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Option grant backdating investigations and capital market discipline

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ABSTRACT

Using a large sample of option granting firms, some of which were investigated for option grant backdating, we develop a predictive model for such investigations and examine how the capital market responded as the backdating scandal unfolded. Firms that were investigated experienced significant stock price declines from the beginning of the Wall Street Journal's *Perfect Payday* series through the end of 2006. Firms predicted to have backdating problems, but not the subject of publicly revealed investigations, experienced stock price performance during the same period that was remarkably similar to that of firms with publicly revealed investigations. In contrast, firms not predicted to have backdating problems experienced normal stock price performance. Our results suggest that capital markets disciplined companies with suspicious option grant histories, often prior to, and irrespective of, any public revelation of an investigation into the matter.

1. Introduction

Although the backdating hypothesis put forth by Lie (2005) was initially met with skepticism, Heron and Lie (2007) demonstrate that most of the puzzling return patterns around executive option grants, first identified by Yermack (1997) were indeed the product of backdated option grant dates. Public awareness and scrutiny of option backdating mushroomed beginning in March 2006, when the Wall Street Journal began its "Perfect Payday" series to expose the magnitude of the option grant backdating scandal by highlighting fortuitous option grant timing at several companies. Since then, numerous firms have been caught up in investigations of option grant backdating. By March 16, 2007, Glass-Lewis & Co. reported that at least 257 companies either had announced internal reviews or had been the subject of SEC and/or Department of Justice investigations into their option granting practices.

At least two studies show that share prices of firms alleged to have backdated option grants fall significantly surrounding the firm-specific news events suggesting that backdating has likely taken place. For instance, Narayanan et al. (2007) examine a sample of 80 firms that were listed on the Wall Street Journal's option scorecard of investigated companies as of September 13, 2006 and find that on average these companies experienced a stock price decline of 7% upon the revelation of backdating. Interestingly, they find that most of the decline occurs prior to the first public announcement of an investigation. This leads them to conclude "some insiders or hedge funds may be receiving word of the likely filing of backdating complaints and either selling or shorting the stock in advance." More recently, Bernile and Jarrell (2009) examine the price reactions of 129 firms listed on the Wall Street Journal's option scorecard as of December 31, 2006 and similarly report significant declines in the stock prices of investigated firms. Bernile and Jarrell also perform

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cross-sectional analyses and report "Investors' reaction to backdating accusations is negatively related to firms' likely culpability and, consistent with increased information risk, shareholders' losses are directly related to the magnitude of the resulting earnings restatements, despite their effect on cash flows being arguably small." Their results illustrate that investors place a considerable weight on the information conveyed by backdating accusations, which suggest managerial self-dealing at shareholder expense. Specifically, investors tend to bid down the stock prices of the accused firms far in excess of estimates of direct costs in terms of future cash flows. These results are consistent with Karpoff et al.'s (2008a,b) conclusions that the reputational losses imposed by financial markets for financial misrepresentation are significant.

While Narayanan et al. (2007) and Bernile and Jarrell (2009) focus on companies that have been publicly thrust into the option timing spotlight, several academic studies, such as Heron and Lie (2009), Bebchuk et al. (2006), and Bizjak et al. (2008) suggest that a substantial number of companies with undisclosed problems remain. This raises interesting questions regarding how efficient capital markets are in disciplining companies when evidence exists to suggest heightened agency problems between owners and managers. For instance, it could be that the declining stock prices documented by Narayanan et al. (2007) and Bernile and Jarrell (2009), which begin prior to the revelation of backdating problems for firms in their samples (all of which have publicly revealed option investigations) are simply the result of market participants "hearing rumors" of impending announcements and reducing their exposures in anticipation of significant legal costs, possible management turnover, etc. Alternatively, it could be that capital market participants were taking calculated positions using publicly-available data to forecast the likelihood of option grant timing problems and simply reduced their exposure to companies where the evidence was suggestive of managerial self-dealing—even in the absence of an impending announcement of an investigation of the firm. This suggests that capital markets are proactive in disciplining companies for heightened agency problems and further suggests that companies are penalized by heightened costs of capital (and thus, lower stock prices) when the evidence is suggestive of managerial self-dealing, even in the absence of any public disclosure of investigations into the matter.

Thus, our main focus in this study is to examine the extent to which capital markets discipline firms for which there are reasons to believe that agency problems are heightened, yet for which no public allegations or revelations have been made. Given that (i) the number of firms estimated to have option backdating problems far exceeds the number with publicly revealed investigations and (ii) the evidence in Bernile and Jarrell (2009) shows that stock market reactions are negatively related to likely culpability for firms with publicly revealed indications of option timing problems, we believe that the option backdating scandal provides a unique setting to investigate this research question. Intuitively, if the market exerts backdating-related discipline, in addition to observing declines in the stock prices of firms with public announcements of backdating investigations, we should also observe declines in the prices of firms where the evidence that can be assembled from their historical option grant date selections is suggestive of heightened agency costs, even in the absence of any publicly disclosed inquiry.

We start our analysis by using the Glass-Lewis report to identify (as of March of 2007) firms that had either announced their own internal investigations or were at some point publicly revealed as being under investigation by the SEC or DOJ. Of these firms, 163 had restated their financial statements to account for option grant timing irregularities as of the time of the report. We then obtain the option grant histories and other firm-specific characteristics for all option granting firms covered on CRSP, Compustat, and Thomson Financial's insider trading database. Consequently, our sample includes the 257 firms appearing in the Glass-Lewis report because of backdating investigations and a sample of 3164 option granting firms that are not included in the Glass-Lewis report because there were no publicly revealed option grant timing investigations at the company as of March of 2007.

Next, we estimate models to identify factors that contribute to an investigation into option grant backdating or to the relative size of a resulting restatement of financial statements. We use these models for predictive purposes on the sample of firms that were not under investigation to classify them into groups. We contrast two groups—those with option grant histories that lead to a prediction that they have a high probability of having backdated options, and those that the model suggests have a low probability of having backdated option grant dates. Similarly, we contrast the group where the predicted financial restatements are the largest with the group where the predicted financial restatements are the least.

We find that the stock price patterns for both of the portfolio groupings that our models predicted to have a high probability of backdating problems (high probability of an investigation; high estimated restatement) are very similar to that for the portfolio of firms that were the subject of publicly announced internal investigations (but not SEC or DOJ investigations) and mentioned in the Glass-Lewis report. For example, cumulative abnormal returns over the period spanning from March 9th, 2006 (roughly one week prior to the WSJ's first *Perfect Payday* article) through December 31, 2006 are −7.2% for the portfolio predicted to have a high probability of an options timing investigation and −8.3% for the portfolio predicted to have the largest relative restatement. The corresponding abnormal return figure for the portfolio of firms with publicly revealed internal investigations is −8.8%. These abnormal declines are all statistically different from zero, but do not statistically differ from each other. In contrast, the portfolios of firms that our models predict to have a low likelihood of either an options timing investigation or a low resulting financial restatement do not experience negative abnormal returns. Moreover, the abnormal returns of the portfolios of firms predicted to have a high probability of an option backdating investigation (high relative restatement) are significantly lower −10.4% (−9.8%) than the abnormal returns for the portfolios of firms predicted to have a low probability of an option backdating investigation or a resulting financial restatement.

Our findings are consistent the recent work of Karpoff et al. (2008a,b), which finds that the reputational losses imposed by financial misrepresentation are significant. Our results also complement Bernile and Jarrell (2009), who study the stock price reactions of firms publicly identified as having potential option backdating problems and conclude that the majority of the stock price declines are due to investors updating their perceptions of agency costs between owners and managers. Our results suggest that capital markets actively discipline firms whose actions suggest that agency costs are heightened, even if there are no formal inquiries into the matter, by the firm, the SEC, or the Department of Justice. Specifically, investors appear to have been able to identify firms that were likely to have option granting problems and bid their prices down, even in the absence of any public announcement. One can also infer from our

Table 1
Summary statistics.

		All firms with investigations	SEC investigations	Department of Justice investigations	Internal investigation only	Control firms
Unique grant dates	Mean	28.11	30.08	32.29	26.10	22.66
	Median	24.00	26.00	28.50	23.00	19.00
Pre-SOX return −20 to grant date	Mean	−4.82%	−5.92%	−6.69%	−3.68%	−0.21%
	Median	−3.99%	−5.56%	−5.68%	−1.45%	0.35%
Pre-SOX return grant date to +20	Mean	10.21%	12.69%	13.23%	7.67%	4.18%
	Median	9.28%	10.98%	10.41%	5.68%	2.66%
Post-SOX return −20 to grant date	Mean	1.63%	1.44%	0.11%	1.81%	1.86%
	Median	1.04%	0.72%	0.71%	1.82%	1.30%
Post-SOX return grant date to +20	Mean	4.97%	4.91%	5.64%	5.02%	3.70%
	Median	3.76%	3.91%	4.40%	3.33%	2.41%
Returns for grants filed late (−20 to grant date)	Mean	0.69%	−0.47%	1.74%	1.79%	1.71%
	Median	−0.88%	−2.39%	0.78%	−0.69%	1.13%
Returns for grants filed late (grant date to +20)	Mean	9.51%	7.52%	5.63%	11.40%	4.58%
	Median	6.84%	6.79%	7.39%	6.83%	2.70%
Equity Market Cap. December 31, 2005 (in $ billions)	Mean	4.28	5.74	9.13	2.78	3.82
	Median	1.06	1.52	1.79	0.67	0.44
N		221	112	52	109	3164

This table reports summary statistics. The grant information is from Thomson Financial's Insider Filing Data for the period January 1996 to December, 2005. Unique grants dates refer to the number of unique grant dates reported by Section 16 filers per company during the sample period. Market value and return information are obtained from CRSP. Returns represent raw returns (excluding dividends) from days GD-20 to the grant date and from the grant date to GD + 20 trading days. Pre-SOX and Post-SOX refer to observations before and after August 29, 2002. Returns for grants filed late reflect the average return for the subset of grants filed after the two-business reporting window mandated by the Sarbanes-Oxley Act.

results that the stock price declines prior to the publicly announced backdating investigations noted by Narayanan et al. (2007) and by Bernile and Jarrell (2009) were driven more by educated investors using financial data to predict which companies were likely to have option grant timing problems and reducing their positions in those firms because of heightened perceptions of agency costs, than by instances where investors were tipped off in some manner about a soon-to-be forthcoming public revelation of an investigation into the firm's option grant practices. The remainder of this paper is organized as follows. The next section describes the sample construction and discusses summary statistics. Section 3 provides the results of our empirical tests and then Section 4 summarizes and concludes.

2. Sample

Our sample begins with firms identified in the Glass-Lewis & Co. report that covers 257 firms that had announced internal reviews, SEC inquiries, or Justice Department (DOJ) subpoenas related to their historical stock-option grants as of March 20, 2007.[1] The Glass-Lewis report is more exhaustive than the list maintained by the *Wall Street Journal* and summarizes additional information that we obtained from Glass-Lewis to use in our event-time tests. For each firm in the Glass-Lewis report and a control group of firms (consisting of all option granting firms not involved in a publicly revealed investigation), we compile stock-option grant histories from Thomson Financial. We then restrict the sample to firms that have stock market data on CRSP and that are still traded through the publication of the first *Wall Street Journal* article in their "Perfect Payday" series, published on Saturday, March 18th, 2006.

Because our models utilize stock return measures for both the pre- and post-SOX periods, we focus only on those firms that have granted options in both the pre- and post-SOX periods to ensure that any changes in the coefficients in our models are not due to changes in sample composition. This leads to a sample of 221 firms with backdating investigations. The control group consists of 3164 firms with available option grant and stock price data, but not appearing in the Glass-Lewis report.

From Glass-Lewis, we also requested and obtained a comprehensive list of backdating events for firms involved in options investigations. These investigations could be publically announced internal reviews or they could be SEC or Department of Justice investigations. For each of the firms in our sample that have investigation announcements prior to December 31, 2006, we have data on late filings, financial restatements, executive/director departures, and whether an internal review has been completed.

2.1. Summary statistics

Table 1 presents the summary statistics for firms that we identified as having granted options on one or more dates to Section 16 officers (i.e., top officers) and directors during the period from January 1996 to December 2005, that have stock return information during our analysis period, and for which we can construct all additional variables used in our cross-sectional tests. We partition the data into five groups: all firms included in the Glass-Lewis report as having any type of investigation, firms investigated by the SEC,

[1] For more information on Glass-Lewis and Company, visit their website: http://www.glasslewis.com/.

firms investigated by the DOJ, firms that have initiated an investigation but are not currently the target of an SEC or DOJ investigation, and a control group of firms that granted options but were not publicly involved in any option investigation. Of the 221 firms subject to investigation, 112 were investigated by the SEC. Of these 112 firms, 52 were also being investigated by the DOJ.

The summary statistics show that grants to top executives are relatively common. During the 1996–2005 sample period, the control firms (i.e., those without any publicly revealed option grant investigation) averaged 22.66 reported grant dates (median of 19), whereas the pool of firms with option investigations averaged 28.11 reported grant dates (median of 24). Firms investigated by regulators average even more reported grant dates, 30.08 (median 26) for those under SEC investigation and 32.29 (median 28.5) for those under investigation by the DOJ.

Table 1 also presents several measures of average stock returns surrounding option grant dates. The returns represent the average across the firms in the sample instead of the average across all unique grants. As a result, all sample firms contribute equally to the reported averages, regardless of the number of grants the firm awarded. In the pre-SOX period, all categories of firms currently under investigation have averages that are consistent with the tell-tale V-shaped signature of backdating—negative average returns in the periods leading up to the grant date and positive average returns immediately thereafter.

It is also apparent that the firms under scrutiny by regulators have patterns that are even more favorable to option recipients. For instance, during the pre-SOX period, the stock price decline in the 20 days before the option grant date was −3.68% (median −1.45%) for those firms with only internal investigations (column 4). In contrast, the price declines are −5.92% (median −5.56%) for the subset of firms under SEC investigation and −6.69% (median −5.68%) for the smaller subset under DOJ investigation. The control firms for which no investigations have been publicly revealed experienced returns of −0.21% (median 0.35%) over the same interval.

The stock price rebound following the grant dates exhibits a similar pattern, with the returns being much more favorable for the executives of firms being investigated by regulators. The stock price rebound in the 20 days following the option grants was 10.21% (median 9.28%) for those 221 firms under investigation. Assuming 252 trading days in a year, this translates into an annualized rate of return of $(1+.1021)^{(252/20)}-1=240.4\%$. The corresponding 20-day post-grant returns for the firms under DOJ investigation is 13.23% (median 10.41%), an annualized return of 379%. The control firms for which no investigation has been announced experienced mean and median returns of 4.18% (annualized = 67.5%) and 2.66% in the pre-SOX period. Obviously, the annualized return for this control group is also significantly larger than the typical yearly return for the overall stock market (i.e., for buy-and-hold investors). However, it is worth noting again that the number of firms publicly known to be under investigation, and thus, represented as such in our sample, is far lower than the number that studies such as Heron and Lie (2009), Bebchuk et al. (2006), and Bizjak et al. (2008) estimate to have backdated stock option grants at some point. As a result, it is likely that the sample of control firms still includes a reasonably large number of companies that have backdated some stock option grants and that the inclusion of these firms in the tabulation of the averages for the control group pulls its average pre-grant stock returns downward and its post-grant stock returns upward. We return to this issue later.

Heron and Lie (2007) show that the SOX rules requiring prompt disclosure of grants diminished the favorable return patterns around option grant dates—eliminating them entirely for grants that were filed promptly. However, they also found that many firms failed to meet the two-day reporting requirements and that the signature return patterns associated with backdating grow stronger with filing delays. In order to jointly capture the effects of the Sarbanes-Oxley reporting rule change and the influence of late filings, we tabulate averages from the post-SOX period and then re-tabulate them for only those grants that were filed after the two-business day reporting deadline.

Regardless of the subset of firms being analyzed (under investigation, vs. otherwise), simple comparisons of the average post-SOX mean and median returns in the 20 days leading up to stock option grants with the corresponding pre-SOX averages show that the change in reporting requirements reduced the tendency to pick a grant date where the stock price was lower than what it was 20 days earlier. Even for the subset of firms under DOJ investigation, the average price decline of −6.69% (median −5.68%) in the pre-SOX period turns into a gain of 0.11% (median 0.71%) in the post-SOX period. Similarly, for firms under DOJ investigation returns from the grant date to 20 days later had average price increases of 13.23% (median (10.41%) in the pre-SOX period compared to only 5.64% (median 4.40%) in the post-SOX period. The favorable post-grant returns are still present, but as Heron and Lie (2007) show, they are driven primarily by the subset of grants that are filed late. For late filers, the average price rebound in the 20 days following the grant date was 9.51% (median 6.84%) for all firms with investigations compared to 4.58% (median 2.70%) for the control sample.

3. Empirical results

We develop two alternative models to categorize firms without publicly disclosed option grant investigations according to their likelihood of having option backdating problems. The first approach utilizes a logistic regression model to estimate the likelihood of an investigation, while the second approach uses an OLS regression model of earnings restatements. We then contrast the stock price movements of firms identified as having a high probability of backdating to those of firms identified as having a low probability of backdating and to firms with publicly revealed investigations, either internal, by the SEC, or by DOJ.

3.1. Estimating the likelihood of backdating with a logistic regression model

Table 2, model 1 shows the results of the logistic regression where the dependent variable equals one if the firm was identified in the Glass-Lewis report as having some form of an investigation (internal, SEC, or DOJ) into its historical option granting procedures, and zero otherwise. Thus, the model contrasts the characteristics of firms with publicly revealed investigations (221 in the Glass-Lewis

Table 2
Logistic estimations of the likelihood of an option backdating investigation andregression estimates of restatements.

	Model 1 Logistic regression		Model 2 OLS regression	
	Coeffic.	*p*-value	Coeffic.	*p*-value
Intercept	−6.419	0.000	−0.036	0.087
Log of # grants	0.783	0.000	0.011	0.070
Stock return, −20 to grant date, Pre-SOX	−2.438	0.030	−0.111	0.007
Stock return, grant date to +20, Pre-SOX	1.390	0.050	0.173	0.000
Monthly low statistic, Pre-SOX	1.366	0.000	0.013	0.184
Stock return, −20 to grant date, Post-SOX	0.936	0.330	−0.011	0.695
Stock return, grant date to +20, Post-SOX	0.283	0.746	0.012	0.756
Monthly low statistic, Post-SOX	0.453	0.020	−0.005	0.530
Late filed grants	−0.163	0.360	−0.002	0.778
V-shaped return pattern, Pre-SOX	1.072	0.000	−0.009	0.303
V-shaped return pattern, Post-SOX	0.425	0.080	0.023	0.011
N	3385		139	
Likelihood ratio statistic	236.92			
Likelihood ratio index	0.145			
Adjusted R^2			0.333	
Model *p*-value			0.000	

Model 1 shows the results of logistic regressions of the likelihood of an option backdating investigation. The dependent variable in the model is equal to 1 if the firm appears on the Glass-Lewis list as having some form of option backdating investigation, zero otherwise. Model 2 shows the results of OLS regression to estimate the magnitude of financial restatements as a percentage of equity market capitalization. The dependent variable is the amount of additional pre-tax compensation expense (i.e., restatement amount) attributable to previously unrecognized expenses resulting from misdated stock options, scaled by the company's market capitalization as of the announcement of the option investigation. We obtained the restatement figures from Glass-Lewis & Co. The Monthly low statistics capture the confidence level that the number of grants priced at monthly lows, relative to the total number of grants by the firm, exceeds the number expected by random chance (approximately 1 out of 20, or 5%) according to the Binomial Distribution. It is defined as 1 minus the probability that the firm would have at least as many grants at monthly lows by random chance and is therefore bounded between zero and one. Late filed grants is an indicator variable equal to one if the firm had one or more late filed grants in the post-Sarbanes-Oxley period. V-shaped return pattern captures whether the firm's grants are on average priced at a low point in the window around the grant date. It is an indicator variable set to 1 if the average return decreased by 5% or more in the 20 trading days prior to the grant date and increased 5% or more in the 20 days subsequent to the grant date. In the post-SOX period, this average is determined using only grants filed late.

report that meet our sample requirements) with those of firms that also granted options, but without an investigation as of the time the Glass-Lewis report was compiled (3164 that meet our sample requirements). The independent variables identify the factors that contribute to an investigation of option granting practices for which we provide summary statistics in Table 1. Specifically, they include the logarithm of the number of unique grant dates for section 16 filers, stock return measures surrounding the firm's grant dates, an indicator variable equal to one if the firm's option recipients had filed grants late in the post-SOX period, statistics reflecting the likelihood that the firm would be able to grant the observed number of grants that coincide with monthly low closing prices by random chance,[2] and an indicator variable reflecting that the return patterns before and after the purported grant dates exhibit the "V-shaped" pattern that often signifies the practice of backdating.[3] Because of the significant role that the Sarbanes-Oxley reporting requirement change had in both curtailing and exposing option grant backdating, we provide separate measures of returns, monthly low statistics, and V-shaped return pattern indicators for both the pre- and post-SOX periods.

Not surprisingly, and consistent with the univariate statistics presented in Table 1, the likelihood of an options investigation increases with the number of grants. One interpretation is that a longer history of option grant decisions makes it easier to establish evidence that points to option grant date manipulation if it is occurring. It is also the case that the frequent use of unscheduled grants, the type that most often involve manipulation, would all else equal tend to lead to a larger total number of grant dates in a given period. With regard to the return variables, the coefficients on the pre-SOX monthly returns show that firms are more likely to be investigated when, on average, the stock price falls by greater amounts in the 20 days prior to the grant date and rises significantly in the 20 days immediately thereafter. These two return variables are not significant in the post-SOX period.

The two additional measures that we include to capture the degree to which option grant dates are favorable (the monthly low statistic and the V-shaped return pattern variable) are significant. The positive coefficients on the monthly low statistics, for both the pre- and post-SOX periods, show that firms are more likely to be investigated if their option grant dates repeatedly tend to

[2] The monthly low statistics capture the confidence level that the number of grants priced at monthly lows, relative to the total number of grants made by the firm, exceeds the number expected by random chance (approximately 1 out of 20, or 5% assuming 20 trading days in a month with unique closing prices) according to the binomial distribution. The statistics, which are calculated separately for both the pre-and post-SOX periods, are defined as 1 minus the probability that the firm would have made at least the observed number of grants at monthly lows by random chance. This measure is bounded between zero and one, with numbers converging toward 1 indicating a greater likelihood of backdating. For example, according to the binomial distribution, if there are 20 balls in an urn, numbered 1 through 20 but otherwise identical, the probability of drawing (with replacement) the ball numbered 1 at least three times out of six tries is 0.00223. Using this example, the analogous measure to our monthly low statistic would be 1 − 0.00223, or 0.99777.

[3] The V-shaped return pattern indicator equals one if the average return decreased by 5% or more in the 20 trading days prior to the grant date and increased by 5% or more in the 20 days subsequent to the grant date. In the post-Sox period, this average is determined using only grants filed late.

coincide with days when the stock price closed at monthly lows. The coefficient on the V-shaped return variable is positive and significant for pre-SOX grants.[4]

3.2. Estimating backdating likelihood using earnings restatements

Another method to assess the intensity of backdating is to examine the financial restatements issued by firms in response to backdating investigations. Glass-Lewis provides a list of companies that quantified (as of March of 2007) the amounts of previously unrecognized expense related to misdated stock options as well as market capitalization figures as of the time of the announcement of its investigation. In our sample of 221 firms with investigations, 139 firms with market data had issued restated financials. For these firms, the amount of the restatement is economically significant, averaging $78.23 million per firm, or 2.71% of market capitalization.[5]

To investigate what contributes to restatement magnitudes, we regress restatement amounts scaled by market capitalization against the same independent variables used in our previous logistic analysis. Model 2 of Table 2 presents the results. The coefficients on the pre-SOX return measures are negative and significant for the returns in the 20-day period leading up to the grant dates and positive and significant for the 20-day post-grant returns. Thus, larger restatements are associated with larger average price declines before grant dates and larger increases immediately thereafter. Although these same two measures do not show up as significant in the post-SOX period, this is likely due to noise induced by the use of a 20-day window in the post-SOX period when in fact most grants were filed much sooner in the new reporting environment. The V-shaped return pattern indicator for the post-SOX grants, which is calculated on the basis of late filed grants only, does show up as significant, suggesting that the presence of favorable option grant patterns combined with late reporting is positively related to the magnitude of restatement.

3.3. Does the market discipline firms in the absence of an options investigation?

Our primary analysis is designed to determine the extent to which stock market participants anticipated those firms likely to have option grant timing problems in advance of, and in the absence of, any formal announcement of an investigation. This is an interesting question for several reasons. As noted earlier, Narayanan et al. (2007) and Bernile and Jarrell (2009) both report that the majority of the abnormal return surrounding the initial announcements of backdating occurs prior to the first public announcement. We confirm these findings for our sample of investigated firms but do not tabulate the results as they are similar to those presented in Bernile and Jarrell (2009).[6] This raises the possibility that information regarding impending investigation announcements may have been leaked to insiders or hedge funds who then sold or shorted the shares, putting downward pressure on the stock price, in the days leading up to the announcement. While this is possible, it is also probable as we hypothesized earlier that sophisticated market participants were able to take calculated positions that reduced their exposure over time, in many cases shortly before the public revelation of backdating problems, in response to their perceived increase in the agency costs for firms with suspicious grant timing histories. If this is the case, given the evidence in Heron and Lie (2009), Bebchuk et al. (2006), and Bizjak et al. (2008) that suggests the number of companies that have manipulated option grant dates far exceeds the number with publicly announced investigations, we expect to see a decline in the stock prices of companies with suspicious option grant histories, even if they have not yet been thrust into the public spotlight.

In order to test this possibility, we use the estimated logit model from Model 1 of Table 2 to categorize those firms *not publicly revealed as under investigation* into two portfolios which we contrast with the set of firms with publicly revealed investigations. The first portfolio consists of the top decile of firms in terms of the predicted probability of an options investigation. The second portfolio consists of the bottom decile of firms in that they have the lowest predicted probability of an options investigation. Our sample of firms that have granted options and meet all of our additional data requirements consists of 3164 firms, so each decile portfolio mentioned above consists of 316 firms. We then contrast the cumulative abnormal returns for the high and low decile portfolios with firms that

[4] Adding size to the model would test whether public identification of option backdating is biased toward larger firms. Given the evidence in Heron and Lie (2009) which suggests that option grant manipulation occurs more frequently in smaller firms, the positive coefficient on the size variable suggests that larger firms actually face greater and more immediate scrutiny than do smaller firms from the media, institutional investors, lawyers, and regulators with regard to potential accounting irregularities. This obviously correlates with a larger potential dollar magnitude of fraud, all else equal, at larger companies. We exclude size in our model to eliminate biasing the model toward only identifying large firms that had high probabilities of backdating. All the variables in the model are directly related to the characteristics of option backdating. Models contrasting firms under investigation by either the SEC, DOJ, or both, with the remaining firms that have publicly revealed an investigation of their option granting practices suggest that the SEC or DOJ are more likely to launch an investigation when there are greater odds against repeatedly picking monthly lows as grant dates, the greater the number of late filed grants, and the more pronounced the V-shaped pattern in the post-SOX period. Not unexpectedly, the addition of size (log of equity market value) shows that regulators also focus their attention on larger firms.

[5] According to the Glass-Lewis report, the largest financial restatement resulting from option grant date backdating was Broadcom's restatement of $2.276 billion, representing 11.4% of its market capitalization as of the time of the investigation announcement. The largest restatement amount in percentage terms was that of Agile Software, whose restatement of $69.6 million represented 19.7% of its $354 million market capitalization at the announcement of its investigation.

[6] For example, cumulative abnormal returns for all firms in the Glass-Lewis report that had either an internal or external investigation are −4.96% over the window −20 to +20 surrounding the first announcement of an investigation. The majority of this decline, −3.09%, occurred in the 20 days prior to the initial announcement. The patterns are similar, albeit larger for firms investigated by the SEC or DOJ. For firms investigated by the SEC, cumulative abnormal returns over the window −20 to +20 totaled −7.49%, with the majority of the decline, −4.08%, occurring in the 20 days prior to the initial announcement. For firms investigated by the DOJ, cumulative abnormal returns over the window −20 to +20 surrounding the initial announcement are −11.90%, with roughly half of the decline (−6%) occurring in the 20 day period leading up to the initial announcement. We find similar results, except for the magnitudes are slightly larger if we use longer event windows such as −60 to +60 around the initial announcements of an investigation into the firm.

have publicly disclosed backdating investigations (i.e., those firms in the Glass-Lewis report). Because there is no public announcement date for firms not currently under investigation, we begin with March 9th, 2006 and continue through December 31st 2006. We chose March 9th, 2006 as a starting point because it is roughly one week before the first article (on Saturday, March 18th, 2006) in the *Wall Street Journal's Perfect Payday* series that exposed the fortuitous option grant timing patterns at specific companies. Although there were a few earlier announcements relating to option backdating, it is apparent that the most significant event in terms of raising awareness of the issue is the start of the *Perfect Payday* series.

Our analysis begins with plots of the data, shown in Figs. 1 and 2. Fig. 1 shows a clear difference in returns between firms in which our logit model predicts the likelihood of an investigation to be high (high probability firms) and firms where the predicted likelihood of an investigation is low (low probability firms). For comparison purposes, Fig. 1 also plots the CARs of firms with only publicly disclosed internal investigations and plots of firms that are the subject of SEC/DOJ investigations. We know from Narayanan et al. (2007), from Bernile and Jarrell (2009), and from our own tests briefly reported earlier, that much of the stock price declines experienced by investigated firms occur before the initial announcement that the firm's option grant history is under investigation. Because the announcements are scattered across time, we should expect gradually declining portfolio returns for firms under investigation. Nevertheless, Fig. 1 also shows a striking similarity between the abnormal returns for the high probability firms and the returns to firms with publicly revealed option grant timing investigations. More specifically, the return performance of the high probability firms is slightly less negative than those under investigation by the SEC or DOJ, but it is very similar to firms that launched their own investigations but were not subject to additional SEC/DOJ investigations. In contrast, the firms for which our logistic model predicts the likelihood of an investigation to be low (low probability firms), experience significantly better stock price performance, with cumulative abnormal returns consistently non-negative over the entire period.

Fig. 2 presents a similar type of contrast, but instead uses the regression model presented in Model 2 of Table 2 to predict the level of financial restatements for all firms in our control portfolio. Once again, we categorize those firms *not publicly revealed as under investigation* into decile portfolios according to predicted restatement amounts, expressed as a percentage of market capitalization. When we compare the stock market performance of the top and bottom deciles with the firms with publicly revealed option grant timing investigations, the results are similar to those presented in Fig. 1. Specifically, firms without a publicly revealed investigation, but predicted to issue large restatements in the future (high estimated restatement firms), experience rather large stock price declines while firms with characteristics that contribute to minimal estimated restatements (low estimated restatement firms) experienced cumulative abnormal returns that fluctuate around zero. As in Fig. 1, the high restatement firms are strikingly similar to the group of companies with publicly revealed option grant investigations. Again, the abnormal returns of the high estimated restatement portfolio tends to be below those of firms that had publicly announced their own investigations, but slightly above the abnormal returns for the firms under investigation by the SEC and/or DOJ.

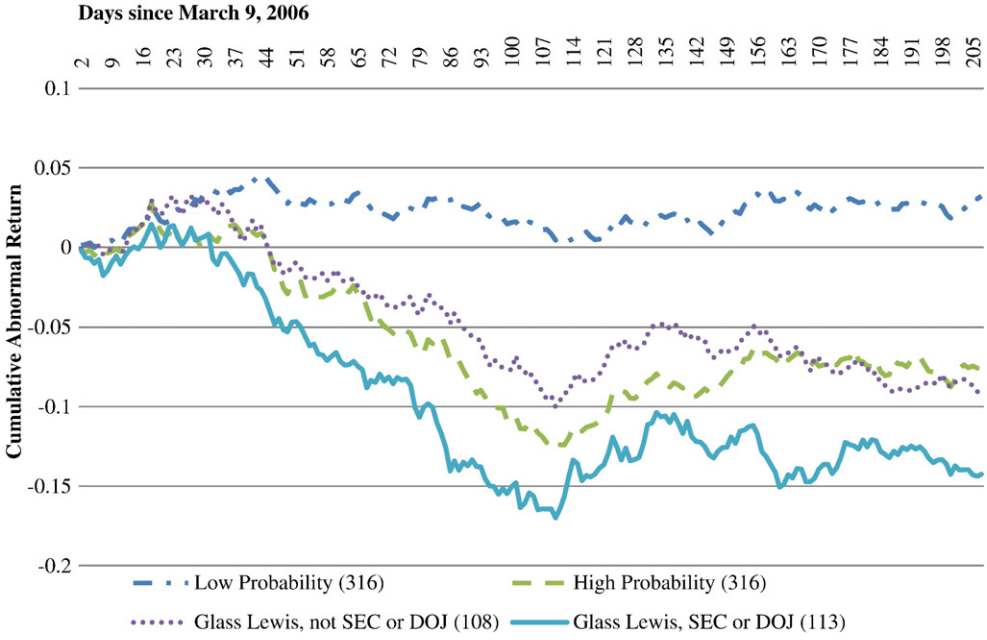

Fig. 1. Cumulative Abnormal Stock Returns from March 9th, 2006 through December 31st, 2006. The figure presents cumulative abnormal returns over the interval from March 9th, 2006 through December 31st, 2006. The low and high probability portfolios are taken from the population of 3162 control firms without publicly revealed investigations into their option granting histories. For these control firms, we use the logit model described in Table 2 to estimate a predicted probability of an option grant timing investigation. The low probability portfolio consists of the 316 control firms for which the predicted probability of an investigation is in the lowest decile. The high probability portfolio consists of the 316 control firms for which the predicted probability of an investigation is in the highest decile. The firms labeled as on the Glass-Lewis list are those firms with public revelations of backdating investigations, for which we obtained all of the variables used in our empirical analysis. Firms with SEC and/or DOJ investigations are shown separately.

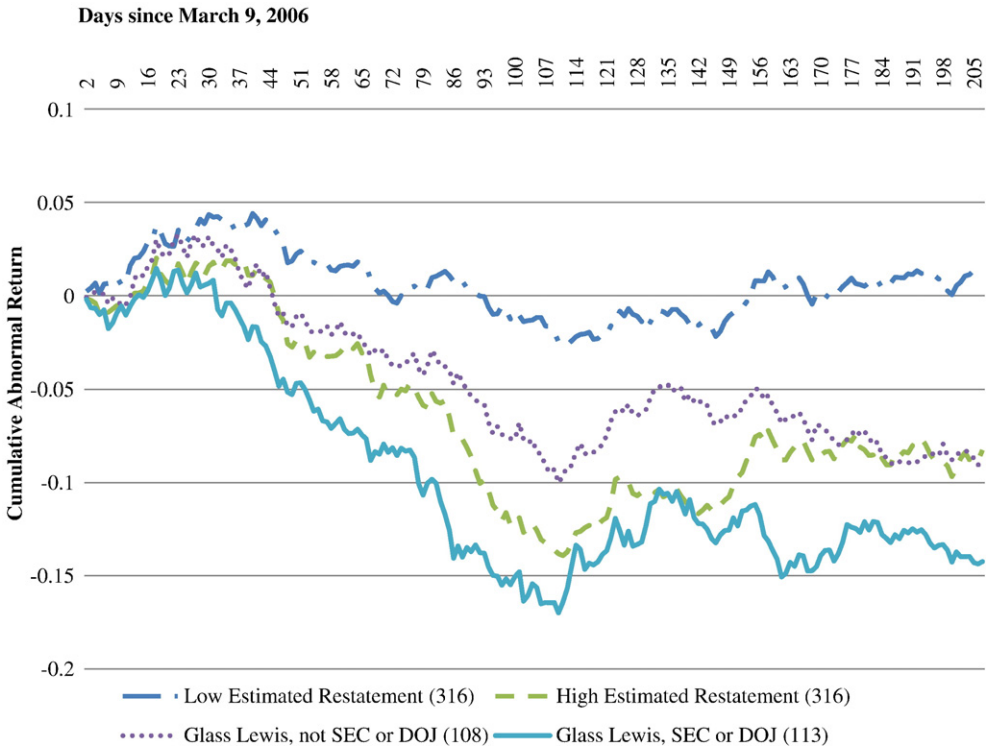

Fig. 2. Cumulative abnormal stock returns from March 9th, 2006 through December 31st, 2006. The figure presents cumulative abnormal returns over the interval from March 9th, 2006 through December 31st, 2006. The low and high estimated restatement portfolios are taken from the population of 3162 control firms without publicly revealed investigations into their option granting histories. For these control firms, we use the OLS regression model described in Table 2 to estimate the amount of financial restatements resulting from an option grant timing investigation. The low estimated restatement portfolio consists of the 316 control firms for which the estimated restatement resulting from option grant timing irregularities is in the lowest decile. The high estimated restatement portfolio consists of the 316 control firms for which the estimated restatement resulting from option grant timing irregularities is in the highest decile. The firms labeled as on the Glass-Lewis list are those firms with public revelations of backdating investigations, for which we obtained all of the variables used in our empirical analysis. Firms with SEC and/or DOJ investigations are shown separately.

In order to illustrate these results more precisely, we cumulate the abnormal returns over several intervals and tabulate the results in Table 3. As in Figs. 1 and 2, we begin tracking the stock returns on March 9, 2006, roughly one week prior to the beginning of the Wall Street Journal's first *Perfect Payday* article, which appeared on Saturday, March 18th, 2006. We present cumulative abnormal returns through the end of April, June, August, October, and December of 2006. The results in panel A show that the market did not respond immediately to the initial news reports of backdating, likely because it took multiple articles in the *Perfect Payday* series and additional academic work such as Heron and Lie (2009) to convey the magnitude of the scandal. For instance, for the 37-day period ending April 30, both the internal investigation portfolio (+1.2%) and the high probability portfolio (+1.4%) exhibit positive (yet insignificant) abnormal returns. As capital markets learned more about the widespread nature of backdating practices over the spring and summer of 2006, a different trend began to emerge. Through June 30th, the internal investigation portfolio lost 2.9%, the external investigation (SEC/DOJ) group lost 9.8% and the high probability portfolio group lost 5.8%, with the latter two significantly different from zero at the 0.01 level. These results contrast with the low probability group, which experienced statistically significant abnormal gains of 3.0%. The abnormal returns for the high probability portfolio are significantly lower than the low probability portfolio, insignificantly different from the set of firms with internal investigations only, and significantly higher than the set of firms publicly revealed to be under investigation by the SEC or DOJ. These general return patterns are consistent for each of the periods extending through December 31, 2006. Through December 31st 2006, abnormal returns cumulate to −7.2% for the high probability portfolio, −8.8% for firms that publicly announced investigations but were not the subject of a SEC/DOJ investigation, and −14.2% for firms being investigated externally by the SEC or DOJ.

The results in panel B, which are based on estimated earnings restatements, parallel those in panel A. Over the interval from March 9th, 2006 through December 31, 2006, abnormal returns for the portfolio of firms with large predicted restatements cumulate to a statistically significant −8.3%. The stock price performance for firms with large predicted restatements differs significantly (<0.01 level) from the +1.5% return for the low restatement portfolio, and is similar to the −8.8% return for the portfolio of firms that have publically announced internal investigations.[7]

[7] We also find significant differences between the low and high probability groups using both a regression analysis and the 4 factor Fama-French model.

Table 3
Cumulative abnormal return intervals.

Panel A: High versus low predicted probability of a backdating investigation										
From March 9, 2006 to	April 30, 2006		June 30, 2006		August 31, 2006		October 31, 2006		December 31, 2006	
	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value
Low predicted probability	0.036	0.002	0.030	0.004	0.018	0.097	0.032	0.024	0.032	0.056
High predicted probability	0.014	0.354	−0.058	0.001	−0.089	0.000	−0.067	0.002	−0.072	0.001
Glass, not SEC DOJ	0.012	0.686	−0.029	0.221	−0.060	0.030	−0.066	0.040	−0.088	0.012
SEC, DOJ	−0.012	0.129	−0.098	0.000	−0.128	0.000	−0.139	0.000	−0.142	0.000
Portfolio differences										
High–Low	−0.022	0.133	−0.088	0.000	−0.107	0.000	−0.099	0.000	−0.104	0.000
High–Glass	0.002	0.906	−0.029	0.507	−0.029	0.753	−0.001	0.825	0.016	0.573
High–SEC_DOJ	0.026	0.075	0.040	0.001	0.038	0.004	0.072	0.001	0.070	0.001
Panel B: High versus low estimated restatements										
From March 9, 2006 to	April 30, 2006		June 30, 2006		August 31, 2006		October 31, 2006		December 31, 2006	
	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value
Low restate	0.035	0.003	0.010	0.046	−0.008	0.657	−0.006	0.299	−0.015	0.160
High restate	0.017	0.124	−0.052	0.012	−0.097	0.000	−0.078	0.001	−0.083	0.002
Glass, not SEC DOJ	0.012	0.686	−0.029	0.221	−0.060	0.030	−0.066	0.040	−0.088	0.012
SEC, DOJ	−0.012	0.129	−0.098	0.000	−0.128	0.000	−0.139	0.000	−0.142	0.000
Portfolio differences										
High–Low	−0.018	0.294	−0.062	0.002	−0.089	0.001	−0.084	0.003	−0.098	0.002
High–Glass	0.005	0.669	−0.023	0.837	−0.037	0.825	−0.012	0.880	0.005	0.544
High–SEC_DOJ	0.029	0.037	0.046	0.000	0.031	0.003	0.061	0.001	0.060	0.001

The Table presents cumulative abnormal returns over different intervals. The first set of columns represents a cumulative abnormal return for the 37 trading-day period from March 9th, 2006 through April 30th, 2006. The final set of columns represents a cumulative abnormal return for the 207 trading-day period from March 9th, 2006 through December 31st, 2006. The low and high probability (estimated restatement) portfolios are taken from the population of 3162 control firms without publicly revealed investigations into their option granting histories. Panel A categories are based on the logit model in Table 2 and Panel B categories are based on the OLS regression model in Table 2). For these control firms, we use the logit (regression) model described in Table 2 to estimate a predicted probability (restatement value) of an option grant timing investigation. The low probability portfolio includes 316 firms for which the predicted probability (estimated restatement) of an investigation is in the lowest decile, zero otherwise. The high probability portfolio includes 316 firms for which the predicted probability (estimated restatement) of an investigation is in the highest decile, zero otherwise. The Glass-Lewis, not SEC or DOJ portfolio includes 108 firms with public revelations of backdating investigations but not an SEC or DOJ inquiry/investigation. The SEC,DOJ portfolio includes 113 firms with SEC or DOJ inquiries/investigations. *P*-values summarize the test statistic for differences in CARs between the four portfolios.

The previously analyzed long-term returns incorporate individual event dates that are important to the progression of events revealing key information about the severity of the options backdating problems. We also analyze specific events related to the *Perfect Payday* series published in the *Wall Street Journal* to reinforce our earlier results. The logic is that firms with a greater likelihood of having backdating problems should be more stock price sensitive to new information about the intensity of the investigations and exhibit larger decreases when news is released. To test this possibility, we examine three significant event dates following the initial article in the WSJ's *Perfect Payday* series: April 10th, 2006 (WSJ article indicating that United Health and Affiliated Computer Services, highlighted in the first *Perfect Payday* article had both revealed that they were subject to an SEC investigation); May 2nd, 2006 (WSJ article indicating the resignation of Comverse Technology Inc's CEO and two others; also the date on which Comverse received a DOJ subpoena indicating that the DOJ would pursue criminal charges in some cases); and May 22nd, 2006 (WSJ article highlights 5 more companies with fortuitous grant timing and points out that DOJ officials had issued subpoenas to a half-dozen companies and that the SEC was investigating at least 20 companies).[8]

The results from these comparisons are presented in Table 4. Panel A compares the high versus low probability of backdating groups. On April 10th, when a WSJ article mentioned that both United Health and Affiliated Computer revealed that they were being investigated by the SEC, the high probability group lost −0.7% compared to a gain of 0.1% for the low probability group. These values significantly differ at the 5% level. Returns for both internal and external investigation groups are similar to the high probability group. As this was the first revelation of SEC inquiry into the firms highlighted in the initial *Perfect Payday* article, the vast majority of the firms in the external investigation group had not yet been revealed. Nonetheless, investors appear to have anticipated many of the firms to be investigated and also others that had suspicious option granting histories and bid their stock prices down.

Similarly, on May 2, when it was announced that top executives of Comverse Technology had resigned and the DOJ issued a subpoena which signaled possible criminal investigations, the group predicted to have a high probability of backdating lost −0.6%

[8] While using the internal investigation group and the external investigation group has a look ahead bias, our goal is to determine if the stock prices of firms not publicly identified as part of the options backdating probe, but with a high likelihood of having backdated options, had similar stock price reactions to firms publicly investigated for backdating. Investors may use similar methodologies to also identify these public targets prior to their first public announcement of their identification. Comparing our sample of firms with a high likelihood of backdating to firms that would eventually be publicly disclosed allows us to test whether investors differentiate between these two groups of firms.

Table 4
Abnormal returns around key event dates.

Panel A: High versus low probability of a backdating investigation						
	April 10th, 2006		May 2nd, 2006		May 22nd, 2006	
	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value
Low predicted probability	0.001	0.924	0.002	0.941	−0.001	0.169
High predicted probability	−0.007	0.000	−0.006	0.013	−0.009	0.001
Glass, not SEC DOJ	−0.007	0.030	−0.004	0.189	−0.005	0.116
SEC, DOJ	−0.007	0.000	−0.007	0.000	−0.006	0.010
Portfolio differences						
High–Low	−0.008	0.012	−0.008	0.023	−0.008	0.001
High–Glass	0.000	0.971	−0.002	0.902	−0.003	0.791
High–SEC_DOJ	0.001	0.195	0.001	0.048	−0.003	0.557
Panel B: High versus low estimated restatements						
	April 10th, 2006		May 2nd, 2006		May 22nd, 2006	
	CAR	*p*-value	CAR	*p*-value	CAR	*p*-value
Low restate	−0.001	0.187	0.001	0.494	−0.004	0.948
High restate	−0.005	0.017	−0.008	0.000	−0.008	0.000
Glass, not SEC DOJ	−0.007	0.030	−0.004	0.189	−0.005	0.116
SEC, DOJ	−0.007	0.000	−0.007	0.000	−0.006	0.010
Portfolio differences						
High–Low	−0.004	0.447	−0.009	0.003	−0.004	0.007
High–Glass	0.002	0.491	−0.004	0.510	−0.002	0.587
High–SEC_DOJ	0.002	0.051	−0.001	0.150	−0.002	0.761

The table presents abnormal returns for three key events in the *Perfect Payday* series. April 10th is the first public announcement of an SEC inquiry into companies covered in the original *Perfect Payday* article. May 2nd is the date of WSJ coverage of the resignation of top officers at Comverse Technology and the date of the DOJ subpoena to Comverse, indicating a criminal investigation. On May 22 the *Wall Street Journal* exposed five additional companies and revealed that several additional companies were under investigation by the SEC and DOJ. The low and high probability (estimated restatement) portfolios are taken from the population of 3162 control firms without publicly revealed investigations into their option granting histories. Panel A categories are based on the logit model in Table 2 and Panel B categories are based on the OLS regression model in Table 2. For these control firms, we use the logit (regression) model described in Table 2 to estimate a predicted probability (restatement value) of an option grant timing investigation. The low probability portfolio includes 316 firms for which the predicted probability (estimated restatement) of an investigation is in the lowest decile, zero otherwise. The high probability portfolio includes 316 firms for which the predicted probability (estimated restatement) of an investigation is in the highest decile, zero otherwise. The Glass-Lewis, not SEC or DOJ portfolio includes 108 firms with public revelations of backdating investigations but not an SEC or DOJ inquiry/investigation. The SEC, DOJ portfolio includes 113 firms with SEC or DOJ inquiries/investigations. *P*-values summarize the test statistic for differences in CARs between the four portfolios.

compared to a gain of 0.2% for the low probability group. These figures statistically differ at the 5% level. Finally, On May 22, when the WSJ highlighted five additional companies with suspicious option granting histories and revealed that several additional firms had received DOJ and SEC inquiries, the group predicted to have a high probability of backdating lost an additional −0.9%, which differs significantly from the −0.1% abnormal return for the low probability group.

As is shown in Panel B, we find similar results when using the estimated restatements. With the exception of April 10th, where the difference is of the correct sign but not statistically significant, the differences between the high and the low estimated restatement portfolio returns are significant and consistent with the conclusion that market forces discipline actions detrimental to shareholder interests, even in the absence of publicly disclosed investigations. As shown previously in Table 3, these results persist through the end of the year, December 31, 2006.

4. Conclusions

The option backdating scandal surfaced in 2006, and as of March of 2007, the number of companies with publicly revealed investigations into their grant timing histories exceeded 250. This number, however, is significantly smaller than what academic researchers such as Heron and Lie (2009), Bebchuk et al. (2006), and Bizjak et al. (2008) suggest are likely to have backdating problems. This discrepancy raises the question as to whether academic researchers have over-estimated the magnitude of the option backdating scandal, or whether many firms will simply go unpunished for a variety of reasons, despite the signature traces of option backdating that can be uncovered by investigating their option granting histories. We address this question by modeling the likelihood of a public option investigation and of financial restatement amounts as a function of firm-specific characteristics, including several measures designed to uncover backdating (if it is present) in each firm's historical option granting practices. We find that capital markets began to anticipate which firms would have backdating problems and bid their stock prices down over time, as more information regarding the practice and option grant histories became known.

When we use our logistic model of investigation likelihood and our regression model of restatement amounts for predictive purposes, we find that firms without publicly revealed investigations, but for which our models predict that option backdating is very likely, experienced very similar (poor) stock price performance as companies with publicly revealed investigations. In contrast, the

stock price performance for the portfolio of firms for which our models predicted the likelihood of backdating to be low (in the lowest decile) is significantly better. These results suggest that as the backdating scandal unfolded and it became clear that more than a handful of firms were involved, capital market participants began to scrutinize the option grant histories of all firms and penalized those firms whose option grant patterns raise the suspicion of significant agency-related costs, regardless of whether the firm was the subject of a publicly revealed investigation. Collectively, our results are consistent with the evidence in Karpoff et al. (2008a,b) and with Bernile and Jarrell (2009) who show that reputational costs (agency-related costs imposed by capital markets) are significantly larger than non-agency-related costs for firms involved with (or even suspected of in the case of our sample) financial misrepresentation and self-dealing.

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