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Options Backdating: The Statistics of Luck

Part III of A NERA Insights Series

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See Table 2 (on page 9) for an updated list of companies involved in options backdating

Forthcoming topics in this options backdating series will include:

n In-Depth Statistics

Misconceptions about Backdating and Probability

In this article, we explain why:

- some patterns of option grants that may appear extremely unlikely are actually very likely;
- the calculations presented in the March 18, 2006 *Wall Street Journal* article can be misleading; and
- factors that were disregarded in published probability calculations may be especially important when estimating the likelihood of grants for specific companies.

Allegations of Backdating

Allegations of backdating typically involve a claim of practice by which companies look back to past stock prices and record option grants on a date prior to the actual date of the grants—a date in which the stock price was low.

According to these allegations, companies were motivated by two goals. The first goal was to report granting options with a strike

Backdating:

Refers to the claim that employee stock options were granted on a date (the backdated grant date) preceding the date in which they were actually granted. A typical allegation is that:

1. The strike price is set equal to the stock price on the date of the (backdated) grant
2. The stock price on the (backdated) date is lower than the stock price on the (actual) date of the grant

Springloading:

Refers to the practice of granting options ahead of good-news and/or withholding good news until employee stock options are granted.

price equal to the stock price on the day of the grant—a goal motivated by accounting and taxation rules.¹ The second goal was to grant options to provide remuneration to the employees who receive them—one way to increase the value of the options to the employees is to grant them with a strike price lower than the stock price of the day in which the grant is issued.² In finance parlance, according to the allegation, these companies granted options that were “at the money” on paper, while, in fact, the options were “in the money.”³

What the Academics Are Saying About Stock Price Patterns around Grant Dates

Aggregate Patterns

The academic literature so far has focused on aggregate patterns across publicly traded companies, not on individual companies. The academic literature on backdating is designed to detect whether the aggregate pattern of stock price movement close to grant dates is inconsistent with an assumed benchmark, not whether an individual company has engaged in backdating. The benchmark that the academic literature has assumed, sometimes explicitly, sometimes implicitly, is that grants were made on a random day. This benchmark is analogous to saying that the grant date is determined by a process similar to that used to select the winning number in the Powerball lottery or to toss a coin. That is, the company randomly picks from trading days when selecting the day of the option grant, regardless of past prices or expectation of future prices.

Different authors have indeed investigated option grant timing and have found varying results (*see table in the appendix for details*).

Lie (2005) finds that, in the aggregate, stock prices tend to decline prior to grant dates and increase immediately after grant dates. Lie speculates that the explanation for this price pattern lies in backdating. Other authors who have investigated stock price movements around option grants find results that in part correspond to and are in part at odds with Lie’s findings. These other works propose a different explanation for their findings: insiders manipulate information releases around the grant dates, a practice sometimes referred to as spring-loading. The academic articles do not, and could not, given the methodologies that they use, find proof of backdating, spring-loading or similar practices; they find, or claim to find, aggregate price patterns that are consistent with those practices being adopted by at least some companies.

Currently Available Academic Literature on Option Timing Does Not Disentangle Legal from Illegal Practices

Current academic literature uses methodologies that are not designed to determine whether an individual company has engaged in backdating. They are designed to detect aggregate patterns, but do not directly analyze specific companies. To our knowledge, no published academic study has addressed the likelihood of grants of specific companies. As one of the academic authors explains, his analysis “*is designed to uncover evidence of retroactive timing in the aggregate, and might be useless in*

identifying exactly which firms engage in such activities” Lie (2005).

The Probability of Grants

What Is the Benchmark to Determine Whether a Grant Is Likely or Unlikely?

The assumption made by academic articles and popular press that, in the absence of backdating, a company would randomly grant options throughout the year (according to the Powerball method) is problematic. Rather than randomly granting options, companies may be more likely to grant options on days in which they perceive their stock to be undervalued. This could lead to a pattern where the price increases after grants would be better than random even in the absence of backdating. Similarly, one would expect to find a price pattern different from random in cases where a company offers employees a bonus paid in option grants if certain production deadlines are reached and announced to the public. These possibilities apply both to the study of aggregate patterns and to the study of individual companies; we return to this topic on page 6.

Some Patterns of Options Grants That May Appear Very Unlikely Are Actually Very Likely

On March 18, 2006, the *Wall Street Journal* published an article entitled “The Perfect Payday” singling out seven companies that according to the *Journal* exhibited “wildly improbable option-grant patterns.” Yet some grant patterns that may appear extremely unlikely at first sight are actually very likely and should be expected.

¹ Companies may grant options at the strike price of their choosing, regardless of the stock price.

² The increase in value is an increase only in the potential value of the option and might not ultimately translate into any increase in value at all if the option is not exercised.

³ An option is said to be at the money on a certain day if its strike price is equal to the stock price on that day; if the strike price is lower than the stock price, the option is said to be in the money.

To illustrate the tricky issues associated with identifying backdating in individual companies, we will set aside for the moment the fact that some companies may issue option grants when they perceive their own stock to be undervalued (that is, we set aside the issue of the appropriate benchmark). Rather, we adopt the assumption that companies are equally likely to grant on any trading day within a year and show that even under this (the Powerball) assumption some grants that may appear unlikely are actually very likely.

Probability theory indicates that if companies were granting options using the Powerball method, we would observe grants on days on which the stock price is at a relative low, on days on which the stock price is at a relative high, and on days on which it is in-between.

Probability theory also implies that if the companies granted options using the Powerball method for each grant, by chance, some companies would grant on a day with a relatively low strike price for most or all of their grants. This can be counterintuitive. Behavioral Economics, an increasingly influential branch of Economic science, has shown that people often erroneously expect random draws to be neither very lucky, nor very unlucky. (See sidebar, right.) Similarly, people might expect a company randomly selecting grant dates to select dates on which the price is neither too high nor too low overall. However, statistical theory states that when many companies select grant dates at random, some will select dates on which the strike price is at a very low point on many occasions.

The *Wall Street Journal* did not account for the fact that there is a large number of directors and officers (D&O) in the United States who receive grants.⁴ With such a large number of D&O, it was practically certain that some of them would receive most of their grants on days in which the stock price was particularly low, even just by chance.⁵ (See side bar, “The woman who won the lottery twice.”)

For example, take a hypothetical Ms. X who received one grant a year for 4 years and that those grants fell on the 1st, 5th, 50th, and 3rd most favorable day in their respective year. The probability of Ms. X receiving grants more favorable than what she received is only 1 in a million, when computed according to the *Wall Street Journal’s* method.⁶ Once we compute the probability of there being at least one Ms. X among all D&O receiving grants in the United States, we find that actually it was practically sure that there would be somebody like Ms. X among them—the probability of there being somebody like Ms. X is actually 99.9%.

In the Same Way in Which There Are Companies That Granted on Very Favorable Days, There Are Companies That Granted on Very Unfavorable Days

As mentioned above, probability theory implies that some companies would grant on days that are consistently good and others on days that are consistently bad, even with the Powerball method. We performed our own analysis that confirmed that to be true for US companies. We analyzed grant patterns for US companies

A common misconception about luck

A simple coin toss example illustrates a misconception about luck. Academic research has shown that, when looking at repeated coin tosses, “people regard sequence H-T-H-T-T-H to be more likely than the sequence H-H-H-T-T-T, which does not appear random, and also more likely than the sequence H-H-H-H-T-H, which does not represent the fairness of the coin.” In reality, the probability of either sequence of heads and tails being drawn at random is exactly the same.[†]

[†] Cited in Daniel Kahneman, Paul Slovic, Amos Tversky (1982) *Judgment under Uncertainty: heuristics and biases*, Cambridge University Press.

⁴ When mentioning D&O, we actually refer to all who had to file forms 3, 4, and 5 with the Securities and Exchange Commission.

⁵ Additionally, The *Wall Street Journal* explicitly stated that it pre-selected “companies that made stock-option grants that were followed by large gains in the stock price,” thereby introducing a distortion called sample selection bias.

⁶ Below we explain what is meant by “favorable day,” how the *Wall Street Journal* arrives at its numbers, and the correction that we make to its calculation. The correction alone increases the probability approximately 100 times.

The woman who won the lottery twice

A woman who won the New Jersey lottery twice in a four-month period prompted the following front-page story in the *New York Times*:[†]

“Defying odds in the realm of the preposterous—1 in 17 trillion—a woman who won \$3.9 million in the New Jersey state lottery last October has hit the jackpot again.”

Two Harvard statisticians reviewed this news story in an article published by the *Journal of the American Statistical Association* on methods for studying coincidences.^{††} They concluded that “[t]he 1 in 17 trillion number is the correct answer to a not-very-relevant question.” We agree with them. A relevant question is the likelihood that *someone* is a double winner over a given span of time; according to their article “it is better than even odds to have a double winner in seven years somewhere in the United States.”

This sort of misunderstanding is widespread in the current debate on options backdating. The *Wall Street Journal*’s calculations that purport to show the likelihood of some grant patterns are actually not very relevant.

[†] *New York Times* February 14, 1986 “Odds-Defying Jersey Woman Hits Lottery Jackpot 2d Time” by Robert D. McFadden.

^{††} Persi Diaconis and Frederick Mosteller (1989) “Methods for Studying Coincidences”, *Journal of the American Statistical Association*, Vol. 84 No. 408.

that granted options in the period 1995 through August 2002.⁷ We focused on at-the-money grants.⁸

Following the *Wall Street Journal*’s approach, we calculated the 20-day stock price return after each trading day in the year and ranked them. For a year with 252 trading days, if a grant fell on the day followed by the highest 20-day return, it would have a probability of 1 in 252 of occurring by chance. Likewise, the chance of the grant occurring on the day of the year ranked eighth or higher would be 8 in 252. For each company, we then averaged the ranks associated with each grant. Figure 1 (see next page) shows all companies and the average rank of their grants.

For example, the figure shows that there are companies with an average rank between 6 and 12. Informally, people would say that these companies have been very lucky. The figure also shows that some companies have an average rank between 240 and 246 (that is, their grants rank on average between the 6th and 12th **worst** day of the year). Informally, people would say that these companies have been very unlucky. Speculation has been rampant about companies that have been very lucky; yet nobody has been paying any attention to companies that have been very unlucky. Probability theory tells us that chance alone can produce both very lucky and very unlucky companies, and indeed we see that there are some of both types.

Consistent with some of the academic findings, Figure 1 also shows that the aggregate pattern of returns for US companies is more favorable than what granting based on the Powerball method would suggest. Specifically, there are more companies that do better than 50% (ranked about 126) than there are companies that on average do worse than 50%. This brings us back to the fact that some companies presumably issue grants when they perceived their stock to be undervalued, while some companies have admitted to engaging in backdating. Thus our finding, very much like the academic literature, does not disentangle legal from illegal practices.

The Calculations Presented in the March 18, 2006 *Wall Street Journal* Articles Can Be Misleading

We also performed our own analysis of the probability that D&O could have received grants more favorable than the ones they actually received to compare it with the *Wall Street Journal*’s analysis.⁹

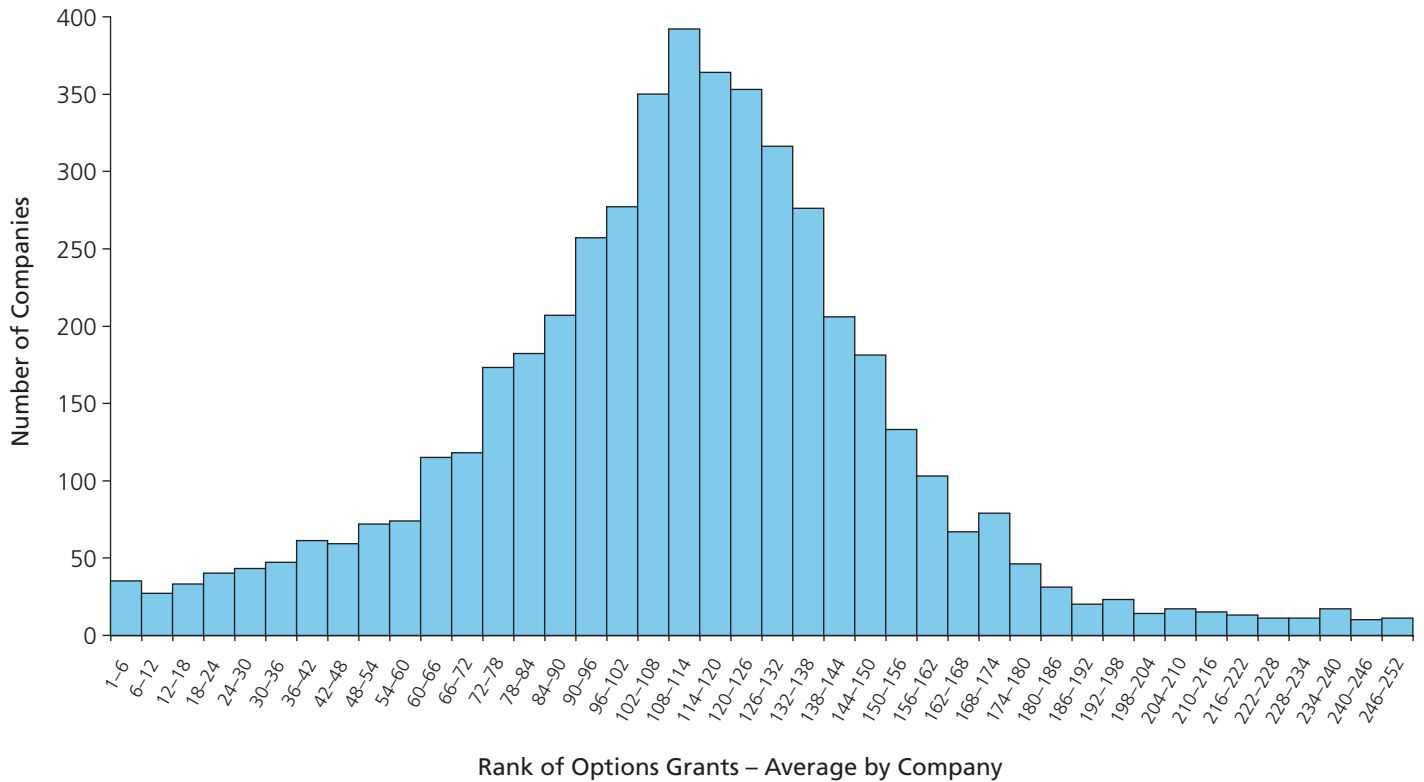
Let’s consider the case of a person who received two grants: one ranking 1 out of 252 and one ranking 8 out of 252; what is the probability of receiving grants that are more favorable than that? It is our understanding that the *Wall Street Journal*’s methodology underestimates (sometimes severely) the probability of receiving grants more favorable than the ones actually received and it can therefore be misleading. *The Wall Street Journal* considers a pattern of grants to be more favorable than the

⁷ In August 2002 the passage of Sarbanes-Oxley drastically reduced the time period in which grants must be reported to the SEC.

⁸ Like the academic studies, we analyzed those grants that we could match to stock prices.

⁹ We followed the *Wall Street Journal* approach for all but an important correction. We made only this correction, not because we think that that is the only correction to be made, but because making only one correction allows us to highlight a very important point. We come back to other methodological considerations on page 6.

Figure 1. Average Rank of Option Grants by Company, Rank Based on 20-Day Stock Price Return (January 1995–August 2002)



Note: Stock price increases are ranked within each year and within each company. A rank of 1 indicates the largest price increase in the year for each company. A rank of 252 indicates the largest price decline of the year for each company. Years that have a number of trading days different from 252 have been rescaled to 252.

actual grants received, if each single alternative grant is more favorable than each single grant actually received, i.e. if each single grant falls on a day of the year ranked either the same or higher than each single actual grant.¹⁰ If everybody in the United States received multiple grants at random (with the Powerball method), the *Wall Street Journal's* calculations would result on average in people having less than 50% probability of having received their grants at random; i.e., *Wall Street Journal* underestimates that probability. For example, if everybody were to receive 10 grants using the Powerball method, the average probability of receiving grants that

are better than the ones actually received, computed using the *Journal's* method, is 9%—quite far from the 50% that we would expect on average for random grants.

The underestimation happens because the *Wall Street Journal's* methodology is inconsistent in its ranking of grant patterns. As an example, compare the following two hypothetical D&O insiders:

- Mr. A received 3 grants (1 per year) ranked respectively 1, 2 and 3 out of 252
- Ms. B also received 3 grants (1 per year), each of them ranked 2 out of 252

When computing the probability of receiving grants that are more favorable than the ones that Mr. A received, Ms. B's grants are counted by the *Journal* as less favorable (because Ms. B's first grant was not as favorable as Mr. A's), but when computing the probability of receiving grants that are more favorable than the ones that Ms. B received, Mr. A's grants are counted by the *Journal* as less favorable (because Mr. A's third grant was not as favorable as Ms. B's). So, according to the *Journal*, Mr. A is at once both better off and worse off than Ms. B.

¹⁰ The *Wall Street Journal* allows for the order of the grants to be different.

We corrected just this feature of the *Wall Street Journal's* method so that if everybody were to receive grants using the Powerball method, the average probability of receiving grants that are more favorable than the ones actually received is 50%.¹¹ The next figure compares the probabilities of the grants computed according to the *Wall Street Journal* method (in gray) and those computed after we correct their method (in blue) for all D&O in the United States.

As we can see, the *Wall Street Journal's* method significantly understates the probability of grants for D&O. Less formally, it

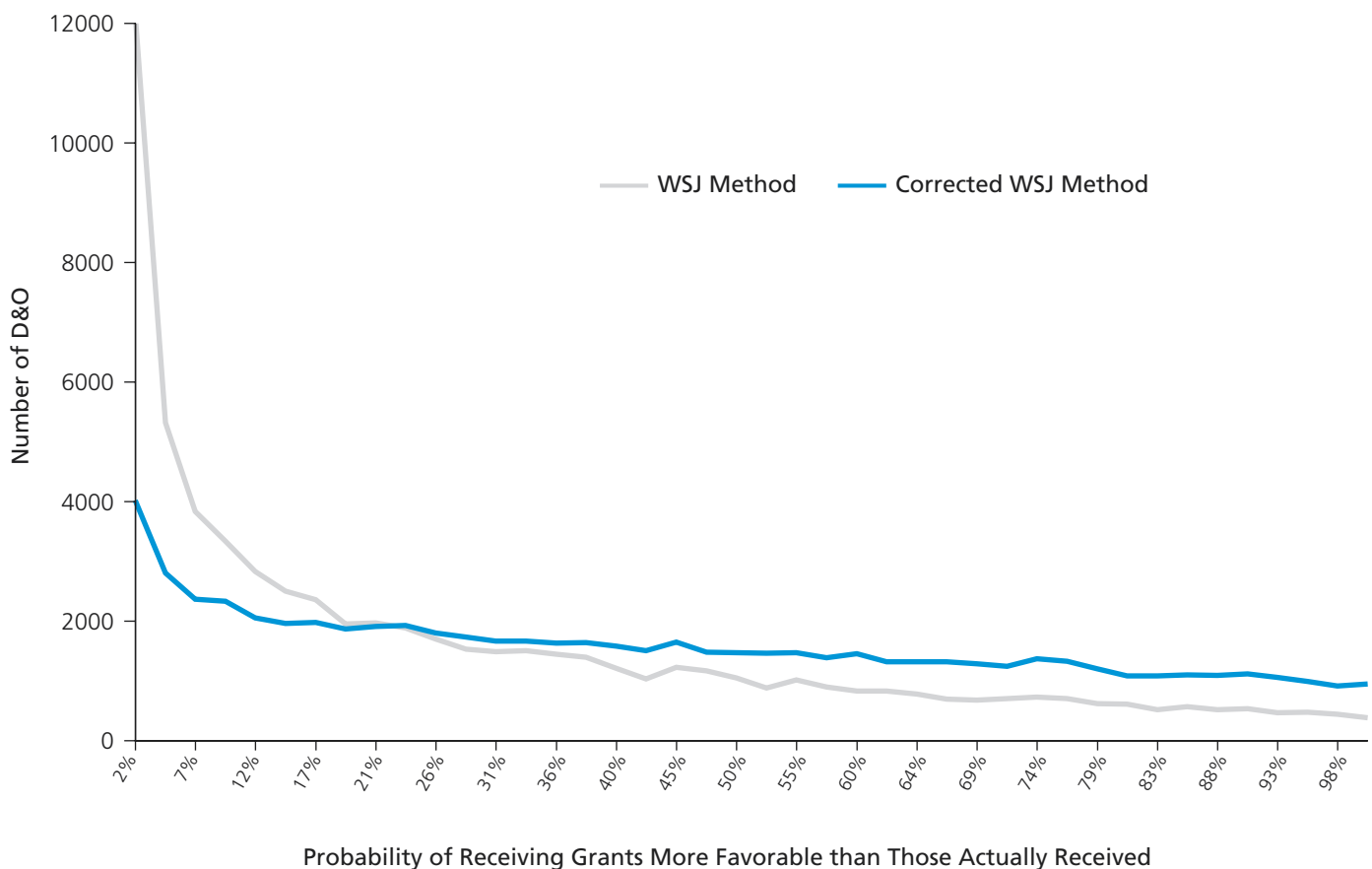
significantly *overstates* the number of D&O that have been very lucky. For example, Figure 2 shows that, according to the *Wall Street Journal's* method, the number of D&O who had a 2% probability of receiving grants more favorable than those actually received is three times as large as the number of D&O obtained using the corrected method. Also, according to the *Wall Street Journal's* method the median D&O had a probability of 18% of receiving grants more favorable than the one that he or she actually received, while the same probability is 38% according to the corrected method.

Factors That Were Disregarded In Published Probability Calculations and That May Be Important When Estimating the Likelihood of Grants for Specific Companies

What Probability to Estimate?

In the previous section, we adopted the same methodology as the *Wall Street Journal* and we corrected it only in one aspect. Yet, there are many other aspects that need attention. These aspects may affect the analysis of aggregated price patterns and they may radically change probability calculations for specific companies. Without attempting to be

Figure 2. The Wall Street Journal's Method of Computing the Probability of Receiving Grants More Favorable than Those Actually Received Can Be Misleading (January 1995–August 2002)



¹¹ For each D&O, we averaged the ranks associated with each grant. That is, if a D&O received a grant on a day ranked No. 8 out of 252 and another grant on a day ranked No. 6 out of 252, we associated to the D&O an average of 7 out of 252. We then computed the probability of receiving grants that are better than that.

comprehensive, we turn to some of those here.

One consideration is the length of the window on which to compute returns. The literature has used various measures; for example, the *Wall Street Journal* uses the 20-day window following the grant, a measure it refers to as “arbitrary.”

Another consideration is whether one should use the actual return for a given day or its rank to assess the likelihood of the grant pattern. These two methods may yield different results; which one is more appropriate may depend on the details of the decision making process within each company.

A further consideration is whether the number of options issued in each grant should be taken into account. For instance, an executive may have been very lucky on an occasion where only a modest number of shares were issued and unlucky on an occasion where a large number of shares were issued. Considering the number of options granted may yield different results.

On What Alternative Dates Could the Grant Have Been Issued?

When assessing the probability of a particular grant, the grant date is compared to other days. The *Wall Street Journal*, for instance, compares grant dates against all other trading dates in a year in which the grant was issued. This, however, may overstate the number of “available comparison” dates. Even before Sarbanes-Oxley, a very large number of grants were reported to the Securities and Exchange Commission in form 4, which required that a grant be reported, not within one year, but within 10 days after the end of the month of the grant. Therefore the type of form that the insider filed as well as the relationship between the date of filing and the reported grant date may inform which days are the suitable comparators to actual grant date.

Scheduled Grants

Scheduled grants cannot be backdated. Some academic authors have taken this specifically into account and noted that grants that are always filed on the same date can hardly be prone to backdating. One needs to consider that scheduled grants may not necessarily always fall on the same calendar day; for instance a scheduled grant may always fall on the first Monday of the fiscal quarter.

To our knowledge, nobody has so far taken into account that grants may be scheduled even if they fall on different dates every year. This can happen when grants are linked to corporate events, such as earning announcements or certain corporate governance meetings. These scheduled grants too, like the fixed-date scheduled grants, can be difficult or impossible to backdate.

Grants for Events That Are Good News for the Company

Another potential factor that, to the best of our knowledge, has not been taken into consideration is that grants may be issued to employees for the accomplishment of corporate milestones that the market interprets as good news.

For example, grants could be made for the appointment of a new CEO, the promotion of an officer, the licensing of a patent, reaching a production goal, or a business deal. In all these examples, the stock price may rise after the grant because of the market assessment of the event, rather than of the grant. Since options are often parts of compensation packages, grants on occasions of new D&O appointments are likely.

Investors May Buy After the News of the Grant Reaches the Market

If, in fact, companies are more likely to issue grants when they perceive their stock to be undervalued, investors may take the news of a grant as a signal to purchase the stock,

thereby causing the price increase. Therefore, a high return following a grant may be a result of an increase in demand for the stock of the issuing company by investors. Thus, it may be appropriate to disentangle the price movement after a grant from the price movement after the news of a grant is on the market.

What's Next?

A lot of misconceptions have been circulating about options backdating and in particular about the statistical calculations that have been used in connection with it. On the one hand, the academic literature studying aggregate price pattern following option grants is comparatively recent and no methodology to disentangle illicit practices from legitimate ones has consolidated yet. On the other hand, we have discussed and presented corrections for some conceptual errors regarding the probability calculations concerning specific companies or specific insiders. Each new case may present some specific characteristic that challenge economists to rethink their method to arrive to the correct conclusion.

Appendix

Table 1. Academic Literature on the Alleged Manipulation of Employee Stock Option Grants

	Data Source	Type of Grants	Practice Investigated
Yermack, David. <i>Good Timing: CEO Stock Option Awards and Company News Announcements</i> . The Journal of Finance, Vol. LII., No. 2 June 1997	Annual proxy statements from Fortune 500 companies	Unscheduled, scheduled, and unclassified	Springloading
Aboody, David & Kasznik, Ron. <i>CEO Stock Option Awards and the Timing of Corporate Voluntary Disclosures</i> . Journal of Accounting and Economics, 29 (2000) pp. 73–100	ExecuComp and annual proxy statements	Scheduled	Springloading
Chauvin, Keith W. & Shenoy, Catherine. <i>Stock Price Decreases Prior to Executive Stock Option Grants</i> . Journal of Corporate Finance, Vol. 7 (2001) pp. 53–76	Forms 4 and 5; CEOs obtained from Forbes compensation survey	Unscheduled	Springloading
Narayanan, M.P and Seyhun, H. Nejat. <i>Do Managers Influence Their Pay? Evidence From Stock Price Reversals Around Executive Option Grants</i> . (Mimeo, version dated January 2005)	Filings by insiders to meet under Section 16(a) requirements	Unscheduled, scheduled, and unclassified	Backdating, springloading and bullet-dodging
Lie, Erik. <i>On the Timing of CEO Stock Option Awards</i> . Management Science, Vol. 51, No. 5, May 2005, pp. 802–812	Standard & Poor's ExecuComp database	Unscheduled, scheduled, and unclassified	Backdating
Lie, Erik & Heron, Randall A. <i>What Fraction of Stock Option Grants to Top Executives Have Been Backdated or Manipulated?</i> (Mimeo, version dated July 14, 2006)	Thomson Financial Insider Filing database	Unscheduled, scheduled, and unclassified	Backdating
Bebchuk, Lucian, Grinstein, Yaniv and Peyer, Urs. <i>Lucky CEOs</i> . (Mimeo, version dated November 16, 2006)	Thomson Financial Insider Filing database	Unscheduled	Backdating and springloading
Bebchuk, Lucian, Grinstein, Yaniv and Peyer, Urs. <i>Lucky Directors</i> . (Mimeo, version dated December 2006)	Thomson Financial insider trading database	Unscheduled, scheduled, and unclassified	Backdating and springloading
Narayanan, M.P., Schipani, Cindy A., & Seyhun, H. Nejat. <i>The Economic Impact of Backdating of Executive Stock Options</i> . Forthcoming in the Michigan Law Review (Vol 105, Issue 8, June 2007)	SEC filings and from Thompson Financial Insider Filing database. Firms from <i>Wall Street Journal</i> options scorecard	Unscheduled, scheduled, and unclassified	Backdating
Lie, Erik & Heron, Randall A. <i>Does Backdating Explain the Stock Price Pattern Around Executive Stock Option Grants?</i> Forthcoming in the Journal of Financial Economics	Thomson Financial Insider Filing database	Unscheduled	Backdating and springloading

Table 2. Companies Involved in Options Backdating: Disclosures and Lawsuits¹

1.	Able Energy	NA			X			
2.	Actel	\$ 7.84		X	X	X	X	X
3.	Active Power	NA				X	X	X
4.	Activision	66.45		X	X	X	X	
5.	Adobe Systems	56.51				X	X	
6.	Affiliated Computer Services	46.84		X	X	X	X	X
7.	Affymetrix	NA		X		X	X	
8.	Agile Software	NA		X		X	X	
9.	Alkermes	NA		X	X	X	X	
10.	Altera	86.62		X	X	X	X	X
11.	American Technology	NA				X	X	
12.	American Tower	NA	X	X	X	X	X	
13.	Amkor Technology	NA	X	X	X	X	X	
14.	Analog Devices	99.96		X	X			
15.	Apollo Group	41.36	X	X	X	X	X	X
16.	Apple	48.45	X	X	X	X	X	X
17.	Applied Micro Circuits	114.52		X	X	X	X	
18.	Applied Signal Technology	NA				X	X	
19.	Arbinet	NA				X	X	
20.	ArthroCare	11.24			X		X	
21.	Aspen Technology	11.76	X	X		X	X	
22.	Asyst Technologies	NA		X	X	X	X	
23.	Atmel	8.55		X	X	X	X	
24.	Autodesk	33.40		X	X	X	X	
25.	Barnes & Noble	73.32		X	X		X	
26.	BEA Systems	NA					X	
27.	Bed, Bath & Beyond	88.74		X	X	X	X	
28.	Biomet	3.27		X				
29.	Black Box	35.07		X	X			
30.	Blue Coat Systems	NA		X	X	X	X	
31.	Boston Communications Group	5.91			X	X	X	X
32.	Broadcom	170.26	X		X	X	X	X
33.	Brocade Communications Systems	119.78	X	X	X	X	X	X
34.	Brooks Automation	3.83	X	X	X	X	X	X
35.	CA	340.65		X		X	X	
36.	Cablevision	NA		X	X	X	X	
37.	Cardinal Health	87.05		X				
38.	Caremark Rx.	68.98		X	X			
39.	CEC Entertainment	16.61			X	X	X	
40.	Ceradyne	0.37		X	X	X	X	
41.	Children's Place	4.32					X	
42.	Chordiant Software	NA		X	X		X	
43.	Cirrus Logic	4.04		X	X		X	
44.	Cisco Systems	677.83		X				
45.	Citrix	67.33					X	
46.	Clorox	60.54		X		X	X	
47.	CNET Networks	NA		X	X	X	X	X
48.	Coherent Inc.	8.06			X		X	
49.	Computer Sciences	46.97		X	X		X	
50.	Converse Technology	208.80	X	X	X	X	X	X
51.	Corinthian Colleges	16.10		X	X		X	
52.	Costco	51.82				X	X	
53.	Crown Castle International	NA		X	X		X	
54.	Cyberonics	12.16		X	X	X	X	X
55.	Dean Foods	19.88		X	X			

Table 2 (continued)

Company	Value of In-The-Money Options ²	Lawsuits		Disclosures			
		Class Action ³	Derivative ⁴	SEC or DOJ Investigation ⁵	Restatement or Charges ⁶	Internal Investigation ⁷	Executive Departure ⁸
56. Delta Petroleum	NA		X	X		X	
57. Digital River	NA		X	X	X	X	
58. Ditech Networks	\$ 0.86		X			X	
59. Dot Hill Systems	NA					X	
60. Electronic Arts	94.00		X	X		X	
61. Electronics for Imaging	NA		X	X	X	X	
62. Embarcadero Technologies	NA				X	X	X
63. Emcore	NA		X		X	X	
64. Endocare	NA			X		X	
65. Engineered Support Systems ⁹	NA			X			
66. EPIX Pharmaceuticals	NA					X	
67. EPlus	NA				X	X	
68. Equinix	NA		X	X ¹⁰		X	
69. Exar	20.42					X	
70. Extreme Networks	51.08			X		X	
71. F5 Networks	1.13		X	X	X	X	
72. Family Dollar	14.51		X	X		X	
73. Finisar	NA				X	X	
74. First American	7.53		X		X	X	
75. Forrester Research	NA					X	X
76. Fossil	3.65		X		X	X	
77. Foundry Networks	NA		X	X	X	X	
78. GAP	444.47					X	
79. Getty Images	NA			X		X	
80. GlenAyre	NA		X			X	
81. Hansen Natural	0.76	X	X	X			
82. HealthSouth	136.09						
83. HCC Insurance Holdings	11.00			X	X	X	X
84. Home Depot	44.79		X	X	X	X	
85. Hot Topic	11.82		X				
86. Hovnanian Enterprises	NA		X				
87. i2 Technologies	NA				X	X	
88. iBasis	NA			X	X	X	X
89. Insight Enterprises	12.73		X	X		X	
90. Integrated Silicon Solution	NA		X		X	X	
91. Intuit	52.48			X ¹⁰		X	
92. J2 Global	NA				X	X	
93. Jabil Circuit	56.19	X	X	X		X	
94. Juniper Networks	154.87	X	X	X	X	X	
95. Jupitermedia	NA		X			X	
96. KB Home	32.48		X	X		X	X
97. Keithley	14.14		X	X		X	
98. King Pharmaceuticals	6.43				X	X	
99. KLA-Tencor	86.29	X	X	X	X	X	X
100. Knobias	NA				X		
101. Kopin	22.85		X			X	
102. KOS Pharmaceuticals	NA			X	X	X	
103. K-V Pharmaceutical Company	NA		X			X	
104. L-3 Communications Holdings	113.63		X			X	
105. Linear Technology	107.35		X	X			
106. Macrovision	13.63			X		X	
107. Management Network Group	NA				X	X	
108. Marvell Technology Group	NA	X	X	X	X	X	
109. Mattel	35.07		X		X	X	
110. Maxim Integrated Products	184.75		X	X		X	

Table 2 (continued)

Company	Value of In-The-Money Options ²	Lawsuits		Disclosures			
		Class Action ³	Derivative ⁴	SEC or DOJ Investigation ⁵	Restatement or Charges ⁶	Internal Investigation ⁷	Executive Departure ⁸
111. McAfee Inc.	\$ 88.48		X	X	X	X	X
112. Meade Instruments	3.34	X	X	X		X	
113. Medarex	NA		X	X	X	X	X
114. Mercury Interactive	95.12	X	X	X	X	X	X
115. Michaels Stores	21.35	X	X	X		X	
116. Microslet	NA				X	X	
117. Microsoft	334.92						
118. Microtune	NA		X		X	X	
119. Mips Technologies	20.08		X	X	X	X	
120. Moldflow	NA				X	X	
121. Molex	14.15			X		X	
122. Monster Worldwide	79.77		X	X	X	X	X
123. msystems ¹¹	NA		X	X	X	X	
124. Nabi	NA					X	
125. Nabors	230.06			X		X	
126. Nephros	NA				X	X	
127. Network Appliance	233.21		X			X	
128. Newport Resources	NA		X		X	X	X
129. Novell	13.62		X			X	
130. Novellus Systems	48.61		X			X	
131. Nvidia	104.67		X		X	X	
132. Nyfix	11.82		X	X	X		
133. O.I. Corporation	NA					X	X
134. Openwave Systems	35.36		X	X	X	X	
135. Parametric	11.58					X	
136. Par Pharmaceutical	6.00		X				
137. Pediatrix	30.49			X	X	X	X
138. Peet's Coffee	0.82		X		X	X	
139. Pixar ¹²	NA			X		X	
140. PMC Sierra	136.97		X	X	X	X	
141. Pool Corp	9.25					X	
142. Power Integrations	11.63		X	X	X	X	X
143. Progress Software	22.59		X	X	X	X	
144. Quest Software	NA	X	X	X	X	X	X
145. QuickLogic	NA		X	X		X	
146. Rambus	56.86	X	X		X	X	X
147. Redback Networks	37.32			X	X	X	
148. Renal Care ¹³	28.36			X			
149. Research in Motion	NA			X	X	X	
150. Restoration Hardware	NA				X	X	
151. RSA Security	34.53		X	X			
152. SafeNet	NA	X	X	X	X	X	X
153. Sanmina-SCI	122.18		X	X	X	X	X
154. Sapient	23.57				X	X	X
155. SBA Communications	NA				X	X	
156. ScanSource	NA		X			X	
157. Selectica	NA					X	
158. Semtech	58.04		X	X	X	X	
159. Sepracor	124.06		X	X	X	X	
160. Sharper Image	NA				X	X	
161. Shaw Group	9.73				X	X	
162. Sigma Designs	NA		X	X		X	
163. Silicon Image	NA			X		X	
164. Silicon Storage Technology	NA		X				
165. Sonus Networks	NA				X	X	

Table 2 (continued)

Company	Value of In-The-Money Options ²	Lawsuits		Disclosures			
		Class Action ³	Derivative ⁴	SEC or DOJ Investigation ⁵	Restatement or Charges ⁶	Internal Investigation ⁷	Executive Departure ⁸
166. Stolt-Nielsen	NA			X	X		
167. SPSS	\$ 16.00				X	X	
168. SteelCloud	NA					X	X
169. Sunrise Senior Living	8.97	X		X	X	X	
170. Sunrise Telecom	NA			X	X	X	
171. Sun-Times Media	NA				X	X	
172. Sycamore Networks	NA		X	X	X	X	
173. Sysview Technology	NA						
174. Take-Two Interactive Software	6.43		X	X	X	X	
175. TETRA Technologies	3.18		X		X	X	
176. The Cheesecake Factory	15.31		X	X	X	X	
177. Third Wave	NA				X	X	
178. THQ	21.30		X	X		X	
179. Transaction Systems	1.89				X	X	
180. Trident MicroSystems	2.93		X	X	X	X	X
181. Tyco	124.79				X	X	
182. Tyson Foods	2.31		X				
183. Ulticom	NA		X	X	X	X	
184. UnitedHealth	369.83	X	X	X	X	X	X
185. Valeant Pharmaceuticals	45.09		X	X	X	X	
186. Verint	NA			X		X	
187. VeriSign	NA		X	X		X	
188. ViaSat	4.33				X	X	
189. Vitesse Semiconductor	97.94	X	X	X	X	X	X
190. Waste Connections, Inc.	10.48		X				
191. Western Digital	6.40		X			X	
192. Westwood One	45.54		X				
193. Wet Seal	7.68				X	X	
194. Wind River	20.82					X	
195. Witness Systems	NA	X	X	X	X	X	X
196. Xilinx	195.04		X	X ¹⁰	X	X	
197. Zarlink	NA				X	X	
198. Zoran	NA	X	X	X		X	

Notes and Sources:

- 1 The universe of companies is defined as those identified by the Wall Street Journal's Options Scorecard, Reuters Factbox and news searches as of 2/10/07.
- 2 In millions of dollars. Defined as the average value of fiscal year-end in-the-money exercisable and unexercisable options from 1997 through 2002. Data are from S&P's ExecuComp Database. NA means the data is not available in the database.
- 3 Data are from class action complaint documents as of 2/8/07.
- 4 Data are from news searches and SEC filings as of 2/10/07.
- 5 Defined as a formal or informal request for information or investigation from the SEC, or a subpoena from the US Attorney's Office.
- 6 Defined as a company announcement of an actual restatement or charge, or the possibility of a restatement or charge.
- 7 Defined as a company announcement of an internal investigation relating to the accounting for or grant of stock options.
- 8 Defined as the resignation or termination of an executive officer or director due to an investigation into the backdating of stock options.
- 9 Acquired on 01/31/06 by DRS Technologies, Inc.
- 10 Indicates that the SEC or DOJ investigation has been concluded with no punitive action.
- 11 Acquired on 11/19/06 by SanDisk Corp.
- 12 Acquired on 05/05/06 by Walt Disney Co.
- 13 Acquired on 03/31/06 by Fresenius Medical Care AG & Co.

Although the data found in the above table have been produced and processed from sources believed to be reliable, no warranty, expressed or implied, is made regarding accuracy, adequacy, completeness, legality, reliability, or usefulness of any information.

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