than British CEOs but the gap between the two is narrowing. In the UK, average CEO total pay in 2003 was approximately \$2.3 million, an increase of 53% over the average of \$1.5 million in 1997.⁸ In the US, average CEO total pay for all sample firms in 2003 was approximately \$4.6 million, an increase of 5% over the average of \$4.4 million in 1997. Average pay for S&P 500 firms of \$8.8 million in 2003 is 8% higher than for the S&P 500 firms for our 1997 sample year. As a caveat to interpreting these changes in pay, we note that changes in business conditions over the six-year window from 1997 to 2003 are unlikely to have been identical in the US and UK. For example, in the final column of Table 1, we show that growth in average firm size in the US exceeded that in the UK from 1997 to 2003. The average market value for all US sample firms rose by 22% during the period compared to a decline of 15% for the UK sample firms. This relatively slower growth in market value for UK firms makes the relatively greater increase in UK pay even more remarkable.

In the US, the average total compensation for the larger sample of 1,495 US CEOs was \$4.6 million in 2003, 98% more than the average pay for UK executives. Similarly, the median pay of \$2.5 million is 52% more than the median UK pay. The US pay premium is especially pronounced for larger firms. The average total compensation for the CEOs of the S&P 500 firms is \$8.8 million or about 200% more than the average pay for UK CEOs. Median US pay is also higher than UK pay in 2003.

⁸ Defined as the sum of salaries, bonuses, benefits, stock options (valued on the date of the grant using the Black-Scholes formula), LTIP related stock grants (valued at 100% of performance contingent awards) and other compensation.

Of more interest however, is the gap between US and UK CEO pay, which has clearly narrowed over time. In 1997 average American CEOs earned three times more than British CEOs, but in 2003 American CEOs earned just twice as much as their British counterparts. The same pattern is observed for median CEO pay: Americans earned 1.9 times more than British CEOs in 1997 versus 1.52 times in 2003. The pay premium also declined for larger firms. The average total pay for an S&P500 CEO pay was five times that of the average British CEO in 1997 but only three and half times greater in 2003.

Of course, these differences might reflect differences in scale. The 250 largest UK firms have an average market value equal to \$9.4 billion in 1997 and about \$8 billion in 2003. This compares to \$6.1 billion (1997) and \$7.5 billion (2003) for the US firms. On the other hand, our sample of 500 largest US firms (the S&P 500) is on average much larger, with mean values of \$16 billion in 1997 and \$20 billion in 2003. Since there are scale differences, our econometric results reported below include company size controls to adjust for any systematic differences in size.

Figure 2 describes the average composition of CEO pay in the two countries. The figure illustrates that salaries are a more important component of CEO pay in the UK compared to the US. Reading the bars from left to right on the figure reveals that in 2003 on average, CEOs in the UK receive 44% of their total pay in the form of base salaries, 22% in bonuses, 11% in stock options (valued at grant-date), 18% in restricted stock, and 6% other. Over time, the importance of salaries in total compensation has declined for UK CEOs by 23%, while at the same time bonuses and equity related pay such as options and restricted stock have become much more important. In this sense, UK pay has become increasingly similar to the pay strategies adopted in

US firms where base salaries comprise a much smaller percentage of total pay for executives (only 31% in 2003).

Bonus payments represent a similar fraction of total pay in the US and the UK in 2003, representing on average 20% of CEO pay. Bonuses as a fraction of pay have been increasing in the UK. The US firms are more likely to pay their CEOs in stock options (32% in 2003) and are less likely to use restricted stock (8% in 2003). Overall, the evidence in Table 1 and Figure 2 suggests that not only is the level of pay between the US and the UK converging, but so too is the structure of pay in terms of emphasizing equity compensation and deemphasizing salaries.

Table 2 reports coefficient estimates of the US-UK pay difference, using OLS regression methods and controlling for company size, growth opportunities, firm performance, stock volatility and industry factors. Extant research on executive compensation has consistently documented that company size and industry are the two most important factors determining levels of CEO pay (see Murphy, 1999). In addition, researchers typically include important control variables for company performance (since this may signal CEO effort or ability) and risk (because relatively risk-averse CEOs demand higher expected pay when compensation is subject to greater risk). Our pay specifications reflect these concerns.

The regressions in Table 2 aim to identify the US-UK pay premium controlling for these other factors. The models therefore, include the market value of the firm dated at $t-1$; the market-to-book ratio dated at $t-1$; the performance of the firm (measured as the one-year total return to shareholders); the volatility of shareholder returns (as a proxy for risk); and a set of industry

dummy variables. The dependent variable in columns (1), (2) and (5) is log(Salary and Bonus), representing cash compensation. In columns (3), (4) and (6), equity-based pay is included, and the dependent variable becomes log(Total Pay). Regressions for each year are performed in columns (1) to (4) while the sample is pooled in columns (5) and (6).

The coefficient of interest is the variable “US indicator” which is equal to one if the firm is US and zero if UK. The coefficient estimate for 2003 in column (2) is 0.14 and indicates that, after controlling for growth opportunities, performance, size, volatility and industry factors, CEOs in the US earn approximately 15% more cash compensation than their British counterparts in that year. Similarly, the coefficient in column (4) of 0.48 indicates that total expected pay is about 62% higher for US CEOs.

The interesting feature of Table 2 is that it shows a narrowing of the US pay premium between 1997 and 2003. For instance, US CEOs in 1997 received 55% higher salary and bonus compared to UK CEOs, falling to 15% in 2003, while the total pay premium for US CEOs was in excess of 124% in 1997 but stood at just 62% in 2003. Untabulated single-country regressions indicate that the reason for this narrowing is that UK pay significantly increased by 61% over the period, while US pay did not change. Finally, in the pooled sample the US indicator is positive and significant, as is the year indicator variable; however, the interaction term between these two is negative and significant, confirming prior univariate evidence that US CEO pay relative to UK pay was lower in 2003 relative to 1997 (144% higher in 1997, as compared to 52% higher in 2003).

Table 2 also consistently shows that a positive and significant correlation exists between pay (measured either as the log(Salary and Bonus) or the log(Total Pay)) and performance shareholder returns. To ensure that this pay-performance result is robust, we confirm our OLS results by estimating median regressions, random effects regressions, and fixed effects regressions. These sensitivity tests confirm a robust relation between pay and performance (untabulated).

Equity incentives

Incentives are greater when the CEO has more of his wealth invested in firm equity and less in other assets. The sensitivity of annual pay to stock returns captures only part of CEO incentives. Much greater incentives are provided by the sensitivity of the CEO's holding of stock and options to changes in firm value. Stock and options directly link CEO wealth to shareholder value, and are the major component of total CEO incentives (Hall and Liebman, 1998; Jensen and Murphy, 1990). In this paper, we measure incentives as the dollar change in the CEO's wealth from a 1% stock price increase (Baker and Hall, 1998; Core and Guay, 1999). We compute this measure as: $1\% \times (\text{share price}) \times (\text{the number of shares held}) + 1\% \times (\text{share price}) \times (\text{option delta}) \times (\text{the number of options held})$.⁹ This incentive measure is consistent with our focus on the risk premium a CEO requires because his wealth is more exposed to the firm's return and less diversified than she would prefer.

For completeness, we also examine an incentive measure developed by Jensen and Murphy (1990), which is analogous to the CEO's percentage ownership. This measure is computed as: $(\text{the number of shares held divided by common shares outstanding}) \times \$1000 + (\text{the number of$

⁹ Shares held includes restricted stock and performance-vested restricted stock.

stock options held divided by common shares outstanding) \times (option delta) \times \$1000.¹⁰ In this measure the \$1000 is a scaling factor, and the important term is the CEO's fractional holding of equity (shares and options). It is important to note that the Jensen-Murphy fractional ownership measure can be obtained from the dollar change measure by dividing the dollar change measure by the market value of the firm and multiplying by \$100,000.

In Table 3 we provide descriptive evidence on CEO shareholdings and financial incentives for the two years 1997 and 2003. We report estimates for all UK and US firms in our sample. The table shows that the average value of US CEO direct stockholdings (excluding options) is about \$99 million. This is about four times that of a British CEO who holds about \$20 million of firm shares (excluding options). The data are positively skewed and median share values are much lower. The median value of an American CEO's share holdings is \$8.13 million compared to \$1.5 million for a British CEO. The table also illustrates that the value of British CEOs share stakes has increased between 1997 and 2003, whereas it has fallen slightly in the US. CEOs in the US also hold a higher fraction of their companies' shares relative to British CEOs. In 2003 the median percentage ownership of common stock by an American CEO was 0.31%, compared to British CEO ownership of 0.05%. However, the percentage ownership by British CEOs has increased between 1997 and 2003, narrowing the gap between UK and US CEO firm ownership.

Table 3 also shows that equity incentives, measured either by dollar incentives or by the Jensen-Murphy statistic, are greater for American CEOs compared to UK CEOs. The median

¹⁰ The option delta (hedge ratio) is calculated as the derivative of Black-Scholes call option value with respect to the share price. In this context the option delta can be thought of as a weight, which varies between 0 and 1, reflecting the likelihood that the stock option will end up in the money.

American CEO in 2003 receives about \$270,000 for every 1% increase in shareholder value. This compares to a British CEO who receives approximately \$53,000 for each 1% increase in firm wealth. Similarly, the 2003 median Jensen-Murphy measure suggests that an American CEO receives about \$15 of every \$1000 increase in shareholder wealth. This contrasts to the median British CEO who receives approximately \$2.21 of each \$1000 increase in shareholder wealth. Between 1997 and 2003 British CEO incentives show substantial percentage increases (from a small base) compared to American CEOs. Overall, the evidence in Table 3 shows American CEOs have greater wealth and incentives in their firms compared with their British counterparts, but that UK CEOs' wealth and incentives have increased between 1997 and 2003.

Table 4 reports coefficient estimates of the US-UK incentive difference, using OLS regression methods and controlling for company size, growth opportunities, stock volatility and industry factors. The dependent variable in columns (1), (2) and (5) is $\log(1+\text{equity incentives})$, whereas in columns (3), (4) and (6) it is the $\log(\text{Jensen-Murphy})$ measure. Regressions for each year are performed in columns (1) to (4) while the sample is pooled in columns (5) and (6). Results using both measures are consistent with prior literature (e.g., Core and Guay, 1999). Riskier firms with greater growth opportunities use more incentives. Larger firms use more dollar equity incentives. However, because dollar incentives increase less than one-for-one with firm market value, the Jensen-Murphy statistic, which is dollar incentives divided by market value and multiplied by \$100,000, decreases as firm size increases. Again, the coefficient of interest is the US indicator variable, which is significantly positive in all regressions. The regression results confirm the univariate results: although UK incentives increased significantly from 1997 to 2003 (untabulated), US CEO equity incentives are greater compared to British CEO incentives both in

1997 and 2003. This suggests that CEOs in the US have much more of their wealth tied up in the firm, and this wealth is at risk to adverse price shocks.

4. The relation between pay and incentives

So far we have illustrated that the level of CEO compensation is significantly higher for US CEOs compared to British CEOs (about 1.6 times higher in 2003). However, what is equally important is that US CEOs have more wealth at risk in the sense that they own significantly more of their companies' stock and stock options relative to UK CEOs (about 5.2 times as much in 2003). As a consequence, as we document in this section, when normed against the amount of incentives held and the consequent risk exposure, CEO pay in the US does not seem large compared to that in the UK.

There are benefits and costs to imposing incentives. The benefits of incentives are that they encourage the CEO to make the right choices. The costs of these incentives are that the CEO must be paid for his work, and because he is risk-averse, he will demand more compensation as the amount of incentives imposed is increased. All agency models predict that the greater the amount of incentives imposed on a CEO, the more he will be paid. Recent research (e.g., Hall and Murphy, 2002) emphasizes that risk-averse and undiversified CEOs discount the value of their firm-specific equity. This occurs because CEOs would prefer to invest their wealth in a diversified portfolio, and therefore do not value \$1 in firm stock as much as \$1 invested in the diversified portfolio. The more incentives the CEO holds, the less his wealth is diversified, and the greater the risk premium he requires.

The idea that pay will be higher when incentives are higher can also shed light on the differences between CEO pay in the US and the UK. As we have seen, CEOs in the US are paid more than British CEOs, although the gap is narrowing. However, US CEOs have more wealth and incentives tied up in the firm compared to British CEOs. Table 5 provides a descriptive example. The table shows median CEO pay for the year (defined as the sum of salaries, bonuses, the grant date value of stock options, restricted stock and, and other pay) and beginning-of-year CEO portfolio incentives (defined as the change in the value of CEO equity holdings for a percentage change in the stock price). Recall that this incentive measure equates \$100 in stock to \$1 in incentives. The third column shows that American CEOs earn more than British CEOs and hold more incentives – as established before. This column shows that in 2003 (1997) the median US CEO received about \$864,000 (\$1,043,000) more pay for holding about \$172,000 (\$180,000) more incentives. What is also interesting is the final row in which we compute the ratio of incremental pay received by the median US CEO for incremental incentives held. This incremental pay per unit of incentives is \$5.0 in pay for each \$1 of incentive in 2003, and \$5.8 in pay for each \$1 of incentive in 1997. In other words, US CEOs receive between \$5.0 and \$5.8 in extra pay for holding an additional \$1 of incentives.

4.1 Estimating the Risk Premium for Holding Incentives

That CEOs who hold greater incentives should receive greater pay seems reasonable. The key question is what magnitude of extra pay would we expect the US CEOs to receive given the extra incentives that US CEOs hold? In other words, is \$5 or \$6 in extra pay per unit of extra incentives reasonable? Some light can be shed by extending the work of Hall and Murphy (2002) and Cai and Vijh (2005) on how much of a risk premium a CEO will require for holding equity. Hall and

Murphy and Cai and Vijh show that the magnitude of the risk-premium increases with the proportion of the manager's wealth that is invested in firm equity (and not in diversified assets) and with the CEO's risk-aversion. Both outside wealth (money not held in firm equity) and risk-aversion are unobservable. However, the literature typically assumes that outside wealth ranges between 50% and 100% of the CEO's inside wealth. For example, if the CEO owns \$10 million in firm equity, the literature assumes that his outside diversified holdings range from \$5 million to \$10 million. In addition, the literature assumes that the CEO's relative risk-aversion ranges from two to three (See for example, Hall and Murphy, 2002, and Cai and Vijh, 2005).

Part of pay can be thought of as compensation for the CEO holding firm equity instead of selling the equity and diversifying (holding aside the component of pay related to the CEO's skill and cost of effort). In other words, one can think of a portion of annual pay as the risk premium paid to the CEO for holding equity for the next year. We estimate the risk-premium that the executive would require to hold an undiversified position in firm stock for the next year, as opposed to diversifying this position. Another way to think of this risk premium is: How much less pay would the CEO accept if she were released from the restriction that she hold a majority of her wealth in firm stock? To solve for this risk-premium, we extend and modify the methods of Hall and Murphy (2002) and Cai and Vijh (2005). We solve for the risk premium the CEO requires to be indifferent between (1) receiving the risk premium and holding the stock for one year, and (2) not receiving the risk premium and selling his firm equity and holding a diversified portfolio instead.

We derive the risk premium by numerically solving the following equation:

$$E[U(\textit{wealth unconstrained})] = E[U(\textit{wealth constrained to firm equity, outside wealth, risk premium})] \quad (1)$$

Wealth constrained to firm equity (inside wealth) is the CEO's beginning of year portfolio of stock and options, which we observe. We assume: (1) the CEO's outside wealth is either 50% or 100% of the CEO's inside wealth, (2) the CEO has power utility with relative risk-aversion of either 2 or 3, and (3) the CEO may invest his outside wealth in long positions in both the market portfolio and the risk-free asset (but may not sell short). The expression on the left side is the utility the CEO could receive if he could invest his total wealth in a utility-maximizing combination of the risk-free asset and the market portfolio. We assume that this unconstrained wealth is equal to the market value of the CEO's stock and options, plus his outside wealth.¹¹ The expression on the right side is the utility the CEO receives when he is constrained to hold the assumed fraction of his wealth in firm stock and options. We assume that the CEO invests the remainder of his wealth in a utility-maximizing combination of the risk-free asset and the market portfolio, and that he holds these positions for one year. The risk-premium is the dollar amount that sets the two sides equal, and is assumed to be paid by the firm to the CEO at the end of the year.

As an illustration of this method, in Table 6, we express the estimated risk premium per dollar of incentives for a hypothetical CEO.¹² Consistent with intuition, the table shows that the CEO requires a greater risk-premium when he is more risk-averse and when more of his wealth is

¹¹ To the extent that the CEO owns options or restricted stock, he will not be able to invest the market value of firm equity in a diversified portfolio. However, the objective of our method is to make comparisons of CEOs with different types of firm equity by asking the question: How much less pay would the CEO accept if he were released from the explicit or implicit restriction that he hold a portion of his wealth in firm stock?

¹² Under our assumption that the CEO has constant relative risk aversion, the risk premium will be proportional to the magnitude of incentives. In other words, if the CEO's inside and outside wealth both increase by a factor of 10, the risk-premium increases by a factor of 10. This makes it convenient to scale the computed risk premium, and in the Table, we express the risk premium per dollar of incentives.

concentrated in firm stock. For our hypothetical CEO, when relative risk aversion is two (three) and 50% of his wealth in firm stock, he requires he requires a risk premium per dollar of incentives of \$5.8 (\$8.5). If the CEO is less diversified and holds 67% of his wealth in firm stock, he requires a risk premium per dollar of incentives of \$7.6 (\$11.0). An estimated risk premium of \$7.6 means that if the CEO has incentives of \$100,000, he requires a risk-premium of \$760,000 to compensate him for his lack of diversification. Recall that the incentives provided by stock equate \$100 in stock to \$1 incentives, so that \$100,000 incentives equates to stockholdings of \$10 million.

It is important to note we estimate a different risk premium than do Hall and Murphy (2002) and Cai and Vijh (2005), although we use similar numerical methods to Cai and Vijh (2005). This prior work determines the risk premium associated with an option grant by solving the following equation:

$$\frac{E[U(\text{wealth constrained to firm equity, outside wealth, option})]}{E[U(\text{wealth constrained to firm equity, outside wealth, risk premium})]} = \quad (2)$$

Essentially, this work holds the risk premium for holding the existing portfolio constant, and solves for the incremental risk premium for a new option grant. By contrast, we solve for the risk premium associated with holding the existing portfolio. We abstract away from any risk associated with current year compensation, and wait to assess the risk of that compensation when it becomes part of the next year's portfolio.

4.2 *Estimating Pay for Skill*

Recall that pay is equal to a risk premium plus compensation for skill and effort. Given incentives and an estimate of the risk premium, one can obtain an estimate of compensation for skill and effort. For example, suppose that CEOs in both the US and UK have relative risk-aversion of two and have 50% of their wealth in firm stock, our analysis suggests that the CEOs would receive a risk premium of \$5.8 for each dollar of incentives held.¹³ As an example, we modify the analysis of median data shown in Table 5 to obtain an estimate of the median pay for skill received by these CEOs. We compute the median pay for skill by subtracting 5.8 times the CEO's beginning-of-year incentives from his total pay. The results of this calculation are shown in Table 7.

The analysis in Table 7 suggests that, assuming the assumption underlying our development of the risk-premium estimate are realistic, once the risk-premium is controlled for, US CEOs do not receive excess pay compared to UK CEOs. As shown in Table 5, in 1997, the median U.S. CEO received about \$1 million more pay than the median UK CEO and held about 7 times as much equity incentives. Given our estimates of expected pay per unit of incentives, Table 7 shows that the extra incentives held by the median US CEO in 1997 can be reasonably expected to explain the difference in median pay between US and UK CEOs. After deducting the expected compensation for holding incentives based on median values, the median pay for skill in 1997 is approximately the same across the two countries (\$988 for US CEOs vs. \$992 for UK CEOs). We observe a similar result for pay in 2003. In 2003, the median U.S. CEO received about \$0.9 million more pay than the median UK CEO and held about 5 times as much equity incentives.

¹³ This estimated risk-premium appears reasonable given the incremental analysis of US incremental pay and incentives shown in Table 5. This computation shows that in 2003 (1997) the median US CEO received about \$864,000 (\$1,043,000) more pay for holding about \$172,000 (\$180,000) more incentives. The pay-incentive ratio for these incremental incentives is \$5.0 (\$5.8) in pay for each \$1 of incentive. In other words, under the assumption that the relation between pay and incentives in the UK is appropriate, US CEOs receive a risk-premium of between \$5.0 and \$5.8 in extra pay for each dollar of additional incentives held.

After deducting the US and UK's expected compensation for holding incentives, the median pay for skill in 1997 is slightly greater in the UK (\$1,300 for US CEOs vs. \$1,434 for UK CEOs).

In Table 8, we examine whether these median results hold when the risk premium adjustment is applied on a CEO by CEO basis. To do this, we compute a risk premium for each CEO. The risk premium is estimated using Equation (1) above assuming that the CEO has relative risk-aversion of 2 and 50% of his wealth outside the firm. Inputs into the calculation are the CEO's beginning-of-year stock and option portfolio, the firm's beta and volatility, an assumed market volatility of 20%, risk-free rate of 5%, and market risk premium of 6%. We then compute each CEO's pay for skill by subtracting the computed risk premium from his total pay. In Panel A, we present the computed risk premium per dollar of incentives. The lower mean and median values for the UK CEOs result from lower volatility and lower option use in the UK.

Panel B of Table 8 shows that the average pay for skill is a large negative value for the U.S. CEOs (-\$2.1 million and -\$2.0 million, for 1997 and 2003, respectively) as compared to positive values for the UK CEOs. However, these average values are heavily influenced by a small number of US CEOs that hold very large amounts of equity. The median values may more interpretable. The median pay for skill decreases slightly over time for the US CEOs (from \$1.0 million in 1997 to \$0.9 million in 2003). By contrast, there is a substantial increase in the median pay for skill for the UK CEOs (from \$0.9 million in 1997 to \$1.5 million in 2003). We also show an adjusted average value after we set negative values to 0. These adjusted averages show mean US skill-based pay of about twice as much in the UK in 1997 (\$2.6 million vs. \$1.2 million). However, the differences narrow substantially in 2003 (\$2.3 million vs. \$2.1 million).

In Table 9, we compare US and UK CEOs' pay for skill within a regression framework that controls for factors such as growth opportunities within the firm, corporate scale, firm performance, volatility and industry factors. Because the data are skewed and contain negative values, we estimate median regressions. We estimate the regression separately for 1997 and 2003. The variable of interest is the coefficient on a US indicator variable. The coefficient of the US indicator variable is significantly positive in 1997 with a value of 627, suggesting that pay for skill is \$627,000 higher in the US in 1997, on average, as compared to the UK. However, in 2003, the coefficient on the US indicator variable is significantly negative, suggesting that US CEOs no longer receive greater pay for skill than UK CEOs. In Columns (3) and (4), we re-estimate the regressions, and exclude volatility as a control variable. Because estimated risk premiums are higher when volatility is higher, there is a possibility of a mechanical negative correlation between volatility and pay for skill (pay - estimated risk premium). In addition, one would not ex ante predict a relation between volatility and pay for skill. These regressions also suggest that in 2003 US CEOs no longer receive greater pay for skill than UK CEOs.

For US CEOs to be overpaid relative to UK CEOs requires that our risk premium estimates are incorrect or that the assumptions we use to develop them are incorrect. For example, if CEOs in both countries had much lower risk-aversion than is assumed in the literature, the risk premium shown in Panel A would drop substantially for both countries, and US pay would again appear high compared to UK pay. In the extreme, if CEOs were risk neutral and required no risk premium for holding incentives, the comparison of pay for skill across the two countries would become identical to the comparison shown in Table 5 in which US CEOs receive 50% more pay

than their UK counterparts. Assuming that the literature's assumptions of relative risk-aversion between two and three are correct, a claim that US CEOs are overpaid relative to UK CEOs requires some combination of the following assumptions: (1) UK CEOs are more risk-averse, (2) UK CEOs hold a greater proportion of their wealth in firm incentives, or (3) the market for skill in the UK is substantially more competitive than in the US. To explore how our results would change if UK CEOs are indeed more risk averse, Table 10 revises the analysis in Table 7 to show the effect of assuming that the median UK CEO is more risk averse (RRA of three) and have more incentives as a percent of their wealth (67%) than the median US CEO, and thus require a a risk premium of \$11.0 for each dollar of incentives held. This analysis shows that the median US CEO receives slightly more pay for skill than their median UK counterparts, but only by about \$150,000 in 1997 and \$80,000 in 2003.

5. Concluding remarks

A growing body of academic research argues that problems with US governance and CEO pay are systemic and that overpayment of CEOs is not limited to a few bad apples, but that all CEOs in the US economy are overpaid. If this conjecture is correct, benchmarking within the US tells us little about whether US executive compensation practices, as a whole, suffer from systemic poor governance and excessive pay. Instead it is necessary to compare US practices with those of other countries where compensation practices ex ante are expected to suffer from these problems to a lesser extent. In this paper, we use the United Kingdom as a benchmark against which to examine whether CEO pay in the United States appears unusually high. These two economies share important governance features, but the UK is generally considered to be less afflicted by problems of excessive executive compensation.

Using unique US and UK data for 1997 and 2003, we compare US and UK CEO pay and incentives. Pay is the total of cash pay, stock and option grants, and other pay. We measure incentives as the change in value of the CEO's equityholdings for a 1% stock return, which equates \$100 in stock to \$1 in incentives. Controlling for firm characteristics, we find that US CEOs have higher compensation and much higher incentives. In 2003, US CEO pay was 1.6 times UK CEO pay, as compared to about 2.2 times in 1997. US CEO incentives in 2003 were about 5.2 times UK CEO incentives, as compared to 8.4 times in 1997. These narrowing differences over time result from substantial increases in UK pay and incentives and flat US pay and incentives. However, despite these increases in UK incentives, US CEOs still hold significantly more equity incentives than their UK counterparts.

We note that greater equity incentives imply greater risk premiums paid to executives. Consequently, we expect that a portion of US CEOs' relatively greater pay is due to their relatively greater equity incentives. The key research question in our paper is whether greater risk premiums can explain some or all of the difference in pay between US and UK CEOs. We note that total pay is the sum of pay for CEO skill plus a risk premium to compensate the CEO for bearing incentive risk, and in order to interpret the pay differences, it is necessary to have separate estimates of pay for skill and the risk premium CEOs receive for holding equity.

To do this, we extend the methods in Cai and Vijh (2005) and estimate risk premiums for US and UK CEOs under various assumptions about CEO risk aversion and outside wealth. For a reasonable range of parameters typical in prior literature, we find that the difference in required

risk premiums (due to differences in incentive levels between US and UK CEOs) is likely to explain the majority of the differences in pay between the CEOs in these two economies.

We conclude that critics of high US executive pay should give greater consideration to the incentives borne by US CEOs and the risk premiums that executives are likely to require to bear these incentives. Or stated another way, if critics believe that the level of US CEO pay is too high, they also might consider whether they would accept lower UK-style incentives as a trade-off for reductions in pay. However, some of these same critics call for greater “pay-for-performance” and incentives for US CEOs. Our findings suggest that calls for lower pay and greater pay-for-performance may be at odds with each other and may be economically infeasible.

An important caveat is that our conclusions rely on the reasonableness of our risk premium estimates, and if our assumptions about risk-aversion and CEO lack of diversification are invalid, so are our risk premium estimates. For example, if CEOs in both countries had much lower risk-aversion than is assumed in the literature, the estimated risk premium would decrease, and US pay would again appear high compared to UK pay. Quantifying the risk-aversion levels of wealthy top executives remains a crucial topic for future research in incentives and governance. A second important caveat is that our conclusions rely on the appropriateness of the choice of the UK as a benchmark. If UK CEOs are also overpaid, a finding that US CEOs are not more overpaid may be of little comfort.

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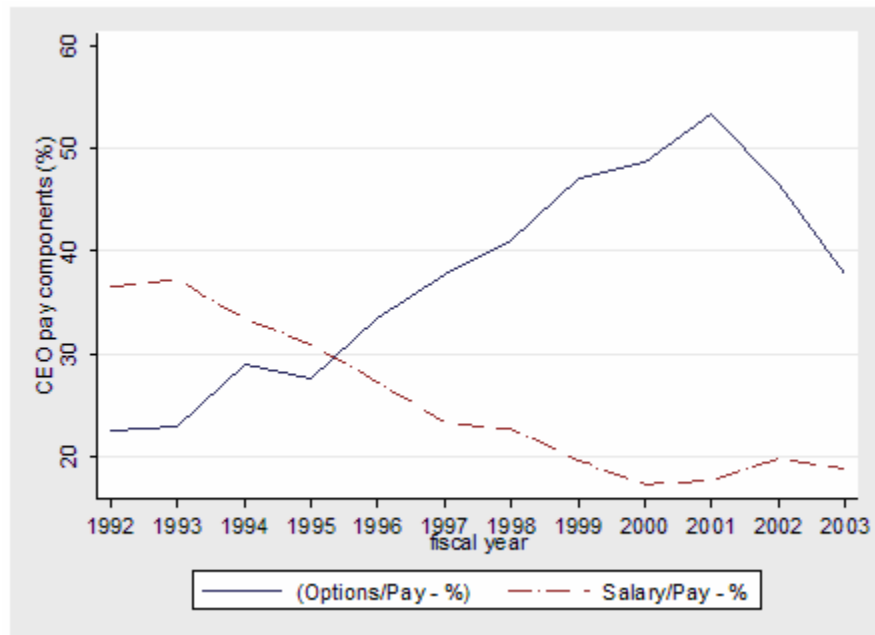
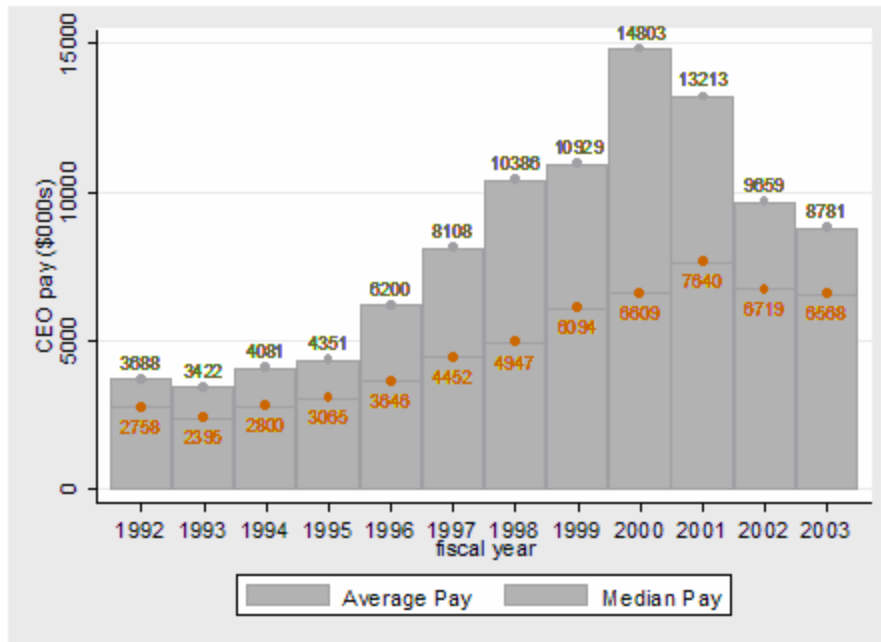
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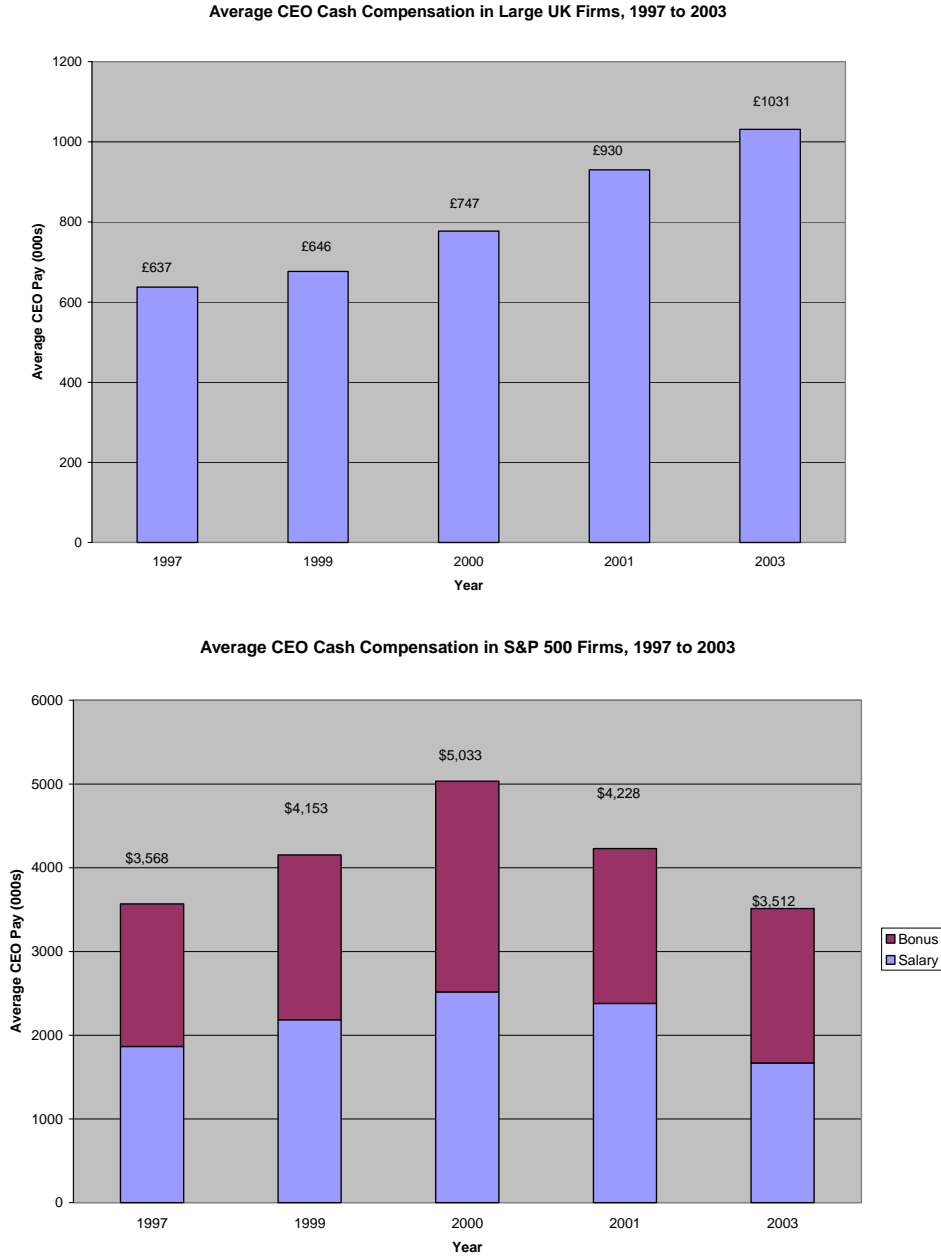
Figure 1a: CEO pay in US S&P 500 firms 1992 to 2003



Note:

Pay levels are given in thousands of 2003 constant dollars. Data are derived from the CEOs of S&P 500 companies (Source: ExecuComp). Pay is the sum of salaries, bonuses, benefits, stock options, stock grants and other compensation (variable TDC1 in Execucomp). Stock options are valued on the date of grant using Execucomp's modified Black-Scholes method.

Figure 1b: CEO cash compensation 1997 to 2003



Note:

Average pay levels are given in 2003 constant pounds sterling. The data are from the largest 200 UK companies ranked by market capitalization. The 1997 data and 2003 are the hand-collected data from annual report and accounts. The 1999, 2000, and 2001 are based on Hemmington Scott supplied data. Units are in thousands. Average CEO cash pay in the UK is given as the height of the bar and is defined as the sum of salaries, bonuses, and benefits. The pay variable excludes equity compensation such as share options and long term incentive shares. Average CEO salaries and bonuses are reported for the United States using ExecuComp data.

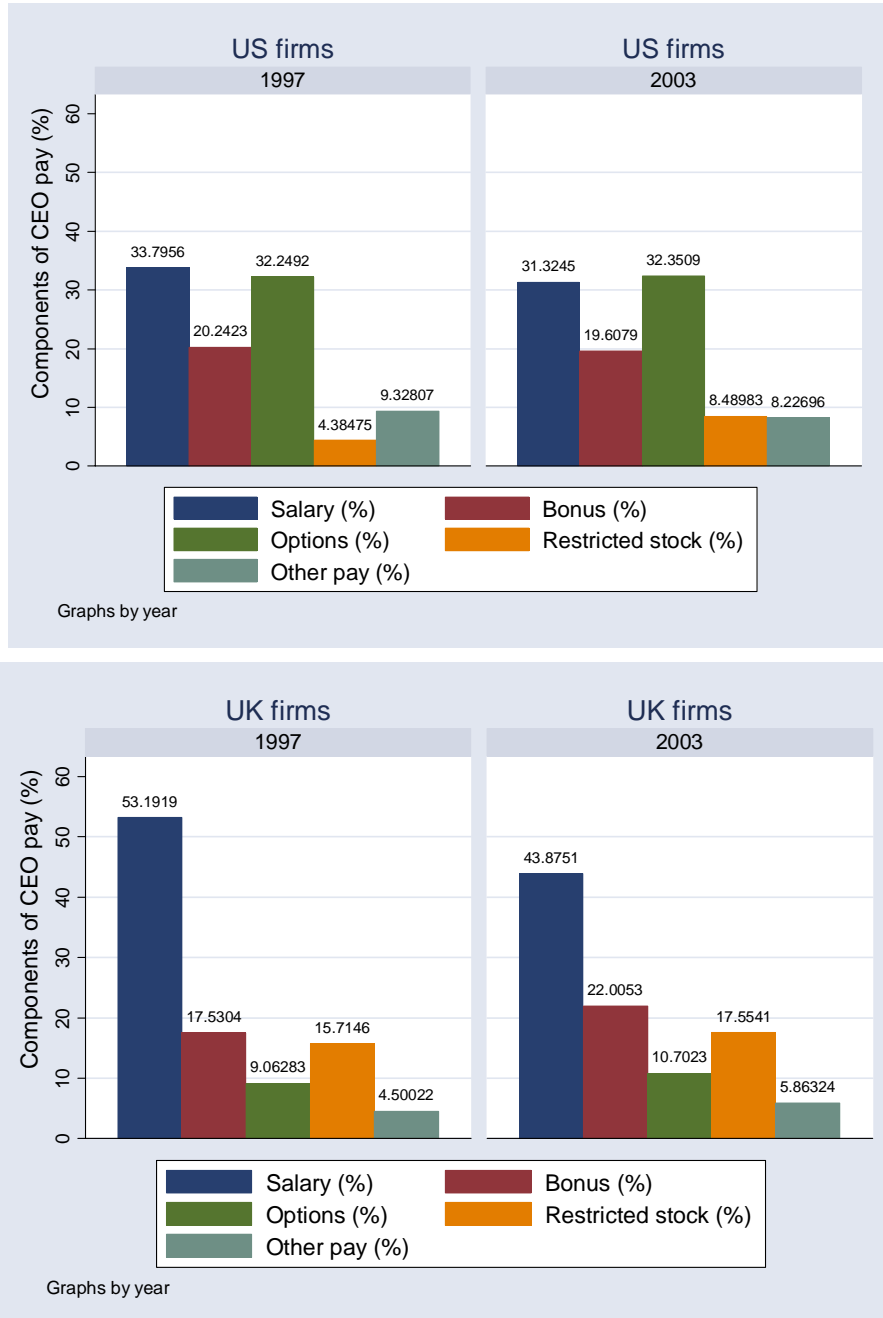
Table 1: US and UK CEO compensation in 1997 and 2003

	Year	N	Total Pay (average)	Total Pay (25 th percentile)	Total Pay (median)	Total Pay (75 th percentile)	Market value (average)
Sample							
US All Firms	1997	1221	\$4,391	\$1,106	\$2,206	\$4,473	\$6,154
	2003	1225	\$4,628	\$1,254	\$2,533	\$5,477	\$7,488
US S&P500 firms	1997	440	\$8,108	\$2,434	\$4,452	\$8,523	\$16,486
	2003	459	\$8,781	\$3,563	\$6,568	\$10,575	\$20,374
UK Largest 250 firms	1997	229	\$1,467	\$750	\$1,163	\$1,715	\$9,360
	2003	209	\$2,339	\$1,134	\$1,668	\$2,891	\$7,974
Ratios							
US All firms / UK	1997		2.99	1.47	1.90	2.61	0.66
	2003		1.98	1.11	1.52	1.89	0.94
US S&P 500 / UK	1997		5.53	3.25	3.83	4.97	1.76
	2003		3.75	3.14	3.94	3.66	2.56

Note:

UK data are from the largest companies in fiscal years 1997 and 2003 ranked by market capitalization. US data include firms in the S&P500, the S&P MidCap 400, the S&P SmallCap 600 and companies in S&P supplemental indices (Source: Execucomp). Total Pay for the firm's CEO is defined as the sum of salaries, bonuses, benefits, stock options (valued on the date of the grant using the Black-Scholes formula), restricted stock grants (valued at 100% of performance contingent awards) and other compensation. UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years 1997 (=1.6386) and 2003 (=1.6355). Nominal data are converted to real data using the CPI index in each economy.

Figure 2: Components of CEO pay



Pay definitions and data sources are contained in Table 1. The results are based on all US firms and the largest 250 UK firms.

Table 2: OLS regressions of US and UK CEO pay

Column	(1)	(2)	(3)	(4)	(5)	(6)
	Log (Salary and Bonus)		Log (Total Pay)		Log (Salary and Bonus)	Log (Total Pay)
	Year: 1997	Year: 2003	Year: 1997	Year: 2003	Years: 1997 & 2003	Years: 1997 & 2003
US indicator	0.44 (0.04)**	0.14 (0.04)**	0.80 (0.05)**	0.48 (0.04)**	0.50 (0.04)**	0.89 (0.05)**
Log(market value _{t-1})	0.25 (0.02)**	0.29 (0.03)**	0.46 (0.02)**	0.47 (0.01)**	0.27 (0.02)**	0.46 (0.01)**
Book to market _{t-1}	-0.04 (0.02)	-0.01 (0.03)	-0.07 (0.01)**	0.01 (0.03)	-0.03 (0.02)	-0.04 (0.02)
Shareholder returns	0.37 (0.08)**	0.24 (0.05)**	0.41 (0.06)**	0.26 (0.04)**	0.27 (0.04)**	0.28 (0.03)**
Stock volatility _{t-1}	-0.20 (0.10)*	-0.25 (0.08)**	0.46 (0.06)**	0.11 (0.06)	-0.23 (0.07)**	0.27 (0.04)**
US×Year=2003					-0.40 (0.06)**	-0.47 (0.06)**
Year=2003					0.56 (0.05)**	0.47 (0.06)**
US-UK difference	55.3%	15.0%	122.6%	61.6%		
Industry Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1421	1426	1421	1426	2847	2847
Adjusted R-squared	0.22	0.21	0.44	0.44	0.22	0.44

Note

A * is significant at 5%; and ** is significant at 1%. Total Pay for the firm's CEO is defined as the sum of salaries, bonuses, benefits, stock options (valued on the date of the grant using the Black-Scholes formula), restricted stock grants (valued at 100% of performance contingent awards) and other compensation. UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years 1997 (=1.6386) and 2003 (=1.6355). Nominal data are converted to real data using the CPI index in each economy. The US-UK CEO pay gap is calculated from the US indicator variable as $100 \times (e^{\text{coefficient estimate}} - 1)$.

Table 3: CEO shareholdings and financial incentives

		Year	Average	Median	Change in the average	Change in the median
CEO shareholdings (\$millions)	US	1997	\$117.16	\$8.13		
	US	2003	\$98.67	\$6.46	-15.8%	-20.5%
	UK	1997	\$9.54	\$0.77		
	UK	2003	\$20.27	\$1.50	112.5%	95.1%
CEO equity incentives (\$thousands)	US	1997	\$1,431.86	\$256.66		
	US	2003	\$1,314.70	\$270.14	-8.2%	5.3%
	UK	1997	\$126.19	\$34.79		
	UK	2003	\$250.60	\$53.38	98.6%	53.4%
CEO shareholdings as a % common shares	US	1997	3.16	0.36		
	US	2003	2.15	0.31	-32.0%	-13.9%
	UK	1997	0.44	0.02		
	UK	2003	1.33	0.05	202.3%	150.0%
Jensen Murphy statistic	US	1997	\$42.37	\$15.01		
	US	2003	\$33.58	\$15.03	-20.7%	0.1%
	UK	1997	\$5.57	\$0.73		
	UK	2003	\$14.42	\$2.21	158.9%	202.7%

Note:

UK data are from the largest companies in fiscal year 1997 and 2003 ranked by market capitalization. US data include firms in the S&P500, the S&P MidCap 400, the S&P SmallCap 600 and companies in S&P supplemental indices. The data source is Execucomp. CEO shareholdings are holdings of common shares (excluding options). CEO equity incentives are defined as: $1\% \times (\text{share price}) \times (\text{the number of shares held}) + 1\% \times (\text{share price}) \times (\text{option delta}) \times (\text{the number of options held})$. The Jensen-Murphy statistic is defined as: $(\text{the number of shares held divided by common shares outstanding}) \times \$1000 + (\text{the number of stock options held divided by common shares outstanding}) \times (\text{option delta}) \times \1000 . UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years 1997 (=1.6386) and 2003 (=1.6355). Nominal data are converted to real data using the CPI index in each economy.

Table 4: OLS regressions of US and UK incentives

Column	(1)	(2)	(3)	(4)	(5)	(6)
	Log (1+Equity incentives)		Log (Jensen Murphy)		Log (1+Equity incent.)	Log (Jensen Murphy)
	Year: 1997	Year: 2003	Year: 1997	Year: 2003	Years: 1997 & 2003	Years: 1997 & 2003
US indicator	2.13 (0.11)**	1.65 (0.11)**	2.13 (0.11)**	1.71 (0.10)**	1.88 (0.08)**	1.93 (0.08)**
Log(market value _{t-1})	0.61 (0.03)**	0.59 (0.02)**	-0.37 (0.03)**	-0.37 (0.02)**	0.60 (0.02)**	-0.37 (0.02)**
Book to market _{t-1}	-0.03 (0.04)	-0.03 (0.01)**	0.01 (0.02)	-0.01 (0.02)	-0.03 (0.01)*	-0.01 (0.01)
Stock volatility _{t-1}	0.63 (0.10)**	0.38 (0.09)**	0.68 (0.10)**	0.06 (0.10)	0.51 (0.07)**	0.36 (0.07)**
Year=2003					-0.12 (0.06)*	-0.16 (0.06)**
US-UK difference	741.5%	420.7%	741.5%	452.9%		
Industry Indicators	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1421	1426	1421	1426	2847	2847
R ²	0.43	0.42	0.47	0.31	0.42	0.39

Note:

A * is significant at 5%; and ** is significant at 1%. The Jensen Murphy statistic is defined as: (the number of shares held divided by common shares outstanding) × \$1000 + (the number of stock options held divided by common shares outstanding) × (option delta) × \$1000. CEO equity incentives are defined as: 1% × (share price) × (the number of shares held) + 1% × (share price) × (option delta) × (the number of options held). UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years 1997 (=1.6386) and 2003 (=1.6355). Nominal data are converted to real data using the CPI index in each economy. The US-UK gap is calculated from the US indicator variable as $100 \times (e^{\text{coefficient estimate}} - 1)$.

Table 5: Incremental pay per unit of incremental incentive for the median CEO

<i>Median Pay and Incentives</i>			
	US	UK	Difference: US - UK
CEO Pay in 1997	\$2,205.71	\$1,162.68	\$1,043.03
CEO Equity Incentives at beginning of 1997	\$210.02	\$29.48	\$180.54
Incremental pay per unit of incremental incentive			\$5.78
CEO Pay in 2003	\$2,532.58	\$1,668.23	\$864.35
CEO Equity Incentives at beginning of 2003	\$212.51	\$40.31	\$172.20
Incremental pay per unit of incremental incentive			\$5.02

Note:

Incremental pay per unit of incremental incentive in last column is computed as difference in pay divided by the difference in incentives.

CEO pay is defined as the sum of salaries, bonuses, benefits, stock options (valued on the date of the grant using the Black-Scholes formula), restricted stock grants (valued at 100% of performance contingent awards) and other compensation. Incentives are the dollar change in CEO firm wealth from a one percent change in the stock price, and are measured at the beginning of the year. UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years. Nominal data are converted to real data using the CPI index in each economy.

Table 6: Risk premium per unit of incentives for holding firm equity

Risk premium per dollar of incentives for various levels of risk-aversion and % of wealth in firm stock

<i>Relative risk-aversion</i>	<i>% of wealth in firm stock</i>	
	50%	67%
2	\$5.8	\$7.6
3	\$8.5	\$11.0

Note:

The risk premium is derived by solving:

$$E[U(\text{wealth unconstrained})] = E[U(\text{wealth constrained to firm equity, outside wealth, risk premium})] \quad (1)$$

The expression on the left side is the utility the executive could receive from investing his wealth in a utility-maximizing combination of the risk-free asset and the market portfolio. The expression on the right side is the utility the executive receives when he is constrained to invest some proportion of his starting wealth in firm equity, and the remainder in a utility-maximizing combination of the risk-free asset and the market portfolio. The executive holds the positions for one year. The risk-premium is assumed to be paid at the end of the year, and is the amount that sets the two sides equal.

The executive is assumed to hold all stock (no options). Returns on the stock and on the market portfolio are assumed to be jointly lognormal, and to follow the capital asset pricing model. The market is assumed to have an 11% expected return and 20% volatility, and the risk-free rate is assumed to be 5%. The stock is assumed to have a beta of 1, an 11% expected return, and 40% volatility.

Table 7: Implied pay for skill for the median CEO

<i>Median Pay and Incentives</i>	US	UK	US/UK
CEO Pay in 1997	\$2,205.71	\$1,162.68	1.90
CEO Equity Incentives at beginning of 1997	\$210.02	\$29.48	7.12
Risk premium (\$5.8 per \$ of incentive)	\$1,218.12	\$170.98	
Implied pay for skill	\$987.59	\$991.70	1.00
CEO Pay in 2003	\$2,532.58	\$1,668.23	1.52
CEO Equity Incentives at beginning of 2003	\$212.51	\$40.31	5.06
Risk premium (\$5.8 per \$ of incentive)	\$1,232.56	\$233.80	
Implied pay for skill	\$1,300.02	\$1,434.43	0.91

Note:

Implied pay for skill computed as pay minus the risk premium. The risk premium is equal to 5.8 times the CEO's equity incentives at the beginning of the year.

CEO pay is defined as the sum of salaries, bonuses, benefits, stock options (valued on the date of the grant using the Black-Scholes formula), restricted stock grants (valued at 100% of performance contingent awards) and other compensation. Incentives are the dollar change in CEO firm wealth from a one percent change in the stock price, and are measured at the beginning of the year. UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years. Nominal data are converted to real data using the CPI index in each economy.

Table 8: Implied pay for skill – All CEOs

Panel A: Computed Risk Premium per Dollar of Incentives

	country	N	Average	25 th percentile	Median	75 th percentile
1997	UK	229	\$3.88	\$2.72	\$3.88	\$4.85
	US	1,211	7.47	3.61	5.51	9.50
2003	UK	209	8.19	4.75	7.06	8.76
	US	1,225	10.56	5.03	7.77	13.20

Panel B: Implied Pay for Skill

	country	N	Average (All values)	Average (Negative Values set to 0)	25 th percentile	Median	75 th percentile
1997	UK	229	1,068	1,216	576	937	1,502
	US	1,211	-2,120	2,635	-585	965	2,626
2003	UK	209	445	2,079	867	1,503	2,776
	US	1,225	-2,037	2,338	-510	869	2,617

Note:

Implied pay for skill computed as total pay minus the risk premium. The risk premium is estimated using Equation (1) above assuming that the CEO has relative risk-aversion of 2 and 50% of his wealth outside the firm. Inputs into the calculation are the CEO's beginning-of-year stock and option portfolio, the firm's beta and volatility, an assumed market volatility of 20%, risk-free rate of 5%, and market risk premium of 6%. UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years. Nominal data are converted to real data using the CPI index in each economy.

Table 9: Median regressions of CEO implied pay for skill in US and UK firms

Column	Implied pay for skill			
	(1)	(2)	(3)	(4)
	Year: 1997	Year: 2003	Year: 1997	Year: 2003
US indicator	627 (124)**	-207 (102)**	198 (107)**	-512 (135)***
Market value _{t-1}	0.10 (0.02)***	0.08 (0.01)***	0.11 (0.03)***	0.09 (0.01)***
Book to market _{t-1}	63 (183)	199 (65)***	111 (117)	6 (32)
Shareholder returns	448 (148)***	522 (75)***	274 (90)**	38 (88)**
Stock volatility _{t-1}	-1555 (229)***	-1803 (229)***		
Industry indicators	Yes	Yes	Yes	Yes
Observations	1421	1426	1421	1426
R ²	0.04	0.03	0.09	0.11

Note:

A * is significant at 5%; and ** is significant at 1%. The dependent variable is Pay for skill as estimated in Table 8. UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years 1997 (=1.6386) and 2003 (=1.6355). Nominal data are converted to real data using the CPI index in each economy.

**Table 10: Implied pay for skill – sensitivity analysis
assuming UK CEOs are more risk averse than US CEOs**

<i>Median Pay and Incentives</i>	US	UK	US/UK
CEO Pay in 1997	\$2,205.71	\$1,162.68	1.90
CEO Equity Incentives at beginning of 1997	\$210.02	\$29.48	7.12
Risk premium (\$5.8 for US and \$11.0 for UK)	\$1,218.12	\$324.28	
Implied pay for skill	\$987.59	\$838.40	1.18
CEO Pay in 2003	\$2,532.58	\$1,668.23	1.52
CEO Equity Incentives at beginning of 2003	\$212.51	\$40.31	5.06
Risk premium (\$5.8 for US and \$11.0 for UK)	\$1,232.56	\$443.41	
Implied pay for skill	\$1,300.02	\$1,224.82	1.06

Note:

Implied pay for skill computed as pay minus the risk premium. The risk-premium is assumed to be \$5.8 per \$1 of incentive for US CEOs, and is assumed to be \$11.0 per \$1 of incentive for the UK CEOs.

CEO pay is defined as the sum of salaries, bonuses, benefits, stock options (valued on the date of the grant using the Black-Scholes formula), restricted stock grants (valued at 100% of performance contingent awards) and other compensation. Incentives are the dollar change in CEO firm wealth from a one percent change in the stock price. Beginning-of-year incentives are estimated by dividing end-of-year incentives by (1 + the stock return for the year). UK pounds sterling denominated data are converted to US dollars using the average \$/£ exchange rate during each of the years 1997 (=1.6386) and 2003 (=1.6355). Nominal data are converted to real data using the CPI index in each economy.