Option Backdating and Board Interlocks

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We examine the role of board connections in explaining how the controversial practice of backdating employee stock options spread to a large number of firms across a wide range of industries. The increase in the likelihood that a firm begins to backdate stock options that can be explained by having a board member who is interlocked to a previously identified backdating firm is approximately one-third of the unconditional probability of backdating in our sample. Our analysis provides new insight into how boards function and the role that they play in providing managerial oversight and determining corporate strategy. (*JEL* G30, G32, G38, J33)

There is now considerable evidence suggesting that a large number of firms in the United States have engaged in the practice of backdating stock option grants awarded to their executives. The practice of backdating involves the board of directors "looking back" in time to select favorable dates to grant stock option awards (e.g., when the stock price was at its lowest). By looking back in this manner, firms can make it appear that the option award was granted at an earlier date and at a lower exercise price compared to the actual date the award was approved. Heron and Lie (2006) estimate that 18.9% of unscheduled at-the-money option grants to top executives during the 1996–2005 period exhibit evidence of backdating or manipulation, with the majority occurring before the implementation of the Sarbanes-Oxley Act (SOX) in August of 2002.[1] At the firm level, they suggest that nearly 30% of firms manipulated option

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[1] While backdating stock options is not likely to continue as part of compensation practices, the practice of "backdating" is not unique to stock option grants and has been conducted in various other contexts. For example, firms can and have backdated sales or accounts receivables to previous months or quarters to improve their accounting performance for those periods. Backdating in this manner, however, violates standard accounting practices. Numerous other types of contracts can be manipulated to the benefit of one party or the other by backdating. These include lease agreements and life insurance policies, among others.

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grants at some point during this period. Other studies, such as Narayanan and Seyhun (2008); Bebchuk, Grinstein, and Peyer (2007a); and Collins, Gong, and Li (2007), provide additional evidence that large numbers of firms appear to have engaged in this controversial practice. Accordingly, option backdating has come to be seen as one of the largest corporate scandals of recent times.[2]

While the above facts suggest that by 2002 option backdating had become widespread, little is known about how this practice began and how it proliferated across firms. In our sample, about 10% of firms reporting an option grant in 1996 demonstrate evidence of backdating. By 2002, over 30% of firms in our sample exhibit evidence of backdating one or more option grants at some point over the time period. Besides having increased in frequency over time, this practice appears to be prevalent in a broad range of industries.

The purpose of this article is to provide evidence regarding the propagation of the practice of backdating. Given that the practice was not publicly disclosed, it is unlikely that it originated independently in each firm.[3] We focus on the role that director interlocks played in contributing to the spread of backdating. The board of directors has primary authority over the level and structure of executive compensation, including determination of the amount and timing of option grants. Consequently, board interlocks and board connections represent a potentially important channel through which knowledge regarding the practice of backdating could have been shared across firms.

Consistent with this view, we find strong evidence that board interlocks are related to the spread of backdating. According to our findings, a firm is more likely *to begin* backdating option grants if the firm has a director who is a board member of another firm that previously backdated its stock options. Our results are both statistically and economically significant. The increase in the likelihood that a firm begins to backdate stock options that can be explained by having a board member who is interlocked to a previously identified backdating firm is approximately one-third of the unconditional probability of backdating in our sample. We also find that a firm is more likely to begin to backdate option awards if directors concurrently receive a stock option grant. This latter result is consistent with the findings of Bebchuk, Grinstein, and Peyer (2007b), who document that directors have also been the recipients of backdated (or otherwise manipulated) option awards, and provides additional support for our

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[2] See also the "Options Scorecard" compiled by the *Wall Street Journal* at http://www.wsj.com, which contains an updated list of the companies that have come under formal scrutiny in connection with option backdating. As of September 2007, over 160 companies are on the list.

[3] The first public mention that firms might be engaging in backdating options does not occur until 2004. Prior to 2004, there was work on the timing of stock options (see Yermack 1997 and Aboody and Kasznik 2000); the first academic paper that mentions backdating is Lie (2005). While published in 2005, Lie (2005) was a working paper in 2004. In a Lexis-Nexis search looking for the terms backdating and stock options both mentioned in any document, the first mention of the practice occurs in a news story in 2001 in the *Buffalo News* where an employee of National Fuel Gas accused upper level management of backdating options. The next news story that is relevant to backdating stock options does not occur until 2005. The SEC announced that it was looking into option timing in a press article in 2004 but the article did not mention backdating.

conclusion that directors were an important conduit contributing to the spread of this practice.

In addition, we identify several other firm and governance characteristics that are associated with the adoption of option backdating. Firms with higher stock-price volatility are more likely to start to backdate options, which is consistent with the fact that higher stock-price variation provides more opportunities to backdate options. A firm is also more likely to begin to backdate, the greater the stock and option holdings of the CEO and when the CEO is younger. Finally, we find that commonalities in firms' auditors and geographic location also help to explain the initiation of backdating. The fact that commonality in auditor choice and geographic location is associated with the initiation of backdating suggests that other linkages between firms beyond those created through board interlocks may also play a role in facilitating the spread of this practice. In contrast to some of the findings in Bebchuk, Grinstein, and Peyer (2007a) and Collins, Gong, and Li (2007), we find little evidence that other measures of the quality of corporate governance, such as institutional ownership, board size, board independence, and whether the CEO is also the chair of the board, are systematically related to the incidence of backdating.

Our article makes several contributions both to the backdating literature and to research on boards of directors. First, we provide evidence that helps to understand how this controversial practice spread across firms, which is of interest to practitioners, academics, and regulators. As far as we know, ours is the first paper to study this issue. Second, similar to Bebchuk, Grinstein, and Peyer (2007a) and Collins, Gong, and Li (2007), we provide evidence regarding firm and governance characteristics associated with backdating. Finally, our analysis adds to the broader literature on corporate governance and in particular to one important aspect of board structure—board interlocks. Much of the existing research on board interlocks examines the relationship between CEO pay and board interlocks (e.g., Hallock 1997; Core, Holthausen, and Larcker 1999; Fich and White 2003; Barnea and Guedj 2006; Larcker et al. 2006). While we also provide some insight into how board connectivity contributes to agency problems and increases in CEO pay, our focus is different. We are more interested in documenting how board connections affect the spread of corporate policy, both across time and across firms.[4] Examining the structure of board interlocks and how they affect the adoption of corporate practices provides insight into our understanding of how boards function and the role they play in corporate governance. Analysis of how stock option backdating spread through board connectivity provides a unique background to study these broader issues.

The remainder of this article is organized as follows. Section 1 describes the practice of backdating options and motivates our analysis. Section 2 describes

[4] Hochberg, Ljungqvist, and Lu (2006) examine the role that networks play in the venture capital industry, and Kuhnen (2007) examines the effects of social networks on the performance in the mutual fund industry.

our data and measures of board connectedness and discusses methodological issues of how to identify whether an option grant was backdated. Section 3 presents our empirical results and discusses our findings. Section 4 presents some robustness tests and discusses other issues associated with our analysis. Section 5 concludes with a brief summary.

1. Prior Research and Motivation for This Study

1.1 Backdating of option grants

The majority of incentive-based pay that goes to senior level managers comes in the form of employee stock options (ESOs).[5] For the most part, ESOs vary little in their features. The contractual life of the vast majority of options granted to employees is between five and ten years (with ten years the most common). Nearly all ESOs are granted at-the-money, where the exercise price of the option is set at the market price on the date of the grant. A primary reason why the majority of option grants are at-the-money involves the accounting treatment of these securities. Prior to 2005, firms expensed the intrinsic value of their options. Since options that are granted at-the-money have an intrinsic value of zero, firms that granted at-the-money options did not have to record an expense for these options. Option grants with an intrinsic value greater than zero would have had to be expensed on the income statement. Additionally, Section 162(m) of the Internal Revenue Code, which was adopted in 1993, requires firms to pay taxes on compensation in excess of $1 million that is not performance based. Firms that granted in-the-money options could have been required to pay taxes on the intrinsic value of these grants if their executives already received non-performance-based pay in excess of $1 million.

Since any price appreciation following a grant increases the value of the options, executives have incentives to try to affect the timing of option grants in order to receive an award either following poor stock-price performance (to lower the exercise price) or prior to good stock-price performance (to gain on the price increase following the grant). Yermack (1997) and Aboody and Kasznik (2000) examine stock-price performance surrounding the granting of stock options, and find evidence that, on average, stock options are awarded prior to increases in stock price. They suggest that managers manipulate the timing of their stock option grants to take advantage of good news following the grant. In contrast, Chauvin and Shenoy (2001) find some evidence of stock-price decreases prior to stock option grants and suggest that managers release bad news just prior to a grant in order to lower the strike price of the grant.

More recently, Lie (2005); Heron and Lie (2006); and Narayanan and Seyhun (2008) reexamined the stock-price performance surrounding stock option grants in the mid- to late 1990s and found, for a significant number of option grants, a pattern of poor stock-price performance prior to the grant followed by a

[5] Murphy (1999) provides a review of compensation practices in U.S. firms.

reversal in stock-price performance after the grant. Given the large number of companies that exhibit this share price reversal, all three papers argue that the evidence suggests that a large number of firms set the grant date retroactively in order to lower the strike price of the options. For example, an article in the WSJ estimated that the odds that the stock-price reversal surrounding six option grants to an executive of Affiliated Computer Services Inc. was completely random to be about one in three hundred billion—the inference being that the ACS executive was extremely unlikely to have received his option grants on randomly chosen days.[6]

It is not illegal to grant in-the-money options. Neither is it illegal *per se* to set the grant date retroactively.[7] If stock option awards are backdated, however, the practice must be revealed in proxy statements and any intrinsic value must be expensed. Failure to report the practice of backdating raises reporting and tax issues. The SEC seems to agree with the conclusion that firms have backdated stock options without reporting the practice, and has filed enforcement complaints at a large and growing number of companies. As of September 2007, the SEC was investigating stock option granting practices in 160 companies. In addition, both the IRS and the Justice Department are looking into stock option backdating. At this point, a number of companies have acknowledged the practice and provided relief to shareholders and implemented changes in their internal governance practices.[8]

One interesting aspect of option backdating is that almost no public information existed about this practice prior to 2004. Prior academic work, such as Yermack (1997); Aboody and Kasznik (2000); and Chauvin and Shenoy (2001), focuses on the issue of the timing of option grants relative to corporate news events. None of these studies mentions backdating as an explanation for their findings. Furthermore, the SEC announced an investigation into option timing in 2004, but did not mention the issue of backdating.[9] The first mention of option backdating that we could find is in an article in the *Buffalo News* in 2001. The article is about a former employee of Natural Fuel Gas who accused the CEO and other executives of backdating stock options. The next mention of backdating we could find is Lie (2005). A version of his paper was circulating in draft form as early as 2004. Several studies, along with ours, however, demonstrate evidence of backdating by a significant number of companies prior to 2001.

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[6] See "The Perfect Payday; Some CEOs Reap Millions by Landing Stock Options When They Are Most Valuable; Luck—or Something Else," Forelle and Bandler, *Wall Street Journal*, March 18, 2006, p. A1.

[7] A number of companies have argued that the reason they backdated stock options was to reduce volatility in the value of option grants across new hires. Significant swings in the price of the stock during the year can create disparity in the value of the grants to employees depending on the date they were hired. For further discussion of this issue, see "Gilded Paychecks: Dating Games," Dash, *The New York Times*, June 19, 2006.

[8] Barnes & Noble, Mercury Interactive, Sepracor, and Family Dollar Stores are some examples. Gregory Reyes, the former head of Brocade Communications Systems, was found guilty on criminal charges related to backdating.

[9] See "Open Secrets: SEC Probes Options Grants as Company News Boosts Stock," Solomon, *Wall Street Journal*, March 30, 2004.

1.2 Board connectivity

The primary purpose of our article is to document how the practice of backdating ESOs diffused across firms through time. One potentially important mechanism that could facilitate the flow of information about backdating is the overlap of corporate directors. We hypothesize that the communication that takes place through board connections is one important mechanism that facilitated the spread of the practice of backdating stock options.

The board of directors plays a key role in managerial oversight and provides advice and guidance on corporate strategy. Because of the important role the board plays in key business decisions, board members themselves are often executives of other firms or have significant business, legal, or political experience. In addition, partly because of the limited pool of qualified candidates, it is not uncommon for a board member to sit on the board of more than one firm. For example, for our sample of firms, which we discuss in more detail below, around 80% of all firms are connected to at least one other firm through a board interlock with the average director sitting on 1.22 boards. Board connections between firms can be beneficial if they facilitate the efficient transfer of information or knowledge, or if they facilitate learning about desirable corporate policies and practices. Alternatively, board interlocks and close relations between firms through director ties potentially reduce the independence of board members and can exacerbate agency problems. Because of the concern about the role that interlocks play in affecting board independence, information providers such as Institutional Shareholders Services (ISS), the Corporate Library, and Governance Metrics all provide information on board interlocks as part of their services that analyze corporate governance structure.

Motivated by the idea that board interlocks might play an important role in information transfer across firms, several studies examine how board interlocks influence corporate strategy and corporate practice. Haunschild (1993) examines how board connections influence acquisition activity. She finds that corporate acquisition activity is emulated across firms when they have interlocked board members. These results are supported by Haunschild and Beckman (1998), who find evidence that certain corporate practices are mimicked when firms share directors. Gulati and Westphal (1999) find that firms are more likely to form strategic alliances, such as a joint venture, when the firms share outside directors, and Davis (1991) and Davis and Greve (1997) find that the adoption of poison pills and golden parachutes are related to board interlocks.[10] This research supports the notion that social networks, such as board interlocks, play an important role in facilitating the exchange of information between firms and in determining the types of practices adopted across firms and industries.

[10] Fich and Shivdasani (2007) find that a firm is more likely to face a financial lawsuit if they have a board member who sits on the board of another firm that has previously been sued for fraud, which suggests that director interlocks are related to firm practices.

It is useful to compare our analysis with the paper that is probably the closet to ours, Davis (1991). He examines whether board interlocks contribute to the spread of poison pills across S&P 500 firms between 1984 and 1989. In contrast to the practice of backdating, which was not publicly disclosed, information on pill adoption is in the public domain. Most firms either provide a press release announcing they have adopted a poison pill or release the information in a proxy statement or annual report. Since information about the adoption of poison pills is publicly available, this makes it harder to distinguish whether the use of poison pills spread because of board connections or through other channels that happen to be correlated with board interlocks. Since backdating was not a well-known practice outside the companies that adopted it, we do not face the same problem. In fact, the lack of general knowledge about the practice of backdating provides a unique and interesting setting to examine the role board connectivity plays in the transfer of information and the adoption of corporate practices.

Nevertheless, it remains possible that the practice of backdating option awards could have spread through other social mechanisms. For example, board members of different firms may travel in similar social networks, belong to the same country clubs, and interact with other board members in various professional and social environments. In addition, many firms share the same auditors or employ the same legal firms or compensation consultants, which could have shared the knowledge of this practice with other firms. In short, the practice of backdating might have spread through mechanisms other than board interlocks. We attempt to analyze and control for a number of these additional factors in our empirical analysis.

2. Data, Methodological Issue, and Measuring Board Connections

2.1 Identifying backdated option awards

We begin by collecting all stock option grants from the Thomson Financial Insider Filing database. The Thomson data contain information on option grants that are recorded on SEC Forms 3, 4, and 5. Among other things, the Thomson data provide information on the reported grant date of the options. We limit our analysis to the time period from January 1996 to August 2002. We begin with 1996 because it is the first year Thomson began collecting data on option grants and we end our sample period in August 2002, since Heron and Lie (2007) find that the incidence of backdating drops dramatically after the implementation of new insider reporting guidelines associated with the passage of SOX in August of 2002.

We apply several filters to the Thomson data to form our sample. The initial universe of stock and option grants consists of 4,189,765 unique grant observations, which is narrowed to 112,981 unique firm-grant-day observations by eliminating nonoption transactions, observations with Thomson relationship

codes from levels 3 and 4 (lower level executives, etc.), and duplicate grant days within the same firm. We require observations to have stock-return data in CRSP for the forty-one-day period beginning twenty trading days prior to and ending twenty trading days following the reported grant date. Prior studies suggest that the majority of the abnormal returns around option grants appear during this time window. We also require that firms have a market capitalization of at least $25 million, and have nonmissing data for total assets from Compustat, and director data from the Compact Disclosure database (we discuss the disclosure data in more detail below). After imposing these restrictions, our final sample comprises 62,364 firm-grant-day observations, representing 25,610 firm-year observations from 5716 unique firms.

If stock option grant dates are chosen randomly, then there will not be any unusual performance pattern in the stock price surrounding the grant date. Alternatively, if the board of directors looks backward in time from the board meeting date and chooses low points in the firm's stock-price history to award option grants, then option awards that have been backdated in this manner will exhibit a stock-price reversal around the reported grant date. Consistent with backdating, Lie (2005); Heron and Lie (2007); and Narayanan and Seyhun (2008) find that, on average, stock option grants are preceded by a fall in the stock price, with a subsequent increase in the stock price following the reported grant date. Looking at a set of option grants to executives covered by the Execucomp database and focusing on grants prior to August 29, 2002 (the effective date of SOX), Heron and Lie (2007) find an average cumulative abnormal stock return (CAR) of −5.6% for the thirty-day period prior to option grants followed by a 3.6% CAR for the thirty-day period following the grants. Using a broader sample of option grants between 1992 and 2002, Narayanan and Seyhun (2008) find an average CAR of −1.5% for the twenty-day period before and a 4.98% average CAR for the twenty-day period after grants.

For our analysis, we need to identify individual grant dates that are likely to have been manipulated, and to do so we employ the following statistical approach. First, we randomly select 500,000 trading days from our final sample of firm years and assign these as hypothetical option grant dates. We calculate the cumulative raw stock returns over the twenty trading-day periods prior to and following the randomly selected grant dates. To measure reversals around the hypothetical grant dates, we compute the difference between the postgrant and pregrant twenty-day cumulative returns. Next, we sort firms into quartiles based on the monthly standard deviation of stock returns calculated over the two-year period preceding the hypothetical grant date. Separating firms into groups based on the volatility of returns controls for the fact that firms with higher stock-price volatility will exhibit more frequent and larger reversals on average, even in the absence of backdating. For the sample of random grant dates in each volatility quartile, we identify the magnitude of the post- to pregrant return difference that corresponds to a prespecified confidence level (e.g., 95% or 99%).

Finally, to identify whether an actual option grant date is likely to have been backdated, we compute the difference in the postgrant and pregrant twenty-day cumulative stock returns around the actual reported grant date and compare this value with the cutoff level corresponding to the desired confidence level based on randomly assigned grant dates. If the magnitude of the return difference around the actual grant date exceeds the cutoff level, the grant is classified as having been backdated. At the firm level, we classify a firm as having backdated options in a given year if we classify any of the option grant dates by that firm in that year as having been backdated.

A few other features of our methodology are also worth noting. First, we use raw returns and not abnormal returns to identify backdated grants. We use raw returns because the benefit of backdating an option grant is independent of whether the stock-price movement is firm specific or is driven by the market. We also conduct the same exercise as described above using market-adjusted CARs to identify backdated grants with no material effect on any of the results presented below. Second, we only examine unscheduled grants when classifying the grant as having been backdated. Similar to other studies, we focus on unscheduled awards because it is much more likely that these are the awards that are manipulated. A grant is identified as scheduled if a grant is issued on the same date, plus or minus one day, in the preceding year and is classified as unscheduled otherwise.

Panel A in Table 1 presents the cutoff levels for returns around the grant date that correspond to a given confidence level within each of the volatility quartiles. In general, the magnitude of the forty-one-day cumulative returns (-20 to $+20$) that are necessary to identify a grant as having been backdated are large and increase significantly with return volatility. For example, to identify backdated grants at the 95% confidence level, cumulative returns around the grant date must be larger than 17.94% for firms with low volatility and must exceed 58.34% for firms with high volatility. At the 99% confidence level, the corresponding return cutoffs are 27.96% and 101.23% for low and high volatility firms, respectively.

Figure 1 plots average stock returns around the grant dates for both backdated and nonbackdated grants in our sample identified based on a 95% confidence level. On average, backdated grants are preceded by a 25% decrease in the stock price over the twenty-day period preceding the grant date followed by a stock-price increase of 30% following the grant. Recipients of these backdated option grants clearly obtain significant benefits from receiving these awards at low stock prices. In contrast, nonbackdated grants show no signs of systematic changes in performance around the grant dates.

Panel B of Table 1 reports the total number of firms in the sample each year and the number of firms identified as backdaters using different confidence levels to identify backdated grants. Across years, the number of firms in the sample remains relatively constant ranging between a high of 3949 firms in

Table 1
Summary statistics for defining backdating firms

	Confidence level for defining backdating		
	95%	97.5%	99%
Panel A: Return cutoff levels for defining backdaters			
Monthly standard deviation of returns	Post- to pre-grant cumulative stock return cutoff level		
Less than or equal to 8.95%	17.94%	22.56%	27.96%
8.95% $<$ STD $\leq$ 13.26%	26.19%	35.33%	41.06%
13.26% $<$ STD $\leq$ 19.98%	36.74%	45.61%	59.33%
Greater than 19.98%	58.34%	74.45%	101.23%

Panel B: Number of backdating firms by sample year				
Year	Total number of firms	Number of firms identified as backdaters		
1996	3,500	374	203	89
1997	3,890	435	248	97
1998	3,949	610	412	193
1999	3,770	484	287	112
2000	3,723	797	531	236
2001	3,434	634	445	198
2002	3,344	307	187	73
Total firm years	25,610	3,641	2,313	998

Summary statistics for defining backdating firms and for the frequency of backdating by year using various return cutoffs. Panel A reports the required level of return reversals for a firm to be identified as a backdater in each volatility quartile. Volatility is measured as the monthly standard deviation of stock returns calculated over the two-year period preceding the grant date. Return levels are reported for the 95, 97.5, and 99% confidence levels. Confidence levels are derived from 500,000 randomly selected trading days that are assigned as hypothetical option grant dates. Panel B reports the number of firms in our sample each year and the number of firms identified as backdaters using different confidence levels. Firms are classified as backdaters using cumulative raw returns over the forty-one-day period beginning twenty days prior to through twenty days following the option grant date. To be a backdater, the cumulative stock returns around the grant date must be larger than the cutoff for a given confidence level and volatility quartile.

1998 and 3344 firms in 2002. The number of firms identified as backdaters fluctuates much more from year to year. The number of firms identified as backdating option grants is highest in 1998, 2000, and 2001, and is lowest in 1996 and 2002.[11] Of the 25,610 firm years in our sample, approximately 14% are classified as backdaters based on a 95% confidence level. In other words, nearly three times as many firm years are classified as backdating option grants than would be expected if options were granted on randomly chosen dates. Similarly, based on a 97.5% confidence level, 9.0% of firm years are classified as backdaters, and 4.0% of firm years exhibit evidence of backdating based on a 99% confidence level.

By way of comparison, Collins, Gong, and Li (2007) classify an option grant as being backdated if the stock price on the grant date is in the lowest decile of the firm's stock-price distribution over a 240-day window surrounding the grant date. Based on this methodology, they classify 12% of

[11] The reason for the low number of backdated grants in 2002 is because we end our sample in August of that year, which corresponds with the implementation of SOX.

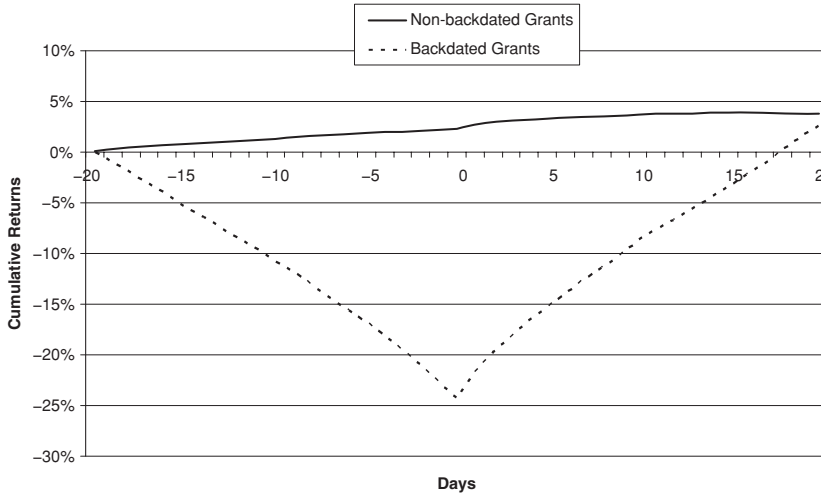

Figure 1
Cumulative returns around stock option grants
Average cumulative stock returns for the twenty-day period prior to and twenty-day period following reported option grant dates. Returns are classified for grants that are identified as backdated and grants that do not exhibit any evidence of being backdated based on the methodology described in Section 2.1.

all firm years in their sample as having backdated option grants. Bebchuk, Grinstein, and Peyer (2007a) examine grants that occur at the lowest stock price during the grant month as a method for identifying grants that are likely to have been manipulated. In their sample, approximately 20% of grants were made at one of the lowest three prices during the month, and 9% of grants were issued at the lowest price. The majority of our empirical analysis is based on backdated grants identified using the 95% confidence level, but we assess the robustness of our results using other confidence levels and the methodologies employed in other studies for identifying backdated grants as well.

2.2 Board of directors sample and measuring interlocks

Data on directors and boards come from the Compact Disclosure (CD) database for the years 1996 through 2002. CD provides the names of the board members for each firm in their database. We use that information to establish the existence of board interlocks. Firms are excluded if they have less than three board members and a market capitalization less than $25 million. The advantage of the CD database is that we have the names of board members for over seven thousand firms. The broad coverage of the database allows us to accurately trace interlocks across essentially the universe of publicly traded firms, resulting in a powerful test of how board interlocks might have contributed to the spread of backdating over time. Firms are identified as having an interlock if they share

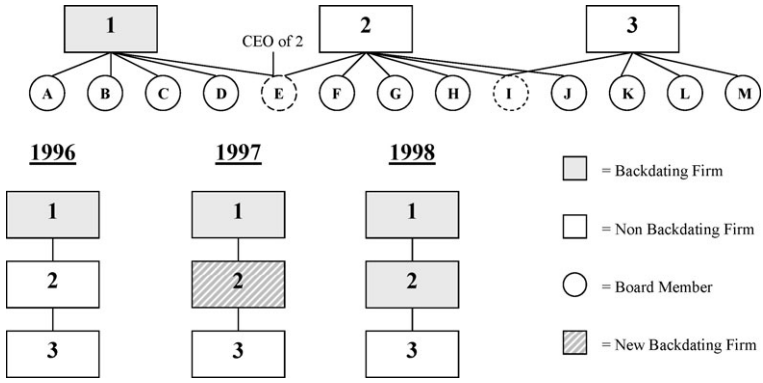

Figure 2
Interlocked boards
Example of board interlocks and the spread of backdating of stock option awards through time. Firms are represented by numbered rectangular boxes and board members by lettered circles. Gray shading represents a firm that has been identified as a backdater. Lines connect board members to various firms. Interlocks are characterized by connected board members to firms. The first part of the figure illustrates how overlapping board members create interlocks. The second part of the figure illustrates the progression of backdating through time with respect to three interlocked firms.

a common board member. We use two primary measures of board interlocks. The first is an indicator set equal to 1 if two firms in the sample share a common board member in that year, and the second is a count of the number of common board members between each possible pair of firms.

Figure 2 presents an example and description of how board interlocks are characterized and linked to backdating firms and how we create our interlock variable(s). In this example, we begin with three firms—Firms 1, 2, and 3. Firms 1 and 2 are interlocked through board member E and Firms 2 and 3 are interlocked through board member I. For our tests, we are interested in whether Firm 2, which shares a board member with Firm 1, begins to backdate provided that Firm 1 was already backdating options. In this illustration, Firm 1 is identified as backdating option awards in 1996 but Firm 2 is not. Because 1996 is the first year of our sample, no firms in that year are identified as new backdaters, and since Firm 1 was backdating in 1996, it would never be identified as a new backdater in our sample period. In 1997, however, Firm 2 begins backdating option awards and is classified as a new backdater.[12] We set an indicator variable equal to 1 for Firm 2 in 1997, indicating a link to a backdater, because it shares a board member with Firm 1 in 1997 and Firm 1 is identified as previously backdating option grants. In addition, we also compute an indicator variable for general interlocks that measures whether the firm has board links to any other firms, including backdaters. This variable is

[12] In order to be eligible for consideration as a new backdater, Firm 2 would have also had to award options in 1996 but not have backdated in that year.

used to control for interlocks in general. Finally, in 1998, Firms 1 and 2 both have backdated option awards, which makes them ineligible to become new backdaters in our analysis. In this example, Firm 3 never backdates its options, even though it is linked to a previously identified backdater in 1998.

We also gather additional data from the CD database, such as board size, CEO and board holdings of stock and options, whether the CEO is chair of the board, institutional ownership, CEO age, and information on board independence. These variables are often missing in the CD database and so the number of observations changes depending on the model specification. We discuss these variables in more detail below.

2.3 Summary statistics on interlocks and backdating

Table 2 provides summary evidence on the frequency of backdating across different industries based on the thirty industry classifications defined by Fama and French (1997). In one-third (10) of the industries in our sample, 14% or more of firm years are identified as having backdated option grants. Consistent with the anecdotal evidence in the popular press, backdating is concentrated in technology-based industries, such as Business Services, Business Equipment, and Pharmaceuticals. More intriguing, however, is the fact that there is evidence that backdating is observed to some extent in all industries. The widespread nature of the practice across industries is consistent with the notion that board connections play a role in propagating the practice of backdating because board members do not generally sit on the boards of industry competitors. For example, in our sample only 15% of all board connections arise from interlocks within the same industry, and there is no difference in the frequency of intraindustry board interlocks between firms identified as backdaters and nonbackdaters.

To provide some initial evidence on the relationship between board interlocks and option backdating, panel A in Table 3 provides descriptive statistics on firms that are identified as having backdated stock option grants and their board characteristics. Columns 2 and 3 of the table report the total number of firms identified as backdating options in each sample year (N) and the number of firms identified as initiating backdating in a given year (New BD). Because our sample starts in 1996, the first year a firm can be identified as a new backdater is in 1997. A firm is identified as beginning to backdate option grants in a given year if (i) the firm had option grants in any previous year(s) but none of those previous grants exhibited evidence of backdating and (ii) option grants in the current year meet the criteria for backdating described in Section 2.1. In 1996, we identify 374 firms as having backdated stock option grants in that year and by construction, no firms are identified as new backdaters. In 1997, we classify 435 firms as backdaters, of which 339 are new backdaters. We observe the largest number of firms initiating backdating in the years 1998 and 2000. Panel B of Table 3 presents data on the number of firms in each year that granted options but do not, according to our definition,

Table 2
Summary statistics for the frequency of backdating across industries

Industry	*N*	BD	BD%	Links%	Avg. links	BD links%	Avg. BD links
Personal and Business Services	3,227	769	24	81	2.32	18	1.09
Business Equipment	2,969	655	22	80	2.37	15	1.09
Healthcare, Med. Equip., Pharma.	2,465	402	16	84	2.56	13	1.07
Automobiles and Trucks	357	58	16	85	3.36	17	1.24
Retail	1,338	213	16	81	2.83	17	1.27
Communication	785	124	16	79	3.13	17	1.10
Apparel	319	49	15	73	2.21	9	0.87
Everything else	565	81	14	78	2.71	18	1.03
Wholesale	811	114	14	80	2.80	20	1.07
Electrical Equipment	330	45	14	84	2.58	18	1.13
Consumer Goods	404	53	13	80	3.13	16	1.44
Fabricated Products/ Machinery	869	109	13	87	3.33	19	1.34
Construction	702	83	12	85	2.94	15	1.01
Recreation	498	58	12	70	2.06	16	0.93
Restaurants, Hotels, Motels	403	45	11	80	2.47	15	1.03
Transportation	553	57	10	77	2.99	19	1.17
Aircraft, Ships, and Railroad	156	16	10	88	4.67	16	1.54
Printing and Publishing	307	31	10	91	3.72	18	1.63
Textiles	142	14	10	82	2.34	23	0.87
Petroleum and Natural Gas	829	81	10	79	2.75	13	0.88
Food Products	444	43	10	86	3.59	21	1.50
Chemicals	414	36	9	94	4.29	19	1.64
Beer and Liquor	60	5	8	98	5.20	32	2.67
Banking, Ins., and Real Estate	4,874	394	8	58	1.97	9	0.68
Business Supplies	424	32	8	91	4.00	21	1.56
Steel Works, etc.	392	26	7	86	3.16	19	1.22
Coal	18	1	6	89	3.44	44	1.88
Utilities	778	39	5	89	3.60	25	1.17
Precious Metals and Mining	146	7	5	81	3.42	20	0.82
Tobacco Products	31	1	3	87	4.19	19	1.78
Total	25,610	3,641	14	77	2.64	16	1.06

Summary statistics for the frequency of backdating across industries. Industry classifications follow the Fama-French (1997) thirty industry classifications. BD is the number of firms in each industry that are identified as backdaters following our definition based on a 95% confidence level. BD% is the percentage of firm years in each industry identified as backdaters. Links% is the percentage of firm years with board links to other firms. BD links% is the percentage of firm years with board links to a firm previously identified as a backdater.

exhibit any evidence of backdating option grants. The data reported clearly show that the practice of backdating appears to spread rapidly across firms over time.

Table 3 also reports statistics on board size and board interlocks for the two subsamples of firms. Firms identified as backdaters have about the same average board size compared to nonbackdating firms. A slightly higher fraction of the backdating firms have directors who are linked to other firms in the sample and the average number of director links is slightly higher in the backdating sample. The final three columns in the table report measures of the frequency and number of director links to firms previously identified as backdaters. Consistent with director interlocks playing a role in the spread of option backdating, firms identified as beginning to backdate option grants in a given year have both a

Table 3
Summary statistics comparing board characteristics of backdating and nonbackdating firms

Year	*N*	New BD	Board size	Boards Per director	Links%	Avg. links	BD links%	Avg. BD links	BD links via CEO%
				Panel A: Backdating firms					
1996	374		7.15	1.50	75	2.29			
1997	435	339	7.76	1.56	79	2.66	29	0.41	10
1998	610	421	8.71	1.60	82	2.99	47	0.90	20
1999	484	272	8.30	1.62	84	3.03	61	1.31	28
2000	797	457	8.28	1.61	85	2.95	63	1.41	28
2001	634	269	8.13	1.53	81	2.64	65	1.55	29
2002	307	110	8.39	1.53	82	2.76	68	1.67	31
Total	3,641	1,868							
				Panel B: Nonbackdating firms					
1996	3,126		7.68	1.48	69	2.26			
1997	3,455	3,136	8.38	1.55	78	2.66	28	0.41	9
1998	3,339	2,782	9.37	1.54	79	2.85	42	0.75	17
1999	3,286	2,433	8.88	1.55	77	2.75	51	1.08	23
2000	2,926	2,048	8.83	1.50	76	2.56	52	1.09	22
2001	2,800	1,698	8.79	1.43	73	2.28	53	1.18	22
2002	3,037	1,557	9.01	1.45	74	2.41	58	1.36	25
Total	21,969	13,654							

Summary statistics comparing board characteristics of backdating and nonbackdating firms. The table reports the average values of board size, the number of boards each director sits on, the percentage and number of board links that firms have to other firms in the sample, the percentage and number of board links to previously identified backdating firms, and the percentage and number of board links to previously identified backdating firms through the CEO. Panel A presents the number of firms identified as backdating options (identified in the second column, *N*) and the number of new firms initiating backdating options each year (identified in the third column, New BD). In order to be identified as a new backdater, a firm must have given an option grant in a prior year that did not exhibit evidence of backdating and then give a grant in the current year that meets our definition of backdating. Panel B presents the statistics for firms that are in the sample in a given year, but are not identified as backdaters.

higher fraction and larger number of director links to firms previously identified as backdaters. For example, as displayed in panel A, 63% of firms identified as backdaters are linked through board interlocks to another firm that backdates in 2000 compared to 53% of nonbackdating firms. Similarly, backdating firms have 1.43 director links on average to other backdating firms in the year 2000, compared to 1.10 director links to backdating firms for nonbackdaters. Finally, Table 3 also reports the fraction of firms with links to backdaters through the CEO. Again considering the year 2000, 28% of the backdating firms share an interlock with another backdating firm through the CEO, whereas 22% of nonbackdating firms share a link through the CEO to other backdating firms.

3. Empirical Results

We begin our analysis in this section with a more formal and detailed examination of the spread of backdating. We first examine which firm and governance characteristics are systematically associated with the initiation of backdating option grants. We then provide several robustness tests to confirm our findings and discuss several other issues that are relevant to our analysis.

3.1 The spread of backdating over time through board connections

Multiperiod logit regressions are used to identify factors that contribute to the spread of backdating over time.[13] The dependent variable is equal to 1 for firm-year observations in which the firm is initially identified as having backdated option grants (what we refer to as a new backdater). In years subsequent to the initial identification as a backdater, the firm is removed from the sample. The dependent variable is equal to zero for all firm-year observations prior to the year the firm is identified as a new backdater and for all firm-year observations of firms that are never identified as backdaters during our sample period. This definition of the dependent variable corresponds to a count of the number of firms that begin to backdate options in a given year relative to the population of firms that have not been identified as backdaters up to that point in time. For example, with reference to Table 3, in 1997 we identify 339 firms as new backdaters and 3136 firms as nonbackdaters. The dependent variable in our regressions is equal to 1 for the first group and 0 for the second group. This classification scheme is carried forward through the remainder of the sample period.

Independent variables in our multivariate analysis include a variable we call total board links, which takes on a value of 1 if the firm has any board links to any other firm(s) in our sample (not just backdating firms) and 0 otherwise. To measure whether board links to previously identified backdating firms are important in explaining the likelihood of a firm beginning to backdate its stock options over and above the effect of board links in general, we include a variable that takes on a value of 1 if the board link is to a firm that has backdated options in a prior year and 0 otherwise. For some specifications, we use a continuous variable that is the natural logarithm of 1 plus the total number of board links between firms and the natural logarithm of 1 plus the total number of board links to backdating firms. Keep in mind that the variable measuring board links to backdating firms requires that the firm is linked to another firm that has been identified as a backdater in a prior sample year.

To further capture any additional effects that board members have on the spread of backdating, we create an indicator variable that equals 1 when directors also receive an option grant in that year. If board members play a role in deciding whether a firm backdates option grants, we would expect that the firm will be more likely to adopt this practice if the directors are also receiving a stock option grant in that year.

We include stock-return volatility in our regressions, measured as the standard deviation of monthly returns in the fiscal year of the grant. Although we control for volatility in our classification of backdating, we might still expect volatility to be positively associated with the likelihood of backdating because firms are more likely to be able to take advantage of backdating options when the stock price is more variable. In addition to volatility, we include firm size

[13] Shumway (2001) demonstrates the equivalence between multiperiod logit models and hazard models.

measured as the natural logarithm of prior year total assets. We do not have any strong priors about the relationship between firm size and the decision to backdate stock options, but include it as a control variable.

We also estimate some specifications that include additional governance characteristics that might be associated with the practice of backdating. These include board size, CEO age, the percentage of CEO holdings of stock and options, the percentage of board holdings of stock and options, the percentage of institutional ownership, an indicator equal to 1 if the CEO is also the chair of the board, and the proportion of board members who are officers or employees of the firm.[14] We use board size to control for the fact that firms with larger boards are more likely to have board links to other firms. Fahlenbrach (2004) finds that firms with younger CEOs receive more equity-based compensation, suggesting a negative correlation between age and the likelihood that a firm backdates option grants. Alternatively, CEO age may proxy for longer tenured and more entrenched CEOs, suggesting a positive relationship between CEO age and backdating.[15] We include CEO ownership of stock and options since executives with higher stock and option holdings may be more entrenched and have more control over the board. Additionally, greater option holdings provide more incentives to backdate option grants to increase their value. We include board holdings of stock and options for the same reason.[16] We include institutional ownership because other studies have found that higher institutional ownership is associated with a higher degree of monitoring. If institutions serve as monitors, then firms with higher institutional ownership are less likely to adopt this practice. We include the fraction of board members who are executives of the firm as a measure of insider board membership. To the extent that boards with more insiders are subject to greater agency conflicts, we expect a positive correlation between the fraction of executive directors and the decision to begin to backdate option grants. Note that a number of these additional variables are missing for some firm-year observations and their inclusion significantly reduces the sample size in some specifications.

Finally, we include indicator variables for auditors in all of the specifications, since there may be certain audit firms that were more likely to allow this practice (Heron and Lie 2006). We also include indicator variables for each state where firms have their corporate headquarters. The state indicators are included to control for the fact that backdating could spread through social

[14] The CD database describes board members in terms of whether they are employees or officers of the company. The CD database does not provide any more detail about the characteristics of each of the board members, which is information often provided in the firm's proxy statement. The classification we use from the CD database, however, is also used in other studies, including Borokovich, Parrino, and Trapani (1996); Agrawal and Knoeber (2001); Kroszner and Strahan (2001); Lehn, Patro, and Zhao (2004); and Linck, Netter, and Yang (2007).

[15] The CD database contains many missing observations for CEO tenure, which precludes us from including this variable directly in our analysis.

[16] The CD database reports insider holdings as reported in the proxy statement. Many firms include option holdings in these reported ownership numbers. For these firms, the CD database does not distinguish between stock and option holdings.

networks or other commonalities between firms that are related to geography rather than board connections. Moreover, outside legal counsel tends to cluster by state of incorporation. To the extent that some outside legal counsels might advocate the practice of backdating, this will control for that effect. Finally, we also include year and industry indicator variables in each regression. We include industry indicators to help control for industry characteristics that are associated with the adoption of this practice. For example, it has been suggested that some compensation consultants might have perpetuated this practice. To the extent that compensation consultants cluster by industry, the industry controls will account for this possibility. All of the variables are defined in the Appendix.

The results of the regressions are reported in Table 4. The table reports coefficient estimates as well as marginal effects (reported in square brackets), defined as the implied change in the estimated probability that a firm begins backdating stock option grants corresponding to a change from 0 to 1 in a dichotomous independent variable or a one standard deviation change in a continuous variable with all other variables in the regression held constant at their sample mean values. In all of the analyses, the *p*-values, which are reported in parentheses, are based on robust standard errors clustered by firm.

The results reported in Table 4 indicate that there is a positive association between the likelihood that a firm begins backdating option grants and having a board member who sits on the board of another firm that is already identified as backdating option grants. The results suggest that board interlocks play a significant role in explaining the spread of the practice of backdating. In all of the model specifications, the coefficient estimates on the independent variable measuring links to firms previously identified as backdaters are both statistically (p-values < 0.01) and economically significant. Based on the coefficient estimate in model 1, the marginal effect indicates that having a board link to a firm that has previously backdated option grants increases the likelihood of a firm beginning to backdate option grants by 3.5%. To put this number in perspective, the unconditional probability of becoming a backdater in any particular year in our sample is 11.9%. Consequently, the effect of having a board interlock to a previously identified backdating firm is nearly one-third of the unconditional probability that a firm will begin to initiate the practice of backdating stock options. Similar results are obtained using the continuous measures of board interlocks found in models 2 and 4. The greater the number of board links to other backdating firms, the more likely a firm is to initiate this practice.

We also find that a firm is more likely to begin to backdate options if the board members receive an option grant that year. The coefficient estimates on the indicator variable for director option grants are positive and significant (p-value < 0.01), and the marginal effects are large. This result is also consistent with the findings of Bebchuk, Grinstein, and Peyer (2007b), who find that directors were also large beneficiaries of backdated option grants, and suggests

Table 4
Multiperiod logit models

	Model			
	1	2	3	4
Intercept	−4.901	−4.885	−2.959	−2.908
	(0.000)	(0.000)	(0.000)	(0.000)
Director variables				
Total board links (1/0)	0.154		0.194	
	[0.013]		[0.018]	
	(0.048)		(0.150)	
Links to backdaters (1/0)	**0.359**		**0.432**	
	[0.035]		**[0.048]**	
	(0.000)		**(0.008)**	
Ln(Summed board links)		0.100		0.014
		[0.009]		[0.001]
		(0.078)		(0.880)
Ln(Summed links to backdaters)		**0.256**		**0.214**
		[0.039]		**[0.035]**
		(0.005)		**(0.002)**
Directors receive grants (1/0)	0.848	0.665	0.829	0.575
	[0.074]	[0.058]	[0.077]	[0.055]
	(0.000)	(0.000)	(0.000)	(0.000)
Firm variables				
Log of total assets	0.035	0.026	0.031	0.017
	[0.003]	[0.002]	[0.003]	[0.002]
	(0.049)	(0.200)	(0.340)	(0.630)
Std. dev. of return	1.910	1.921	0.567	0.583
	[0.141]	[0.143]	[0.056]	[0.058]
	(0.000)	(0.000)	(0.250)	(0.240)
Governance variables				
Board size			−0.003	−0.010
			[0.000]	[−0.001]
			(0.870)	(0.610)
CEO is chair of board			0.089	0.083
			[0.009]	[0.008]
			(0.320)	(0.360)
CEO age			−0.027	−0.027
			[−0.003]	[−0.003]
			(0.000)	(0.000)
CEO stock and option holdings%			0.974	0.934
			[0.097]	[0.093]
			(0.025)	(0.030)
Institutional ownership%			0.096	0.129
			[0.010]	[0.013]
			(0.590)	(0.470)
Board stock and option holdings%			0.055	0.013
			[0.005]	[0.001]
			(0.960)	(0.990)
Percentage of executive directors on the board			0.432	0.408
			[0.043]	[0.041]
			(0.120)	(0.150)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Auditor dummies	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes
Observations	15,522	15,522	6,059	6,059
Chi-square	742	740	281	280
Probability of chi-square	0.000	0.000	0.000	0.000
Pseudo *R*-square	0.076	0.075	0.071	0.069

Dependent variable is equal to 1 if the firm is identified as a new backdater and is equal to 0 otherwise. Multiperiod logit models identifying the director, firm, and governance characteristics associated with the incidence of option backdating. The data cover the time period 1996–2002. The dependent variable is equal to 1 in the year that a firm is identified as backdating option grants for the first time and is equal to 0 otherwise. After a firm is identified as a new backdater, it is dropped from the sample in subsequent years. Independent variables capture whether the firm has interlocking directors and other firm and governance characteristics. Further description of the variables is provided in the Appendix. Marginal effects are reported in square brackets. *p*-values, which are reported in parentheses, are based on robust standard errors clustered by firm.

that firms are more likely to begin backdating option grants when directors also benefit from the practice.

Several other factors also affect whether a firm will begin to backdate option grants. The likelihood that a firm begins to backdate is positively correlated with stock-price volatility and CEO holdings of stock and options and inversely related to CEO age. We also find some evidence that general board links and firm size are associated with the probability of initiating backdating, although these measures are not consistently statistically significant across model specifications.

Board size, board holdings of stock and options, whether or not the CEO is also chair of the board, and institutional ownership are unrelated to the likelihood that a firm begins to backdate option awards. We find some weak evidence that the likelihood that a firm begins to backdate options is related to board independence as measured by the fraction of employees or retired employees on the board. The coefficient estimates on board independence are positive and nearly significant (p-values of 0.12 and 0.11 in the two different specifications). In general, these results provide little evidence that the decision to begin to backdate option grants is systematically related to standard measures of the quality of corporate governance.

The inclusion of indicator variables for different auditors, states, and industries does not affect any of the reported results regarding board interlocks, although both the auditor and state indicator variables are jointly significant (p-values < 0.05). These results provide some evidence that specific audit firms and connections through geography are also associated with the spread of the practice of backdating. For the purposes of our study, however, the board interlock variables remain statistically significant even after controlling for these additional factors.

Finally, in unreported analysis, we also examine whether the incremental effect of board interlocks differs depending on whether or not the board link is through the CEO or the compensation committee or depending on whether or not directors also receive option grants in that year. In all cases, the estimated incremental effects are not statistically significant, suggesting that it is the existence of a board connection (rather than the type of connection) that is important for understanding how knowledge of the practice of backdating was spread across firms.

4. Robustness Tests and Other Considerations

One advantage of using option backdating as a background to study the role that board connections play in the transfer of knowledge and corporate practices is the fact that the practice was not well known outside board rooms. One disadvantage, however, is that we must identify grants as backdated using stock-price patterns associated with the grants, without knowing for certain whether in fact the grants were backdated. Of course, the issue of how to

Table 5
Robustness tests

	Definition used to identify backdated option grants				
	97.5% Confidence level	99% Confidence level	Collins, Gong, and Li (2007)	Bebchuk, Grinstein, and Peyer (2007a)	Random grant dates simulation
Intercept	−4.741	−6.069	−4.395	−4.375	−1.882
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Total board links (1/0)	0.013	−0.116	0.068	0.206	0.020
	[0.001]	[−0.003]	[0.000]	[0.013]	[0.003]
	(0.884)	(0.300)	(0.292)	(0.008)	(0.780)
Links to backdaters (1/0)	0.184	0.131	0.195	0.049	0.008
	[0.031]	[0.013]	[0.031]	[0.003]	[0.001]
	(0.019)	(0.063)	(0.016)	(0.432)	(0.920)
Directors receive grants (1/0)	1.951	1.721	1.747	1.063	0.185
	[0.060]	[0.025]	[0.0490]	[0.051]	[0.024]
	(0.000)	(0.000)	(0.000)	(0.002)	(0.026)
Log of total assets	0.038	0.090	0.088	0.091	−0.027
	[0.002]	[0.002]	[0.008]	[0.003]	[−0.004]
	(0.061)	(0.055)	(0.065)	(0.080)	(0.100)
Std. dev. of return	1.864	1.73	1.151	1.189	−0.195
	[0.102]	[0.043]	[0.105]	[0.111]	[−0.026]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.500)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Auditor dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Observations	17,625	19,599	14,609	12,380	15,645
Chi-square	705	417	639	341	297
Probability of chi-square	0.000	0.000	0.000	0.000	0.000
Pseudo *R*-square	0.091	0.081	0.065	0.034	0.025

Dependent variable is equal to 1 if the firm is identified as a new backdater and is equal to 0 otherwise. Multiperiod logit models identifying the director, firm, and governance characteristics associated with the incidence of option backdating. The data cover the time period 1996–2002. The dependent variable is equal to 1 in the year that a firm is identified as backdating option grants for the first time and is equal to zero otherwise. After a firm is identified as a new backdater, it is dropped from the sample in subsequent years. Independent variables capture whether the firm has interlocking directors and other firm and governance characteristics. A description of the different methods used for identifying backdated option grants is given in Section 4.1, and a description of the independent variables is provided in the Appendix. Marginal effects are reported in square brackets. *p*-values, which are reported in parentheses, are based on robust standard errors clustered by firm.

identify grants that are backdated is not unique to this study. In this section, we discuss several robustness checks and provide some insight into several other issues that are relevant to our analysis.

4.1 Identification of backdated option grants

Table 5 repeats the analysis in Table 4 using different criteria to identify backdating firms. The first two models presented in the tables increase the confidence level cutoff required for a grant to be classified as backdated. In model 1, the confidence level used is 97.5% and in model 2 it is 99%. In model 3, we identify a grant as backdated using the methodology of Collins, Gong, and Li (2007). They classify an option grant as being backdated if the stock price on the grant date is in the lowest decile of the firm's stock-price distribution over a 240-day window surrounding the grant date. In model 4, we use the Bebchuk, Grinstein,

and Peyer (2007a) measure of backdating. They classify a grant as backdated if the stock price on the grant day is the lowest price in the month of the grant. Finally, in model 5 we randomly assign a grant date for each firm grant-year in the sample and identify the grant as backdated if the return reversal surrounding the random grant date fits our definition mentioned above using the return cutoff for the 95% confidence level. If our methodology for identifying a backdated grant is not biasing our results, we expect the coefficient on the indicator for interlocks with backdating firms in model 5 to be statistically insignificant.

In models 1 and 2 in Table 5, the coefficient estimates on the backdater link variable are positive and statistically significant (p-values of < 0.01 and 0.061, respectively). It is not too surprising that as we increase the confidence level, the statistical significance of the coefficient estimate becomes weaker. Using a more stringent cutoff to identify backdated grants significantly reduces the number of firms that are identified as backdaters and reduces the power of our test to the extent that we misclassify firms that backdate as nonbackdaters. In model 3, which uses the Collins, Gong, and Li (2007) definition to define backdating firms, the coefficient estimate on the backdater interlock variable is positive and significant (p-value < 0.01). In model 4, which uses the Bebchuk, Grinstein, and Peyer (2007a) definition to define backdating firms, the coefficient estimate on the backdater interlock variable remains positive, but is no longer statistically significant. Compared to our method, the Bebchuk et al. method identifies a substantial number of firms as backdaters that do not meet our statistical criteria for identifying backdating. To the extent that we misclassify firms that do not backdate as backdaters, this also reduces the power of our test. To further assess this issue, we reestimate the regression in model 4 (results not reported) using the intersection of Bebchuk et al.'s definition and our definition (based on the 95% confidence level) to identify backdating firms. Consistent with the idea that misclassification reduces the power of our test, the coefficient estimate on the backdater interlock variable in this regression remains positive and becomes statistically significant (p-value < 0.05).

Finally, when we randomly assign grant dates to identify backdated grants, the coefficient estimates on the backdater interlock variable are not statistically significant. The results from model 5 suggest that our result linking board interlocks to the spread of backdating in Table 4 is not an artifact of misclassification arising from our methodology for identifying backdating firms. Overall, the results from Table 6 indicate that our earlier analysis is robust to several different alternative methodologies for identifying the existence of backdating, and also indicate that our results are not an artifact of our statistical methodology for identifying backdated grants.

4.2 Outside counsel and compensation consultants

Although our analysis focuses on board connections, it remains possible that other formal or informal social networks could also provide a conduit for the spread of information about this practice. For example, information about

backdating might have been shared by outside corporate counsel and compensation consultants. If patterns across firms in the employment of outside legal counsel or compensation consultants follow similar patterns to board interlocks, then our finding that interlocks are responsible for the spread of the practice of backdating could be spurious. Because firms are not required to report outside counsel or compensation consultants, we cannot directly test the role that these entities play in the spread of backdating.[17] We can, however, provide some evidence that our findings are not a result of interlocks being associated with outside counsel or compensation consultants.

To the extent that outside counsel or compensation consultants cluster by geographic location, industry, or firm size, then our inclusion of these characteristics as control variables should reduce the chances that our results are spurious. There is some anecdotal evidence that corporate outside counsel tends to cluster both on industry and on location. For example, the California-based law firm of Wilson Sonsini Goodrich & Rosati represents seventy different Silicon Valley companies. Furthermore, as far as we know, neither the Department of Justice nor the SEC has brought charges against either outside corporate counsel or compensation consultants for being complicit in option backdating.[18] The fact that no outside counsels or compensation consultants have been targeted for action suggests that they might not have played a prominent role in the spread of this practice across companies.[19]

4.3 Board and CEO turnover

Another possible mechanism through which the practice of backdating could have been spread is if CEOs seek out weak monitors and hire board members from firms that also backdate in order to initiate the practice at their own firm. Adding board members in order to facilitate backdating does not imply that backdating was not spread through interlocks but it does change how we interpret the findings. We address this question in a couple of ways. First, we examine board tenure at backdating and nonbackdating firms. We find no difference in director tenure between the two groups, which suggests that backdating firms do not add directors at a different rate compared to nonbackdating firms. Second, we examine directly whether the incidence of backdating is associated with a firm adding a new director from another firm that already backdates

[17] Starting in 2006, firms are required to report the use of compensation consultants. Prior to 2006, however, firms were not required to report the use of compensation consultants.

[18] There have been several inside corporate counsels that have been implicated in backdating stock options. For example, Lisa Berry, who was inside counsel at two different firms over two different time periods, is accused of backdating option grants at both firms.

[19] We also had a discussion about backdating with two high level executives at two different well-known compensation consulting firms. Both executives said they were not aware of the practice until fairly recently. Both said that it was unlikely compensation consultants would be involved in backdating because that would occur within the firm at an administrative level and so they would not have known if a particular grant was backdated. Their role, as described by them, is to provide data and advice on pay levels and pay structure but does not involve providing guidance on the administrative details associated with option grants.

options. We do not find any evidence that the incidence of backdating is higher for interlocks based on new directors relative to the incidence based on existing linkages.

Similarly, to the extent that CEO turnover follows poor performance and the firm experiences improved performance upon hiring a new CEO, then the return reversal we observe around option grants could be associated with the hiring of a new CEO who also receives stock options. Moreover, if interlocks are related to CEO turnover, then our results could be driven by the hiring of new CEOs. To address this concern, we repeated the analysis with a dummy variable for CEO turnover in all of the specifications mentioned above. We find no evidence that the incidence of backdating is associated with the hiring of a new CEO, nor does controlling for CEO turnover change any of our inferences regarding board interlocks.

4.4 Interlocks and stock-return characteristics

A final concern is that interlocking directors may serve on firms with similar stock-return patterns and characteristics. Since we are using stock-price patterns to identify backdating, then to the degree that interlocks are associated with stock-price patterns, this potentially induces a correlation between board interlocks and option backdating. To address this issue, we examine the stock-return correlations between linked firms. We find no difference in the return correlations between linked firms that backdate and linked firms that do not. Moreover, the average correlation in stock returns between linked firms is quite low, which is not consistent with board members serving at firms with similar return patterns. We would also expect firms in the same industry to have the most similar stock-return distributions (i.e., risk profiles or density functions). Board linkages across firms in the same industry, however, are uncommon because directors seldom sit on the boards of industry competitors.

5. Conclusion

Boards of directors play an integral role in corporate oversight, and guide corporate policy and strategy. The purpose of this article is to provide additional insight into the role that board interlocks play in facilitating the exchange of information and the propagation of corporate practice across firms. Specifically, we examine whether board interlocks appear to be a factor that contributed to the spread of the controversial practice of backdating stock options. Examination of the practice of backdating of ESOs provides a unique setting to examine the role that board interlocks play in setting corporate policies because the use of this practice was not publicly disclosed until well after the practice was established at a large number of firms.

Our results indicate that the practice of backdating stock options increased significantly over time and spread through a wide range of industries. By 2002, over 30% of the firms in our sample over a wide range of different

industries exhibited evidence consistent with the backdating of option grants. More importantly, our results indicate that board interlocks appear to be an important factor in facilitating the spread of this practice. In particular, board interlocks to previously identified backdating firms can explain about one-third of the unconditional probability that a firm begins to backdate option grants. The likelihood of a firm beginning to backdate stock options is also negatively related to board size and the age of the CEO, and is positively related to stock-price volatility, CEO stock and option holdings, and with concurrent option grants to the firm's directors. As far as we know, ours is the first academic analysis of how the practice of backdating spread across firms.

Although we focus on the role that board interlocks play in explaining the spread of the practice of backdating stock options, we believe that our contribution to the literature is deeper. Our analysis indicates that boards operate in complex and dynamic social environments and suggests that recognizing and accounting for this environment is important to understanding how boards share information through board interlocks and board connections and the role that boards play in managerial oversight and the determination of corporate strategy.

Appendix

Variable definitions

Total board links = An indicator variable equal to one if the firm has a board interlock to any other firm in the sample.
Links to backdater = An indicator variable equal to one if the firm has a board interlock to another firm that has previously backdated an option grant.
Ln(Summed board links) = The natural logarithm of one plus the total number of board interlocks to any other firm in the sample.
Ln(Summed links to backdaters) = The natural logarithm of one plus the total number of board interlocks to firms that have previously backdated stock options.
Total assets = The book value of total assets.
Standard deviation of stock returns = The average monthly standard deviation of stock returns over the twenty-four-month period prior to the year of the grant.
Directors receive grants (DRG) = An indicator variable equal to one of the firm issues grants to directors.
Board size = The total number of board members.
CEO is the chair of the board = An indicator variable equal to one if the CEO is also chairman of the board.
CEO age = The age of the CEO.
CEO ownership% = The percentage of outstanding shares and options held by the CEO.
Institutional ownership% = The percentage of outstanding shares owned by institutional investors.
Board ownership% = The percentage of outstanding shares and options held by the board of directors.
Fraction of the board who are executive directors% = The fraction of board members who are executive directors (i.e., insiders or officers).
Industry = Indicator variables for each industry. Industry categories follow the Fama and French (1997) thirty industry classifications.

Year = Indicator variables for each year in the sample. Sample period covers 1996–2002.
Auditor = Indicator variables for each of the Big 4 audit firms and one for all other audit firms in the sample. Audit firms come from the Compustat database.
State = Indicator variables for each state where the firm locates its corporate headquarters.

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