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What Fraction of Stock Option Grants to Top Executives Have Been Backdated or Manipulated?

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We estimate that 13.6% of all option grants to top executives during the period 1996–2005 were backdated or otherwise manipulated. Our study primarily focuses on grants that were unscheduled and at-the-money, of which we estimate that 18.9% were manipulated. The fraction is 23.0% before the new two-day filing requirement took effect on August 29, 2002, and 10.0% afterward. For the minority of grants that are not filed within the required two-day window, the fraction of manipulated grants remains as high as 19.9%. We further find a higher frequency of manipulation among tech firms, small firms, and firms with high stock price volatility. In addition, firms that use smaller (non-big-five) auditing firms are more likely to file their grants late. Finally, at the firm level, we estimate that 29.2% of firms manipulated grants to top executives at some point between 1996 and 2005.

Key words: executive compensation; stock option grants; backdating
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1. Introduction

Yermack (1997) finds that firms' stock returns are abnormally high immediately after executive stock option grants, and Aboody and Kasznik (2000), Chauvin and Shenoy (2001), Collins et al. (2005a, b), Lie (2005), Heron and Lie (2007), and Narayanan and Seyhun (2008) also find that the returns are abnormally low before the grants. The latter four studies find evidence that backdating, i.e., picking a past date on which the stock price was particularly low to be the grant date, contributes to this stock price pattern. Heron and Lie (2007, p. 294) conclude that "backdating is the major source of the abnormal stock return patterns around executive stock option grants" and that it can explain "most, if not all, of the pattern" in stock returns around grants.

However, the extant research does not specifically attempt to discern the fraction of grants that are backdated or otherwise manipulated. What we do know is that the media, principally starting with a *Wall Street Journal* article (Forelle and Bandler 2006), have identified dozens of suspect firms, firms under formal investigation, and firms that have admitted irregularities in the accounting of their option grant dates. For example, at the end of October 2006, the *Wall Street Journal Online* (2006) reported that at least 120 firms have come under scrutiny for past option grants. As of March of 2007, a Glass-Lewis report indicated that the number of firms that either had announced internal reviews or had been the subject of the U.S. Securities and Exchange Commission (SEC) and/or U.S. Department of Justice investigations into their option-granting practices had increased to 257. Furthermore, Derek Meisner, a former branch chief in the enforcement division of the SEC, stated that he is "not aware of a corporate practice that has come under such scrutiny by the SEC" (Anand and Arnold 2006). Clearly, the magnitude of the option grant manipulation problem is of great interest to both the investment community and regulators, and it is the subject of speculation in the media. This study provides some estimates on the fraction of grants to top executives that have been backdated or manipulated in some fashion. Another important contribution is that we examine the effects of firm characteristics and the identity of the auditor on the decision to manipulate grant dates.

Our estimation methodology rests on the assumption that, in the absence of backdating or other types of grant date manipulation, the distributions of stock returns during the month before and after grant dates should be roughly the same, implying that the distribution of return differences should be centered on zero. This allows us to infer the fraction of grants that must have been manipulated by contrasting the distribution of the observed return differences with what

the distribution should be in the absence of grant timing. One might argue that firms might merely grant options after stock price declines, e.g., a negative macroeconomic shock. However, the empirical evidence in Heron and Lie (2007) does not support this conjecture, because the negative abnormal returns before option grants are absent for the subset of their sample that reported option grants immediately. We explain our estimation procedure along with potential bias in further detail later.

Our sample consists of 39,888 stock option grants to top executives that were dated between January 1, 1996, and December 1, 2005. We estimate that 13.6% of these grants were manipulated. However, there are significant differences across time periods, company types, grant characteristics, and even auditors.

Accounting convention and tax rules provide incentives for companies to price the majority of their option grants to be at-the-money (i.e., to set the exercise price to be equal to the market price) on the purported grant date (see Heron and Lie 2007 for further discussion). If companies choose not to grant the options at-the-money, the incentive to manipulate the grant date is muted. Moreover, if grants are scheduled to occur on a certain date every year, the opportunity for manipulating the grant date is absent. Thus, the remainder of our analysis focuses on unscheduled, at-the-money option grants, for which we estimate the fraction manipulated to be 18.9%.

Before August 29, 2002, we estimate that 23.0% of unscheduled, at-the-money grants were manipulated. After the SEC tightened the reporting regulations on August 29, 2002, to require executives to report stock option grants they receive within two business days (see Heron and Lie 2007 for further details), 10.0% of unscheduled, at-the-money grants were manipulated. For grants filed within the required two-business-day window in this later period, the incidence of manipulation drops to 7.0%, a stark contrast to our estimate of 19.9% for grants filed late.

Because many of the companies that have been singled out as suspects of having backdated options are technology companies and/or companies with volatile stock prices (which increases the potential gains from backdating), we also partition our sample according to stock price volatility and whether firms operate in the tech sector. Not surprisingly, we find that tech firms and firms with high stock price volatility are significantly more likely to manipulate grants. Even when controlling for these features, we also find that small firms and firms that had been public for a shorter time are more likely to engage in backdating.

According to a *Reuters News* article (Drawbaugh 2006), "the SEC is exploring what auditors knew about questionable practices; what information, if any, was withheld from them; and whether they may have signed off on practices such as backdating and spring-loading." We utilize auditor data to identify whether there exists a significant association between grant manipulation and auditor affiliation. The results suggest that all of the big-five auditing firms have conducted audits of firms that have manipulated grants at some point. After controlling for other factors, we find that non-big-five auditing firms are associated with more late filings, which are again positively related to the likelihood of backdating.

In our final set of tests, we extend our analysis from the grant level to the firm level. After aggregating the grants in each firm, we estimate that 29.2% of 7,774 firms in the sample backdated or manipulated grants to top executives at some point between 1996 and 2005. Overall, our results suggest that backdated or otherwise manipulated grants are spread across a remarkable number of firms, although these firms did not manipulate all of their grants.

The remainder of this paper proceeds as follows. The next section describes the sample and the methodology. Section 3 presents empirical results. Finally, §4 summarizes and concludes.

2. Sample and Methodology

2.1. Sample

We obtain our sample of stock option grants to CEOs from the Thomson Financial Insider Filing database. This database captures insider transactions reported on SEC forms 3, 4, 5, and 144. We restrict our sample to transactions that occurred before December 1, 2005 (so that a month of subsequent returns is available in the 2005 Center for Research in Security Prices database). We further require stock returns to be available from 20 trading days before to 20 trading days after the grant date. Finally, we include only grants to the CEO, president, or chairman of the board. We include all three categories because we have observed many instances in which top executive officers (typically referred to as the CEO) identify themselves by an alternative title (such as the president) in their SEC filings. We eliminate any duplicate grants that occur on a given grant date, so that there is only one grant for a given date and company combination.[1] Our final sample consists of 39,888 grants across 7,774 companies.

The Insider Filing database provides the official grant date and the exercise price. The exercise price

[1] Because numerous top executives often receive options on the same date, our estimates really capture the fraction of grant dates involving top executives that are backdated, rather than the fraction of grants to top executives that are backdated. We show later that grants are more likely to be backdated when there are more recipients, suggesting that our estimates would be higher if we did not eliminate duplicate grants on a given grant date.

equals the closing price on this date for half of the grants.[2] For 12% of the grants, the exercise price is the closing price on the prior day. For the purposes of estimating returns around grant dates, we define the grant date to be the day on which the exercise price equals the stock price. For the remaining 38% of the grants, we cannot match the exercise price with the closing price on the official grant date or the prior day. There are several possible reasons for this. First, it is possible that some alternative to the closing price, e.g., the average of several prices leading up to the close of the grant date, was used as the exercise price. Second, the options might deliberately have been granted out-of-the money. For example, the exercise price might have been set to equal 110% of the market price. Third, a price adjustment, e.g., due to a stock split, might have been made to the data that we did not uncover. Fourth, there might be an error in the reported exercise price or grant date. (We have uncovered lots of such errors when examining individual observations in greater detail.)

Each of the years from 1997 to 2001 has between 11% and 12% of all grants in our sample. The number of grants steadily drifts downward in the subsequent years. When adjusting the number of grants in 2005 for the exclusion of December of that year, the decline from 2001 to 2005 is 27%. There are many possible reasons for this decline, including new accounting rules requiring stock options to be expensed even if the options are not in-the-money at the time of the grant and new filing rules effective August 29, 2002, requiring grants to be filed with the SEC within two business days. The latter rule in particular curtails the benefits from backdating option grants.

From August 29, 2002, to the end of that year, only 66% of the grants were filed on time. In 2003 and 2004, the fractions of grants filed on time were 71% and 81%, respectively, and by 2005, the fraction had increased to 87%. We find it surprising and unnecessary that so many grants continue to be filed late, especially because the SEC unveiled on May 5, 2003, its website to simplify the filing of forms 3, 4, and 5. Perhaps the apparent late filings reflect a widespread practice of backdating grants more than two days back.

2.2. Methodology for Estimating the Fraction of Grants That Are Backdated

In the absence of opportunistic grant timing or opportunistic timing of information flows around grants, the returns before and after grant dates should be similar. Consequently, if opportunistic timing is absent, the distribution of the difference between the returns for a given number of days after the grants and the returns for the same number of days before the grants should be centered roughly at zero. We use this logic to develop an estimate of the fraction of grants that are backdated or otherwise manipulated.

Our estimate encapsulates the extent to which various manipulative practices, including backdating and springloading (i.e., granting options before predicted price increases), contribute to the abnormal stock price patterns around declared option grant dates. It further captures any tendency for firms to simply grant options after stock price declines. However, the empirical evidence in Heron and Lie (2007) suggests that the majority of the abnormal returns before and after purported grant dates are attributable to backdating. Thus, we believe that the effects of manipulative practices other than backdating and the practice of granting options after stock price declines on our estimates are minor. This is further corroborated by our estimates for certain subsamples of grants reported later.

Because prior studies suggest that most of the abnormal stock returns around grants occur during the month before and after the grants, we focus on the difference between the stock returns during the 20 trading days after the grants and those during the 20 trading days before the grants. The mean and median differences in returns are 6.3% and 2.8%, respectively. Furthermore, 57% of the differences are positive. These statistics suggest that the distribution is not centered at zero, but rather that the whole distribution has been shifted upward. Importantly, this is not driven by just a few outliers.[3]

Based on the assumption that half of the return differences should be negative in the absence of any manipulation, we infer the fraction of grants that have been manipulated. Suppose that a fraction p of all grants are manipulated and that the rest $(1-p)$ are not manipulated. Then the fraction p will all have positive differences and the fraction $(1-p)$ will have 50% positive differences and 50% negative differences. Therefore, the total fraction of negative differences will be

[2] If a stock split has occurred between the grant date and the filing date, the exercise price in the filing is often adjusted to account for this split. If so, we try to unadjust the given exercise price to make it comparable to the market price on the grant date.

[3] We also develop a benchmark distribution intended to reveal what the distribution of the return differences would look like in the absence of opportunistic timing. The benchmark distribution is based on the same companies as the original sample of grants, but where the grant dates have been replaced with a random date from either the period from six months before to three months before the grant date or the period from three months after to six months after the grant date. For the benchmark sample, the mean and median difference in returns are -0.2% and -0.6%, respectively, and the fraction of differences that are positive is 48%. On the basis of these statistics, the distribution appears to be centered roughly at zero, or perhaps slightly less. Thus, our assumption that the distribution of return differences around grant dates is centered on zero in the absence of opportunistic timing seems reasonable and perhaps even slightly conservative.

Table 1 Estimates of the Fraction of Manipulated Grants

	Grants at-the-money		Grants not at-the-money		All grants	
	N	Estimated fraction backdated (%)	*N*	Estimated fraction backdated (%)	*N*	Estimated fraction backdated (%)
Unscheduled	20,322	18.9	12,396	10.7	32,718	15.8
Scheduled 1	2,468	2.8	1,666	−1.9	4,134	0.9
Scheduled 2	1,857	7.1	1,179	6.2	3,036	6.7
All grants	24,647	16.4	15,241	9.0	39,888	13.6

Notes. This table presents estimates of the fraction of grants that were manipulated. The return difference is the difference between the stock return during the 20 trading days after the grant (days 1–20 relative to the grant date) and the stock return during the 20 days before the grant (days −19–0 relative to the grant date). The estimate of the fraction of grants that were manipulated is then defined as $(1 - 2q)$, where q is the fraction of negative return differences. A grant is defined to be at-the-money if the exercise price equals the price on the grant date. A grant is defined to be scheduled if it occurs at the same time in each year. To classify grants as scheduled, we examine the relative timing of grants made during the prior and subsequent years. *Scheduled* 1 means that a grant is dated within one day of the one-year anniversary of a prior grant. *Scheduled* 2 means that a grant does not meet the condition for *Scheduled* 1, but is followed by a grant that is dated within one day of the one-year anniversary of the grant in question. All other grants are classified as unscheduled.

$0.5 \times (1 - p)$. If q is the actual fraction of negative differences we observe, we can solve for p as a function of q:

$$0.5 \times (1-p) = q \quad \Leftrightarrow \quad p = 1 - 2q. \tag{1}$$

A natural question is whether our estimate of the fraction of backdated grants p is biased in some manner. We believe that our estimate might actually understate the prevalence of backdating and similar manipulative practices for several reasons. First, we might not have made the correct adjustments to the grant dates in all cases. As we note earlier, we compare the given exercise price to the closing price on the day of the official grant date and to the closing price on the previous day, and we define the grant day to be the day when the closing price equals the exercise price. However, in 38% of the cases we are unable to match the exercise price with a market price, in which cases it remains unclear exactly what day we should have defined to be the grant date. If we somehow use the incorrect date, the true backdating effect is partially obscured. Consistent with this argument (as well as other explanations), we show later that our estimate of the fraction of backdated grants is higher if we remove the grants for which we cannot match the exercise price with a market price.

A second reason why our estimate might understate the frequency of backdating is that we might not have used the correct period for contrasting stock returns. This will introduce noise that can disguise some backdating. For example, some media articles suggest that grants have been backdated to the date from the prior month with the lowest price. If the price has steadily increased during the prior two months, but less so in the most recent month, the purported grant date would be one month prior to the decision date. However, the return difference would be negative, and we would not count it as a backdated grant in our analysis. Consistent with this argument, we show later that our estimate of the fraction of grants that are backdated increases for a subsample of grants for which we are able to refine the return period.

3. Empirical Results

3.1. Estimates of Backdating Frequency

Table 1 reveals that the fraction of manipulated grants in our entire population of grants is 13.6%. As noted earlier, our estimate captures various manipulative practices, including backdating, as well as the possibility that grants simply occur after declines in stock prices. To assess the magnitude of effects other than backdating, we also report our estimate for the subsample of grants that are filed within one day. These grants could not have been backdated (at least not more than one day) but could still have been manipulated in other ways (e.g., springloaded) or timed to occur after price declines. Our estimated fraction of manipulation is only 0.3% for this subset of grants, suggesting that practices other than backdating play a minor role in our results. We provide more descriptive statistics and an alternative approach of examining the prevalence of option grant timing in the online supplement (provided in the e-companion).[4]

Lie (2005) and Heron and Lie (2007) discuss the motivations for backdating in detail, which include that grants historically receive more beneficial accounting and tax treatment when the options are granted at-the-money (or out-of-the-money) as opposed to being in-the-money. This explains why companies usually choose the exercise price to equal the market price on the declared day of the grant, which again gives rise to the benefits of backdating. Naturally, if the exercise price is not chosen in this

[4] An electronic companion to this paper is available as part of the online version that can be found at http://mansci.journal.informs.org/.

way, the incentive to backdate is diminished.[5] Thus, we initially partition our sample of grants into those that are at-the-money versus others, and we report estimates for both groups in Table 1. Of the grants that are at-the-money, we estimate 16.4% to be manipulated, compared to 9.0% of grants that are not at-the-money. These results suggest that grants are almost twice as likely to be manipulated if they are at-the-money, but a substantial portion of grants that we classify as not being at-the-money are also manipulated. We recognize that at-the-money grants might have been misclassified as not being at-the-money because of either undetected stock splits after the grant dates were chosen or erroneous exercise prices or grant dates in the database. Consequently, the only definite conclusion we can make from our estimates is that at-the-money option grants are much more likely to be manipulated than other grants.

If the grants are scheduled in advance, it is impossible to opportunistically time them. Unfortunately, in a large sample setting, it is difficult to gauge whether grants truly are scheduled. Following Aboody and Kasznik (2000), Lie (2005), and Heron and Lie (2007), we assume that grants are scheduled if they occur at the same time every year. Based on this assumption, we adopt two classification schemes. First, we classify a grant as scheduled if it is dated within one day of the one-year anniversary of a prior grant. This is the classification that Heron and Lie (2007) use.[6] However, this classification would not capture (a) the first of a string of scheduled grants and (b) a scheduled grant if grant data are missing for the previous year. Second, we classify a grant as scheduled if it is followed by a grant that is dated within one day of the one-year anniversary, given that it is not already classified as scheduled using our first classification criterion. This second classification scheme might capture some truly scheduled grants that our first classification scheme misses, at the risk of including unscheduled grants after which subsequent scheduled grants are merely patterned. Irrespective of our classification scheme, we will undoubtedly misclassify a number of grants. We believe that most of the grants that are classified as scheduled using the first scheme are truly scheduled and that most of the grants that are classified as unscheduled by both schemes are truly unscheduled.

Table 1 shows that 15.8% of the grants that are classified as unscheduled are estimated to be backdated or otherwise manipulated. For grants that are classified as scheduled using the first classification scheme, the fraction is only 0.9%. For grants that are classified as scheduled using the second classification scheme, the fraction is 6.7%, consistent with the notion that this classification scheme incorrectly classifies many unscheduled grants as scheduled. Finally, 18.9% of grants that are both at-the-money and classified as unscheduled are estimated to be manipulated. In the remainder of our analysis, we focus on this sample of grants that are at-the-money (such that the motivation for opportunistic timing clearly exists and the grant data are likely to be free of errors) and unscheduled (such that opportunistic timing is feasible). This subsample represents 51% of our total sample of grants.

Panel A of Table 2 shows our estimates before August 29, 2002, when the new two-day filing requirement took effect, and panel B shows the estimates afterward. In the earlier period, we estimate that 23.0% of the unscheduled, at-the-money grants were manipulated. The new filing requirements appear to have greatly curbed the frequency of manipulation. Our estimate under the new regulatory era is 10.0%. However, as we noted earlier, a substantial fraction of grants violate the two-day filing requirements. Panel B shows the estimates for those grants that are filed on time versus those that are not. Approximately 19.9% of unscheduled, at-the-money grants that are filed late are manipulated, compared to only 7.0% of grants that are filed in time. Thus, the new filing requirements did not eliminate manipulation of grants for two reasons. First, many firms simply ignore the two-day filing requirements, in which case the incidence of manipulation appears to be roughly the same as it was before these requirements took effect. Second, the two-day gap between the official grant date and the filing date still provides sufficient gains from backdating for firms to adopt such practices.

Our results suggest that the two-day filing requirement has roughly halved the incidence of manipulation. Furthermore, Heron and Lie (2007) suggest that "the new reporting requirements appear to have reduced the average abnormal return by almost 80% on the post-grant day." The combined results suggest that the reduced abnormal return documented by Heron and Lie (2007) is due to both a reduction in the incidence of backdating and other manipulative practices and a reduced gain (manifested in lower abnormal returns) when manipulation occurs, especially if

[5] In the special case where the exercise price is set to be the average market price across numerous recent days, the price pattern leading up to the grants is likely to be the opposite of that for backdated at-the-money option grants. If the price has drifted downward in recent days, it is better to postpone the grant so that the higher prices in the beginning of the downward drift are excluded from the calculation of the exercise price. On the other hand, if the price has increased recently, it makes sense to hurry the grant so that the earlier low prices are included in the calculation of the exercise price. By this reasoning, the prices are likely to increase leading up to the grant whose exercise price is based on average past prices.

[6] In comparison, Aboody and Kasznik (2000) classify a grant as scheduled if is dated within one *week* of the one-year anniversary of a prior grant. However, Lie (2005) shows results that indicate that this classification captures too many grants that are not strictly scheduled.

Table 2 Estimates of Unscheduled, At-The-Money Grants That Were Manipulated

	N	Estimated fraction backdated (%)
Panel A: Pre-SOX grants		
All grants	13,828	23.0
Grants by non-high-tech firms	10,410	20.1
Grants by high-tech firms	3,418	32.0
Grants by small firms	4,113	23.1
Grants by medium-sized firms	6,407	27.0
Grants by large firms	3,308	15.4
Grants by firms with low stock return volatility	4,493	13.6
Grants by firms with medium stock return volatility	4,743	26.2
Grants by firms with high stock return volatility	4,434	29.0
Panel B: Post-SOX grants		
All grants	6,494	10.0
Grants filed within two business days	5,002	7.0
Grants filed more than two business days after grant date	1,492	19.9

Notes. This table presents estimates of the fraction of unscheduled, at-the-money grants that were manipulated. The return difference is the difference between the stock return during the 20 trading days after the grant (days 1–20 relative to the grant date) and the stock return during the 20 days before the grant (days −19–0 relative to the grant date). The estimate of the fraction of grants that were manipulated is then defined as $(1 - 2q)$, where q is the fraction of negative return differences. A grant is classified as scheduled if it is either (i) dated within one day of the one-year anniversary of a prior grant or (ii) followed by a grant that is dated within one day of the one-year anniversary of the grant in question, and unscheduled otherwise. A grant is defined to be filed on time during this period if it is filed within two trading days of the grant date. A grant is defined to be at-the-money if the exercise price equals the price on the grant date. Pre-SOX grants are grants dated before August 29, 2002, and post-SOX grants are grants dated on or after August 29, 2002. High-tech firms are those that are in the Computers, Electronic Equipment, or Measuring and Control Equipment industries based on the classifications of Fama and French (1997) or have a SIC code between 7,370 and 7,379 (computer programming companies, which are part of the Business Services in Fama and French 1997). Non-high-tech firms are all other firms. Small firms are those with market capitalization less than \$100 million, medium-sized firms are those with market capitalization between \$100 million and \$1 billion, and large firms are those with market capitalization in excess of \$1 billion. Market capitalization is calculated 20 days before the grants. Stock return volatility is the standard deviation of daily stock returns for the year ending 20 days before the grant date, provided that at least 50 daily stock returns are available. Low stock return volatility is less than 3%, and high stock return volatility is more than 5%.

backdating is practiced only within the two-day filing window.

Panel A partitions our sample of grants dated before August 29, 2002 by industry, size, and stock return volatility. First, we compare grants by non-high-tech firms versus grants by high-tech firms because a disproportionate number of technology firms appear to have come under scrutiny for possible backdating. A *Reuters News* article (Gershberg 2006) stated that "technology companies, which have relied heavily on options packages to boost executive and employee salaries, have been the most vulnerable to such probes to date." A *Forbes* article (MacDonald and Brown 2005, p. 56) quotes a Silicon Valley lawyer as saying "I'd be surprised if there was even one public tech company that did not employ this practice in those [bubble] years." The estimated fraction of unscheduled, at-the-money grants that are manipulated is 20.1% among non-high-tech firms and 32.0% among high-tech firms. Evidently, technology firms are more likely to manipulate option grants than other firms, consistent with the media's general depiction of this issue.

We further compare grants by small (market capitalization 20 days before grant < \$100 million), medium (\$100 million < market capitalization < \$1 billion), and large (market capitalization > \$1 billion) firms. We conjecture that large firms have better governance mechanisms and routines in place that will mitigate grant timing. Consistent with this conjecture, we estimate the fraction of unscheduled, at-the-money grants that are manipulated to be 23.1% among small firms, 27.0% among medium-sized firms, and 15.4% among large firms.

Finally, we partition the grants roughly into terciles based on the volatility of the underlying stock returns. If the stock prices are stable, there is little to gain from timing the grant dates. Thus, we expect that the frequency of grant timing is greater for firms whose stock prices are volatile. Consistent with this line of reasoning, we estimate the fraction of unscheduled, at-the-money grants that are manipulated to be 13.6% among firms with low volatility, 26.2% among firms with medium volatility, and 29.0% among firms with high volatility.

3.2. Option Repricing and Backdating

An additional question of interest is whether some of the return patterns we document are attributable to option repricing events. Although it is certainly true that some of the grant dates that appear in our analysis reflect option repricings, empirical studies that examine option repricings prior to a 1998 regulatory change that required firms to expense the estimated value of repriced grants (Brenner et al. 2000, Chance et al. 2000, Callaghan et al. 2004) suggest that repricings for top executives are relatively infrequent events. Moreover, Chidambaran and Prabhala (2003) document that, since the 1998 regulatory change, option repricings have virtually disappeared. Although companies may use "6 and 1" option exchanges to avoid expense charges associated with a repricing, as Gupta (2006) points out, the possibility of fortuitous managerial grant timing is greatly curtailed (assuming prompt reporting) as the exercise price for the new options is set at least six months and one day after the old options have been canceled.

As noted earlier, Heron and Lie (2007) contend that backdating likely explains most of the fortuitous timing of option grants, often first considered to be simply springloading or perhaps repricing. With regard to springloading, the most convincing evidence is that the favorable return patterns disappear altogether for grants that are reported immediately after the grant date since the 2002 change in option grant reporting requirements. This leads to the conclusion that, prior to the recent focus on backdating, companies that were choosing grant dates to precede significant news events were typically doing so with the benefit of hindsight and taking advantage of the reporting lag to ensure that the anticipated gains were realized. As for the return patterns around repricings, it is worth noting that the patterns identified by Callaghan et al. (2004), which show significant declines in the stock price leading up to the repricing date, followed by immediate and sizeable return reversals centered exactly on the repricing date, bear a striking resemblance to the patterns that Heron and Lie (2007) attribute to backdating. Note also that, as Callaghan et al. (2004) point out, information about stock option repricing (at the time of their sample) was not generally revealed to the public until the release of the proxy statement for next year's annual meeting. Because their sample period preceded the reporting changes mandated by the Sarbanes-Oxley Act (which reduced the required time to report option grants to the SEC to no more than two days—down from the 10th day of the month after the grant in most cases), it is likely that a significant proportion, if not all, of the return reversal centered exactly on the purported grant repricing dates in their sample is attributable to repriced grants set with the benefit of hindsight.[7]

Investigations into options backdating practices at some companies are also uncovering instances where options are allegedly "repriced" using the benefit of hindsight without any public record of the original option grant. For instance, the U.S. Department of Justice alleges that McAfee's former General Counsel Kent Roberts used the benefit of hindsight to reprice one of his option grants to counter a decline in the stock price after the original grant date. According to the indictment, Roberts was originally granted an option with a grant date of February 14, 2000, and an exercise price of $29.62. After a decline in the stock price, but before the original grant was publicly revealed, Roberts allegedly participated in changing the grant date to April 14, 2000, which reduced the exercise price to $19.75. Thus, option grants can be repriced with the benefit of hindsight even in instances where no public record of the repricing exists.

3.3. Bias from Using the Wrong Return Period

As discussed earlier, our estimated fraction of grants that were manipulated might be understated to the extent that we used the incorrect period for examining stock returns. In the case of backdating (which we believe to be the dominant type of manipulation), the proper period to use depends on how far back the options can be backdated, which likely varies from case to case. By looking at a subsample of grants for which we can better gauge this period, we assess the magnitude of the bias in our estimates. In particular, we focus on at-the-money grants that are filed with the SEC two days after the official grant date. As we showed evidence of earlier, a nontrivial fraction of these grants have been backdated or otherwise manipulated, but they can have been backdated only two days. Thus, we can say with a relatively high degree of certainty that we should focus on the two-day returns. Our estimate of the proportion of manipulated grants is then based on the difference between the two-day returns after the grants and the two-day returns before the grants. Looking at the difference in returns is still critical, because we need a proper benchmark against which the post-grant returns can be compared.

We estimate the fraction of manipulated grants based on both the two-day returns and the 20-day returns for the sample of unscheduled, at-the-money grants. The estimates based on the two-day and 20-day periods are 11.8% and 9.9%, respectively, for grants that are filed two days after the declared grant date. Thus, for this subsample of grants, our estimate based on the 20-day period appears to understate the true fraction by approximately 20%. The estimates are higher using the two-day period even for grants that are not filed two days after the purported grant date (21.4% based on the two-day period and 20.3% based on the 20-day period), suggesting that while the 20-day period captures most of the underlying effect, it also captures considerable noise that contributes to an understatement of the estimate of the proportion of grants that involve manipulation.

3.4. The Role of the Auditor

There are arguably some aspects of grant manipulation that involve faulty accounting. Numerous restatements after detection of backdating support this argument. Because auditors are supposed to scrutinize board minutes and other documents that might

[7] An example of this is TurboChef Technologies Inc., which stated the following in its 10-K form for the 2006 fiscal year: "There is evidence that certain former members of management and of the Board of Directors at the time determined grant dates and exercise prices in hindsight for certain stock option grants by (i) apparently selecting grant dates in hindsight to obtain more favorable exercise prices within a particular range of dates; and (ii) apparently repricing certain grants in hindsight based, in some cases, on the lowest closing market price within a particular range of dates to attain lower exercise prices" (p. iii).

have revealed evidence of manipulation, it is natural to ask what role they have played, if any.

The media have speculated that auditors have played a role in the manipulation of option grants. An *Investor's Business Daily* (2006, p. A2) article states that "Federal prosecutors launched a criminal probe into the options practices of pharmacy benefits manager Caremark" and goes on to say that "CareMark has dismissed its auditor KPMG." A *Wall Street Journal* article (Reilly 2006b, p. C3) discusses the case of Micrel Inc.:

> In a lawsuit filed in 2003, Micrel Inc. alleges Deloitte [& Touche LLP], its former auditor, signed off on an arrangement in which the company would set the strike price for employee stock options at the stock's lowest price during the 30 days after the grant of options was approved. ... Micrel's lawsuit raises the question of 'how many companies may have been backdating their employee stock options with the full blessing of their independent auditors,' according to a note this week from research firm Glass Lewis & Co.

Reuters News (Drawbaugh 2006) follows up:

> The U.S. investigation into corporate stock option timing abuses is expanding to look at the role of outside auditors, said sources close to the probe. Authorities were said to be looking at what auditors knew about company manipulation of options' grant dates and exercise prices to boost their value to executives who got them. ... In the options probe, sources said, the SEC is exploring what auditors knew about questionable practices; what information, if any, was withheld from them; and whether they may have signed off on practices such as backdating and spring-loading. ... 'As these cases shake out, I wouldn't be surprised if we saw that there were auditors who were familiar with some of the details of this,' said George Stamboulidis, partner at the law firm of Baker Hostetler and a former federal prosecutor.

Finally, a *Wall Street Journal* article (Reilly 2006a, p. C1) raises the possibility that auditors "didn't live up to their watchdog role" and states that "the big accounting firms haven't said whether they believe there was a problem on their end."

To investigate formally whether certain auditors have contributed to option manipulation or allowed manipulation to occur, we identify the auditor of the firms in our sample at the time of the grants. We conjecture that big-five auditing firms are associated with less manipulation, because big-five firms face greater reputation loss from poor audit quality (DeAngelo 1981). Consistent with our conjecture, Ashbaugh-Skaife et al. (2007) document that the big auditing firms are associated with more internal control deficiency reports, suggesting that they undertake a more careful audit. We further separate the big-five firms in our analysis in case these firms behave differently. Because of sample size constraints, we lump all non-big-five firms into one group.

We obtain the auditor information from Audit Analytics, which contains such data for each of the years since 2000. Table 3 reports our estimates of the fraction of grants that are manipulated for each of the big-five auditing firms and for smaller auditing firms as a group. For all auditors, the estimates decrease from the period before August 29, 2002, to the period afterward. There are also some differences in the estimates across the auditors. Small auditors are associated with more manipulation than big-five firms after August 29, 2002. Among big-five firms, PricewaterhouseCoopers and KPMG are associated with less manipulation before August 29, 2002, and PricewaterhouseCoopers is also associated with less manipulation after August 29, 2002. However, we should be careful when interpreting these differences in manipulation estimates because they might reflect differences in the characteristics of audited firms. Thus, we refine our analysis by examining the effect of auditors in a multivariate context, in which

Table 3 Estimates of the Fraction of Manipulated Grants by Auditor

	Pre-SOX grants		Post-SOX grants	
	N	Estimated fraction backdated (%)	*N*	Estimated fraction backdated (%)
PricewaterhouseCoopers LLP	833	17.4	1,128	3.7
Ernst & Young LLP	1,022	19.5	1,444	9.9
Deloitte & Touche LLP	579	23.7	882	10.9
KPMG LLP	681	17.5	954	8.6
Arthur Andersen LLP	455	24.0		
Other auditors	284	20.4	819	13.2

Notes. This table presents estimates of the fraction of unscheduled, at-the-money grants that were manipulated. The return difference is calculated as the difference between the stock return during the 20 trading days after the grant (days 1–20 relative to the grant date) and the stock return during the 20 days before the grant (days −19–0 relative to the grant date). The estimate of the fraction of grants that were manipulated is then defined as $(1 - 2q)$, where q is the fraction of negative return differences. A grant is defined to be at-the-money if the exercise price equals the price on the grant date. A grant is classified as scheduled if it is either (i) dated within one day of the one-year anniversary of a prior grant or (ii) followed by a grant that is dated within one day of the one-year anniversary of the grant in question, and unscheduled otherwise.

we control for a number of variables that might be correlated with both the incidence of manipulation and the auditor.

3.5. Multivariate Analysis

In our multivariate analysis, we regress both the return difference (i.e., the difference between stock returns in the 20 days after the grant and the stock returns in the 20 days before the grant) and an indicator variable for whether the return difference is positive against various independent variables. Following the earlier univariate analysis, the independent variables include indicator variables for whether the grant was dated on or after August 29, 2002, whether it was filed early, whether it was filed late, and whether the granting firm was in the technology sector. We use continuous variables to capture the volatility and magnitude of stock returns over the year prior to the grant. Because corporate governance mechanisms are related to both firm size and age (see, for example, Boone et al. 2007, Linck et al. 2008), we also include the logarithm of market capitalization and the logarithm of the number of years that the firm has been public.[8] Finally, we include the logarithm of the number of executives and directors who received options on the given grant date, a variable that indicates whether any of the recipients were outside directors, and the total number of shares underlying the options granted. We speculate that the presence of other recipients, especially outside directors, might affect manipulation practices. We further predict that larger grants are more likely to be manipulated, and the total number of shares underlying the options granted is a crude measure of the size of the grant. A concern is that this variable is correlated with firm size, but the inclusion of the market capitalization variable should mitigate this concern. In a separate set of regressions based on the sample of grants for which we could identify the auditor, we introduce auditor indicator variables as independent variables one at a time. Thus, the auditor coefficients should be interpreted as the effect from the given auditor relative to all other auditors. To control for temporal effects, we include indicator variables for the year of the grant in all regressions. We estimate robust standard errors incorporating firm-level clustering in all of our multivariate models to account for the presence of multiple observations across time for a given firm in our sample.

Panel A of Table 4 shows the results based on the entire sample of unscheduled, at-the-money grants, and panel B shows the results for the sample of unscheduled, at-the-money grants for which we could identify the auditor. Consistent with earlier univariate analysis, grant manipulation is more prevalent among firms that are small, have been public for a shorter time, operate in the tech sector, and have high stock return volatility. Furthermore, manipulation is more likely when large numbers of options are granted and there are numerous recipients. The results regarding return volatility and grant size both suggest that manipulation is more likely when there is relatively more to gain.

The coefficients on PricewaterhouseCoopers are negative, with a p-value of 0.014 in the logistic regression of whether the return difference is positive. None of the other auditor coefficients differ statistically from zero at conventional levels. Consequently, there is no evidence to suggest that a particular auditor is to be singled out for the high frequency of backdating in our aggregate sample.

The regressions in Table 4 control for whether the grants are filed late. It is possible that certain auditors are associated with more late filers, which in turn could lead to a greater fraction of backdated grants. Because this indirect effect would not show up in Table 4, we examine the relation between late filing and auditor directly. Table 5 shows results from regressing whether a grant was filed late against control variables and auditor indicator variables. The most important determinants of late filing appear to be firm size and age. Smaller firms and firms that have been public for a shorter time are significantly more likely to file late than are large and mature firms. After controlling for firm size and age, grants of firms audited by non-big-five firms are significantly more likely to be filed late. This likely explains the relatively high incident of manipulation among these firms in Table 3 after August 29, 2002.

The combination of the results in Tables 3–5 suggests that there are some small differences in the fraction of manipulated grants among the firms covered by various auditors. PricewaterhouseCoopers is associated with a lower fraction of grants with positive return differences, whereas non-big-five auditing firms are associated with a higher fraction of late filings, which are positively associated with manipulation.

Most of our analysis has focused on unscheduled grants, because scheduled grants do not permit the

[8] We also reestimated all of our multivariate models including additional governance variables such as CEO age, CEO tenure, an indicator variable equal to one if the CEO was also the chairman of the board, the firm's G-Index (Gompers et al. 2003) for the year of (or closest to) the grant year, and an indicator variable equal to one if the firm had a dual class capital structure. None of the additional governance measures showed up as reliably significant in a multivariate context. Because the consideration of these additional governance variables did not materially affect any of our conclusions, but reduced the sample size by approximately 75% (the additional governance variables are readily available for only the largest 1,500 or so (S&P 1,500) publicly traded firms covered on the Execucomp and IRRC databases), we do not tabulate the additional models.

Table 4 Regressions of Return Differences for Unscheduled, At-The-Money Grants

	Regression of return difference		Logistic regression of whether return difference is positive	
	Coefficient	*p*-value	Coefficient	*p*-value
Panel A: Unscheduled, at-the-money option grants ($N = 18{,}899$)				
Intercept	−0.122	0.000	−0.010	0.963
Post-SOX	−0.050	0.020	−0.235	0.028
Filed early	−0.004	0.549	−0.096	0.143
Filed late	0.044	0.000	0.195	0.004
Log of market capitalization	0.001	0.852	−0.045	0.002
High-tech firm	0.042	0.000	0.164	0.000
Stock return volatility	1.360	0.000	0.347	0.719
Stock return over previous year	0.002	0.483	0.043	0.006
Log of years since firm became public	−0.020	0.000	−0.106	0.000
Log of the number of option recipients	0.008	0.056	0.075	0.009
Outside director(s) granted options	−0.003	0.600	−0.044	0.278
Log of total number of underlying shares	0.015	0.000	0.096	0.000
Year 1997	−0.007	0.375	−0.022	0.761
Year 1998	0.026	0.005	0.070	0.347
Year 1999	−0.017	0.857	−0.019	0.798
Year 2000	0.033	0.002	0.039	0.595
Year 2001	0.007	0.521	−0.126	0.081
Year 2002	−0.036	0.001	−0.238	0.002
Year 2003	−0.002	0.932	0.094	0.463
Year 2004	−0.014	0.528	−0.177	0.162
Year 2005	−0.009	0.693	−0.098	0.432
Panel B: Unscheduled, at-the-money option grants with auditor information ($N = 8{,}614$)				
Intercept	−0.083	0.028	0.185	0.479
Post-SOX	−0.037	0.111	−0.179	0.148
Filed early	−0.006	0.424	−0.119	0.096
Filed late	0.041	0.000	0.190	0.011
Log of market capitalization	0.000	0.930	−0.044	0.006
High-tech firm	0.037	0.000	0.176	0.004
Stock return volatility	1.348	0.000	0.653	0.628
Stock return over previous year	0.001	0.694	0.063	0.005
Log of years since firm became public	−0.012	0.008	−0.081	0.013
Log of the number of option recipients	0.003	0.563	0.077	0.060
Outside director(s) granted options	−0.001	0.929	−0.039	0.516
Log of total number of underlying shares	0.013	0.000	0.075	0.000
Year 2001	−0.012	0.413	−0.135	0.107
Year 2002	−0.061	0.000	−0.259	0.004
Year 2003	−0.046	0.081	0.019	0.897
Year 2004	−0.057	0.029	−0.286	0.056
Year 2005	−0.048	0.064	−0.189	0.208
Auditor				
PricewaterhouseCoopers LLP	−0.013	0.123	−0.140	0.014
Ernst & Young LLP	0.006	0.471	0.056	0.300
Deloitte & Touche LLP	0.005	0.562	0.084	0.188
KPMG LLP	−0.003	0.724	−0.006	0.929
Arthur Andersen LLP	0.014	0.485	−0.017	0.878
Other auditors	0.004	0.752	0.036	0.647

Notes. This table presents coefficients from either ordinary least squares regressions of stock return differences or logistic regressions of whether the return differences are positive. The return difference is the difference between the stock return during the 20 trading days after the grant (days 1–20 relative to the grant date) and the stock return during the 20 days before the grant (days −19–0 relative to the grant date). A grant is defined to be at-the-money if the exercise price equals the price on the grant date. A grant is classified as scheduled if it is either (i) dated within one day of the one-year anniversary of a prior grant or (ii) followed by a grant that is dated within one day of the one-year anniversary of the grant in question, and unscheduled otherwise. Pre-SOX grants are grants dated before August 29, 2002, and post-SOX grants are grants dated on or after August 29, 2002. A grant is defined to be filed early if it is dated on or after August 29, 2002, and it was filed within one business day with the SEC. A grant is defined to be filed late if it is dated on or after August 29, 2002, and it was filed more than two business days after the grant date. Market capitalization is calculated 20 days before the grants. High-tech firms are those that are in the Computers, Electronic Equipment, or Measuring and Control Equipment industries based on the classifications of Fama and French (1997) or have a SIC code between 7,370 and 7,379 (computer programming companies, which are part of the Business Services in Fama and French 1997). Stock return volatility is the standard deviation of daily stock returns for the year ending 20 days before the grant date, provided that at least 50 daily stock returns are available. Stock return over the previous year is the return for the year ending 20 days before the grant, provided that at least 240 trading days are available during the year. The number of option recipients captures the total number of executives and directors who received options on the given grant date. Outside director(s) granted options indicates that at least one nonexecutive director received options on the given grant date. The total number of underlying shares is the total number of shares underlying options granted on the given grant date. In panel B, the regressions are first estimated without the auditor indicator variables. The coefficients below come from those regressions. The auditor indicator variables are then included *one at a time*, so the coefficient on each auditor indicator variable should be interpreted as the effect from that auditor relative to all other auditors.

Table 5 Logistic Regressions of Whether Grants Are Filed Late

	Coefficient	*p*-value
Panel A: Unscheduled, at-the-money option grants ($N = 6{,}214$)		
Intercept	2.644	0.000
Log of market capitalization	−0.245	0.000
High-tech firm	−0.140	0.119
Stock return volatility	0.122	0.950
Stock return over previous year	0.037	0.188
Log of years since firm became public	−0.138	0.006
Year 2003	−0.118	0.273
Year 2004	−0.552	0.000
Year 2005	−0.928	0.000
Panel B: Unscheduled, at-the-money option grants with auditor information ($N = 5{,}002$)		
Intercept	2.682	0.000
Log of market capitalization	−0.247	0.000
High-tech firm	−0.141	0.176
Stock return volatility	−0.348	0.883
Stock return over previous year	0.019	0.549
Log of years since firm became public	−0.145	0.010
Year 2003	−0.059	0.639
Year 2004	−0.532	0.000
Year 2005	−0.929	0.000
Auditor		
PricewaterhouseCoopers LLP	−0.132	0.182
Ernst & Young LLP	−0.120	0.304
Deloitte & Touche LLP	−0.051	0.673
KPMG LLP	0.026	0.812
Other auditors	0.383	0.001

Notes. This table presents coefficients from logistic regressions of whether grants are filed late based on the sample of grants dated on or after August 29, 2002. A grant is defined to be filed late if it was filed more than two business days after the grant date. A grant is defined to be at-the-money if the exercise price equals the price on the grant date. A grant is classified as scheduled if it is either (i) dated within one day of the one-year anniversary of a prior grant or (ii) followed by a grant that is dated within one day of the one-year anniversary of the grant in question, and unscheduled otherwise. Market capitalization is calculated 20 days before the grants. High-tech firms are those that are in the Computers, Electronic Equipment, or Measuring and Control Equipment industries based on the classifications of Fama and French (1997) or have a SIC code between 7,370 and 7,379 (computer programming companies, which are part of the Business Services in Fama and French 1997). The year indicator variables refer to the year of the grant dates. Stock return volatility is the standard deviation of daily stock returns for the year ending 20 days before the grant date, granted that at least 50 daily stock returns are available. Stock return over the previous year is the return for the year ending 20 days before the grant, provided that at least 240 trading days are available during the year. In panel B, the regressions are first estimated without the auditor indicator variables. The coefficients below come from those regressions. The auditor indicator variables are then included *one at a time*, so the coefficient on each auditor indicator variable should be interpreted as the effect from that auditor relative to all other auditors.

Table 6 Logistic Regressions of Whether Grants Are Scheduled

	Coefficient	*p*-value
Panel A: At-the-money option grants ($N = 23{,}142$)		
Intercept	−3.479	0.000
Log of market capitalization	0.099	0.000
High-tech firm	−0.290	0.001
Stock return volatility	−17.433	0.000
Stock return over previous year	0.050	0.005
Log of years since firm became public	0.263	0.000
Year 1997	0.647	0.000
Year 1998	0.825	0.000
Year 1999	0.745	0.000
Year 2000	0.657	0.000
Year 2001	1.043	0.000
Year 2002	1.153	0.000
Year 2003	0.925	0.000
Year 2004	0.508	0.000
Year 2005	−0.006	0.964
Panel B: At-the-money option grants with auditor information ($N = 10{,}878$)		
Intercept	−2.648	0.000
Log of market capitalization	0.123	0.000
High-tech firm	−0.357	0.003
Stock return volatility	−15.119	0.000
Stock return over previous year	0.018	0.514
Log of years since firm became public	0.201	0.001
Year 2003	−0.033	0.588
Year 2004	−0.474	0.000
Year 2005	−1.069	0.000
Auditor		
PricewaterhouseCoopers LLP	0.024	0.794
Ernst & Young LLP	0.142	0.138
Deloitte & Touche LLP	−0.166	0.125
KPMG LLP	0.062	0.598
Arthur Andersen LLP	−0.159	0.252
Other auditors	−0.202	0.182

Notes. This table presents coefficients from logistic regressions of whether at-the-money grants are scheduled. A grant is classified as scheduled if it is either (i) dated within one day of the one-year anniversary of a prior grant or (ii) followed by a grant that is dated within one day of the one-year anniversary of the grant in question, and unscheduled otherwise. A grant is defined to be at-the-money if the exercise price equals the price on the grant date. Market capitalization is calculated 20 days before the grants. High-tech firms are those that are in the Computers, Electronic Equipment, or Measuring and Control Equipment industries based on the classifications of Fama and French (1997) or have a SIC code between 7,370 and 7,379 (computer programming companies, which are part of the Business Services in Fama and French 1997). The year indicator variables refer to the year of the grant dates. Stock return volatility is the standard deviation of daily stock returns for the year ending 20 days before the grant date, granted that at least 50 daily stock returns are available. Stock return over the previous year is the return for the year ending 20 days before the grant, provided that at least 240 trading days are available during the year. In panel B, the regressions are first estimated without the auditor indicator variables. The coefficients below come from those regressions. The auditor indicator variables are then included *one at a time*, so the coefficient on each auditor indicator variable should be interpreted as the effect from that auditor relative to all other auditors.

grant date to be manipulated. Collins et al. (2005a) suggest that firms might choose grants to be unscheduled so that they can more easily be manipulated. Thus, we also estimate a regression of whether a grant is scheduled based on our two earlier classification schemes. The results are reported in Table 6. Consistent with Collins et al. (2005a), large firms are more likely to grant options on a scheduled basis. Furthermore, scheduled grants are more common among non-high-tech firms, firms that have been public for a longer time, and firms with low stock return volatility. The latter result suggests that firms choose

to grant options on an unscheduled basis when the potential benefits from manipulating the grant date are large. There is no relation between auditor identity and the use of scheduled grant dates.

3.6. Fraction of Firms Engaged in Backdating

Our analysis thus far has focused on the fraction of grants that are manipulated. This does not translate directly into the fraction of firms that have engaged in grant manipulation for several reasons. Firms might have manipulated only some of their grants during a period. Moreover, firms that manipulated grants in the early years of the sample period might have ended this practice when the new two-day filing requirement became effective. Both of these scenarios suggest that the manipulated grants are not concentrated among certain firms but are spread across a large number of firms, such that the fraction of firms that have manipulated grants is likely higher than the fraction of grants that have been manipulated. Further complicating the issue is that the number of grants varies across companies combined with the possibility that this number is related to the incidence of manipulation. That is, the manipulated grants could be spread across a small set of firms with many grants or a large set of firms with few grants.

To gauge the fraction of firms that have manipulated grants, we first average the 20-day return differences at the firm level. Then we apply the same estimation method as earlier on the firm level averages. For the whole sample period, we have average return differences for 7,774 firms. We estimate that 29.2% of these firms engaged in backdating or similar manipulation of grants to top executives at some point between 1996 and 2005.[9] We also replicate our analysis for the period before and after August 29, 2002. Based on a sample of 6,868 firms, we estimate that 30.1% engaged in grant manipulation at some point between 1996 and August 28, 2002. Furthermore, based on a sample of 4,098 firms, we estimate that 16.1% engaged in manipulation at some point between August 29, 2002, and 2005.[10] Collectively, one might interpret these estimates to mean that approximately one-half of the firms that manipulated grants before August 29, 2002, continued to do so afterward, but that very few firms initiated the practice after August 29, 2002. In any event, the high fractions underscore how widespread the practice of backdating and similar practices must have been. Furthermore, the alleged incidents of grant manipulation that have surfaced in the media appear to represent merely the tip of the iceberg.

[9] To the extent that we are missing grants for some of the firms in our sample, the estimates at the firm level might be biased downward.

[10] Similar to what we did when examining individual grants, we also repeated the firm-level analysis based on random dates from either the period from six months before to three months before the grant dates or the period from three months after to six months after the grant dates. The fraction of mean differences that are positive at the firm level using these random dates is 48%, suggesting that our estimate is, if anything, conservative.

4. Summary and Conclusion

Past studies have revealed that stock prices decrease before grants to top executives and increase immediately afterward. Heron and Lie (2007) attribute the vast majority of this pattern to backdating of grants. This study extends prior studies by estimating the fraction of grants that are backdated or otherwise manipulated. We also relate this fraction to time period, grant characteristics, firm characteristics, and auditing firms.

We estimate that 13.6% of grants between 1996 and 2005 have been backdated or manipulated in some fashion. This fraction is highest for unscheduled, at-the-money grants and among firms that are small, have been publicly owned for a shorter time, operate in the tech sector, and have high stock price volatility. The incidence of manipulation was more than halved as a result of the two-day filing requirement that took effect on August 29, 2002, but it remains high for grants that are filed late. Controlling for these factors, the auditor also seems to play a minor role. Non-big-five auditors are associated with a larger proportion of late filings, which are associated with manipulative practices such as backdating. Finally, we extend our analysis to the firm level and estimate that 29.2% of firms at some point engaged in manipulation of grants to top executives between 1996 and 2005.

Despite the prevalence of backdating and related manipulations, we believe that only a minority of the firms that have engaged in this practice will be identified. It can be difficult to identify grant manipulation with certainty for individual firms for a variety of reasons. First, it is not clear what look-back period firms use when backdating grants, making it unclear what period to examine when assessing whether the grant date had the lowest price. Second, if the lowest price during the look-back period occurs at the beginning or end, the typical "V" pattern in stock prices around the grant date that is associated with backdating might be absent. Third, firms might have several stock option plans in place, some of which might not permit manipulation. Fourth, the people responsible for the grant manipulation might try to disguise this practice, e.g., by choosing the second-lowest price during the look-back period. In any event, regulators have enhanced the disclosure requirements (see Heron et al. 2007 for details) and will likely enforce the requirements more strictly, such that the incidence of grant manipulation will decline further.

Our results suggest that option grant date manipulation was pervasive, more so than other types of manipulation of which we are aware, perhaps with the exception of manipulation of financial statement information to, e.g., inflate reported earnings. We speculate that grant manipulation was pervasive for several reasons, including (i) the relative simplicity with which grant dates can be manipulated, (ii) the apparent confusion about the legality of such manipulation among many parties involved, and (iii) the difficulty of detecting grant manipulation from the outside. At the same time, we find the pervasiveness to be disconcerting, because it suggests the existence of a huge informational gap between executives and directors on one side and shareholders and regulators on the other side, despite continual efforts to bridge this gap via increased disclosure requirements and improved governance structures.

Our research also suggests that manipulation of dates could occur for many types of transactions that are reported with a lag, and we believe this to be a fruitful area for further study. This is particularly the case in situations where the manipulation contributes to higher reported company earnings and/or provides financial gains for insiders. Indeed, recent research has already uncovered evidence of backdating in the cases of option exercises (Cai 2007, Cicero 2007, Dhaliwal et al. 2007) and charitable stock gifts by top executives (Yermack 2008).

5. Electronic Companion

An electronic companion to this paper is available as part of the online version that can be found at http://mansci.journal.informs.org/.

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