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Regulation and the Composition of CEO Pay

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It is well known that the use of stock options for compensating executives in large U.S. companies was widespread during the last 15 years. But were all firms using them with equal intensity? We are interested in the answer to this question because option grants are different from other compensation instruments in the type of incentives they provide, how transparent they are to investors, and the level of insider trading that they allow. In this article, we provide an empirical examination of the trends in the last two decades of the use of different compensation instruments, mainly focusing on restricted stock grants and option grants. We find that there have been important changes, and that they coincide in time with two changes in regulation: the modifications to reporting requirements for option grants introduced by the passage of the Sarbanes-Oxley Act in 2002, and the 2006 adoption of revised accounting standards from the Financial Accounting Standards Board (FASB) included in statement no. 123R (FAS 123R), which mandated the expensing of option grants.

Today, companies pay their top executives through some or all of the following instruments: a salary, a bonus program, stock grants (usually with restrictions on the ability to sell them), grants of options on the stock of the firm, and perks and long-term incentive plans that specify retirement and severance payments, as well as pension plans and deferred benefits. The most accepted explanation for the inclusion of compensation instruments that are contingent on the performance of the firm is the existence of a moral hazard problem: The separation of ownership and control of the firm implies the need to provide incentives

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to the chief executive officer (CEO) that align his interests with those of the firm owners.

In the presence of moral hazard, the optimal contract prescribes that the pay of the executive should vary with the results of the firm. However, in spite of the need for incentives, limited funds on the part of CEOs or risk aversion considerations imply that exposing the CEO to the same risk as shareholders is typically either an unfeasible or an inefficient arrangement. The optimal contract should balance incentives and insurance. Some part of the compensation should not be subject to risk, like the annual salary, providing some insurance to the CEO against bad performance of the firm over which he does not have control. However, some part of the compensation should be variable and tied to some measure of performance of the firm. The main variable pay instruments can be classified in three categories. First, bonus plans, which make annual pay dependent on yearly accounting results. Second, grants of stock of the firm (often referred to as "restricted stock," since the executive cannot sell them for some time after they are granted, typically about three or four years); these make pay in the longer term dependent on the results of the firm over a longer time horizon. Third, grants of stock options, which allow the executive to purchase stock of the firm at a pre-established price (the "exercise price") and also typically are granted with restrictions as to how soon they can be exercised; these also provide incentives for longer-term performance, but they only pay off for the executive if the stock price of the firm is above the exercise price.[1]

These different compensation instruments differ in how transparent they make compensation to shareholders or outside investors. For example, bonus schemes that are based on both objective and subjective performance targets may be more difficult for an outside investor to evaluate than a plain restricted stock grant. These instruments also differ on how robust they are to insider trading and other opportunistic behavior; the exercise of stock options or the sales of vested stock can potentially be timed by the CEO to the disclosure of particularly good or bad news on the prospects of the firm, for example, and bonuses may be sensitive to creative accounting practices where some annual results are made to look better by using the degree of freedom present in accounting standards, or by fraudulent misrepresentation of financial results.

[1] When options are granted with the exercise price equal to the stock market price at the date of grants, they are called "at the money;" this is the most popular practice, although some options are occasionally also granted "in the money" (with exercise price below market price) or "out of the money" (with exercise price above market price).

Another important factor is that various compensation instruments are treated differently for taxation purposes and are subject to different disclosure requirements and accounting standards. As an example of heterogeneity in tax treatment, non-qualified option grants, which have been the most popular type of option grant in the last two decades, trigger a tax deduction for the company when they are exercised by an employee; salaries or any other compensation that is not performance-based (like plain restricted stock awards) in excess of one million dollars, instead, do not qualify for a deduction.[2]

As an example of heterogeneity in disclosure requirements, compensation that is given to executives in the form of perks does not need to be detailed in the compensation disclosure tables of proxy statements if its value is less than $10,000; when the value exceeds that sum, the disclosure is only in a footnote. Salary, bonus, stock, and option grants are disclosed in the mandatory compensation table instead.[3]

These differences have historical origins, and are likely subject to political pressures. One cannot ignore, however, the distortion that the tax, disclosure, or accounting treatment may potentially have on the choice of instruments, and through that—as we just argued—on the efficiency of incentives and the transparency of compensation practices to shareholders. Hence, in this article we ask the following questions: Are firms in certain industries or of larger size more likely to use option grants? Are firms that use options more likely to pay higher compensation to their CEOs? Have restricted stock grants replaced option grants after expensing and reporting rules were changed in 2002 with Sarbanes-Oxley, and then again in 2006 with the adoption of Statement of Financial Accounting Standards 123R (SFAS 123R) accounting standards? Has the relative importance of salary and bonuses decreased in recent years in favor of option or stock grants?

Regulatory Changes

In this article we consider two major changes in the U.S. regulation of compensation practices. The first change is the Sarbanes-Oxley Act of 2002, which aimed to improve corporate governance after several earnings management scandals surfaced in the early 2000s. The second change is a revision of accounting rules introduced by the SFAS 123R in 2006, which for the first time mandated a positive expense for options

[2] This differential tax treatment was introduced in 1993, IRC section 162(m). See Hall and Liebman (2000) for an analysis of the taxation of executive compensation. See Meyers (2012) for a recent explanation of requirements on stock awards that are considered performance-based and qualify for a tax deduction.

[3] See Securities and Exchange Commission (2006).

awarded "at the money" (with exercise price equal to the stock market price at the date of the grant).

We use available data on executive compensation from 1993 to 2010 to evaluate the effect of these two regulation changes in the choice of compensation instruments of large public U.S. firms. Note that the Dodd-Frank Act, which was motivated by the financial crises of 2008, was passed in 2010 and it affected financial firms only. It would certainly be interesting to know how the increased scrutiny of incentive schemes that the Act mandates (both for executives and lower level employees) is affecting pay practices at large financial institutions. However, we do not have enough observations in our sample to deal with that regulatory change in this article.

The Sarbanes-Oxley Act, as part of its effort to improve transparency to shareholders, decreased the time window allowed for the disclosure of insider trades to two business days.[4] Before the Act, firms had until the end of the fiscal year to report any type of insider trading, including the grants of options to employees of the firm. As it became apparent after some investigations, a number of firms were able to exploit the lax reporting requirements to engage in "backdating," the (illegal) practice of artificially changing the grant date of options to the day with the lowest stock price in the time window allowed for reporting.[5,6] The benefits of this practice were twofold, and hinged on both the accounting standards and the tax treatment of options. First, it allowed the firm to report higher earnings. At the time, accounting standards under SFAS 123 allowed firms to expense grant options according to their "intrinsic value," which is zero for options granted at the money. Instead, the intrinsic value of an option in the money (which is what was being effectively granted without the backdating) would have been positive, and hence a compensation expense would have been deducted from the firm's income, resulting in lower reported earnings. Second, it allowed a larger tax deduction for the firm at the time that the option was exercised. Under Internal Revenue Code (IRC) section 162(m), firms can deduct from their tax liability any compensation costs that originate in incentive pay. In contrast,

[4] "Ownership Reports and Trading by Officers, Directors and Principal Security Holders," Release No. 34-46421 (Aug. 27, 2002) [56 FR 56461] at Section II.B.

[5] Investigations pointing to the existence of backdating became well-known only in 2005. Since Sarbanes-Oxley was passed in 2002, it may be the case that the change in reporting requirements was not directly aimed at preventing backdating. In other words, in trying to improve corporate governance in general, the Act inadvertedly limited the possibility of backdating.

[6] For a discussion of the issues and anecdotal evidence, see the *Wall Street Journal* article "The Perfect Payday" (March 18, 2006). For an academic evaluation of the backdating practice, see Heron and Lie (2007) and references therein.

there is a limit of one million dollars for deducting compensation that is not tied to incentives. Hence (provided the employee was already receiving one million dollars in non-incentive compensation), the tax deduction would have been lower for an option in the money, since the difference between the stock price at the time of grant and the exercise price would not have been considered incentive pay.[7] Backdating options without proper disclosure, then, implied both misreporting to investors the amount of incentive pay given to employees, and engaging in fraudulent accounting to save on taxes.[8] The Act, by decreasing the time window allowed to report the granting of options to two business days after the trade takes place, constrained the firms' ability to misreport the actual date of the grant, and hence made options a less attractive compensation instrument for firms that were backdating, or for those that were considering the possibility of doing it at some point.

The second piece of regulation that we consider is SFAS 123R, a revision to accounting standards SFAS 123, which was adopted by the Security and Exchange Commission (SEC) in 2006. The main change introduced by the revision was a homogenized method of valuation of options to "fair value" calculations, such as Black and Scholes. Previously, the "intrinsic valuation" method was allowed, which attributed a zero value to options granted at the money. Because option grants are accounted for as expenses in the income statement of the firm, this change in valuation method effectively eliminated the possibility of not charging any expense of compensation for options granted at the money.[9] The general view on this piece of regulation is that, after its adoption, companies were no longer able to "hide" the dent of option grants on their accounting profit. This view is supported by the numerous complaints by large U.S. corporations when the measure was first proposed, arguing that lower earnings per share would hurt, for example, their ability to borrow and grow, hindering innovation and job creation. However, under the disclosure requirements in SFAS 123 before 2006, firms were already required to report (in a footnote in

[7] This tax treatment applies to "non-qualified" option grants, which are the most common in executive compensation packages during the time period that we study. Firms are also allowed to grant "qualified" options, or "incentive stock options," to their employees, which are limited to a maximum value of $100,000, and hence are not usually granted to executives. See Bickley (2012) for details on the taxation of employee stock grants.

[8] Because backdating implies a violation of the SEC's disclosure rules, a violation of accounting rules, and a violation of tax laws, the SEC has sued a number of companies suspected to have engaged in this practice. See, for example, the testimony of Christopher Cox as Chairman of the SEC on September 6, 2006 (available at www.sec.gov), where he states that charges related to this matter were made as early as 2003.

[9] Accounting standards and a detailed description of accepted "intrinsic value" calculations can be found in APB 25, from the FASB.

their proxy statement) enough information about their grants of employee options for any interested shareholder to compute the cost of these (using, for example, the Black and Scholes valuation). Hence, the economic impact of this change in regulation remains unclear, and it somehow hinges on the assumption that the information disclosed in the footnotes was somewhat less available to the public than after it was officially included as an expense in the income statement.[10]

It is important to note that the first proposal for the expensing of options was drafted as far back as 1993. Due to strong opposition from the corporate sector and other political forces, the final recommendations in FASB 123 issued in 1995 merely recommended the expense, but did not mandate it. The public debate about the pros and cons of expensing, which involved senators, congressmen, the SEC, and lobbyists from the corporate sector, was ongoing for more than a decade. Finally, in 2006, the SEC endorsed the revision SFAS 123R, which mandates expensing. It is worth noting that many large public firms started the expensing on a volunteer basis as early as 2002; some commentators have noted that this voluntary adhesion, and the final political push that lead to the mandatory requirement, were rooted in the Enron and other accounting scandals in 2002.[11] Hence, the effect of SFAS 123R is potentially present as early as the passage of the Sarbanes-Oxley Act, preventing the separate identification in the data of the effect of the two regulations. Nevertheless, in our analysis we find significant changes in the patterns of usage of stock and option grants coinciding with both changes in regulation.

Outline

In this article, we start by describing the data. We provide a motivating example that illustrates the primary difficulties in using the currently available data on CEO compensation to answer the main questions of interest to us. In Section 2 we briefly review some previous attempts in the academic literature to shed light on similar issues, and the differences with the approach we take here. We proceed with our main analysis in two parts: First, in Section 3, we document facts related to the extensive margin (i.e., when and by which firms are stock and option grants used), and second, in Section 4, we discuss facts related to the intensive margin (i.e., what is the relative importance of

[10] See Guay, Kothari, and Sloan (2003) and Guay, Larcker, and Core (2005) for a clear exposition of these issues.

[11] See, for example, Brown and Lee (2011), or "Reporting Employee Stock Option Expenses: Is the Debate Over?" by Paulette A. Ratliff (www.nysscpa.org/cpajournal/2005/1105/essentials/p38.htm).

stock, options, and other forms of pay for the firms that use them). We document the change in compensation practices across the different regulatory regimes. We also explore the correlation of other firm characteristics, like size, industry classification, and executive characteristics, like age, tenure, and gender, with the choice and importance of the different available compensation instruments. We also examine the relationship of usage of stock and option grants with the level of pay. We conclude in Section 5.

1. SAMPLE DESCRIPTION AND DATA INTERPRETATION ISSUES

Thanks to disclosure requirements by the SEC, we have data available on pay to the top executives of public U.S. companies starting in 1992. This data is collected systematically by Compustat into a database called Execucomp. Many academic studies have used Execucomp and other available data to document the regularities in the level of pay and its sensitivity to firm performance, across time and also for firm characteristics like size and industry.[12]

The Execucomp data set is published by Compustat four times per year. Each release includes the new information for companies that filed their proxy statements with the SEC in that period (companies can decide when their fiscal years start, and hence there is variation in when annual proxies are filed). Execucomp tries to collect data on the firms that are listed in the S&P 1500 index, which roughly corresponds to the 1,500 largest U.S. firms by market capitalization. This article uses the information on CEO pay of the October 2011 edition of the Execucomp data, which covers 1992 to 2010, for a total of 19 complete fiscal years. We exclude observations in year 1992, since there are very few and they may not be representative. We exclude CEOs who own a large fraction of the firm's stock, since presumably pay is not set to provide incentives for these owner-CEOs. Next, we elaborate on the issues in choosing the threshold value for this selection.

[12] For the analysis of sensitivity of pay to performance, see the seminal contributions of Jensen and Murphy (1990), Rosen (1992), and Hall and Liebman (1998). For the relationship of pay level and sensitivity to firm size in the cross section, see Schaefer (1998) and Baker and Hall (2004). A more recent study of the variation of the level of pay over time and its potential relationship to firm size is Gabaix and Landier (2008). Frydman and Saks (2010) provides a comprehensive historical overview of both level and sensitivity of pay facts using a small sample of firms over an unusually long period, from 1936 to 2005.

Ownership, Incentives, and Steve Jobs

In this article we are interested in the decisions of firms to use or not use a given compensation instrument. One potential concern with this analysis is that the choice of a firm of not using stock or options may be explained by the fact that its CEO is a founder of the company, or that he or she is very vested in the firm already. An example of this would be Steve Jobs, who is, in our sample from 1997 to 2010, listed as the CEO of Apple, Inc.

Jobs's history of compensation over 12 years is easily summarized. In 1997, the year he took the CEO position, Jobs received, as a director of the company, 30,000 stock options with an exercise price of $23, to be vested proportionally over a three-year period.[13] The salary of Jobs was $1 for all the years we observe him in the sample. He received sporadic bonus and "other compensation" payments, stock in 2003, and options in 1997, 2000, and 2002.[14,15] In the company's own words:

> "In 2010, Mr. Jobs's compensation consisted of a $1 annual salary. Mr. Jobs owns approximately 5.5 million shares of the Company's common stock. Since rejoining the Company in 1997, Mr. Jobs has not sold any of his shares of the Company's stock. Mr. Jobs holds no unvested equity awards. The Company recognizes that Mr. Jobs's level of stock ownership significantly aligns his interests with shareholders' interests. From time to time, the Compensation Committee may consider additional compensation arrangements for Mr. Jobs given his continuing contributions and leadership."[16]

Jobs's ownership shares are only reported in Execucomp, combined with option holdings, for four of the years, and they never exceed 1.35 percent of the total shares outstanding, which is about the 67th percentile ownership in the original sample of CEOs. Even if one may be tempted to think that Jobs was not an "agent" for the shareholders of Apple due to the great value of the stock that he owned (especially after the 2003 grant, valued at more than $80 billion at the grant date), a closer look at the evolution of his ownership shows that he went from owning one share in 1997 to owning 5.5 million shares mainly as a result of his compensation packages. Moreover, Jobs had a considerable amount of wealth from his investment in Pixar, and one could argue

[13] See Apple's Definitive Proxy statement on March 16, 1998.

[14] According to Execucomp, Jobs received a bonus payment in 2001 and 2002, and two big sums as "other compensation" in 2001 and 2002.

[15] Given the compensation pattern of Jobs, it is interesting to note that Apple stated in April 2003 its decision to voluntarily expense option grants to its employees according to FASB recommendations

[16] See Apple's Definitive Proxy statement on January 7, 2011.

that stakes had to be necessarily high in order to provide him with adequate incentives. Finally, when Jobs's illness was made public, markets reacted, providing proof that the value that Jobs was bringing to the company was real.

The case of Steve Jobs is easy to check and understand, but in general the data on ownership in Execucomp shows some inconsistencies, and there are many missing values, since ownership is recorded only if it is over 1 percent. Hence, a back-of-the-envelope calculation of the value of the stock held by the CEO is not always available, and even if it were it would be hard to determine when the CEO is subject to a moral hazard problem based on those numbers.[17] From our analysis of the Jobs case, however, we conclude that we cannot rule out that ownership, in our sample, is a result of dynamic incentives provided by the firm. Hence, we are most comfortable adopting a conservative criteria of only dropping CEOs from our sample if their ownership reaches 50 percent in any of the years that they worked for a given firm, as opposed to more restrictive selection criteria in the literature.[18] Our final sample includes information on 6,146 different executives, and 3,248 firms, which amounts to 6,416 unique executive-firm pairs. In the year 1993, we observe 1,147 firms, and every year after that the number is at least 1,500, with a maximum of 2,010 firms in the year 2007.

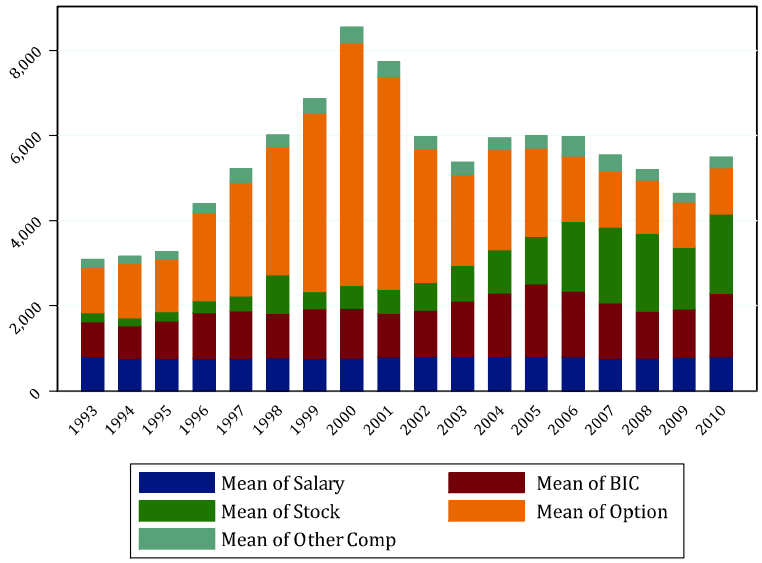
Compensation Measures

Our focus in this article is on the choice of compensation instruments by the firm, and we use the information readily available in Execucomp about each of the components of total compensation: salary, bonus and incentive compensation, stock and option grants, and "other compensation" such as pension plans, life insurance premiums, or perks. Note that to avoid discontinuity issues with the "bonus" and "incentive compensation" variables due to changes in reporting requirements in 2006, we sum these two to construct a single series, which we refer to as BIC throughout the article. Also, in spite of the different accounting standards during the sample period, Execucomp contains the Black and Scholes valuation of option grants for the whole period: Companies that used alternative valuations prior to SFAS 123R were required

[17] In spite of the sparse availability, we did construct a value of shares owned for the CEOs for which we had data: The average value for those that we classified as non-owners was $1,928,000, compared to a mean total compensation of $2,507,000.

[18] Clementi and Cooley (2010) used the more restrictive threshold of 1 percent ownership. We conducted a robustness check of our main analysis by dropping all CEOs who owned 3 percent or more shares on average over their tenure and results did not change qualitatively.

Figure 1 Average CEO Compensation



Notes: "BIC" stands for bonus and incentive compensation.

to provide the parameters necessary to calculate the Black and Scholes value. Whenever we need a measure of total compensation, we use the sum of these components (the variable $TDC1$ in Execucomp).[19]

Figure 1 presents the evolution of the mean total compensation in our sample over time, and its components. All the amounts here and in the rest of the article are normalized to thousands of 2010 dollars using the consumer price index. The year 2000 stands out as the peak in our measure of compensation, with an average of $8,553,690 and a median of $3,107,580. The year 2009 seems to be the last one of a decreasing compensation trend coinciding with the financial crisis: Mean compensation for this year was $4,637,950, while the median was $3,030,940.

The most salient fact about the composition of pay in Figure 1 is that the variation of pay with the business cycle is implemented through

[19] For recent studies that use this same measure of total compensation, see Gabaix and Landier (2008); Frydman and Saks (2010); and Cheng, Hong, and Scheinkman (2012).

the grants of stock and options, rather than through salary, bonus, or other compensation. For example, the graph shows that the decline in average total compensation between 2000 and 2003 is driven by a decline in the value of stock options. However, after 2002, the category BIC becomes somewhat cyclical as well. It is important to keep in mind that, of these components of total compensation, only bonus and incentive payments are mechanically related to the results of the firm. For example, the amount used to construct Figure 1 is the expected value of the grant at the time when it was awarded. Hence, the fact that compensation was the highest in the year 2000 is not due to a high value of past grants driven by a stock market boom, but rather to a conscious decision by the firms to increase the value of compensation for their CEOs.[20]

2. PREVIOUS LITERATURE

Before we start our analysis of the data, we review the relevant literature and explain our contribution.

In an influential chapter of the *Handbook of Labor Economics*, Murphy (1999) provides some suggestive evidence for a sample of firms between 1992 and 1996 that the importance of the different compensation instruments in pay packages (salary, bonus, stock, and option grants) varies across firms according to their size and the industry to which they belong.[21]

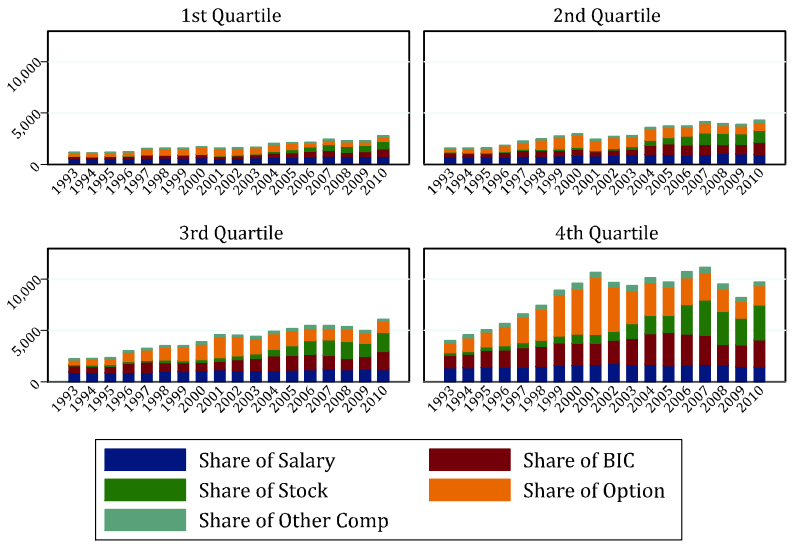
In his graphical analysis for the effect of size, Murphy compares S&P 500 industrials, mid-cap industrials, and small-cap industrials. We replicate and extend his analysis (including data up to 2010) in Figure 2, where we classify firms in our sample, year by year, into four quantiles according to their volume of sales.

The most striking fact that emerges from Figure 2 is that firms with larger sales figures have higher levels of pay. The variation in the relative importance of the different compensation instruments is difficult to evaluate in a systematic manner, although it is clear that larger firms have a larger portion of their pay given in stock and options. Also, the increase in the relative importance of options in the late 1990s that has been frequently commented on both in the academic and the popular press seems to have been disproportionately concentrated in the quantile of the largest firms.

[20] Note that firms amortize the expense from these grants over their vesting period, and hence compensation expenses are actually smoothed out over time by the firms.

[21] See Figures 2 and 3 in Murphy (1999).

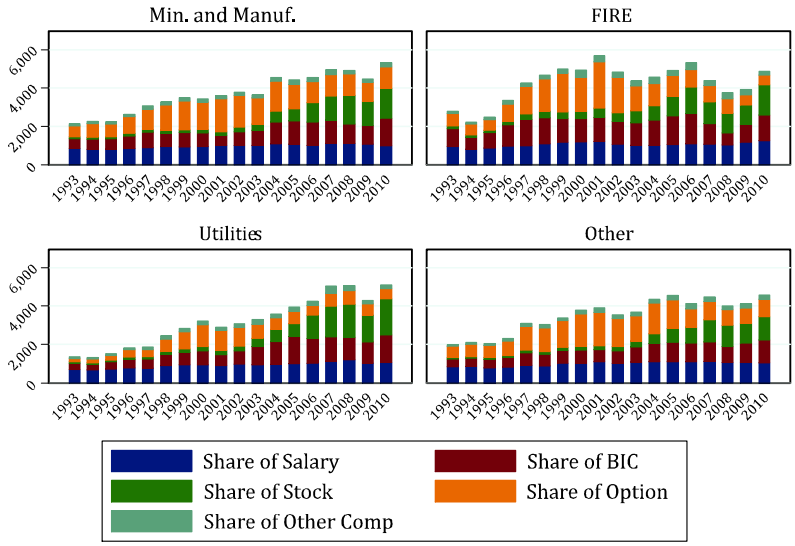
Figure 2 Average Compensation and its Components, by Quartiles of Sales Volume



Murphy's graphical analysis for the regularities across different industries is limited to S&P 500 firms, and it uses a classification of SIC industries in four groups: mining and manufacturing firms, financial services firms, utilities firms, and other industries. In Figure 3 we replicate this evidence, again extending the sample to include data from 1992 to 2010, as well as all firms in the S&P 1500. Figure 3 does not allow us to draw any clear conclusions. If anything, it seems to suggest that firms in utilities seem to rely more on restricted stock than option grants. In a related study, and for the period 1992–2001, Murphy (2003) classifies firms into "new economy" versus "old economy" according to the industry sector they belong to, and he finds that new economy firms (those competing in the computer, software, internet, telecommunications, or networking fields) use stock-based compensation (both restricted stock and options) more often and to a larger extent.

One important shortcoming of the simple facts reported in Murphy (1999, 2003) is that they do not inform us about the relationship between combinations of individual characteristics (industry and size together, for example) and usage of instruments. Also, the information about the variation in the cross-section is lost in the graphs. Our

Figure 3 Average Compensation and its Components, by Industry Group



contribution in this article consists of analyzing the data according to firm characteristics by running some simple regressions. Our analysis is still partial, since we are not exploiting the panel component in the data, but we are able to provide a more accurate description of the facts by controlling for several individual firm characteristics. We also split our analysis into the extensive margin (which compensation instruments are used) and the intensive margin (given a set of instruments that is being used, what is their individual share of total compensation).

In addition to answering the questions posed above about the trends in the usage of different compensation instruments, we explore whether factors other than firm size or industry classification may be associated with the usage of certain instruments. For example, given the limits on tax deductions imposed on salaries, firms that—for reasons other than their industry and size—choose to compensate their CEO with a larger sum of money may benefit more from issuing non-qualified option grants or restricted stock grants. As another example, executives who have longer tenures may need fewer restricted stock grants if they already hold a large number of shares of the firm from previous grants.

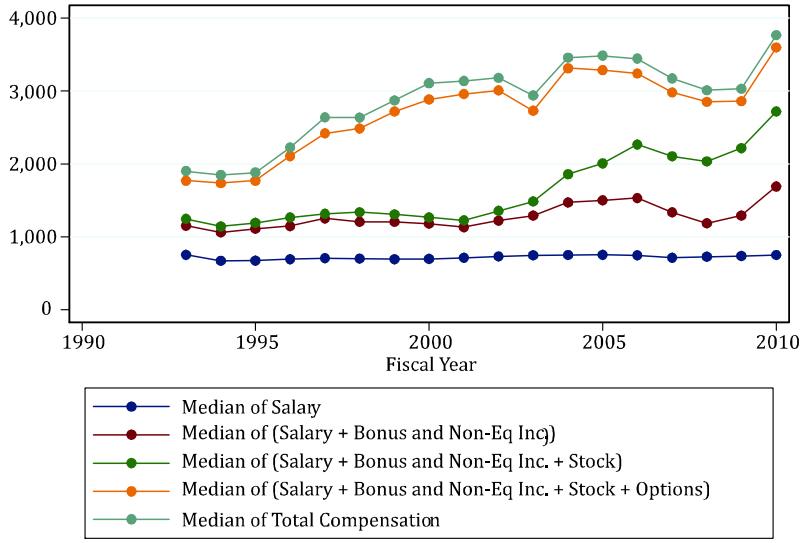
This last point, which is an interesting one, refers to the dynamic nature of incentives for CEOs. There have been important efforts in the literature of CEO compensation that track the evolution of the portfolio of grants of the executives, so that at each point in time we have a better understanding of how the executive's wealth would vary with a particular realization of the firm's results. Some important examples are Hall and Liebman (1998), Core and Guay (1999), and, more recently, Clementi and Cooley (2010). These measures of incentives are a way of controlling for outstanding past issues of stock and option grants. The focus of these studies, however, has not generally been the trends in the usage of compensation instruments. An important exception is Core and Guay (1999), who study this in detail for a shorter time period than the one we are analyzing here. They construct a model of the optimal level of stock holdings of the CEO, for incentives purposes. They find evidence that new grants (combining stock and options) are aimed at maintaining that level of incentives, as old grants expire or go out of the money. However, as far as we know, none of the studies that construct the portfolio measures address the potential effects of regulation on the trends in the usage of individual compensation instruments.

One important shortcoming of our data set is that it starts in 1993. Regulations on tax deductibility of CEO pay had just changed at the time (see IRC section 162(m)). Data on compensation practices prior to 1993 would be useful to the understanding of the distortions that 162(m), and other tax advantages introduced earlier, may have induced on pay practices.[22] Detailed compensation data for a broad representative set of firms going further back in time is not available; however, Frydman and Saks (2010) provide a historical analysis of a limited set of firms.[23]

As part of their analysis, Frydman and Saks (2010) plot the median of the partial sums of salary and bonus payments, successively adding the value of stock and option grants. They find that, even though the usage of options picks up considerably after taxation advantages are introduced in 1950, their relative importance in total compensation, as well as that of stock grants, does not become significant until the 1980s.[24] Since their sample of firms is necessarily limited (because of the long historical scope), and for comparison purposes, we replicate their graphical analysis for our sample in Figure 4.[25] For the

[22] See Jarque (2008) for a review.
[23] See also Lewellen (1968).
[24] See Frydman and Saks (2010, Figure 2, p. 2,108).
[25] See Frydman and Saks (2010, Figure 1, p. 2,107).

Figure 4 Median Total Compensation and its Main Components

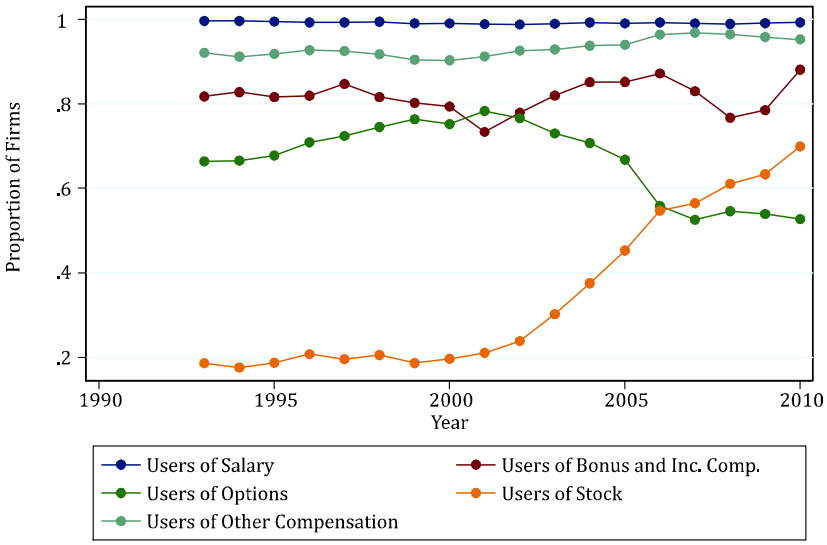


overlapping period from 1992 to 2005, and again with the caveat of not controlling for individual characteristics in this simple graphical analysis, we confirm their findings: Option grants have been an increasingly important component of the median pay of CEOs for the whole period, while the importance of stock awards started to pick up around 2002. With respect to the mean compensation that we plotted in Figure 1, we see that the importance of options was not as marked for median pay in the 1999–2001 period as it was for mean pay. Other than that, the main patterns seem to align between the two figures.

3. THE COMPOSITION OF PAY PACKAGES: THE EXTENSIVE MARGIN

We start this section by documenting the usage of the different compensation instruments over time. Then we proceed to analyze more formally which firm characteristics may be relevant for the choice of instruments of compensation. We find that variables like size and industry classification have some explanatory power over whether firms decide to include options or stock in their compensation packages.

Figure 5 Evolution of the Percentage of Firms that Use Each Instrument



Changes in regulation during the period we are studying exhibit the highest correlation with changes in usage patterns.

The Use of Different Compensation Instruments: A First Look

For all the firms in our sample, we check year by year which ones use each instrument (for example, a firm "uses" stock if it reports a positive stock grant to their CEO, regardless of the amount of the grant). This is plotted in Figure 5.

As is apparent from the graph, the use of both salary and other compensation is fairly universal and fairly constant over time (with a slight trend up for other compensation in the last five years). The use of bonus and incentive compensation is volatile around 85 percent, with no obvious trends. But the most striking feature in Figure 5 is the run-up in the use of restricted stock grants starting around 2003, which coincides with an important decrease in the use of option grants.

Given the strong variation over time in the usage of stock and options, it is worth thinking about the factors that could potentially be determining the decision of a firm to include either type of grant

in the compensation package to its CEO. Here we point to three main factors: (1) differences in tax advantages and accounting standards, (2) differences in sensitivity to firm performance, and (3) fixed costs of adoption of each instrument.

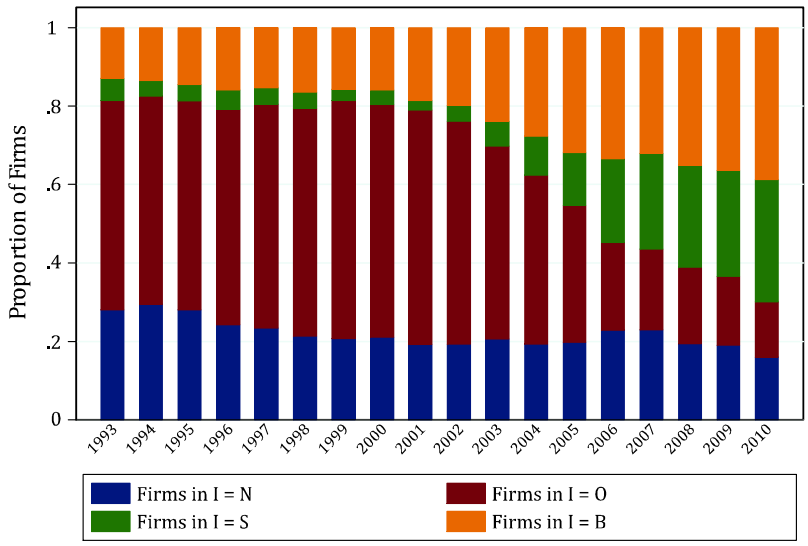
First we turn to tax and expensing differences. As we discuss at length in the introduction, both the passage of the Sarbanes-Oxley Act in 2002, and, especially, the change in expensing requirements and valuation of options in SFAS 123R approved in 2006 (and expected and voluntarily adopted by many firms as early as 2002), seem to have decreased the relative attractiveness of option grants over stock grants. We can summarize the comparison between the two instruments as follows. Restricted stock grants do not qualify for a tax deduction, they have to be accounted for as compensation expenses, and, before 2002, they had to be reported as insider transactions within 10 days of the grant. Options were more advantageous than stock before 2002 because they only had to be reported as insider transactions by the end of the fiscal year of the company; after Sarbanes-Oxley, both types of grants have to be reported within two business days of the transaction. Options were more advantageous than stock before 2006 because (i) they could be deducted for tax purposes, and (ii) they did not need to be expensed; after 2006, advantage (i) is still present, but (ii) is no longer there.

Second, stock and options may implement different incentives for the CEO. That is, in principle, without any accounting or tax differential treatment, stock and options could be substitutes in a compensation package: One could transfer a given amount of resources to the CEO either with a stock grant or with an option grant of equal expected value. However, the value of each of these two grants could change differently with changes in the value of the firm, i.e., the sensitivity of the compensation may be different depending on whether it includes only options or only stock (or both). Hence, idiosyncratic characteristics of the firm, like industry, size, or financial health, may determine the optimal sensitivity of pay to performance, and hence instrument choice.

Third, there may be a fixed cost of including an extra instrument in a compensation package (perhaps related to communication of new or more complex compensation practices to shareholders and creditors); this would imply that larger firms decide to include a different set of compensation instruments than their smaller counterparts.

To shed some light on these and other potential hypotheses, we will formally analyze the correlation of different firm characteristics on the choice of compensation instruments. We start our analysis of the data by classifying firms into four mutually exclusive groups, $\mathcal{I}$, according

Figure 6 Evolution Over Time of the Percentage of Firms in Each I Group



to which set of compensation instruments they use:

$$\mathcal{I} = \{S, O, B, N\},$$

with typical element I. That is,

- a firm with $I = S$ includes restricted stock grants (but no options) in its compensation package to the CEO,
- a firm with $I = O$ includes options (but no stock),
- a firm with $I = B$ includes both restricted stock and options, and
- a firm with $I = N$ includes none of the two.

Table 1 Descriptive Statistics of the Sample

	S		*O*		*B*		*N*		asset val (mil. $)	age (y)	tenure (y)	female
	Lev.	Diff.	Lev.	Diff.	Lev.	Diff.	Lev.	Diff.	(ave)	(ave)	(ave)	(%)
Overall	.12		.43		.24		.22		14,924	55	7	.02
Per. I	.04	*base*	.57	*base*	.16	*base*	.24	*base*	11,926	56	7	.01
Per. II	.09	.05	.45	−.12	.26	.10	.20	−.04	16,893	56	7	.02
Per. III	.26	.17	.19	−.26	.35	.09	.20	.00	18,155	55	7	.03
Other	.11	*base*	.42	*base*	.21	*base*	.26	*base*	5,545	54	7	.03
Min/Man	.10	−.01	.47	.05	.25	.04	.19	−.07	6,030	56	7	.02
FIRE	.17	.06	.36	−.06	.27	.06	.20	−.06	61,872	56	8	.01
Utilities	.17	.06	.36	−.06	.23	.02	.25	−.01	13,833	56	6	.01
size Q_1	.11	*base*	.48	*base*	.20	*base*	.21	*base*	324	54	8	.03
size Q_2	.12	.01	.45	−.03	.27	.07	.17	−.04	1,150	55	8	.02
size Q_3	.12	.01	.41	−.07	.32	.12	.15	−.06	3,675	56	7	.02
size Q_4	.11	.00	.40	−.08	.37	.17	.12	−.09	54,604	57	7	.01
age Q_1	.12	*base*	.45	*base*	.23	*base*	.21	*base*	8,460	47	5	.03
age Q_2	.11	−.01	.45	.00	.26	.03	.17	−.04	17,100	54	6	.02
age Q_3	.12	.01	.42	−.03	.28	.05	.18	−.03	17,769	58	7	.01
age Q_4	.12	.01	.39	−.06	.20	−.03	.28	.07	16,583	65	12	.00
tenure Q_1	.11	*base*	.41	*base*	.28	*base*	.19	*base*	18,103	53	1	.03
tenure Q_2	.12	.01	.42	.01	.27	−.01	.18	−.01	17,516	54	4	.02
tenure Q_3	.13	.02	.43	.02	.24	−.04	.20	.01	14,912	55	7	.02
tenure Q_4	.12	.01	.44	.03	.18	−.08	.27	.08	11,481	59	17	.01
Male	.12	*base*	.43	*base*	.24	*base*	.22	*base*	15,095	56	7	0
Female	.18	.06	.34	−.09	.27	.03	.20	−.02	5,594	52	5	1

Figure 6 presents the evolution of the proportion of firms in each of these four groups over our sample period. The evidence is consistent with the changes in regulation prompting firms to switch from using options only (O) to using stock only (S); but it is also apparent that a higher portion of firms use both instruments (B), suggesting that some firms may have chosen to add stock to the use of options, rather than completely substituting options with stock. Next, we formally evaluate the role of changes in regulation in these variations in usage patterns, after also considering other potential determinant factors for these patterns, such as the size of the firm and the industry to which it belongs.

The Determinants of the Composition of Pay Packages

Table 1 presents the breakup of firms in the compensation groups in $\mathcal{I}$ according to the regulatory periods, the industry group, and several firm and CEO characteristics available in Execucomp. It also includes statistics that describe the cross relations between these variables. We have established the existence of three different subperiods in our sample determined by important changes in regulation. Table 1 reports, in its first three rows, the fraction of firms that choose each instrument in the sample, and the changes in these fractions after the two changes in regulation. We denote as period I observations those from 1993 to 2001, as period II those from 2002 to 2005, and as period III those from 2006 to 2010. We see in the table that the fraction of firms in S increases in both subperiods, but especially in the later one. The fraction of firms in O options decreases, again more sharply in the later subperiod. The fraction of firms in N remains fairly constant over time around its overall mean of 22 percent. As we explained in the previous subsection, both regulations had the effect of decreasing the relative attractiveness of options over stock grants. Given this, it is useful to trace the changes in the fraction of firms that use options at all, i.e., $O \cup B$. In period I, we see that 73 percent of firms had options in their compensation packages. In period II this fraction remains fairly constant, at 71 percent: The decrease in O is almost exactly offset by the increase in B. That is, in the second subperiod firms were more likely to use options together with stock, rather than alone, but still as likely as before to use options at all. However, in the last subperiod the fraction drastically decreases to 54 percent: Although the fraction of firms in B increases, the decrease in O is three times as large. This is consistent with the annual evidence presented in Figures 5 and 6, which

show that the main adjustment in the usage of options was gradual and took place mainly over the course of period II.

For industry classification, we use the simple four groups of firms proposed by Murphy (1999). Firms are classified into: 1) mining and manufacturing, 2) finance and real estate (FIRE), 3) utilities, and 4) a mixed group containing any other firm. Table 1 reports that the choice of S is relatively more likely in FIRE and utilities, while that of O is more likely in mining and manufacturing and other. The choice of B is relatively more likely in FIRE, and less in other. Finally, the proportion of firms choosing N is much lower in mining and manufacturing and FIRE.

Next we report the breakout into compensation groups according to size. The literature has established that size is an important factor in the determination of pay levels. We use total assets as a measure of size.[26] Year by year, we classify the firms in our sample according to which of the four quantiles of the distribution of asset value they belong. Table 1 reports the fraction of firms that choose each instrument in the sample, and the differences from the fractions for the control group, which is the quantile of smallest firms. The patterns of usage of S seem to be independent of size, while O and N are relatively more popular in smaller firms. On the other hand, using stock and options together (B) is more frequent in larger firms.

Other potentially important characteristics are the tenure, age, and gender of the CEO. We briefly discuss each of these in turn.

Younger executives may have different career concerns than older ones, less experience, or different attitudes toward risk. More tenured executives may be more vested in the firm by means of historical grants, or firm-specific human capital. In Table 1 we see that the choice of S seems to be fairly independent of both age and tenure. The choice of O, instead, is more frequent for younger executives, while, interestingly, given the natural correlation of these two variables, it is less frequent for shorter tenured ones. The frequencies of choice of B are hump-shaped with respect to age, and decreasing for tenure. Firms seem more likely to use none of the instruments more frequently for long-tenured executives, and less frequently for middle-aged ones.

Some have argued that women are more risk averse than men (see Schubert et al. [1999] for a discussion of the evidence); this could influence the choice of compensation instrument. We only have 548

[26] For recent estimates, see Gabaix and Landier (2008, Table I, p. 66). Other size measures used in the literature are the number of employees and sales value. We confirm that in our data set the size measure with the highest R^2 for the level of pay is asset value. Details are available upon request.

firm-executive-year observations that correspond to a female CEO, versus 30,032 for males. Despite this, we report the average use of instruments by gender in Table 1 to point to one apparently significant difference: Female CEOs are about 10 percent less likely than male CEOs to receive options exclusively.

We now proceed to validate these raw statistics by performing a formal check on the effect of firm characteristics on the choice of instrument. We model the value to a given firm i of choosing a set of instruments I at time t as

$$\begin{aligned} V(I)_{it} &= \alpha + \sum_{k=1}^{3} \beta_k \; industry_i + \sum_{k=1}^{2} \beta_{3+k} \; period_t + \beta_6 \; tenure_{it} \\ &\quad + \beta_7 \; age_{it} + \beta_8 \ln (assets)_{it} + \beta_9 \; female_{it} + \varepsilon_{it}. \end{aligned} \tag{1}$$

In words, the value $V(I)_{it}$ is assumed to depend linearly on a constant, α, dummy variables for the three distinct regulatory periods in the sample, an indicator variable for the industry group to which that firm i belongs, and the characteristics of firm i in year t that we selected based on our sample analysis. We do not observe directly the value $V(I)_{it}$, but rather the discrete choice of firms for $I \in \{S, O, B, N\}$. Hence, our statistical model is

$$\Pr\left(V(I)_{it} > V\left(I'\right)_{it}\right) \quad \forall I' \neq I,$$

where the probability of observing the choice of a given I depends on whether $V(I)_{it}$, the value derived by a firm i from using instrument I at time t, is higher than the value of the other instruments. We assume the noise term ε_t has a type I extreme value distribution, so our discrete choice regression is a multinomial logit.

One concern with the interpretation of the results of the regression is the potential for colinearity. Table 1 reports, starting in the column labeled "Period," the averages of each variable in the subgroups defined in the different rows of the table. When analyzing those, the most salient fact is the uneven average size across periods (average size is increasing) and across industry groups (FIRE contains firms that are, on average, 10 times the size of firms in mining and manufacturing). However, when we plot the actual size distribution across periods it is not significantly different, thanks to the high variation in the size of firms within periods that we get by using the cross section. The difference in the distribution of size across industry groups is more

Table 2 Regression Results

Instrument	S			O			B			N		
Regression spec.	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Mean(Pr(I|X))	0.122***	0.123***	0.122***	0.427***	0.427***	0.427***	0.248***	0.248***	0.248***	0.203***	0.202***	0.203***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
*sic*4: *ALE*("Other")	0.110***	0.108***	0.110***	0.416***	0.408***	0.411***	0.245***	0.222***	0.233***	0.229***	0.263***	0.245***
	(0.004)	(0.003)	(0.004)	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
AME(Min/Man)	-0.006	-0.006	-0.006	0.037***	0.032***	0.041***	0.036***	0.038***	0.040***	-0.067***	-0.064***	-0.075***
	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
AME(FIRE)	0.038***	0.049***	0.038***	-0.015	0.034***	0.006	-0.049***	0.034***	-0.013	0.026**	-0.117***	-0.031***
	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.011)	(0.008)	(0.009)	(0.009)	(0.010)	(0.007)	(0.009)
AME(Utilities)	0.080***	0.089***	0.082***	-0.076***	-0.018	-0.053***	-0.043***	0.025**	-0.013	0.039***	-0.095***	-0.016
	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)	(0.010)	(0.007)	(0.009)
Period: ALE(I)	0.039***	0.040***	0.039***	0.579***	0.596***	0.577***	0.165***	0.173***	0.164***	0.216***	0.192***	0.220***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
AME(II)	0.049***	0.048***	0.049***	-0.121***	-0.145***	-0.119***	0.096***	0.079***	0.097***	-0.025***	0.019***	-0.027***
	(0.004)	(0.004)	(0.004)	(0.008)	(0.007)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
AME(III)	0.227***	0.222***	0.227***	-0.390***	-0.410***	-0.387***	0.186***	0.169***	0.192***	-0.023***	0.020***	-0.031***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
AME(ln(*assets*))	-0.001	-0.005**	-0.000	-0.008***	-0.048***	-0.020***	0.051***	0.001	0.030***	-0.042***	0.052***	-0.009***
(mean = 7.71, SD = 1.78)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
AME(ln(TDC1))		0.010***			0.102***			0.117***			-0.228***	
(mean = 8.00, SD = 1.16)		(0.002)			(0.003)			(0.003)			(0.003)	
AME(*Ave*(ln(TDC1)))			0.000			0.034***			0.054***			-0.088***
(mean = 8.21, SD = 0.91)			(0.003)			(0.004)			(0.004)			(0.003)
N	26736	26686	26736	26736	26686	26736	26736	26686	26736	26736	26686	26736
Pseudo R^2	0.109	0.215	0.120	0.109	0.215	0.120	0.109	0.215	0.120	0.109	0.215	0.120

Standard errors in parentheses. *AME*s are not reported for variables that were not statistically significant.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

apparent. However, we perform a robustness check of the main qualitative features of our regression results by running our regression in four different samples according to industry group, and we confirm them all.[27]

The results of the regression using the benchmark specification for $V(I)$ in (1) are reported in Table 2, under the column labeled as regression specification (1). In the first row of Table 2, we report the regression sample averages, or, equivalently, the average predicted probability in the model. The numbers differ slightly from those reported in Table 1 because some of the observations have missing values for some of the regressors, and hence they are dropped from the sample.

In order to provide an intuitive sense of the estimated relative importance of each regressor, the rest of the rows in the table report the average of the partial derivatives of the probability of usage, or the average marginal effect of each explanatory variable x_{ij} in the vector of all explanatory variables X_i, defined as

$$AME(j) \equiv Mean_i \left(\frac{\partial \Pr(I|X_i)}{\delta x_{ij}} \right).$$

That is, using the estimated coefficients, we calculate how much the probability of using each instrument changes for each of the firms in the sample when we marginally increase the value of a given explanatory variable x_{ij}, evaluated at the true value of the vector of regressors X_i for firm i; then we take the average of those marginal changes over i. Note that the marginal effects are calculated in a slightly different way for discrete variables. The marginal effects with respect to the variable "Period," for example, represent the average change induced by hypothetically switching a firm from the base period, I, to each of the remaining periods.[28] Formally,

$$AME(j) \equiv Mean_i \left[\Pr\left(I|X_i^{-x_{ij}}, x_{ij} = n\right) - \Pr\left(I|X_i^{-x_{ij}}, x_{ij} = base\right) \right],$$

for all n different than *base*, where *base* denotes the value of the regressor x_j, in this case period I, and $n \neq base$ represents period II and period III. The notation $X_i^{-x_{ij}}$ represents the vector of regressors X_i excluding regressor x_j. In order to provide a benchmark to evaluate these discrete changes in probability, we also report, for discrete

[27] Details are available upon request.

[28] To calculate the marginal effect for "2002–2005," Stata calculates the predicted probabilities by setting to 1 the dummy for the baseline period of "1993–2001" into each observation while leaving all other regressors at their true sample values. Then it calculates this predicted probability again by substituting "2002–2005" instead. The average of this difference is the reported marginal effect.

regressors, the level of the average predicted probability in the sample when setting $x_{ij} = base$ (we denote this by $ALE\,(j)$ in the table).

Some of the strongest economic effects are associated with the three regulatory subperiods. Size and industry are also statistically significant for all groups. Despite the differences reported in Table 1, and possibly due to high standard deviations, our controls for gender, age, and tenure of the CEO often do not have a statistically significant effect on the choice of compensation instruments, so we choose to not report the AMEs for these variables.[29] We now summarize the findings regarding period, industry, and size.

Regulatory periods *Firms move away from compensation packages that include only options after both regulatory changes, either to use only stock or to use options together with stock. They mainly add stock to their compensation packages during period II, and they mainly substitute stock for options in period III.*

We find that if the same firm went from living in period I, before Sarbanes-Oxley, to period II, the probability of it choosing O would decrease by a substantial 12 percentage points (pp), while that of choosing S would increase 5 pp and that of choosing B would increase by almost 10 pp. In period III, after FAS 123R went into effect, the probability of using options would be 39 pp lower than in the initial period, leaving it at about 20 percent. The most favored category in that switch would be stock, with a 23 pp increase, followed by both, with a 19 pp increase. The use of none decreases at a modest 2–3 pp in each of the two periods.

Industry classification *Firms in FIRE and utilities favor packages that include stock exclusively, or no grants at all, more frequently than the average firm. Both these industries make less use of packages that include options exclusively, or stock and options together. Firms in mining and manufacturing, in contrast, use options exclusively, or together with stock, slightly more than the average firm, and they are less likely to compensate without using any grants at all.*

The control industry, "other," aligns with the average usage probabilities in the overall sample. We see that switching from "other" to "mining and manufacturing" is associated with a shift away from using N into O, or B, in comparable magnitude. Switching to FIRE is associated with an important shift away from O and B (by 2 and 5 pp,

[29] Details are available upon request.

respectively), into S and N (by 4 and 3 pp, respectively). Switching to utilities, which includes transportation, communications, electric, gas, and sanitary services, presents, perhaps surprisingly, a similar pattern than FIRE. For utilities, however, the effects are even stronger: The decrease in B and O is by 4 and 8 pp, respectively, and the increase in N and S is by 4 and 8 pp, respectively.

Size *Larger firms are less likely to use compensation packages that include options exclusively, and more likely to use those that include both stock and options. They are also less likely to compensate without using any type of grants at all.*

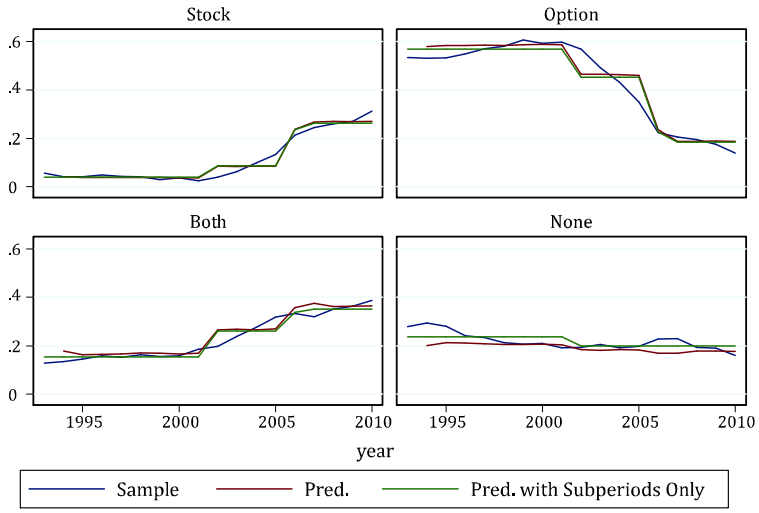
Firm size is a continuous variable (the log of the value of assets measured in thousands of 2010$). An increase in firm size significantly increases the probability of choosing B, to the detriment of choosing O or N. It is difficult to compare the economic importance of size with respect to the discrete variables that we just commented on, since the numbers in the table represent the effect of infinitessimal increases in size, not changes in industry or period as above. For comparison, we can calculate the implied average change in the probabilities for an increase in log size equal to one standard deviation. This back-of-the-envelope calculation implies that the probability of choosing B increases by approximately 9 pp, while that of O decreases by 1 and that of N by 7. This suggests that the magnitude of changes associated with size is similar to that of changes in the industry classification, but smaller than that of the regulatory subperiods.

The Role of Individual Firm Characteristics

In Figure 7 we provide a simple graphical evaluation of the fit of the model in equation (1). We have plotted the sample percentage of users of each instrument by year in each of the subplots (blue line), the predicted probability of usage by the full model in (1) (red line), and a limited model that includes as regressors only the period dummy indicators (green line).[30] The main result that emerges from this comparison is that the explanatory power of the variables that indicate the different subperiods is high. Although the econometric model is not able to fit the smooth decline in the use of options, we have already pointed out earlier in this article that the new standards in FAS 123R

[30] The SEC adopted FAS 123R reporting rules for firms filing their proxy statements after December 15, 2006. Hence, we classify firms as being in period III if the month in which their fiscal year ends falls after November 2006. This means that in the year 2006, the firms in the sample are split across two subperiods. This explains the extra kink in the predictions using the restricted model.

Figure 7 Fit of the Model Over Time



were already recommended by the FASB in 1993, and some companies started adopting them earlier than 2006. This may explain most of the discrepancies between the green line and the true data.

In contrast with the good fit of the model over time, a low pseudo-R^2 seems to suggest that, even including the individual characteristics, our model does not do a good job in explaining individual cross-sectional variation in the use of instruments. As is apparent from the figure, the individual characteristics of the firm that we include in the full regression do not add much to the explanatory power of the model over time. In fact, the pseudo-R^2 of the regression using only the regulatory subperiods as explanatory variables is already 7 percent, compared to the 11 percent of the full model in specification (1). More work is needed to understand which individual characteristics of firms determine their choice of compensation instruments.

The Role of the Level of Pay

One potential explanatory variable of the choice of instrument that we left out of our analysis in regression specification (1) is the level of pay itself. It may be the case that tax advantages, or transparency concerns of the firm, make it more convenient for the firm to pay large sums to its CEO in the form of stock or options, rather than through

Table 3 Average Total Compensation and Average Mean Compensation by Firm

Period		S	O	B	N	Across Groups
I	$TDC1_{it}$	5,683	6,211	8,809	1,668	5,519
		(37,035)	(16,821)	(15,811)	(3,360)	(16,176)
	$\text{mean}(TDC1)_i$	5,752	5,707	7,457	4,227	5,630
		(7,804)	(7,707)	(7,707)	(6,211)	(7,002)
II	$TDC1_{it}$	5,672	5,677	8,854	2,185	5,808
		(8,023)	(7,399)	(10,304)	(3,627)	(8,106)
	$\text{mean}(TDC1)_i$	5,422	5,380	7,206	4,380	5,660
		(6,447)	(5,876)	(7,510)	(7,398)	(6,771)
III	$TDC1_{it}$	5,539	4,754	7,621	1,762	5,372
		(7,861)	(6,645)	(7,827)	(2,866)	(7,218)
	$\text{mean}(TDC1)_i$	5,236	4,616	6,688	3,625	5,310
		(6,163)	(5,196)	(6,421)	(5,605)	(6,090)
Across Periods	$TDC1_{it}$	5,585	5,893	8,299	1,804	5,542
		(16,417)	(14,020)	(11,448)	(3,299)	(12,412)
	$\text{mean}(TDC1)_i$	5,350	5,486	7,056	4,095	5,542
		(6,499)	(6,409)	(7,125)	(6,335)	(6,691)

Notes: Standard deviations in parenthesis.

a salary or a bonus program. To explore this possibility, we present in Table 3 the average level of total compensation (first row of all periods, labeled as $TDC1$) by group and subperiod. We can see that firms in N have a remarkably lower level of compensation, across all subperiods. Moreover, firms choosing B have the highest average compensation in all subperiods. The statistics for the group using only stock or only options are interesting: The level of pay is higher for O in period I, when options were more likely to be used on their own than stock (see Table 1). During period II, average pay is equal across the two groups of users. As we discussed in Section 3, this is a period when Sarbanes-Oxley had just been passed, making the choice of options more costly —at least in terms of opportunities for backdating and maybe in terms of public image. In period III, after the new accounting standards that made the valuation of options less arbitrary became compulsory, the ranking of average pay reverses: CEOs of firms that are users of stock are paid, on average, more than those that are users of options.

In order to explore formally the explanatory power of the level of pay after controlling for firm characteristics, we replicate the regression in equation (1), but add the level of total compensation (the log of the variable $TDC1$ in Execucomp) as a regressor. The results are reported in Table 2, under the column labeled as regression specification (2).

The meaningfulness of these estimated effects needs to be evaluated in the context of the mechanics of compensation, since there is an obvious relation between the level of compensation and the use of grants. This mechanical relationship exists unless we think that sometimes firms issue grants that are very small in value. In the sample, the minimum value for stock and option grants is in the order of $3; the 1st percentile value is $18,667 for stock grants and $38,355 for options; the 10th percentiles values are about $200,000 and $250,000, respectively. Given that the 10th percentile of salary payments in the sample is $364,000, and that of total compensation is in the order of $750,000, these statistics suggest that fairly low values of the grants are possible and not that uncommon.

Another concern with the results of regression specification (2) is endogeneity: Since stock and options are risky assets, CEOs receiving their compensation in the form of grants (as opposed to salary or other less risky instruments, such as bonuses) may need to be compensated for their risk aversion with higher levels of pay. See Hall and Murphy (2002) for a formal explanation and quantification of the effect of risk aversion on the value of grants to executives, and the comparison of that value to the cost for the firm.

Total compensation is indeed a significant variable according to the results of the multinomial logit. Also, the pseudo-R^2 doubles with respect to specification (1). We find that a marginal increase in the level of pay leaves the probability of using stock almost unchanged, while it increases the one for choosing O by 10 percent and of B by 12 percent; it decreases the probability of using N by 23 percent.

The effects of size change significantly in specification (2). An increase in size now has a small but significant positive effect on the probability of S. The effects on O remain negative but increase significantly in magnitude. Moreover, the positive relation between size and choosing B becomes negligible (and insignificant) when controlling for the level of pay. Finally, the negative effect of size on the probability of choosing N changes to positive when controlling for the level of pay, suggesting that if a given firm is granting a relatively high level of total compensation, the fact that it is a larger firm actually makes it less likely to include stock or options in its compensation package.

We can also consider the changes in the marginal effects of the rest of the regressors with respect to those reported in specification (1). As for the period variable, the new model has similar implications both for period II and III when it regards the choice of S. However, the negative effect on the probability of choosing O is even stronger, while that of choosing B is still positive but weaker. The effect on choosing N changes sign in both periods with respect to specification (1): Although

magnitudes are small, firms are more likely to choose N in later periods than in the initial one. Note in Table 3 that there is no clear trend of average compensation over time across groups; however, compensation is lower in later periods for firms that include options in their packages.

As for the industry dummy, while the results for mining and manufacturing are very robust, for FIRE and utilities we observe some important changes. While firms in FIRE were more likely to choose S or N in specification (1), when including the level of total compensation as a control they are more likely to choose S, and O or B are now favored (in similar magnitudes), while N is now less likely to be chosen. Utilities is also more likely to choose S or N in specification (1); in specification (2) it becomes a likely user of B and a less likely user of N. A possible explanation of these reversals in the sign of the coefficients is that, given their size, firms in FIRE and utilities tend to have lower levels of pay, which are associated with a lower probability of choosing B and a higher probability of choosing N; when the level of pay is not a control, that effect is assigned by the model to the industry dummy.

One may suspect that the covariance of the regressors with the level of pay is a potential cause of these changes in the estimated coefficients. However, the covariance is not perfect, and both size and pay remain significant in the robustness check, suggesting that specification (1) may have an omitted variable problem. Numbers need to be taken with caution.

As a final robustness check, we replicate the regression in equation (1) but add as a regressor the average level of total compensation (the log of the average of the variable $TDC1$ in Execucomp) of a firm across the years that it stays in the sample, rather than the actual level of $TDC1$ in each year. The results are reported in Table 2, under the column labeled as regression specification (3). Table 3 reports the average and standard deviation of this measure of pay in the sample (labeled mean$(TDC1)_i$). The most striking feature is the much higher pay for firms choosing N when compared to the average of contemporary level of pay. This reflects the fact that many of the firms in N are in one of the other compensation groups in some of the years.

The hope in including average pay as a regressor is that this may break slightly the mechanical link between the level of pay and the presence of grants, and rather pick up some firm characteristics that are correlated with, for example, the outside opportunity of the CEO, or any other characteristic that determines his average pay across the years but not necessarily the timing of the grants. We see in Table 3 that the pseudo-R^2 is higher than in specification (1), but much lower than in specification (2). The average level of pay is a significant

explanatory variable for O, B, and N, and the sign of the coefficients is aligned with that of the contemporaneous level of pay, but its economic importance is much smaller, confirming that some of the effects of the level of pay on the choice of instruments are purely mechanical.

Choosing N and the Timing of Grants

There is some anecdotal evidence that companies tend to have fixed timing rules when it comes to giving stock or option grants to their executives. Hence, when we observe a firm choosing N in our sample it may just mean that the firm is in a "non-granting" year, but that it will grant again the following year, or in a couple of years, depending on its timing rule. For example, taking the compensation of Steve Jobs over his tenure as Apple CEO (see Section 1), according to our classification, the company chose N in 10 of the years, O in 3, and S in 1. Why firms may not want to smooth out grants is, to our knowledge, an open question, and beyond the scope of this article. However, the common practice of having the selling restrictions of both stock and option grants vest progressively over time does provide some smoothing. Unfortunately, there is no good data readily available on these vesting periods. Nonetheless, we should keep in mind that if the practice of timing grants on a regular basis is really prevalent, then the statistics about usage presented here should be understood as informative about the timing of grants, and changes in usage patterns would be informative about changes in this timing.

A thorough analysis of the reincidence patterns in the usage of instruments is beyond the scope of this article, and is left for future research. However, in order to provide a sense of how much of the variation in instrument choice in the data is not coming from timing of grants, we now report on a measure of the frequency of instrument use at the individual firm level: We calculate the fraction of years that a given firm is in each of the groups, or the "firm's time share of I." Denoting by t_{iI} the number of years that a firm i is in compensation group I, and by T_i the total number of years that firm i is in the sample, firm i's time share of I is defined

$$\tau_{iI} \equiv \frac{t_{iI}}{T_i}$$

for each I in $\mathcal{I}$. To give more meaning to the extreme values $\tau_{iI} = 0$ and $\tau_{iI} = 1$, we construct a balanced subset of the sample that includes only firms that we observe for at least six years ($T_i \geq 6$, a total of 489 firms out of the original full sample of 3,248 firms). From the fact that there are mass points at 0 (and, to a lesser extent, at 1) in the frequencies for this subsample, we conclude that, provided compensation cycles

Table 4 Percentage of Firms that are Never in a Given Compensation Group

Percent of Firms with $\tau_{iI} = 0$	S		O		B		N	
Period	Bal.	Full	Bal.	Full	Bal.	Full	Bal.	Full
I	.82	.86	.08	.12	.49	.61	.40	.42
II	.80	.80	.26	.29	.39	.53	.65	.60
III	.59	.55	.65	.64	.29	.42	.72	.59

are shorter than six years, not all the firms are following alternating times for the inclusion of options or stock grants in their compensation packages. This means that at least some of the variation that we see in the data comes from meaningful choices about the usage of the different compensation instruments.

Because the timing choices themselves may be influenced by the regulation period, in Tables 4 and 5 we report statistics of τ_{iI} by regulatory subperiod. We report this for the balanced subsample (denoted "Bal."), as well as for our original full sample (denoted "Full").

Table 4 reports the fraction of firms with $\tau_{iI} = 0$, i.e., they are never in compensation group I. It shows a pattern consistent with the evidence in our previous regression results: The fraction of firms that never were in group S or B decreases over time, while that of firms never choosing O increases. Interestingly, the increase in the fraction of firms with $\tau_{iN} = 0$ over time suggests that, if anything, timing decisions have changed toward using grants more frequently.

Table 5 reports the average value of τ_{iI} contingent on it being positive; that is, the average time share τ_{iI} for firms that are in compensation group I for at least one year. To report both the averages and their significances, we run an ordinary least squares regression of τ_{iI} on period dummies, for each I. The first column under each I reports, for the balanced sample, the coefficients for the constant (the level in the control period, I) and the included dummies (the change in the average τ_{iI} in each subsequent period with respect to period I), while the second column reports the same coefficients for the larger sample of firms that are in the data for at least six years. The patterns and significances are remarkably similar across the two samples of firms. There is no evidence of a significant decrease in the fraction of years that firms choose to grant options only (τ_{iO}) in period II, while it is significant both statistically and economically in period III. There is an important upward trend for both τ_{iS} and τ_{iB}, and a lot less markedly

Table 5 Mean Time Shares

Mean $(\tau_{iI}\|\tau_{iI} > 0)$	S		O		B		N	
Period	Bal.	Full	Bal.	Full	Bal.	Full	Bal.	Full
I: Level	.26	.28	.62	.65	.36	.40	.34	.41
	(.03)	(.02)	(.01)	(.01)	(.02)	(.01)	(.01)	(.01)
II: Change from	.15	.17	[−.02]	[−.02]	.19	.15	.07	.10
Period I	(.04)	(.02)	(.02)	(.01)	(.02)	(.01)	(.02)	(.01)
III: Change from	.31	.27	−.14	−.14	.33	.24	[.05]	.08
Period I	(.04)	(.02)	(.03)	(.02)	(.02)	(.01)	(.03)	(.01)
Adjusted R^2	.17	.13	.03	.03	.18	.10	.01	.03
N	387	1,345	979	3,532	894	2,531	602	2,489

Notes: Time share τ_{iI} represents the fraction of years that firm i belongs to group I, out of the total number of years that firm i is in the sample. This table reports mean time shares for each I, for firms with positive τ_{iI}. Square brackets indicate insignificance at the 5 percent confidence level.

for τ_{iN}.[31] That is, (1) firms that choose O do so less frequently in period III, (2) firms that choose S, or B, do so more frequently in the later periods than in the initial one, and (3) firms that choose N do so only slightly more often in the last two periods than in the first one. Since these changes in grant timing patterns align with the trends in the usage of instruments that we have reported in Table 2, we conclude that our results could be due, at least partly, to a change in the frequency of usage of stock and options, rather than a change in the number of different firms that use them.

It is important to keep in mind that the evidence on the timing of grants that we have provided in this section is partial, since it does not control for the amount of past grants and it only exploits the panel aspect of the data in a limited way. It would be interesting to perform the analysis of usage that we do here with a comprehensive measure of the wealth of the CEO vested in the firm at each point in time (as in Clementi and Cooley [2010]), as a way of controlling for outstanding incentives. This is left for future research.

[31] Note that Table 5 is providing evidence for firms that have $\tau_{iI} > 0$, and these firms differ across Is; hence, the percentages across rows do not typically sum up to 1.

Table 6 Shares of Total Compensation, by Instrument

	Salary (%)	**BIC** (%)	**Stock** (%)	**Option** (%)	**Other** (%)
All	**.32**	**.23**	**.11**	**.28**	**.06**
S	.27	.23	.45	0	.05
O	.27	.20	0	.49	.04
B	.19	.20	.26	.31	.04
N	.59	.30	0	0	.10

4. THE IMPORTANCE OF DIFFERENT COMPENSATION INSTRUMENTS: THE INTENSIVE MARGIN

In the previous section we asked what determines the choice of compensation instruments. A natural complementary question to that is what is the relative importance of each instrument in the total compensation of the CEO. In this section, we provide some simple statistics about the share of total compensation that salary, bonus and incentive compensation (BIC), stock grants, option grants, and "other compensation" represent.

Table 6 documents the average of these shares in our sample, disaggregated by groups of users. The most salient feature of those statistics is the difference in the shares of grants across firms in S, O, and B: Firms in B have a combined share of grants of 57 percent, higher than the shares of grants for firms using stock exclusively (45 percent) or options exclusively (49 percent). The share of BIC is similar for firms in S, O, and B, around 20 percent. In contrast, firms in N, who do not use stock or options, use both BIC and "other compensation" more intensely than the rest of firms, but the share of the only incentive instrument, BIC, is 30 percent, well below the combined shares of incentive instruments (BIC + stock + option) of the rest of the firms. In other words, BIC, stock, and options do not appear to be perfect substitutes for each other. This evidence complements what we presented in Table 3 about the relationship between the level of compensation and the usage choices, suggesting that the relative importance of different instruments may be related to the choice of instruments through the level of pay. We saw in Table 3 that firms in N have levels of total compensation between one-third and one-fourth of the rest of firms. In spite of this, the relative importance of the salary is much higher for them. Hence, there seems to be a fixed component in the determinant of the salary, or a "cap," which is somewhat independent of whether the firms choose to also award grants or not. The most obvious

Table 7 Shares of Total Compensation, by Instrument

Freq.		Salary (%)	BIC (%)	Stock (%)	Option (%)	Other (%)
	Period I	**.35**	**.22**	**.04**	**.33**	**.05**
.04	*S*	.34	.26	.33	0	.07
.57	*O*	.28	.20	0	.48	.04
.16	*B*	.22	.18	.20	.36	.04
.24	*N*	.62	.28	0	0	.09
	Period II	**.29**	**.23**	**.10**	**.32**	**.05**
.09	*S*	.27	.26	.42	0	.06
.45	*O*	.25	.20	0	.51	.04
.26	*B*	.18	.20	.25	.33	.04
.20	*N*	.56	.32	0	0	.11
	Period III	**.29**	**.23**	**.24**	**.18**	**.06**
.26	*S*	.25	.22	.49	0	.05
.19	*O*	.27	.21	0	.48	.04
.35	*B*	.18	.21	.31	.27	.04
.20	*N*	.55	.32	0	0	.12

explanation is the limits to tax deductions for salaries above a certain level.[32] However, other factors may be important, like the need to provide incentives through variable pay. This also possibly plays a role in explaining the difference in the shares of salary across the firms in S, O, and B. The share of salary is the lowest (19 percent) for firms in B, which are the ones that have the highest total compensation according to Table 3. However, the share of salary is equal for firms in S than for firms in O, in spite of the average total compensation in S being 90 percent of that in O.

Our previous analysis has shown that the use of instruments differs importantly across subperiods, and to some extent across industry groups. Hence, we now look at the average shares controlling for these two variables.

Table 7 presents evidence on the changes in the relative importance of the instruments over the three different regulation subsamples. For convenience, we replicate the sample frequencies of each group of compensation, within a period, that we already discussed following Table 1.

[32] The Omnibus Budget Reconciliation Act Resolution 162(m) of 1992 imposed a $1 million cap on the amount of the CEO's non-performance-based compensation that qualifies for a tax deduction. See Jarque (2008) for a review of the academic literature that studied the effects of that change of regulation on pay practices.

When we look at the shares for all the users together, we see that while the shares of BIC and "other compensation" remained fairly constant at about 23 percent and 5 percent, respectively, the share of salary was higher in period I (35 percent as opposed to 29 percent post-2002). The share granted in the form of options also experienced a sharp decline, but only in period III, when it went from 32 percent to 18 percent. The share of compensation that is no longer granted through salary after 2002 and no longer granted through options after 2006 is granted through stock: There is an increase in the share of stock of 6 pp in period II, and then of 14 extra pp in period III. These changes in the share of stock over time (intensive margin) are in line with the changes in the choice of S reported in Table 1 (extensive margin), where we saw that firms tended to "add" stock to their compensation package in period II, rather than completely substitute options for stock. Note, however, that these numbers for the share of total compensation that are given in the form of stock are representative both of firms in S and B in Table 1. We discuss the data in each compensation group next.

When we look at the statistics disaggregated by user groups, we see slightly different changes over the regulatory periods for each of them. The most striking fact may be the increase in the share of stock, which happens both for firms that are in S and in B. For firms in S, the share of stock increases by 9 pp in period II (compensated mainly by a decrease in the share of salary of 7 pp), and then by 7 pp in period III (compensated mainly by a decrease in the share of BIC by 4 pp). For firms in B, the share of stock increases by about 5 pp each period, while the share of options decreases (3 pp in period II, 6 extra pp in period III). In addition, for firms in O the share of options stays constant overall (and it even increases by 3 pp in period II). In other words, for the firms that continue to rely exclusively on option grants in spite of the regulatory hurdles, the relative importance of options with respect to salary, BIC, and "other compensation" does not decrease. That is, if what we observe is a response to the regulatory changes, it seems to have taken place through the extensive margin (with firms in O going from 57 percent of the sample to 19 percent), rather than the intensive one. This suggests that there might be some fixed cost to adopting a new instrument of compensation, maybe related to accounting costs or perhaps to communication to shareholders.

Table 8 presents the shares of each compensation instrument by industry group. The variation in the shares across instrument users, within a given industry group, is fairly in line with the patterns by users that we described in Table 6, so we do not report the

Table 8 Shares of Total Compensation, by Industry Group

	Salary (%)	**BIC** (%)	**Stock** (%)	**Option** (%)	**Other** (%)
Min/Man	.32	.22	.11	.31	.05
FIRE	.29	.27	.15	.23	.06
Utilities	.34	.25	.14	.21	.06
Other	.33	.20	.11	.30	.06

disaggregated numbers here.[33] One main conclusion stands out from Table 8—mining and manufacturing and other use options and salary more intensely than do FIRE and utilities, which rely more on BIC and stock. FIRE, which includes financial firms, has in fact the lowest share for salary. It is important to keep in mind that, as reported in Table 1, the proportion of firms in each user group is not constant across industry groups; this, together with the (omitted) evidence that shares for user groups within industry align with those reported in Table 6, implies that most of the variation across industries is due to composition effects, without important industry-specific patterns for the shares of each compensation instrument.

5. CONCLUSION

In the last decade several regulatory changes took place in the United States regarding the reporting and expensing of stock option grants. This article provides an empirical analysis of the impact of these changes in the composition of pay packages for CEOs at the largest U.S. firms from 1993 to 2010. Both the passage of the Sarbanes-Oxley Act in 2002 and the changes in accounting standards in SFAS 123R mandated by the SEC in 2006 erased some advantage of granting options versus stock as part of the compensation of CEOs. We find evidence indicating that firms may have responded to this by shifting away from options and into stock. Even though, after the two regulatory changes, there is still a significant portion of firms in the sample that choose to grant options to their CEO (about 55 percent of firms in the 2006–2010 period, compared to 67 percent before 2002), alone or combined with stock, the fraction of firms that are awarding options but not stock in a given year decreases (from 57 percent before 2002 to 19 percent after 2006).

[33] A more detailed table with shares across industries and compensation groups is available upon request.

However, while only 4 percent of firms used exclusively stock grants before 2002, this percentage increases over the period we analyze to reach 26 percent after 2006.

How firms decide whether to include options, stock, both, or none of the two types of grants in their pay packages remains to be understood, but we find some regularities. Firms in finance and in utilities are more likely to use stock or neither, while firms in mining and manufacturing are more likely to use options, or stock and options together. Larger firms tend to use stock and options together, although this effect disappears if we control for the level of pay, which is higher at larger firms. A higher level of pay is associated with a higher probability of using stock and options together, or only options.

We also find that different compensation instruments do not appear to be perfect substitutes within compensation packages. The relative importance of bonuses in overall compensation has not decreased over time, while that of the salary has, in favor of stock and option grants. Perhaps surprisingly given the decrease in the popularity of option grants starting in the early 2000s, the relative importance of options in relation to the total amount of compensation has not decreased over time for firms that still include options in their compensation packages.

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