Is Backdating Vicious? - An Investigation on the Rationale of Backdating CEO Stock Options

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Abstract

The practice of backdating executive stock options has drawn strong criticism of the public and also serious attention of the regulators. Nowadays, it seems backdating was used to be widely adopted among firms. Other than pure luck and insider manipulation, I conjecture some backdating is de facto rational. By using a sample of 126 firms under investigations related to backdating practice, I find backdating firms tend to be larger, having lower cash holdings, and facing higher stock price volatility. In addition, there is little evidence for managerial entrenchment and underperformance. Based on the empirical results, in the end I build up a simple dynamic game of imperfect information and show that higher performance indeed increases the likelihood of backdating, which distinguishes backdating from repricing mechanism.

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1 Introduction

Since the 1980s, facing promising prospects but with financial constraints, firms, especially in the high-technology industry, have started to grant stock options[1] to employees. In addition to compensation, it also aims to provide incentives and further align the interests between ownership and control. In other words, granting stock option is viewed as an effective way to alleviate the principal-agent problems (Jensen and Meckling, 1976). As time goes by, it has been a common practice for firms, across sectors, to take options as an indispensable part of the compensation package for executives. In particular, the 1990s was a period of massive option grants to executives and even middle managers in large US firms.

According to Hall and Murphy (2002), in 1998 the median values of stock and options owned by S&P's industrial and financial CEOs are $30 millions and $55 millions, respectively. Besides, Core and Guay (1999) find that, between 1992 and 1996, stock options contributes approximately one-third to the value of the median CEO's equity portfolio and one-half of total equity incentives, i.e. the sensitivity of portfolio value to stock price.

During the past few years, academic researchers found that firms' stock returns are abnormally low immediately before executive stock option grants, and returns are abnormally high just before the grants[2]. Since stock options are generally granted at the money (due to tax considerations[3]), in addition to pure luck or the ability to forecast the stock price pattern, insider timing of grants with anticipation of possible stock increases and strategic timing of information releases around grants are the most likely explanations to this phenomena. However, Lie (2005) and Heron and Lie (2007) suggest another possibility which better suits this stock price pattern around CEOs option grants. That is, by hindsight, insiders reset the grant dates to one with a particular low stock price, which is the so-called "backdating".

[1] Employee stock options offer workers right to buy company stock at a set price and usually have a vesting period of several years. Options are usually granted by directors and detailed by a compensation committee. In most cases, companies make their grants at the same time each year, avoiding the potential for date manipulation, but in fact no law requires this.

[2] See Yermack (1997), Aboody and Kasznik (2000), Chauvin and Shenoy (2001), Lie (2005), and Narayanan and Seyhun (2005).

[3] Heron and Lie (2007) provide several explanations.

These findings, followed by press reports[4], brought option grant timing to the attention of US federal prosecutors, and particularly, the Securities and Exchange Commission. The SEC previously focused on cases that firms time grants to benefit from positive corporate news, such as strong earnings or M&A. Backdating is regarded as illegal, an violation of security laws amounting to financial fraud, as long as it is not disclosed to shareholders. More precisely, the practice is not illegal under three conditions: if no firm documents have been forged, if shareholders have been informed, and if the backdated options are correctly accounted for in firms' earnings and tax statements. Otherwise, backdating is simply considered as a vicious way to steal money from shareholders.

Another argument against backdating is that, since the purpose of granting options is to provide incentives to maximize firm value, by resetting their options to a date with a favorable (lower) strike price, CEOs are actually rewarded for poor performance, or just for doing nothing. Hence, backdating is viewed as an example of managerial rent seeking. The anticipation of backdating could also reduce managerial incentives. However, defenders argue that it only involves (relatively) small sums and it offers an alternative to market-based pay. On top of that, making backdating illegal with criminal charges[5] might "kill" innovation forces in the business world (ex. Apple Inc.).

As a closely related topic, previous literature focused on the issue of option repricing, i.e. when the strike prices for previously granted options that are significantly out of the money are lowered. Empirical studies[6] suggest that the majority of option repricing happen after declines in stock prices. Another important feature is that, technology, trade and service oriented firms[7], along with small firms[8], conduct option repricing more. In most cases, repricing either directly lowers the original strike price and/or shortens the vesting period. As a result, backdating and repricing practice are not exactly the same, suggesting different mechanisms and implications.

The main goal of this paper is, by using a sample of 126 firms currently undergone

[4] See Wall Street Journal (2005).

[5] For firms, major damages that follow a backdating charge include the departure of the CEOs, re-statement of the financial statements, legal expenses, and stiff tax bills and potential penalties for unpaid income and payroll taxes (for both firms and individuals).

[6] The evidence is so far limited to US capital market only.

[7] See Chidambaran and Prabhala, 2003.

[8] See Chance et al., 2000.

(either formal or informal) investigations by the US federal prosecutors, to determine possible causes and effects of backdating practice. In particular, in the causal perspective, I test common beliefs that backdating is associated with poor corporate governance and inferior firm performance. To achieve that, I collect corporate governance data from IRRC database and firm performance data from Compustat database for individual firm in my sample. Besides, for each sample firm, I form a peer group which consists of at most four firms with similar firm size and in the same industry, which could viewed as a "matched" portfolio to each sample firm. Then, I compare both the governance and performance between the sample and the market average, and further between the sample and its peer group, for testing. The results might be able to shed some light whether backdating is just another new form of repricing. Additionally, if firms want to reward successful CEOs, why do they choose backdating, instead of other possible options? To answer that question, by collecting data from Compustat and CRSP databases, I examine whether backdating firms face severe financial constraint and/or higher stock price volatility.

After separate univariate analyses, by estimating both linear probability and binomial probit model, I further conduct a regression analysis to determine cross-sectional characteristics of backdating firms. Specifically, I want to know what industry, financial and governance characteristics induce firms (not) to choose to backdate CEO options. For instance, I control for firm size, age, performance, volatility, board size, management ownership and entrenchment, along with industry and labour market condition.

Moreover, by applying Event Study analysis, I estimate the impact brought by the press revealing backdating of the sample firms, which can be loosely regarded as reputation risk. Also, one interesting issue is to see if those firms conduct other forms of corporate fraud more. To do that, I collect corporate fraud information from the Accounting and Auditing Enforcement Releases published by the SEC, suggesting blatant violations of the Generally Accepted Accounting Principles standards of reporting and disclosure. Alternatively, I refer to the securities class action filings in the United States between 1996 and 2007, which can be viewed as valid proxies for alleged corporate fraud, according to Alexander et al. (2007). Both measures exclude CEO stock option backdating related cases. Again, I compare fraud conducting propensity between the sample firm and its

peer group. The alternative hypothesis is that firm might not act in bad faith, and it chooses backdating because the benefits actually outweigh the costs. Having the results of Event Study analysis and corporate fraud testing, I examine what might determine the reputational risk, with the traditional OLS estimation.

In short, what I find is that, no matter in terms of market average or peer group, the sample firms don't have worse governance structure and inferior performance, either. Consequently, backdating practice doesn't purely result from lucky or greedy executives. Financial constraint seems not a reason for backdating, but stock price volatility does, which might explain why backdating is preferred to other available options for compensation. More than that, firm-specific characteristics such as size, financial constraint, profitability and managerial entrenchment have significant influence on backdating decision. In general, backdating firms tend to be larger, growing, volatile, facing profitability shock, under financial constraint and tighter labour market. Also, they have smaller boards, high managerial ownership, but less managerial entrenchment. As a result, compared with Chidambaran and Prabhala (2003), despite sharing some common features, backdating and repricing firms still have distinctive properties, and it's fallacious to argue that backdating is de facto another form of repricing mechanism. What distinguishes between the two is that repricing is to incentivize managers and backdating is to keep them from accepting outside options.

When it comes to the consequences, the news announcement regarding backdating indeed brings a huge loss to firms. On average, there is an abnormal 2% drop of the stock price for sample firms on the news release day. Extending the event to a period of 61 days, this drop increases to approximately 7%, and the stock price never returns to the previous level. As for the comparison of corporate fraud between the sample firm and its peer group, I find that sample firms on average face more class action lawsuits than their peer group. In other words, backdating firms have higher propensity for corporate fraud. Lastly, the analysis of reputation risk shows that better profitability, promising growth prospects, and/or poor governance would reduce the reputation risk for firms, and conducting other corporate fraud would aggravate it. Besides, the reputation risk is further reduced for firms with poor governance who also conduct other corporate fraud.

However, when it comes to the whole pre-event period, the severeness of reputation risk is mainly driven by growth opportunities and the level of corporate fraud, whose influences are enhanced compared to the previous event-day analysis.

The last part of this paper, following Acharya et al. (2000), builds up a simple dynamic game of imperfect information. Mainly, it shows that, under some circumstances, backdating is the best response for firms. In addition, another important implication is that, the higher the (high signal of) final cash flow is, the higher the likelihood of backdating is. That is consistent with the previous empirical implications which distinguish the backdating and the repricing mechanism.

The remainder of this paper has the following structure. Section 2 provides, among others, two typical cases that illustrate how the backdating works. Section 3 gives a brief literature review related to backdating. Section 4 contains hypotheses to be tested. Section 5 describes the dataset and the methodology applied. Section 6 shows the estimation and testing results. Section 7 presents the game. Lastly, Section 8 summaries the findings and concludes.

2 Case Studies: ACS and Brocade[9]

2.1 The ACS case

The ACS (Affiliated Computer Services), founded in 1988, is a techonology-outsourcing company in Dallas, Texas. It provides diversified business process and information technology outsourcing solutions to commercial and government clients worldwide. Its former CEO, Jeffrey Rich, helps transform a small technology company into one with more than $4.4 billion in annual revenue and around 55,000 employees. Thanks to rises of ACS's stock price, Mr. Rich's wealth increases greatly by his stock-option gains; however, the timing of grants is so exceptional that soon raises the public's eyebrow. At first glance, it might seem he is just lucky. But according to a WSJ analysis, the odds of this happening purely by chance are slim – around one in 300 billion. In comparison, the odds of winning the multistate Powerball lottery with a $1 ticket are one in 146 million. As a matter of

[9] Source: Factiva database and Wall Street Journal archive.

fact, if his grants from 1995 through 2002 had dated at the yearly average share price, he'd have gained 15% less.

For illustration, let's take an especially well-timed grant for instance. One grant with 500,000 options with a strike price $11.53 offered to Mr. Rich, adjusted for stock splits, are dated on October 8, 1998, which happens to be the end of a precipitous stumble of its stock price. More specifically, the stock price falls 28% in the 20 trading days prior to October 8, and rises 60% in the following 20 trading days. According to Ms. Pool of ACS, this grant is for Mr. Rich's promotion to CEO; nonetheless, in fact, he isn't promoted until February 1999. In response, Ms. Pool said the company has a "six-month transition plan" for him, and the October 8 option grant is "in anticipation" of his promotion. Actually, if his grant had dated on the day of his official promotion announcement, Mr. Rich would have earned far less. The grant isn't reported to the SEC until 10 months after the stated grant date. Ms. Pool said that doesn't violate any regulation at that time.

Mr. Rich's options are granted by a special board committee, mostly including directors Frank Rossi and Joseph O'Neill. Mr. O'Neill says, "We had ups and downs in our stock price like any publicly traded stock. If there were perceived low points, would we grant options at that point? Yes." Mr. Rich says grants are made on the day the compensation committee authorized them, or within a day or so. In addition, he claims that he or Chairman Darwin Deason makes recommendations to the special board committee concerning option dates.

In September 2005, Mr. Rich resigns abruptly as the CEO, again with favorable timing. In an unusual separation agreement, the company agrees to make a special payment of $18.4 million, equal to the difference between the strike price of 610,000 of his outstanding stock options and the closing ACS stock price on the day of his resignation. What's intriguing is that, the company doesn't reveal the news of his resignation on that day. Instead, his resignation is announced several days later, which causes the stock falling by 6%. In turns out that Mr. Rich gains an extra $2 million by exercising the options just before the news. Facing this, Mr. Rich says that ACS signs his separation agreement on Friday, using Thursday's price for the options payout. The reason that it postpones the announcement until Monday is that it doesn't want to seem "evasive" by putting the news

out late Friday.

On March 7, 2006, ACS announces that SEC has asked for documents related to its stock-option grants from October 1998 through March 2005 as part of an informal inquiry. On May 10, a preliminary internal probe concludes that the effective dates of executive stock options seem to precede their written approval dates and it plans a charge of nearly $32 million to restate its financial statements due to the grants. Later on November 27, CEO and President Mark A. King, along with CFO Warren D. Edwards sign separation agreements with ACS which allow them to stay in the company during a transition period until June 30, 2007. The noncash compensation costs related to backdating would be as high as $51 million, excluding tax related expenses.

2.2 The Brocade case

The Brocade (Brocade Communications Systems), founded in 1995, is a data storage-networking company in San Jose, California. It provides storage switches that function as virtual traffic officers and allow for interconnection between storage devices. Gregory Reyes, who works as its CEO since mid-1998, resigns in January 2005, at the same time the company announces it would restate financial statements from 1999 to 2004 because of improper accounting for previous options granted to new or part-time employees, employees on leaves of absence or in transitory roles with the company. One of its most remarkable restatements is for fiscal 2000. During that year, Brocade actually losses $951.2 million, instead of the originally reported $67.9 million earnings. The $1 billion difference is related to its stock-based compensation and associated with income tax adjustments. After resignation, Mr. Reyes remains as a consultant and director within the company for several months.

Similarly, some of Mr. Reyes' options are granted on highly favorable dates. For example, one grant is dated on October 1, 2001, at the time when its stock price reaches to the yearly lowest level; also, two other grants come at monthly stock lows. Even though Mr. Reyes doesn't exercise any options after the company goes public in 1999, he makes a fortune by selling at least $380 million of shares before its IPO. On May 16, 2005, Brocade discloses that the Justice Department and the Securities and Exchange Commission are

investigating its option-granting practices. After two years, on May 31, 2007, Brocade agrees to settle with SEC and pays $7 million.

Besides, since April 2006, Brocade has been under a class action lawsuit, lead by The Arkansas Public Employee Retirement System who claims a $1.9 million loss, stating that Brocade recruits employees by giving them offer letters with early, mostly inaccurate, starting dates for employment. According to the suit, some employment has an early start date, put on leaves of absence while in fact they haven't finished their employment at another company yet, in order to get the favorable price on options. For instance, on January 6, 2000, David Smith receives an offer letter from Mr. Reyes and is employed as a vice president. His compensation consists of a base salary of $240,000 a year and 200,000 options, with the grant date of his first day of employment. However, Mr. Smith states that he doesn't start working full-time in Brocade until April, rather than the supposedly January start date. Between 2000 and 2001, Mr. Smith profits $7.4 million from the sale of his share holding.

The suit also alleges that Mr. Reyes has the authority to grant options "as a committee of one" and that he sometimes holds "ad hoc" board meetings with other executives to approve option grants. In the beginning, Mr. Reyes denies any backdating practice under his watch, but now he recognizes its existence. Nevertheless, facing criminal fraud charges and millions of dollars in fines, he still defends himself by stating that its purpose is to retain and recruit talented employees, not to defraud shareholders. The one-person stock option committees are to facilitate the hiring and retaining procedure, and are legal under the law of Delaware, where Brocade is incorporated. What's more, he argues that he doesn't realize its accounting implications, isn't directly involved in awarding backdated options, and investors doesn't consider them material, either.

3 Literature Review

Bizjak, Lemmon, and Whitby (2007) argue that board interlock, as a significant factor, facilitates the spread of the backdating practice across firms; more than that, younger CEOs, higher stock volatility and larger holdings of stock and options hold by CEOs also attribute to the likelihood of backdating. However, little evidence is provided that practice

of backdating is systematically related to poor corporate governance.

Narayanan, Schipani, and Seyhun (2007) discuss the economic impact of legal, corporate governance, tax, disclosure, and incentive issues arising from revelation of dating games with regard to executive option grant dates. They provide an estimate of the value loss incurred by shareholders of firms implicated in backdating and compare it with the potential gain that executives might have obtained from backdating. Using a sample of firms that have already been implicated in backdating, the authors find that the revelation of backdating results in an average loss to shareholders of about 8%, i.e. around $500 million dollars per firm. On the other hand, they estimate that the average potential gain from backdating to executives in these firms is under $600,000 per firm annually. In the end, they suggest some remedies for not only backdating, but also for other dubious practices such as spring loading.

Palmon, Bar-Yosef, Chen, and Venezia (2004) evaluate the common practice of setting the strike prices of executive option plans at-the-money, while explicitly introducing these factors and allowing the reward package to include fixed wages and options or stock grants. They simulate the firm's decisions and the manager's effort choice under alternative compensation schemes and identify schemes that are optimal. They find that when abstracting from tax considerations, it is optimal to establish the strike price in-the-money. However, taking tax issue into account, it may be optimal to issue at-the-money options. They further show that the above result holds both when the strike price is linked to an economy-wide benchmark and not, in addition, issuing options with benchmarked strike prices usually dominates issuing options with non-benchmarked strike prices.

Murphy (2002) provides evidence inconsistent with the managerial-power hypothesis and instead offers an alternative, "perceived-cost view", to current practices which are difficult to justify from an optimal-contracting point of view. Furthermore, in order to alleviate the incurred perceived-cost problems, educating managers and boards on the true economic costs of stock options, along with imposing accounting charges for option grants and eliminating the asymmetry between the accounting and tax treatment of executive and employee stock options are suggested as part of the solutions.

Hall and Murphy (2002) conduct a certainty-equivalent analysis to determine the cost,

value, and pay-for-performance sensitivity of non-tradable stock options owned by undiversified and risk-averse executives. They show that firm's cost of option-granting typically exceeds its value to executive-recipients, along with it's practical implications. For instance, using the Black-Scholes methodology, the values of CEO's options are overestimated, which partly explains why executives often demand large premiums to accept options in lieu of cash payments. Another important implication is that, the incentives provided by options are maximized with a strike price at or near the grant-date market price when this grant is an add-on, ceteris paribus. However, if executives are "charged" for the options through reduced cash compensation, then incentives are maximized with a strike price close to zero, i.e. restricted stock. Thus, under this framework, some common practices, such as setting higher performance benchmarks by issuing premium options or refraining from repricing following stock price declines, are not necessarily in the interests of shareholders.

Sauer and Sautner (2007) investigate the link between option repricing, firm performance, and corporate governance by using a dataset of 77 European firms repricing their stock options between 1987 and 2003. They find repricing is common for young and fast growing firms that show a sharp decline in accounting and stock price performance in the two years before the repricing, and cash compensation is not adjusted downwards when the repricing occurs. Furthermore, the performance improves significantly after the repricing, which is associated with the corporate governance structure. In particular, board size and its structure are related to the favorableness of the repricing.

4 Hypotheses

One possibility for the firm (i.e. the board or compensation committee) to backdate CEO's current options is as follows. The CEO has (unexpected) good performance; however, in the meantime the whole industry (or some of the competitors) is not doing well. Facing likely talent shortage, outside options might appear and induce her to leave the firm. To keep her, the firm has to provide her with some form of benefits (like, immediate bonus) and backdating her current options is one possibility, among others. Due to the fact that

the firm might be under financial constraint[10] and/or avoiding share-dilution, backdating is preferred to cash or stocks for the firm. On top of that, backdating options without revealing is tax-efficient for both parties. As for the CEO, on the other hand, she might also prefer to backdating the current options, if given a higher value.

Furthermore, it's also intriguing to see what backdating might bring to the firm. In addition to major damages described in the beginning, there is one "indirect" damage of particular interest, i.e. news announcement. When receiving the news, shareholders could express their opinions through the stock market, which could be viewed as the public outcry. In order to answer these questions, I'll conduct the following tests,

For precedents:

- H1: Backdating is associated with poor corporate governance.
- H2: Backdating is associated with inferior performance.

Why do firms choose backdating to award successful CEOs, among other options?

- H3: Backdating is associated with firms under financial constraint.
- H4: Backdating is associated with firms having higher stock price volatility.

For consequences:

- H5: The press revealing the backdating practice has negative impact on firm value.
- H6: The backdating firms also conduct more other corporate fraud.

5 Data and Methodology

Until September 2007, there are 126 public firms under (formal or informal) investigations or internal probes, available on the WSJ[11]. Table 1 shows the sample firm characteristics. On the whole, more than one-third of the firms have market value less than 1,000 million dollars, suggesting many sample firms are relatively small[12]. However, there are still approximately 11% of the firms with market value exceeding 10,000 million dollars, suggesting some outliners in the sample size distribution. On the face of it, the argument

[10] See Yermack (1995), Dechow, Hutton, and Sloan (1996), Core and Guay (2001).

[11] Wall Street Journal "Perfect Payday" report (the June 12, 2007 version). (http://online.wsj.com/page/perfectpayday.html)

[12] If using a common criterion for small firms, which is less than US$100 millions in market value, in 2001 there are 11 and in 2006 there are only 4 companies that are qualified for small firms. In any case, the porpotion of small firms is further reduced.

that backdating firms tend to be small is not valid, despite my sample bears inherited upward bias in size. That is, large firms are more likely to be the investigation targets for regulators. On the other hand, if categorized by industry, almost 60% of the firms are in the information technology (IT) sector. This is not surprising, since the IT sector is the industry which has been widely issuing stock options for the past decade.

In order to test the first hypothesis, I use the IRRC database. The Investor Responsibility Research Center, the so-called IRRC, publishes detailed listings of corporate governance provisions for firms in Corporate Takeover Defenses. The data comes from various public sources, such as corporate bylaws and charters, proxy statements, annual reports, and 10-K and 10-Q documents filed with the SEC. In particular, 30 distinct corporate governance provisions for approximately 1,500 firms since 1990 are provided. In my sample, data of 103 firms are available. In addition to the governance data, the IRRC provides information about board members, which allows me to gather board size data. The board size is a measure for board effectiveness, being another proxy for corporate governance[13].

Next, I use both the Compustat and the CRSP databases to test the rest of the precedent hypotheses and also to conduct the subsequent regression analysis to find individual firm characteristics associated with this practice. The Compustat database (from Standard & Poor's) provides more than 300 annual and 100 quarterly Income Statement, Balance Sheet, Statement of Cash Flows, and supplemental data items on more than 24,000 publicly held companies. Moreover, it includes a sub-database called ExecuComp database which has over 80 different compensation items on more than 12,500 executives (top five executive managers per company) in companies included in the S&P 500, S&P 400 MidCap and S&P SmallCap 600 indexes, and over 35 measures of company financial performance taken from Compustat, starting from 1992. As for the CRSP (The Center for Research in Security Prices), it maintains the most comprehensive collection of security price, return, and volume data for the NYSE, AMEX and Nasdaq stock markets. Moreover, the CRSP provides stock indices, beta- and cap-based portfolio, treasury bond and risk-free rates, and mutual fund data.

[13] See Yermack (1996).

As for my fifth test, I conduct the Event Study methodology. As a starting point, I choose stock price as a proxy for firm value. Next, I use both the Factiva database and WSJ report to identify the earliest press revealing date as the event date. Factiva covers up to 8,000 sources of information including major wire services, US business publications, national and regional newspapers, and trade publications. The estimation window has 255 days, ending 46 days before the event date. On the other hand, the event window contains 61 days in total, starting from 30 trading days before and ending 30 trading days after the event. Then, applying the event study method, I estimate the average abnormal returns for my sample firms.

To test the last hypothesis, following Shane, Harley and Yisong (2005), I collect corporate fraud information from the Accounting and Auditing Enforcement Releases (AAERs) published by the SEC. AAERs provide cases in which the SEC believes to have sufficient evidence of accounting or auditing fraud to bring a case against a firm or its executives. In other words, AAERs generally represent blatant violations of the Generally Accepted Accounting Principles (GAAP) standards of reporting and disclosure. Alternatively, I use the Stanford Securities Class Action Clearinghouse (SSCAC) and find securities class action filings in the United States between 1996 and 2007, resulting in 2,541 cases. Alexander et al. (2007) argue that the assumption that value-impacting corporate fraud follows by a security class action lawsuit filled under the 1933 Exchange Act or the 1934 Securities Act is justifiable. Hence, those filings are valid proxies for alleged corporate fraud. However, one major potential problem is that using class action data might overestimate the actual corporate fraud; that is, some allegations are frivolous. The enactment of the Private Securities Litigation Reform Act of 1995 (PSLRA) aims to reduce frivolous lawsuits. Since the data starts from 1996, this overestimation problem is much alleviated.

As a robustness check, I adopt the matching technique for all the tests described above (except H5). In order to reduce the possibility of "mis-matching", i.e. to mistakenly include firms that also conduct backdating practice but never get caught in the peer group, there are at least two things that draw attention. On the one hand, the group-forming criteria need loosening, and thus I only use two factors, industry and size, to form a peer group for each individual firm in the sample. On the other, unsuitable firms

need to be excluded in the peer group. To achieve that, I conduct another test for all peer groups. According to Heron and Lie (2007), the enactment of Sarbanes-Oxley Act of 2002[14] (SOX) makes the abnormal stock return pattern weaker but doesn't eliminate it all together. Furthermore, they argue that, after SOX, the fact that firms delay their option reporting implies backdating practice. Thus, on average, the peer group is expected not to miss the reporting requirement more than its sample firm. If it's not the case, unsuitable firms need to be excluded from the peer group.

Following Heron and Lie (2007), I obtain 92 filing information regarding stock option grants to CEOs of sample firms from Thomson Financial Insider Filing database, which provides insider transactions reported on SEC Forms 3, 4, 5, and 144. I include only observations with a cleanse indicator of R ("data verified through the cleansing process) and H ("cleansed with a very high level of confidence"). Besides, I consider transactions that occur after August 29, 2002 (the effective date of SEC's new reporting requirements) and filings that occur before January 1, 2007.

Admittedly, by focusing on firms under investigations only, one major sample selection bias arises. That is, firms that conduct backdating but never get caught are not included in the sample, which might lead to spurious outcome and implications. Nevertheless, my main object in this paper is to find "one" scenario, instead of the unique one, which might justify the backdating practice. Thus, this sample selection problem is much alleviated in this context.

6 Estimation and Testing Results

6.1 Backdating and Corporate Governance

To test if corporate governance structure is associated with backdating practice, firstly I use the GIM Index (along with its (revised) five sub-indices[15]) and the BCF Entrenchment

[14] Among others, SOX changes the reporting regulations for stock option grants. In the past, CEOs receiving grants usually report to the SEC on Form 5, not due until 45 days after the company's fiscal year-end, and also to shareholders in the proxy statement, not due until next year's annual meeting. (To report to the SEC, if Form 4 is used, the 10th day of the month following the grants is the deadline.) After SOX, stock option grants must be reported to the SEC on Form 4, within two business days after the grants.

[15] The Notice Requirement provision is added to the Delay subindex, the Dual Class provision is added to the Voting subindex, the Recapture of Profits provision is added to the Other subindex, and the

Index[16] to measure the level of shareholder rights in 1990 and 2006, representing the earliest and the latest available data respectively. The lower the index is, the stronger rights the shareholders have, which suggests better corporate governance structure. I also use the board size as another proxy for corporate governance. That is, the smaller the size is, the better the governance is. By comparison between the sample group and the whole market, Table 2 shows that, by using mean test, the sample group in general has at least as good corporate governance as the market average. In particular, in 2006, except the Delay category of GIM sub-index, the sample group has significantly stronger shareholder rights. The board size is smaller in the sample group than its peer group, not statistically significant though. The median test results in outcome not as robust as what the mean test does, but the same conclusion still holds. Using individual variables, the results (undocumented) are similar but then weaker.

To take a closer look, I compare shareholder rights and board size between the sample firm and its corresponding matched firms. Table 3 shows similar pattern as previous results, and in general the shareholder rights of the sample group is not worse than that of its peer group. More specifically, except the Protection subindex (which flips the sign, not significant though), the difference of other index remains the negative sign. However, if compared with the average market level in Table 2, both the degree and (some of) its significance of differences vary. The median test, again, has similar outcome, and the sample firms have significantly better shareholder protection in terms of voting mechanisms, along with measures which alleviate managerial entrenchment. As for the board size, there is no difference between the sample firms and their matched firms. To sum up, based on these testing results, I reject the null hypothesis, and backdating isn't associated with poor corporate governance structure.

6.2 Backdating and Firm Performance

As the first step, I collect data from the WSJ COMPANY RESEARCH, which provides 1-, 2-, and 5-year return data of individual stock, its corresponding industry index, and also the market index, respectively. According to Table 4, the sample group has beat-

Antigreenmail Law is taken out from the State subindex.

[16] See Bebchuk, Cohen and Ferrell (2004) and Gompers, Ishii and Metrick (2003).

the-industry performance in any mean stock return measure. Particularly, during the past 5 years, the stock return of the sample group is 2.5 times of that of the industry as a whole, which is also statistically significant. However, in general, its corresponding industry performs worse than the whole market which has the proxy of DJ U.S. Total Market Index, except the one-year return measure. On the other hand, the median test results in similar but weaker outcome.

Table 5 shows the comparison of the performance between the sample firm and the market, and its peer group, respectively, on the year-by-year basis from 1993 to 2005. In general, the estimates of the differences from the mean test are larger than those from the median test, which might be attributed to the outliners in the sample distribution. Thus, for the remainder of this paper I use only the median test results to avoid biased interpretations. First of all, column Difference(M, SP) represents the yearly excess stock returns, with the S&P500 index as the market benchmark, of the sample firms. During this period, there are 7 years (out of 13) in which the sample firms have beat-the-market performance, among them 4 are statistically significant, with 2 years of significant underperformance. As for the rest of the columns, they show the yearly excess growth rates, with three proxies[17], of the sample firms, relative to their peer group. Among these three proxies, the estimates of sales difference are all positive. In particular, from 1998 to 2000, the sample firms beat their peer group with double-digit growth in percentage. In addition, in 2001, 2004 and 2005, they also perform significantly better than their peer group. The remaining two proxies have weaker outcome, but it's never the case that the sample firms significantly underperform their peer group. As a result, combining all the evidence above, I reject the null hypothesis, and backdating practice isn't associated with firms having inferior performance.

6.3 Backdating and Financial Constraint

The preceeding finding that backdating firms outperform the market and their peers indicates likely outside options for successful CEOs, and hence firms have to provide additional compensation to keep them from leaving (even to avoid the "prospects" that they might

[17] Sales, Operating Income Before Depreciation, and Net Income.

leave). There are several possible options, in which backdating is one of them. In order to understand why backdating firms don't choose the alternatives, firstly I examine the financial constraint facing the sample firm and its peer group. Table 6 shows the results which test whether these two groups have the same financial constraint, defined as cash holdings subtracted by interest expenses, on the year-by-year basis from 1993 to 2005. Both mean and median tests convey similar patterns, and in particular, before 2000, backdating firms do have lower cash holdings relative to their matched counterparts. Afterwards, the pattern is reversed, and backdating firms hold more cash. However, most of the results are not statistically different, either on mean or median test. Furthermore, I test the difference between the two groups directly, and Table 7 displays a similar pattern, though some of the differences become statistically significant. The median test shows before 2000, backdating firms are under significant financial constraint, relative to their peer group. Afterwards, the pattern is not clear. Having all, I don't have strong evidence to claim that backdating is associated with financial constraint, and cash holdings seem not to be a major attribute to backdating decision.

6.4 Backdating and Stock Price Volatility

In this session, I test if the stock price volatility, defined as the standard deviation of the stock price centered on its mean, of backdating firms is different from (or more accurately, larger than) that of the market. If yes, that implies it's easier to take advantage of the stock price variation in order to profit from backdating. There are three proxies for the market, the S&P500 Composite Index, the value-weighted and equally-weighted NYSE/AMEX Index. Table 8 shows the two testing results whether the excess stock price volatility of the sample firms, relative to that of the market, is statistically significant different from zero. On the whole, the answer is yes and, in particular, this excess volatility is positive. For instance, in the case of S&P500 as the market index, it has the most prominent outcome for both mean and median tests. For one thing, the mean test shows most years between 1993 and 2005 have more than 20% excess volatility, which is somewhat decreased in recent years. For the other, the median test suggests a similar, but less pronounced pattern; nevertheless, this excess volatility is statistically significant throughout all 13 years, being at least 10% each year. Based on the findings, backdating is associated with

higher stock price volatility, and thus I argue that the positive excess stock price volatility of backdating firms tends to enable them to benefit from backdating practice.

6.5 What industry- and firm-specific characteristics do backdating firms have?

Following Heron and Lie (2006), I conduct a regression analysis on what industry- and firm-specific characteristics that backdating firms share. Specifically, I estimate both linear probability and binomial probit model on what industry, financial and governance characteristics induce firms (not) to choose to backdate executive stock options. The dependent variable is assigned to 1 for backdating firms and 0 for matched firms. On the other hand, the explanatory variables include ones such as stock return volatility, firm size (logarithm of market capitalization), financial constraint (cash subtracted by interest expenses), R&D propensity (R&D expenses divided by total assets), and growth opportunity by using the market to book ratio, i.e. the book value of assets plus the market value of common stock less the sum of book value of common equity and balance sheet deferred taxes.

Also, I control for profitability by using return on assets (a ratio of EBIT, i.e. earnings before interest and tax, to total assets), CEO option holding ratio (the black-scholes option value divided by total compensation), and executive labour market tightness measured by turnover ratio divided by underperformance ratio. If this measurement is low, it would suggest a tight labour market. Otherwise, the turnover is supposed to be proportional to underperformance, given the market is loose. Due to the difficulty to determine the exact timing and also the tendency of multiple occurrences of backdating, for each company I calculate explanatory variables on an annual basis from 1992 to 2005 and then average them out[18]. In Table 9, Panel A reports the correlations between explanatory variables and Panel B summaries the estimation results, in which some models further control for industry effects coded using the first 2-digit NAICS codes.

According to Panel B, both linear probability and binomial probit specifications result in similar outcome. First, consistent with earlier univariate analysis, I find little evidence that backdating is associated with shoddy governance. However, contrary to the previous

[18] This approach can be problematic because the positive or negative outliners would cause biased coefficients, which can't be alleviated due to the relatively small sample size.

findings, it's associated with underperformance, which might attribute to the outliner issue; in addition, using absolute measure for profitability without comparing to industry or the whole market weakens this argument. Next, conforming with characteristics of repricing firms, backdating firms tend to be young, growing, also having performance shocks and smaller boards of directors. However, the statistically significant positive relationship between firm size and the likelihood of backdating contradicts the repricing mechanisms, possibly due to the sample selection problem. That is, big companies are the easy targets for regulators.

Likewise, financial constraint plays a substantial role on backdating practice, and the more cash that a company owns, the lower chance that the backdating occurs. Other factors, such as stock return volatility, managerial option holding and labour market tightness have expected coefficients, though not significant. For instance, higher volatility and high managerial ownership suggests backdating is in fact beneficial for managers. So, if the labour market is tight, it does no harm for firms to backdate in order to keep the talent. The R&D propensity is probably what's surprising, since it implies that higher propensity is related to lower backdating prospects. However, it's not significant, and I would interpret this as the following, the backdating practice is so commonly used across sectors that it isn't restricted to technology-intensive industry only.

Based on these findings, I argue that repricing firms and backdating firms indeed share similar characteristics, but they are not identical. In particular, performance is the major factor that separates the two. In other words, under a tight labour market, facing underperformance, repricing is needed to incentivize managers; on the other hand, facing superior performance, backdating is one way to keep managers from leaving. Moreover, note that repricing concentrates on some industries, but backdating is widely adopted across sectors.

6.6 What impact does the news of backdating bring to the firm?

In this section, I first conduct the Event Study methodology to test the hypothesis that the press revealing backdating practice has negative impact on firm value. To identify the event date, I use three different sources of news release, which are Factiva, WSJ,

and the last one with the earliest date between the former two. Table 10 summarizes the press announcement dates from these two sources, together with the probe order and rulings announcement dates of individual firms. The event window starts from 30 trading days before through 30 trading days after the press announcement in my sample, and the estimation period is 255 days ending 45 days before the announcement. Using market model and market adjusted return model, I calculate the abnormal returns as the difference between the realized stock returns and the ones predicted by the model. Generally speaking, it should be more appropriate to use the last source of news release, i.e. the earliest date between Factiva and WSJ, for analysis since people use massive sources of information, which also spreads quickly nowadays. Hence, I take it as my benchmark case for the remainder of this section.

Table 11 reports the analytical results. First, by using equally weighted market index, Panel A provides the day-by-day (cumulative) average abnormal returns and their corresponding test statistics. On date 0, on average, there is a -2.09% abnormal stock return and a -7.36% cumulative abnormal return for the sample firms. In addition, I divide the whole event window into three sub-periods, i.e. pre-event, event, post-event. Based on different weighting measures for market index, Panel B and C report the estimates for the cumulative average abnormal returns (CAAR). To further demonstrate, fig. 1 and 2 displays the CAAR pattern during the event window period. For the market adjusted returns model, prior to around 20 days before the announcement, the average stock prices move in line with what the theory predicts but start to decrease sharply afterwards. In particular, the CAAR from Day -20 to Day -1 is around -5%, or -0.25% a day. On the announcement date, the average abnormal stock returns plummet more than 2%, which is statistically significant and making its CAAR exceeding -7.5%. Since then, the stock prices gradually resume to the theoretical trend, though they never return to previous levels. In particular, the average abnormal return between Day 1 and Day 30 is meagerly 0.4% by equally weighted market index (or -0.16% by value weighted market index), both statistically insignificant. On the other hand, the market return model has similar but slightly weaker results (undocumented).

In sum, the results described above suggest that the first press revealing backdating

practice indeed has significantly negative impact on firms; consequently, the hypothesis is not rejected. Moreover, before the press announcement, in particular, from 20 days beforehand, the CAAR starts to decline monotonically and substantially. To explain it, two major forces, among others, might be going on during that period. For one thing, based on other information (e.g. abnormal stock trading or other related news about backdating), investors already anticipate the news release approaching; for the other, which is more likely, insiders anticipate that happening as well. Both two factors attribute to and further aggravate the negative abnormal returns before the formal announcement. At first glance, I suspect the second effect dominates the first one, since insiders should have better information on firms. However, because the abnormal stock return pattern almost disappears soon after the announcement, I conclude that both effects are already priced in, and the investor effect is not necessarily dominated by the insider effect.

6.7 Backdating and Other Corporate fraud

The last part of the empirical analysis aims to understand whether firms under investigations might in fact act not in bad faith. For that purpose, first I collect the number of AAERs, published by the SEC, of individual firm in my sample. Table 12 shows that the number of AAERs of sample firms ranges from 0 to as high as 10, with an average of 0.19 case per firm. As an alternative proxy for corporate fraud, I use the Stanford Securities Class Action Clearinghouse (SSCAC) and find Securities Class Action Filings (SCAFs) in the United States between 1996 and 2007, resulting in 2,541 cases in total. Alexander et al. (2007) argue that the assumption that value-impacting corporate fraud follows by a security class action lawsuit filed under the 1933 Exchange Act or the 1934 Securities Act is justifiable. Hence, those filings are valid proxies for alleged corporate fraud. However, one major caveat is that using class action data might overestimate the actual corporate fraud. As a result, it's the best to be viewed as the upper bound of estimation of firm's true corporate fraud level. Similarly, the number of SCAFs of sample ranges from 0 to 3, with an average of 0.63 case per firm. Since AAERs capture outrageous cases of corporate wrongdoing, it can be viewed as the lower bound of the estimation of corporate fraud level. Thus, the "confidence interval" of the true corporate fraud committed by firms should be between these two estimates. Note that I exclude backdating related cases for

both AAERs and SCAFs.

To compare between the sample firm and its corresponding peer group, I use the SCAFs proxy in order to avoid underestimation (undocumented). For the peer group as a whole, the number ranges between 0 and 1, and the mean is 0.27 (the median is 0.25) case per group. The mean test shows that the sample and its peer firms don't seem to have the same fraud levels; more specifically, the sample has significantly more. Nevertheless, the median test indicates otherwise. That is to say, the sample firms on average face more class action lawsuits than their counterparts, but not so if the influences of the outliners are eliminated. Hence, I don't find conclusive evidence to reject the hypothesis that backdating firms conduct more other corporate fraud.

As mentioned earlier, one way for shareholders to express their views on firms is through the stock market. And therefore, to some extent, the stock price variation can be regarded as the "public outcry". Intriguingly, I want to see if there is relationship between cumulative abnormal return (CAR) and corporate fraud. To achieve that, firstly I use the results from the Event Study in the previous session which include individual CAR during the whole event window. Table 11 reports the outcome in three different sub-periods, i.e. CAR(-1,0), CAR(-30,0) and CAR(-30,30). Panel B shows that the correlation between the number of AAERs and any CAR measure is negative, suggesting that the higher the number of AAERs is, the higher the negative cumulative abnormal return is[19]. Since the level of negative cumulative abnormal return represents the severeness of public outcry for firms, it can be viewed as the reputation risk facing firms. As a result, the negative correlation between the two suggests that the higher the severeness of public outcry, the more likely that the shareholders, or the blockholders might file for law suits as long as they find evidence of wrongdoings of their firms.

Furthermore, I conduct a regression analysis, trying to find out what might determine the public outcry. Because the abnormal return almost disappears after the event, Table 13 only shows the estimation results for two dependent variables, CAR(-1,0) and CAR(-30,0). For CAR(-1,0), in general, market-to-book ratio, return on assets, and GIM index are positively associated, with different significant levels, with this CAR measure, which

[19] The SCAFs case has mixed outcome, which makes it somewhat difficult to interpret.

is negatively correlated with AAERs. Consequently, having promising business prospects, better profitability, and/or poor governance would reduce the reputation risk for firms, and conducting other corporate fraud would aggravate it. When the interaction term of GIM index*AAERs is added in the regression, the reputation risk is further reduced for firms with poor governance who also conduct other corporate fraud at the same time. In addition, after controlling for industry effects, I find all the explanatory variables remain the same signs, despite return on assets and GIM index are not statistically significant anymore.

On the other hand, when it comes the whole pre-event period, a similar picture emerges. Nevertheless, now only the growth opportunities and corporate fraud related measures matter for the reputational risk. The significance of profitability and corporate governance structure disappear. More than that, another major difference compared to its event day analysis is that, the magnitude for every important factor greatly increases. For both cases, replacing AAERs with SCAFs results in similar outcome, though weaker again (undocumented).

7 A Game

The previous testing results show evidence supporting the conjecture that some backdating practices are rational. Thus, in this section, following the baseline linear model in Acharya et al. (2000), I build up a simple game which demonstrates one situation in which backdating is a rational strategy for the firm.

The firm in this game is owned by an entrepreneur (the "principal") who employs a manager (the "agent") to operate a project lasting for two periods. Without loss of generality, the initial investment is normalized to unity. At the end of the second period (terminal node), there is a one-time cash flow (possibly H^2, HL, and LL, where $H>1>L$), depending on the actions (effort levels) taken by the manager in each of the two periods, and the outcome of the interim first period can be regarded purely as an information event signalling the final cash flows, providing a reference for later renegotiating the terms of the initial contract.

The manager's set of possible action in each period is $A = [0, \bar{a}]$ ($\bar{a}<1$). After taking

the action a∈A in the first period, a public signal s∈{H, L} is observed signalling the final outcomes. After the signal, the manager chooses her second period action, and I denote the action following the H signal with a_h and one following the L signal with a_l. The prospects of the signals and of the final cash flows depend on the actions taken by the manager. Given the initial period action a, the signal H is observed with probability p(a) = a and the signal L with 1-p(a). Once H realizes, the manager chooses action a_h, and the final cash flow H^2 is realized with probability p(a_h) and cash flow HL with 1-p(a_h). Similarly, after the signal L, the manager chooses action a_l, and the final cash flow L^2 is realized with probability p(a_h) and cash flow LH with 1-p(a_l). Figure 3 expresses the baseline model in an extensive form.

The actions incur a cost or disutility to the manager, which is denoted by c(a) = ka (k>0). In addition, W=(w_{hh}, w_{hl}, w_{lh}, w_{ll}) denotes a compensation scheme devised by the principal for the manager. The objective of the manager is to choose an initial action a, and the subsequent action a_h or a_l to maximize the expected (linear) utility of her compensation subtracted by the cost of the actions. As a benchmark model, I also assume a risk-neutral principal who anticipates the manager's response to any initial offer and chooses a compensation scheme maximizing her own initial expected (linear) utility, similarly, subtracted by the manager's compensation. For simplicity, I put discount rates to zero and assume this principal-agent relationship lasts for the whole two periods.

In order to derive the equilibrium, using the backward induction approach, I consider the following,

For the manager,

$$\begin{aligned} U_i(a_i, w_{ii}, w_{ij}) &= p(a_i)w_{ii} + (1-p(a_i))w_{ij} - c(a_i), \;\; i = \{h, l\},\; j \neq i \\ &\Longrightarrow \;\; U(a, U_h, U_l) = p(a)U_h + (1-p(a))U_l - c(a) \end{aligned}$$

For the entrepreneur,

$$\begin{aligned} V_h &= p(a_h)(H^2 - w_{hh}) + (1-p(a_h))(HL - w_{hl}) \\ V_l &= p(a_l)(L^2 - w_{ll}) + (1-p(a_l))(LH - w_{lh}) \\ &\Longrightarrow \;\; V = p(a)V_h + (1-p(a))V_l \end{aligned}$$

Here, it's further assumed that the strike price is normalized to unity, which is valid because in practice executive stock options are usually issued at the money. Given any α, the optimal compensation scheme is the following (note that HL<1 by construction),

$$\begin{aligned} w_{hh} &= \alpha(H^2-1)^+ = \alpha(H^2-1) \\ w_{hl} &= \alpha(HL-1)^+ = 0 \\ w_{lh} &= \alpha(LH-1)^+ = 0 \\ w_{ll} &= \alpha(L^2-1)^+ = 0 \end{aligned}$$

Under the usual pre-commitment mechanism, the compensation anticipated by the manager at the terminal nodes is the initial one offered by the principal. Thus, the manager's best response of a*(α) and the equilibrium payoff V(α) are easily determined. Lastly, the principal chooses α to maximizes V(α). Now, the close-form equilibrium come as follows,

For the manager, first,

$$\max_{a\in[0,\bar{a}]} a\alpha(H^2-1) + (1-a)0 - ka$$

$$a_h = \left\{ \begin{array}{ll} 0, & if \quad \alpha(H^2-1) < k \\ \bar{a}, & otherwise \end{array} \right\}$$
$$U_h = \left\{ \begin{array}{ll} 0, & if \quad \alpha(H^2-1) < k \\ \bar{a}\alpha(H^2-1) - k\bar{a}, & otherwise \end{array} \right\}$$

$$a_l = U_l = 0$$

Next,

$$\max_{a\in[0,\bar{a}]} aU_h + (1-a)U_l - ka$$

$$a = \left\{ \begin{array}{ll} 0, & if \quad U_h - U_l < k \\ \bar{a}, & otherwise \end{array} \right\}$$

For the entrepreneur,

$$\begin{aligned} \alpha &= \frac{k(1+\bar{a})}{\bar{a}(H^2-1)}, \quad \text{and} \\ V &= \bar{a}H^2 + \bar{a}(1-\bar{a})HL + (1-\bar{a})L^2 - k\bar{a}(1+\bar{a}) \end{aligned}$$

As a result, in equilibrium, given the initial contract W=(w_{hh}, w_{hl}, w_{lh}, w_{ll}) designed by the entrepreneur, the manager exerts action ā during the first period. Afterwards, when signal H occurs, she will continue with action ā, but with zero effort when signal L realizes.

7.1 Subgame Perfect Bayesian Equilibrium

In this section, I extend the baseline model and assume this principal-agent relationship lasts at least one period only and breaking the initial contract (by either party) doesn't incur any cost or penalty. Notice that the model here can't distinguish between new issues of options and resetting (backdating in my case) of current options. In other words, no new options are issued in this game. Then, my question is that, what happens if after one period, the signal H is realized and the entrepreneur finds that unexpected outside options appear? In that case, there is a risk that, under the initial contract, the manager might leave the firm and it's not possible to find the alternative (in time) to continue with the project, which would fail and incur a loss of the initial investment 1. To keep her, in this game, what the entrepreneur can do is to reset, i.e. backdate, the initial contract.

The timeline has the following (revised) structure,[20]

—|————|————————|————————————|————————|————>

T=0 T=1 T=2

Contract Effort(MH) Signal(Renegotiation) Effort (MH) Final Outcome realized

Figure 5 shows the extensive form of the game after the signal H is realized. After the signal H, the entrepreneur, as Player 2, facing the prospects of outside options for the manager, moves first to decide whether to reset the initial contract or not. That is, to change α to $\alpha^{'}$ or not. Then the manager, as Player 1, given the outcome of renegotiation, decides to stay in the firm or accept the (best) outside option and leaves the firm. If she stays, as usual, she chooses the action $a_h$and the final cash flow realizes; on the other hand, if she leaves, she receives the outside option without incurring any disutility from the action[21]. To derive the subgame perfect Bayesian equilibrium in this dynamic game

[20] Refer to Figure 4 for a simple illustration.

[21] Strictly speaking, the best outside option can be defined as any payoff value (slightly) larger than the original wage w_{hh}.

of imperfect information, first Player 2 must have a belief about which node has been reached, which is represented by probability P and 1-P, as shown in Figure 5.[22]

In addition, I assume that $\alpha^{'} > \alpha$, and without loss of generality, the best outside option B $= \bar{a}\alpha(H^2 - 1)$. Similarly, by using the backward induction technique, I find that, for Player 1, after renegotiation there are four subgames, as shown with red thick arrows in Figure 6. Given the payoffs, Player1 has four possible pure strategies as follows,

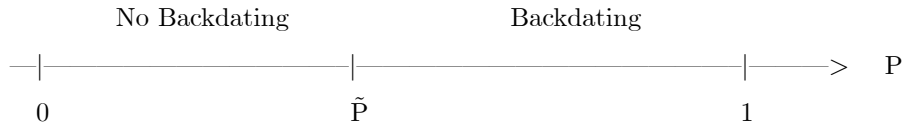
Strategy 1 (S1) : stay and choose action $\bar{a}$, if $\alpha^{'} - \alpha \geq \dfrac{k}{(H^2 - 1)}$; accept B and leave, otherwise.

Strategy 2 (S2) : accept B and leave the firm.

Strategy 3 (S3) : stay and choose action $\bar{a}$.

Strategy 4 (S4) : stay and choose action $\bar{a}$.

Next, for Player 2, due to the non-singleton information set, there is only one subgame with two cases for consideration[23]. In Case 1, as shown in Figure 7, there exists a pure strategy: backdate (reset α to $\alpha^{'}$), if $P \geq \tilde{P} = \frac{\bar{a}k}{(\bar{a}H^2 - k(1+\bar{a})+1)}$; not to backdate (keep α intact), if $P < \tilde{P}$, where $\alpha^{'} = \alpha + \frac{k}{H^2-1}$ for profit maximization. For further illustration,



To check what might influence this threshold $\tilde{\text{P}}$, I have the following relations,

$$\begin{aligned}
\frac{\partial \tilde{P}}{\partial H} &= \frac{-2\bar{a}^2 kH}{(\bar{a}H^2 - k(1+\bar{a})+1)^2} < 0 \\
\frac{\partial \tilde{P}}{\partial k} &= \frac{\bar{a}(\bar{a}H^2 + 1)}{(\bar{a}H^2 - k(1+\bar{a})+1)^2} > 0 \\
\frac{\partial \tilde{P}}{\partial \bar{a}} &= \frac{k(1-k)}{(\bar{a}H^2 - k(1+\bar{a})+1)^2} \lesseqgtr 0
\end{aligned}$$

To interpret the results, first notice that the expected profit for the firm to backdate is $\bar{a}H^2 - k(1+\bar{a}) - \bar{a}k$, in which the first element $\bar{a}H^2$ is the expected value of the final

[22] More specifically, Player 2 has a belief that the best outside option appears (exogenously) with probability P, and nothing happens (or no valid outside options) with probability 1-P.

[23] Case 1 refers to the situation when $\alpha^{'} - \alpha \geq \frac{k}{(H^2-1)}$; Case 2 refers to when $\alpha^{'} - \alpha < \frac{k}{(H^2-1)}$.

cash flow given manager's response, the second element $k(1+\bar{a})$ is the wage (also the best outside option), and the last element $\bar{a}k$ can be regarded as the cost of backdating. Then,

1. When H is higher, suggesting a higher (signal of) final cash flow, the firm has more to lose if the manager leaves the firm. Thus, the entrepreneur has higher propensity to backdate and the threshold of briefs for outside options reduces.

2. When k is higher, suggesting a higher cost for the efforts, then the original contract of wage is higher. Then the outside options need to be more attractive in order to induce her to leave the firm, which is more costly for other firms. That means it would deter some potential outside options. In addition, the cost of backdating goes up as well. Thus, the entrepreneur has lower propensity to backdate and the threshold of briefs for outside options increases.

3. When $\bar{a}$ is higher, suggesting both a higher (expected) final cash flow, a higher wage, and a higher cost of backdating for the firm, the impact on the expected profit is undetermined. However, similar to argument 2, higher decreases the prospects for outside options. Even so, due to the uncertainty of profit, its impact on the likelihood of backdating is still ambiguous.

By the same token, when it comes to Case 2, Player 2 has one pure strategy which is not to backdate no matter what her belief is. However, that means $\alpha^{'} = \alpha$, which contradicts the assumption of $\alpha^{'} > \alpha$. As a result, this case doesn't hold.

In conclusion, in this subgame after signal H, two subgame-perfect Bayesian Equilibrium are the following,

((stay and choose action $\bar{a}$), (backdate, when $P \geq \tilde{P}$)), and
((stay and choose action $\bar{a}$), (not to backdate, when $P < \tilde{P}$)).

8 Conclusions

10 years ago, Yermack (1997) first identifies the pattern of abnormal stock price return around CEO stock option grants, suggesting the possibility of firms timing option grants or firm-related announcements. Later on, Lie (2005) and Heron and Lie (2007) argue that, instead of timing grants and announcements, it's more likely that CEO options are in fact backdated. That is, the grant date of current options are changed to more

favorable dates, i.e. with lower striking prices. Moreover, the comprehensive newspaper coverage starting from 2004 reveals this backdating practice to the public and further draws regulators' attention, which both regard it as a vicious way of stealing money from the firm. However, its common use among firms implies that, in addition to lucky or greedy CEOs, there might be rational considerations behind.

Based on testing results, the central message is that, the backdating practice isn't solely due to lucky or greedy executives. In fact, on average, backdating firms are not associated with poor corporate governance and are not having inferior performance, either. The high stock price volatility of backdating firms might be one major reason which leads to the backdating decision since it's easier to take advantage of the stock variation, and hence benefit from backdating. The firm-specific characteristics such as size, financial constraint, profitability and managerial entrenchment are all influential in backdating decision. What's more, backdating firms tend to be larger, growing, volatile, facing profitability shock, under financial constraint and tighter labour market. They also bear other features such as smaller boards, high managerial ownership, but less managerial entrenchment. Consequently, in spite of the similarity, backdating and repricing firms still have differences, and it's not valid to view backdating simply as another form of repricing. What distinguishes between the two is that, given a tight labour market, repricing is to incentivize managers and backdating is to keep them in the company.

In addition, one major consequence following backdating is what news announcement might affect the firm value. During the 61-day event period, there is an abnormal stock price drop of approximately 7%, and it never resumes to its previous trend. Thus, the backdating news indeed imposes a non-negligible loss on firms. Moreover, backdating firms face more class action lawsuits than their peer group, suggesting backdating firms might have higher propensity for fraud. Furthermore, having better profitability, good growth prospects, and/or poor governance would reduce the reputation risk for firms, and conducting more corporate fraud would intensify it. In addition, the reputation risk is further reduced for firms with poor governance who meanwhile conduct other types of corporate fraud. However, taking the whole pre-event period into account, the severeness of reputation risk is mainly influenced by growth opportunities and the level of corporate

fraud.

Lastly, the dynamic game of imperfect information following the high signal of final cash flow shows that, under some circumstances, backdating is rational for firms. More than that, when the (high signal of) final cash flow is higher, the likelihood of backdating for firms is higher. Contrast with the repricing mechanism which provides incentives after inferior firm performance, the backdating mechanism keeps the talent by offering "immediate bonus". That is consistent with the empirical implication that backdating is not associated with poor performance.

So far, what I have been doing is to determine the associations between backdating and firm characteristics. It matters more to pin down the causality relationship. Hence, what remains to be done for the future work is to find out the (approximately) accurate timing of those backdated options and conduct the testing again. If it's not feasible to find the precise timing, there are two (indirect) ways to proceed with, by checking the filing delay of the option grants and the CAR around the option grant dates. Meanwhile, the theoretical framework needs be relaxed further to fit the real world, such as the exogenous outside options, the risk averse and linearity assumptions in the model.

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Appendix

Table 1
Sample Firm Characteristics

This table provides a summary of the backdating executive options firms in 2001 and 2006, respectively. The full sample consists of 126 firms that are under federal investigations in the US. Panel A shows the size distribution of sample firms, and the market value data are retrieved from Datastream. Panel B shows their industrial orientations where the industrial classification is based on Wright Reports, http://wrightreports.ecnext.com/.

Panel A: Size

Market Value (US$ million)	2001		2006	
	Number of Firms	Fraction in %	Number of Firms	Fraction in %
< 1,000	50	40.00	44	34.92
1,000 – 2,000	21	16.80	26	20.63
2,000 – 3,000	8	6.40	7	5.56
3,000 – 4,000	9	7.20	10	7.94
4,000 – 5,000	5	4.00	4	3.17
5,000 – 6,000	5	4.00	5	3.97
6,000 - 7,000	3	2.40	3	2.38
7,000 – 8,000	4	3.20	4	3.17
8,000 – 9,000	3	2.40	3	2.38
9,000 – 10,000	3	2.40	5	3.97
> 10,000	14	11.20	15	11.90
Sample Size	125	100.00	126	100.00

Panel B: Industry

Industry	Number of Firms	Fraction in %
Construction	1	0.79
Defense	1	0.79
Diversified	1	0.79
Chemicals	2	1.59
Financial	2	1.59
Food & Beverages	2	1.59
Recreation	2	1.59
Oil, Gas, Coal & Related Services	3	2.38
Utilities	5	3.97
Retailers	7	5.56
Drugs, Cosmetics & Health Care	11	8.73
Miscellaneous	14	11.11
Electronics	75	59.52
Sample Size	126	100.00

Table 2
Backdating and Corporate Governance (1)

This table shows the test results of Corporate Governance Index between the backdating executive options firms and the market average in 1990 and 2006, respectively. The full sample consists of 21 (in 1990) and 103 (in 2006) firms that are under federal investigations in the US. The Corporate Governance Index data are computed by data from IRRC. Panel A shows the mean test results, and the symbol * represents statistical significance at the 0.05 level, using t-test for equality. Panel B shows the median test, and the symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively, using Wilcoxon/Mann-Whitney (tie-adjusted) test for equality. P-values are reported in the parentheses.

Panel A: Mean Test

		1990			2006		
		Sample (S)	Market (M)	Difference (M,S)	Sample (S)	Market (M)	Difference (M,S)
GIM Index		7.24	8.89	-1.65*** (0.009)	8.05	9.02	-0.97*** (0.000)
GIM Sub-Index	Delay	1.67	1.80	-0.14 (0.601)	3.12	3.26	-0.15 (0.273)
	Protection	2.38	2.38	0.00 (0.999)	1.81	2.04	-0.24** (0.037)
	Voting	0.62	0.65	-0.03 (0.875)	0.49	0.71	-0.23*** (0.005)
	Others	0.48	1.20	-0.72*** (0.002)	0.66	0.97	-0.31*** (0.001)
	State	0.95	1.58	-0.63*** (0.009)	1.20	1.59	-0.38*** (0.000)
BCF Entrenchment Index		1.00	1.93	-0.93*** (0.002)	1.88	2.25	-0.37*** (0.003)
Board Size[1]		8.42	10.30	-1.88*** (0.0067)	8.62	9.12	-0.50 (0.2213)
Sample Size		21	1466		103	1896	

Panel B: Median Test

		1990			2006		
		Sample (S)	Market (M)	Difference (M,S)	Sample (S)	Market (M)	Difference (M,S)
GIM Index		8	9	-1** (0.022)	8	9	-1*** (0.000)
GIM Sub-Index	Delay	1	2	-1 (0.462)	3	3	0 (0.249)
	Protection	2	2	0 (0.943)	2	2	0 (0.028)
	Voting	1	0	1 (0.749)	0	1	-1*** (0.003)
	Others	0	1	-1*** (0.001)	1	1	0 (0.001)
	State	1	1	0 (0.005)	1	1	0 (0.001)
BCF Entrenchment Index		0	2	-2*** (0.001)	2	2	0 (0.003)
Board Size		8	10	-2*** (0.0048)	8	9	-1 (0.2751)
Sample Size		21	1466		103	1896	

[1] Data started from 1996 the earliest.

Table 3
Backdating and Corporate Governance (2)

This table shows the test results of whether the backdating firm and its peer group have the same Corporate Governance Index in 2006. The sample consists of 85 firms that are under federal investigations in the US. The Corporate Governance Index data are computed by data from IRRC. The median test uses Wilcoxon/Mann-Whitney (tie-adjusted) test for equality. The symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively, and P-values are reported in the parentheses.

		Mean Test			Median Test		
		Sample (S)	Peer Group (P)	Difference (P,S)	Sample (S)	Peer Group (P)	Difference (P,S)
GIM Index		8.18	8.62	-0.45 (0.1110)	8.00	8.67	-0.67* (0.0985)
GIM Sub-Index	Delay	3.15	3.46	-0.31* (0.0815)	3.00	3.50	-0.50 (0.1818)
	Protection	1.87	1.81	0.06 (0.6694)	2.00	2.00	0.00 (0.9601)
	Voting	0.51	0.62	-0.12 (0.2793)	0.00	0.50	-0.50** (0.0208)
	Others	0.68	0.90	-0.22** (0.0232)	1.00	1.00	0.00 (0.0266)
	State	1.20	1.24	-0.04 (0.6819)	1.00	1.00	0.00 (0.3629)
BCF Entrenchment Index		1.89	2.35	-0.46*** (0.0025)	2.00	2.33	-0.33*** (0.0028)
Board Size		8.62	8.26	0.36 (0.4590)	8	8	0 (0.3781)
Board Size[2]		7.26	7.27	-0.01 (0.9815)	7	7	0 (0.6231)
Sample Size		85	85		85	85	

[2] Data in 2001, in which have the most observations.

Table 4
Backdating and Performance (1)

This table shows the test results of stock returns between the sample firms (S) and the industry (I), the industry and the market (M), and the sample firms and the market, respectively. The full sample consists of 111 firms that are under federal investigations in the US. The stock returns data are collected from WSJ Company Research and the Dow Jones U.S. Total Market Index represents the market benchmark. Panel A shows the mean test, and the symbol * represents statistical significance at the 0.05 level, using t-test for equality. Panel B shows the median test, and the symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively, using Wilcoxon/Mann-Whitney (tie-adjusted) test for equality. P-values are reported in the parentheses.

Panel A: Mean Test			
Performance During Past: (from July 16 or 17, 2007)	Difference (I,S)	Difference (M,I)	Difference (M,S)
1 year	0.0309	0.0565***	0.0874*
	(0.5371)	(0.0000)	(0.0765)
2 years	0.0775	-0.0547***	0.0228
	(0.2556)	(0.0010)	(0.7297)
5 years	2.5447**	-0.0404	2.5043**
	(0.0106)	(0.5576)	(0.0117)
Sample Size	111	111	111

Panel B: Median Test			
Performance During Past: (from July 16 or 17, 2007)	Difference (I,S)	Difference (M,I)	Difference (M,S)
1 year	-0.1450***	0.0897***	-0.0553**
	(0.0004)	(0.0000)	(0.0139)
2 years	-0.0963**	-0.0677***	-0.1640***
	(0.0309)	(0.0000)	(0.0000)
5 years	0.1328	-0.1991***	-0.0663
	(0.2389)	(0.0000)	(0.2970)
Sample Size	111	111	111

Table 5
Backdating and Performance (2)

This table shows the test results of performance between the sample firms and the market (M), which has the proxy of S&P500 index, also between the sample firms and their peer group (P). The full sample consists of firms that are under federal investigations in the US. The stock prices (SP), sales (S), operating income before depreciation (OIBD), net income (NI) data are collected from CRSP. Panel A shows the mean test, and the symbol * represents statistical significance at the 0.05 level, using t-test for equality. Panel B shows the median test, and the symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively, using Wilcoxon/Mann-Whitney (tie-adjusted) test for equality. P-values are reported in the parentheses.

Panel A: Mean Test

Performance During:	Difference (M,SP)	Difference (P,S)	Difference (P,OIBD)	Difference (P,NI)
1993	0.3289*	-0.2781	-0.5189**	0.9220
	(0.0577)	(0.1704)	(0.0288)	(0.7148)
1994	0.0491	0.0157	-0.1834	-0.6131
	(0.4951)	(0.7717)	(0.3132)	(0.5381)
1995	0.7406***	0.2831	3.8601	1.7580
	(0.0001)	(0.1510)	(0.3061)	(0.4396)
1996	0.1458*	0.7081	1.9302	4.0710
	(0.0768)	(0.1668)	(0.2742)	(0.4465)
1997	0.3157***	0.0613	-1.4327	0.2905
	(0.0001)	(0.7780)	(0.3651)	(0.4779)
1998	0.2298***	4.7975	0.7674	-0.2326
	(0.0008)	(0.1287)	(0.1850)	(0.7975)
1999	0.9468***	0.5870	0.0344	1.7464
	(0.0000)	(0.1505)	(0.8879)	(0.2238)
2000	-0.1102	0.4335***	1.3056	-14.0949
	(0.1346)	(0.0070)	(0.1907)	(0.3655)
2001	0.1881	0.2013**	0.8329**	-0.1432
	(0.2620)	(0.0442)	(0.0320)	(0.8942)
2002	-0.3431***	0.0079	-0.1145	-0.2206
	(0.0000)	(0.8606)	(0.7058)	(0.7121)
2003	1.0305***	0.0370	0.6648*	-0.0149
	(0.0000)	(0.2635)	(0.0652)	(0.9750)
2004	0.1741***	0.1090***	0.2141	0.1438
	(0.0028)	(0.0055)	(0.2149)	(0.6901)
2005	0.0454	0.0813**	0.3392*	0.4330
	(0.2020)	(0.0224)	(0.0857)	(0.3343)
Sample Size	125	82	82	82

Panel B: Median Test

Performance During:	Difference (M, SP)	Difference (P,S)	Difference (P,OIBD)	Difference (P,NI)
1993	0.0940	0.0589	-0.5189	-0.0899
	(0.1256)	(0.6891)	(0.2087)	(0.3478)
1994	-0.0302	0.0872	-0.1010	-0.1473
	(0.7343)	(0.5355)	(0.2814)	(0.3121)
1995	0.3525***	0.0029	-0.0972	0.1034
	(0.0000)	(0.3209)	(0.5605)	(0.7397)
1996	-0.0300	0.0350	0.0831	0.1887
	(0.5343)	(0.2361)	(0.1248)	(0.4734)
1997	0.1650***	0.0576	0.1335	0.1448**
	(0.0000)	(0.2726)	(0.3219)	(0.0404)
1998	0.0606	0.1101**	0.1962***	0.3994***

	(0.5830)	(0.0434)	(0.0094)	(0.0030)
1999	0.5682***	0.1117**	0.1296*	0.3755***
	(0.0000)	(0.0331)	(0.0786)	(0.0038)
2000	-0.3019***	0.1596**	0.2107*	0.1309
	(0.0000)	(0.0125)	(0.0870)	(0.1639)
2001	-0.1282	0.0708**	0.2234**	0.2058
	(0.1228)	(0.0227)	(0.0447)	(0.1046)
2002	-0.4494***	0.0427	-0.0409	0.0582
	(0.0000)	(0.7261)	(0.2354)	(0.8575)
2003	0.7189***	0.0385*	0.1449*	0.1683
	(0.0000)	(0.0641)	(0.0813)	(0.1302)
2004	0.0431	0.0683***	0.1603**	0.0687
	(0.2410)	(0.0060)	(0.0192)	(0.2423)
2005	-0.0284	0.0448**	0.0443	0.0885
	(0.5596)	(0.0160)	(0.1864)	(0.3407)
Sample Size	125	82	82	82

Table 6
Backdating and Financial Constraint (1)

This table shows the test results of whether the backdating firm and its peer group face the same financial constraint between 1993 and 2005. The sample consists of 104 firms that are under federal investigations in the US. The financial constraint is defined as cash subtracted by interest expenses. The median test uses Wilcoxon/Mann-Whitney (tie-adjusted) test for equality. The symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively, and P-values are reported in the parentheses.

	Mean Test			Median Test		
	Sample (S)	Peer Group (P)	Difference (P,S)	Sample (S)	Peer Group (P)	Difference (P,S)
1993	45.13	69.60	-24.47 (0.2945)	7.92	24.69	-16.77 (0.1103)
1994	44.86	61.31	-16.45 (0.5611)	6.45	16.77	-10.32* (0.0867)
1995	31.31	49.17	-17.86 (0.2991)	3.73	14.54	-10.81** (0.0474)
1996	47.60	72.61	-25.01 (0.3836)	8.34	15.05	-6.71 (0.2247)
1997	55.47	68.63	-13.15 (0.5190)	16.05	21.90	-5.86 (0.2866)
1998	70.16	75.19	-5.03 (0.8399)	11.34	24.47	-13.14 (0.1433)
1999	92.43	142.22	-49.79 (0.2806)	26.47	33.52	-7.05 (0.5785)
2000	168.52	136.18	32.34 (0.3933)	55.22	52.86	2.36 (0.5107)
2001	226.42	160.30	66.12 (0.1861)	60.47	57.94	2.53 (0.4923)
2002	232.02	177.00	55.03 (0.2916)	83.88	62.12	21.76 (0.6171)
2003	307.02	211.35	95.68 (0.1616)	114.59	95.30	19.29 (0.5370)
2004	311.33	195.11	116.23 (0.1329)	70.26	100.60	-30.34 (0.8112)
2005	337.97	266.17	71.79 (0.5077)	90.75	102.48	-11.72 (0.6244)
Sample Size	104	104		104	104	

Table 7
Backdating and Financial Constraint (2)

This table shows the test results of financial constraint between the backdating firm and its peer group between 1993 and 2005. The sample consists of 104 firms that are under federal investigations in the US. The financial constraint is defined as cash subtracted by interest expenses. The median test uses Wilcoxon/Mann-Whitney (tie-adjusted) test for equality. The symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively, and P-values are reported in the parentheses.

	Difference(P,S)	
	Mean Test	Median Test
1993	-24.47	-8.67**
	(0.2945)	(0.0162)
1994	-16.45	-9.34***
	(0.5008)	(0.0003)
1995	-17.86	-4.85***
	(0.2201)	(0.0016)
1996	-25.01	-3.08
	(0.2664)	(0.2319)
1997	-13.15	-4.33
	(0.3686)	(0.3280)
1998	-5.03	-7.91***
	(0.7048)	(0.0034)
1999	-49.79	-3.97**
	(0.1304)	(0.0491)
2000	32.34	6.85
	(0.2787)	(0.2007)
2001	66.12*	4.60
	(0.0607)	(0.6058)
2002	55.03	-0.59
	(0.1363)	(0.7929)
2003	95.68*	1.32
	(0.0660)	(0.8945)
2004	116.23**	-1.28
	(0.0388)	(0.7843)
2005	71.79	5.90
	(0.4398)	(0.7820)
Sample Size	104	104

Table 8
Backdating and Stock Price Volatility

This table shows the test results of Stock Price Volatility between backdating firms and the market from 1993 to 2005. The sample consists of 121 firms (S) that are under federal investigations in the US. The proxies for the market are S&P Composite Index (S&P), and value weighted and equally weighted NYSE/AMEX Index (VWNA and EQNA, respectively). The Stock Price Volatility is defined as the standard deviation of monthly stock price, centered at the mean. The median test uses Wilcoxon/Mann-Whitney (tie-adjusted) test for equality. The symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively, and P-values are reported in the parentheses.

	Mean Test			Median Test		
	Difference (S&P,S)	Difference (VWNA,S)	Difference (EWNA,S)	Difference (S&P,S)	Difference (VWNA,S)	Difference (EWNA,S)
1993	0.2970***	0.2948***	0.2710***	0.1492***	0.1470***	0.1233***
	(0.0010)	(0.0011)	(0.0026)	(0)	(0)	(0)
1994	0.3121*	0.3119*	0.3052*	0.1466***	0.1464***	0.1397***
	(0.0791)	(0.0793)	(0.0859)	(0)	(0)	(0)
1995	1.3977	1.4036	1.4213	0.1281***	0.1340***	0.1517***
	(0.1907)	(0.1889)	(0.1834)	(0)	(0)	(0)
1996	0.0900	0.0984	0.1091	0.1194***	0.1278***	0.1385***
	(0.2871)	(0.2444)	(0.1972)	(0)	(0)	(0)
1997	0.2865***	0.2875***	0.2930***	0.1208***	0.1218***	0.1273***
	(0.0001)	(0.0001)	(0.0001)	(0)	(0)	(0)
1998	0.1942***	0.1996***	0.1720***	0.1710***	0.1765***	0.1488***
	(0)	(0)	(0)	(0)	(0)	(0)
1999	0.2653***	0.2791***	0.2679***	0.2165***	0.2303***	0.2191***
	(0)	(0)	(0)	(0)	(0)	(0)
2000	0.3124***	0.3207***	0.3261***	0.2740***	0.2823***	0.2877***
	(0)	(0)	(0)	(0)	(0)	(0)
2001	0.2485***	0.2644***	0.2805***	0.1708***	0.1867***	0.2027***
	(0)	(0)	(0)	(0)	(0)	(0)
2002	0.2472***	0.2615***	0.2773***	0.2198***	0.2341***	0.2499***
	(0)	(0)	(0)	(0)	(0)	(0)
2003	0.1886***	0.1867***	0.1355***	0.1433***	0.1414***	0.0902***
	(0)	(0)	(0)	(0)	(0)	(0)
2004	0.1477***	0.1436***	0.1270***	0.1175***	0.1135***	0.0968***
	(0)	(0)	(0)	(0)	(0)	(0)
2005	0.1264***	0.1183***	0.1124***	0.1101***	0.1020***	0.0961***
	(0)	(0)	(0)	(0)	(0)	(0)
Sample Size	121	121	121	121	121	121

Table 9
Regression Analysis of Determinants to Backdating

This table provides Linear Probability and Binomial Probit Estimation of characteristics of backdating firms. The dependent variable is assigned to 1 for backdating firms and 0 for matched firms. For the explanatory variables, firm size has proxy of log(market value), financial constraint is defined as cash subtracted by interest expenses, R&D ratio is R&D expenses divided by total assets, and the market to book ratio is market value of assets divided by the book value of total assets, i.e. the book value of assets plus the market value of common stock less the sum of book value of common equity and balance sheet deferred taxes. Also, return on assets is a ratio of EBIT (earnings before interest and tax) to total assets, CEO option holding ratio is option value (black-scholes) divided by total compensation, and labour market tightness is measured by turnover ratio divided by underperformance ratio. Panel A reports the correlations between explanatory variables and Panel B summaries the estimation results, in which some models control for industry effects coded using the first 2-digit NAICS codes. P-values are reported in the parentheses and the symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively.

Panel A: Correlations

	Firm Size	Age	FC	R&D Ratio	MTBR	ROA	Volatility	Board Size	BCF Index	Option Ratio	Labour Market
Firm Size	1										
Age	0.205	1									
FC	0.558	0.143	1								
R&D Ratio	-0.154	0.049	-0.051	1							
MTBR	0.178	-0.250	0.117	-0.158	1						
ROA	0.244	0.207	0.151	0.127	-0.181	1					
Volatility	0.359	-0.216	0.215	-0.189	0.629	-0.145	1				
Board Size	0.228	0.442	0.142	0.042	-0.297	0.209	-0.132	1			
BCF Index	-0.109	-0.006	-0.178	-0.029	-0.102	-0.090	-0.048	0.237	1		
Option Ratio	0.093	-0.078	-0.053	-0.145	0.246	-0.175	0.171	-0.167	-0.001	1	
Labour Market	-0.052	-0.021	-0.031	-0.123	-0.086	-0.114	-0.055	0.003	0.152	-0.039	1

Panel B: Estimation Results

Dependent Variable	Linear Probability Model		Binomial Probit Model	
	(1)	(2)	(1)	(2)
Size - Log(Market Value)	0.301158***	0.293409**	0.829792***	0.824565**
	(0.0026)	(0.0103)	(0.0075)	(0.0147)
Age	-0.005719*	-0.002544	-0.019198*	-0.009648
	(0.0901)	(0.5345)	(0.0758)	(0.4311)
Financial Constraint	-0.020185**	-0.022799**	-0.056056**	-0.064518**
	(0.0164)	(0.0127)	(0.0380)	(0.0205)
R&D Propensity	-1.347212	-1.399009	-4.572896	-5.411744
	(0.7609)	(0.7720)	(0.7106)	(0.6943)
Market to Book Ratio	0.025148	0.025502	0.075958	0.084273
	(0.1145)	(0.1810)	(0.1721)	(0.2056)
Return on Assets	-0.007249**	-0.007338**	-0.02073**	-0.021035*
	(0.0170)	(0.0278)	(0.0323)	(0.0546)
Volatility	0.000642	0.003686	0.006938	0.015333
	(0.9479)	(0.7536)	(0.8405)	(0.7094)
Board Size	-0.005802	-0.011531	-0.010623	-0.029065
	(0.7951)	(0.6707)	(0.8658)	(0.6960)
BCF Index	-0.062072	-0.085963**	-0.18347*	-0.269434**
	(0.1030)	(0.0296)	(0.0946)	(0.0220)
CEO Option holding Ratio	0.100229	0.105699	0.327393	0.380299

	(0.5612)	(0.5852)	(0.5034)	(0.4780)
Labour Market Tightness	-0.057847	-0.046715	-0.170521	-0.133146
	(0.7084)	(0.7650)	(0.7172)	(0.7743)
Industry Effects	No	Yes	No	Yes
R^2	0.202	0.239		
Adjusted R^2	0.143	0.097		
McFadden R^2			0.160	
LR statistic			35.03151	
			(0.0002)	
Schwarz criterion			1.529	1.922
Sample Size	160	160	160	160

Table 10
Summary of the Press Announcement Date

This table summarizes the earliest dates of press announcement revealing backdating practice, informal or formal probes, and rulings of sample firms from two sources, Factiva and WSJ. Companies with bold letters have replaced their CEOs and companies with grey area have their financial statements unchanged.

Company	The earliest news release date (Factiva)	The earliest news release date on WSJ report	The news release date of informal probe order	The news release date of formal probe order (SEC)	The news release date of ruling
Activision	June 19, 2006	July 28, 2006	July 28, 2006	June 7, 2007	
Affiliated Computer Services	Mar. 7, 2006	May 10, 2006	Mar. 7, 2006		
Affymetrix	July 31, 2006	Aug. 1, 2006			
Agile Software	Sep. 12, 2006	Oct. 26, 2006			
Alkermes	May 26, 2006	Aug. 10, 2006	26 May 2006		May 25, 2007 (no enforcement)
Altera	May 9, 2006	June 21, 2006	May 25, 2007		Feb. 20, 2007 (no enforcement)
American Tower	May 20, 2006	May 23, 2006	May 20, 2006		
Amkor Technology	June 12, 2006	Aug. 16, 2006	Sept. 15, 2006		
Analog Devices	Nov. 11, 2005	May 24, 2006	Nov. 11, 2005		Nov. 2005 (settled with SEC), now under US Attorney
Apollo Group	June 10, 2006	June 9, 2006	June 10, 2006		Apr. 24, 2007 (civil charges)
Apple Inc.	June 29, 2006	June 2006	Oct. 4, 2006		
Applied Micro Circuits	May 31, 2006	May 31, 2006	June 12, 2006		
Applied Signal Technology	Jan. 18, 2007	Jan. 16, 2007			
ArthroCare	Aug. 23, 2006	Aug. 23, 2006	Aug. 23, 2006		June 1, 2007 (no enforcement)
Aspen Technology	June 12, 2006	Sept. 6, 2006	June 12, 2006		
Asyst Technologies	June 14, 2006	June 7, 2006	June 7, 2006		Feb. 6, 2007 (no enforcement)
Atmel	July 25, 2006	Aug. 15, 2006	Aug. 15, 2006		
Autodesk	Aug. 18, 2006	Aug. 17, 2006	Sept. 5, 2006		
Barnes & Noble	July 12, 2006	July 12, 2006	July 21, 2006		
BEA Systems	Aug. 4, 2006	Aug. 16, 2006			
Bed, Bath & Beyond	Aug. 4, 2006	Oct. 10, 2006	Oct. 10, 2006		
Black Box	Nov. 17, 2006	Nov. 17, 2006	Nov. 17, 2006		
Blue Coat Systems	July 14, 2006	Aug. 3, 2006	Aug. 3, 2006		
Boston Communications Group	May 22, 2006	July 21, 2006	July 21, 2006		
Broadcom	May 18, 2006	May 18, 2006	June 12, 2006	Dec. 18, 2006	
Brocade Communications Systems	Nov. 11, 2005	Jan. 7, 2005	May 16, 2005		July 20, 2006 (criminal and civil charges); May 31, 2007 (Settled with SEC)
Brooks Automation	Mar. 18, 2006	Late Apr. 2006	May 12, 2006		
CA (Computer Associates)	June 29, 2006	June 29, 2006			
Cablevision	Aug. 8, 2006	Aug. 8, 2006	Aug. 16, 2006		
Caremark Rx.	May 19, 2006	May 18, 2006	May 18, 2006		
CEC Entertainment	Aug. 7, 2006	Aug. 11, 2006	Aug. 11, 2006		

Ceradyne	Aug. 2, 2006	Aug. 4, 2006	Oct. 24, 2006		
Chordiant Software	Aug. 10, 2006	July 24, 2006	July 25, 2006		Feb. 14, 2007 (no enforcement)
Cirrus Logic	Oct. 25, 2006	Oct. 24, 2006	Oct. 30, 2006		
Clorox	Aug. 2, 2006	Aug. 2, 2006			
CNET Networks	May 22, 2006	May 22, 2006	May 24, 2006		
Computer Sciences	May 29, 2006	June 29, 2006	June 29, 2006		
Comverse Technology	Mar. 18, 2006	April 2006	May 4, 2006		Aug. 9, 2006 (criminal charges); Jan. 10, 2007 (settled with SEC)
Corinthian Colleges	July 12, 2006	July 12, 2006	Aug. 18, 2006		
Costco Wholesale	Oct. 13, 2006	Mar. 19, 2007	Mar. 19, 2007		
Crown Castle International	Aug. 4, 2006	Aug. 4, 2006	Aug. 4, 2006		
Cyberonics	June 8, 2006	June 8, 2006	June 9, 2006		
Dean Foods	Aug. 4, 2006	Nov. 1, 2006	Nov. 1, 2006		May 10, 2007 (no enforcement)
Delta Petroleum	May 24, 2006	May 22, 2006	June 19, 2006		
Electronic Arts	July 19, 2006	Sept. 20, 2006	Sept. 20, 2006		
Emcore	Nov. 7, 2006	Nov. 6, 2006			
Endocare	Aug. 24, 2006	Aug. 1, 2006	Aug. 1, 2006		
Engineered Support Systems	May 14, 2006	June 12, 2006	June 12, 2006		Feb. 6, 2007 (civil charges)
EPlus	Aug. 11, 2006	Aug. 11, 2006			
Equinix	June 12, 2006	June 12, 2006	June 12, 2006		Dec. 6, 2006 (termination of SEC probe); Jan. 17, 2007 (withdrawal of grand jury subpoena)
Extreme Networks	Sept. 21, 2006	Sept. 15, 2006	Sept. 15, 2006		
F5 Networks	May 22, 2006	May 22, 2006	May 22, 2006		
Forrester Research	Dec. 20, 2006	Dec. 19, 2006			
Foundry Networks	June 28, 2006	June 27, 2006	June 27, 2006		
Getty Images	Nov. 9, 2006	Nov. 9, 2006	Nov. 9, 2006		
Hansen Natural	Oct. 29, 2006	Oct. 31, 2006	Oct. 31, 2006		
HCC Insurance Holdings	Aug. 11, 2006	Nov. 17, 2006	Nov. 17, 2006		
Home Depot	June 16, 2006	June 16, 2006	June 23, 2006		
IBasis	Sept. 11, 2006	Oct. 20, 2006	Oct. 20, 2006		
Insight Enterprises	Oct. 21, 2006	Oct. 31, 2006	Oct. 31, 2006		
Integrated Silicon Solution	Aug. 4, 2006	Oct. 23, 2006			
Intuit	June 9, 2006	June 9, 2006	June 9, 2006		Oct. 30, 2006 (no enforcement)
J2 Global	Aug. 7, 2006	Aug. 11, 2006			
Jabil Circuit	Mar. 18, 2006	May 3, 2006	May 3, 2006		
Juniper Networks	May 17, 2006	May 22, 2006	May 22, 2006		
KB Home	Aug. 4, 2006	Aug. 23, 2006	Aug. 24, 2006		
Keithley	Aug. 12, 2006	Sept. 14, 2006	Sept. 14, 2006		
King Pharmaceuticals	Nov. 10, 2006	Nov. 10, 2006			
KLA-Tencor	May 22, 2006	May 22, 2006	May 22, 2006	Feb. 9, 2007	
KOS Pharmaceuticals	Aug. 16, 2006	Aug. 8, 2006	July (Aug. 8, 2006)		
Linear Technology	May 22, 2006	May 24, 2006	June 15, 2006		

Macrovision	June 14, 2006	June 13, 2006	June 13, 2006		Nov. 2, 2006 (no enforcement); Feb. 13, 2007 (withdrawal of grand jury subpoena)
Marvell Technology Group	May 22, 2006	July 5. 2006	July 5, 2006		
Maxim Integrated Products	May 22, 2006	June 7, 2006	June 7, 2006		
McAfee Inc.	May 19, 2006	May 25, 2006	May 25, 2006	June 9, 2006	
Meade Instruments	May 22, 2006	May 22, 2006	June 13, 2006		
Medarex	May 24, 2006	May 24, 2006	May 24, 2006		
Mercury Interactive	Nov. 11, 2005	May 15, 2006	Nov. 11, 2005		May 31, 2007 (settled with SEC)
Michaels Stores	June 9, 2006	June 14, 2006	June 15, 2006		Sept. 7, 2006 (withdrawal of one grand jury subpoena, but received another one)
Microtune	Sept. 20, 2006	Sept. 20, 2006			
Mips Technologies	Aug. 31, 2006	Sept. 19, 2006	Sept. 19, 2006		
Molex	Aug. 3, 2006	Aug. 2, 2006	Oct. 5, 2006		
Monster Worldwide	June 12, 2006	June 12, 2006	June 12, 2006		Feb. 15, 2007 (plead guilty to criminal charges)
msystems	June 2, 2006	June 1, 2006	July 3, 2006		
Nabors Industries	Dec. 27, 2006	Dec. 27, 2006	Feb. 7, 2007		May 9, 2007 (no enforcement)
Newpark Resources	July 14, 2006	June 29, 2006			
Nvidia	June 9, 2006	Aug. 10, 2006			
Nyfix	Nov. 11, 2005	May 20, 2006	Nov. 11, 2005		
Openwave Systems	May 22, 2006	May 22, 2006	May 22, 2006		
Pediatrix	Aug. 3, 2006	Dec. 6, 2006	Dec. 6, 2006		
Pixar	Aug. 8, 2006	Nov. 9, 2006	Sept. 17, 2006		
PMC-Sierra	Aug. 14, 2006	Nov. 9, 2006	Nov. 9, 2006		
Power Integrations	Apr. 19, 2006	May 5, 2006	May 24, 2006		
Progress Software	June 21, 2006	June 19, 2006	June 27, 2006		
Quest Software	May 23, 2006	May 22, 2006	June 1, 2006		
QuickLogic	July 27, 2006	Aug. 7, 2006	Aug. 7, 2006		Mar. 23, 2007 (no enforcement)
Rambus	May 24, 2006	May 30, 2006			
Redback Networks	July 1, 2006	June 30, 2006	June 30, 2006		
Renal Care	May 22, 2006	June 2, 2006	June 2, 2006		
Research In Motion	Sept. 29, 2006	Sept. 28, 2006	Oct. 27, 2006		
Restoration Hardware	Nov. 1, 2006	Aug. 28, 2006			
RSA Security	May 20, 2006	June 13, 2006	May 20, 2006		
SafeNet	May 19, 2006	May 19, 2006	May 19, 2006		
Sanmina-SCI	June 10, 2006	June 9, 2006	June 9, 2006		
Sapient	Oct. 17, 2006	Oct. 17, 2006			
Semtech	May 23, 2006	May 22, 2006	May 22, 2006		
Sepracor	May 24, 2006	June 2, 2006	June 2, 2006		
Sharper Image	Sept. 7, 2006	Sept. 7, 2006			
Sigma Designs	July 27, 2006	July 26, 2006	July 26, 2006		
Silicon Image	Oct. 29, 2006	Oct. 31, 2006	Oct. 31, 2006		
Sonus Networks	Nov. 6, 2006	Nov. 6, 2006			
Stolt-Nielsen	June 3, 2006	June 1, 2006	July 6, 2006		

Sunrise Telecom	Sept. 20, 2006	Sept. 20, 2006	Sept. 20, 2006		
Sycamore Networks	May 23, 2006	May 23, 2006		May 23, 2006	
Take-Two Interactive Software	July 10, 2006	July 10, 2006	July 10, 2006		Feb. 14, 2007 (settled with SEC)
The Cheesecake Factory	July 18, 2006	July 19, 2006	Aug. 3, 2006		
THQ	July 18, 2006	Aug. 7, 2006	Aug. 7, 2006		
Trident Microsystems	May 22, 2006	May 26, 2006	2004, June 16, 2006 (Justice)		
UnitedHealth	Mar. 18, 2006	May 11, 2006	May 11, 2006	Dec. 26, 2006	
Valeant Pharmaceuticals	Sept. 11, 2006	Sept. 11, 2006	Sept. 11, 2006		
Verint	Apr. 18, 2006	Apr. 17, 2006	July 20, 2006		
VeriSign	June 27, 2006	June 27, 2006	June 27, 2006		
Vitesse Semiconductor	Mar. 18, 2006	Apr. 19, 2006	May 18, 2006		
Witness Systems	Aug. 9, 2006	Aug. 9, 2006	Oct. 30, 2006		
Xilinx	June 7, 2006	June 23, 2006	June 23, 2006		Nov. 30, 2006 (no enforcement)
Zoran	May 23, 2006	July 3, 2006	July 3, 2006		

Table 11
Event Study Analysis

This table presents the abnormal stock returns around the earliest press release of backdating practice of the sample firms. Abnormal stock returns are estimated by the market risk adjusted model, with equally weighted market index excluding dividends, in which the estimation window lasts 255 days ending 45 days prior to the release. The release information is collected from Factiva and WSJ. Panel A shows the results on the daily basis, and panel B summaries by dividing the whole event window into three sub-periods. Similar to Panel B, Panel C shows the summary of the sub-period results by using value weighted market index excluding dividends, *ceterīs paribus*. The symbols *,**, and *** denote statistical significance at the 0.05, 0.01 and 0.001 level, respectively, using a 2-tail test.

Panel A: Day-by-Day Basis (equally weighted index)						
Day	Sample Number	Average Abnormal Return (%)	Cumulative Average Abnormal Return (%)	Positive: Negative	Sign	Patell Z
-30	119	0.20	0.20	51:68	(-)	0.581
-29	119	-0.42	-0.22	45:74	(-)	-2.488*
-28	119	0.23	0.01	59:60	(-)	1.321
-27	119	-0.19	-0.18	61:58	(+)	-1.194
-26	119	0.17	-0.01	55:64	(-)	1.148
-25	119	0.06	0.05	62:57	(+)	0.253
-24	119	0.08	0.13	60:59	(+)	0.845
-23	119	0.32	0.45	61:58	(+)	1.34
-22	119	-0.16	0.29	53:66	(-)	-1.33
-21	119	-0.40	-0.11	51:68	(-)	-1.827
-20	119	-0.17	-0.28	61:58	(+)	-0.49
-19	119	-0.72	-1.00	57:62	(-)	-2.986**
-18	119	-0.07	-1.07	52:67	(-)	-0.091
-17	119	-0.42	-1.49	46:73	(-)	-1.794
-16	119	-0.39	-1.88	53:66	(-)	-1.481
-15	119	-0.41	-2.29	57:62	(-)	-1.504
-14	119	-0.05	-2.34	54:65	(-)	-0.225
-13	119	0.06	-2.28	61:58	(+)	0.402
-12	119	-0.38	-2.66	51:68	(-)	-1.642
-11	119	-0.30	-2.96	48:71	(-)	-1.454
-10	119	-0.15	-3.11	52:67	(-)	-0.552
-9	119	-0.32	-3.43	47:72	(-)	-1.161
-8	119	-0.35	-3.78	55:64	(-)	-1.36
-7	119	-0.41	-4.19	48:71	(-)	-2.678**
-6	119	0.03	-4.16	57:62	(-)	0.628
-5	119	-0.21	-4.37	54:65	(-)	-1.005
-4	119	-0.24	-4.61	59:60	(-)	-1.149
-3	119	-0.47	-5.08	51:68	(-)	-2.017*
-2	119	-0.30	-5.38	42:77	(-)	-1.325
-1	119	0.11	-5.27	61:58	(+)	1.018
0	**119**	**-2.09**	**-7.36**	**33:86**	**(-)**	**-9.660*** **
1	119	-0.17	-7.53	61:58	(+)	-0.547
2	119	-0.10	-7.63	57:62	(-)	0.111
3	118	0.43	-7.20	62:56	(+)	2.346*
4	118	0.25	-6.95	65:53	(+)	0.808
5	118	-0.59	-7.54	41:77	(-)	-3.169**
6	118	0.07	-7.47	60:58	(+)	0.383
7	118	0.34	-7.13	61:57	(+)	1.329
8	117	-0.11	-7.24	56:61	(-)	-0.239
9	117	-0.02	-7.26	54:63	(-)	-0.014
10	117	0.01	-7.25	58:59	(-)	-0.107

11	117	0.02	-7.23	51:66	(-)	0.033
12	117	0.01	-7.22	64:53	(+)	0.378
13	117	0.22	-7.00	64:53	(+)	0.756
14	117	-0.58	-7.58	45:72	(-)	-2.622**
15	117	0.32	-7.26	61:56	(+)	1.225
16	117	0.23	-7.03	60:57	(+)	0.769
17	117	0.38	-6.65	65:52	(+)	1.891
18	117	0.16	-6.49	55:62	(-)	0.85
19	117	-0.39	-6.88	49:68	(-)	-2.040*
20	117	0.16	-6.72	59:58	(+)	0.867
21	117	-0.16	-6.88	59:58	(+)	-0.838
22	117	-0.04	-6.92	53:64	(-)	-0.138
23	117	0.05	-6.87	59:58	(+)	0.413
24	117	-0.08	-6.95	56:61	(-)	-0.252
25	117	0.41	-6.54	62:55	(+)	1.524
26	117	0.13	-6.41	60:57	(+)	0.806
27	117	-0.30	-6.71	50:67	(-)	-0.977
28	117	0.03	-6.68	47:70	(-)	-0.762
29	116	0.23	-6.45	63:53	(+)	0.941
30	116	-0.50	-6.95	50:66	(-)	-2.632**

Panel B: Pre- and Post Event Period Basis (equally weighted index)

Period	Sample Number	Average Abnormal Return (%)	Precision Weighted CAAR (%)	Positive: Negative	Patell Z
(-30,-2)	119	-5.36	-4.80	45:74(-)	-4.314***
(-1,0)	119	-1.98	-1.79	39:80(-)	-6.111***
(+1,+30)	119	0.40	0.23	56:63(-)	0.203

Panel C: Pre- and Post Event Period Basis (value weighted index)

Period	Sample Number	Average Abnormal Return (%)	Precision Weighted CAAR (%)	Positive: Negative	Patell Z
(-30,-2)	119	-6.10	-5.69	43:76(-)	-5.104***
(-1,0)	119	-2.14	-1.96	36:83(-)	6.685***
(+1,+30)	119	-0.16	-0.37	54:65(-)	-0.326

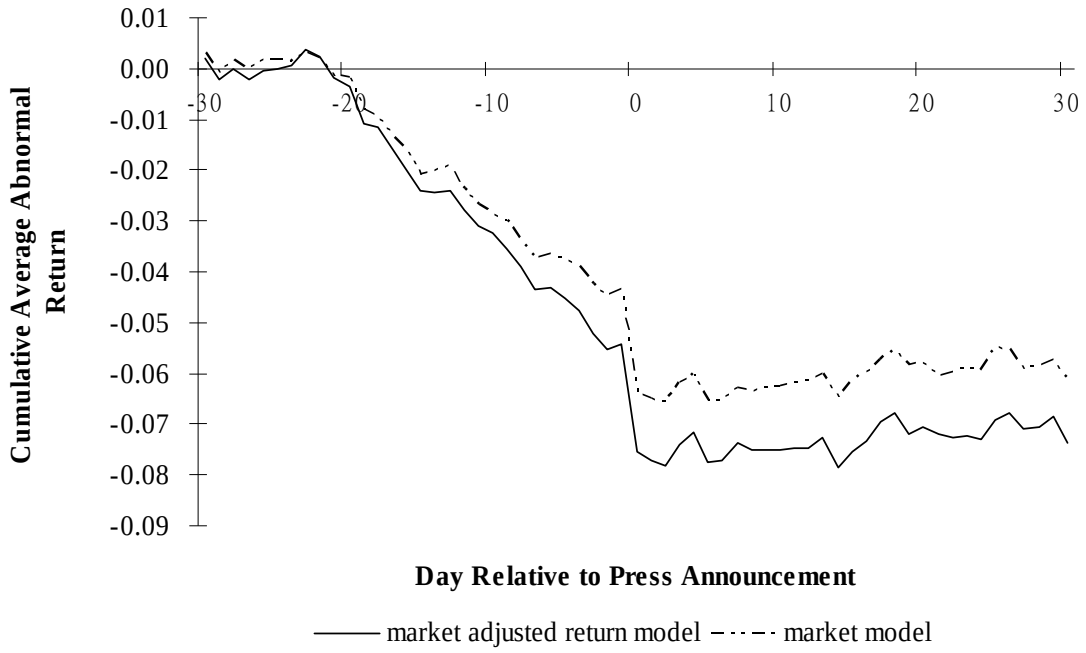

Fig. 1. Cumulative Abnormal Stock Returns Around Press Revealing Backdating Date

Figure 1 shows the cumulative abnormal stock returns from 30 days before through 30 days after the earliest press release of backdating practice of the sample firms. Abnormal stock returns are estimated using the market model and market risk adjusted model, with equally weighted market index excluding dividends, in which the estimation window lasts 255 days ending 45 days prior to the release. The release information is collected from Factiva and WSJ.

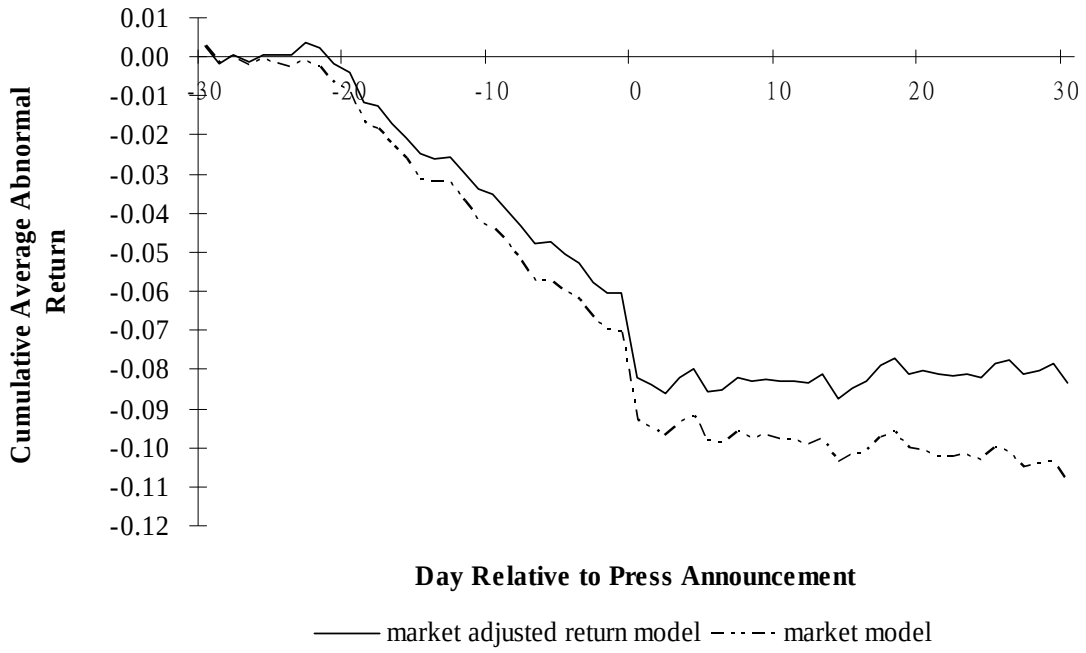

Fig. 2. Cumulative Abnormal Stock Returns Around Press Revealing Backdating Date

Figure 2 shows the cumulative abnormal stock returns from 30 days before through 30 days after the earliest press release of backdating practice of the sample firms. Abnormal stock returns are estimated using the market model and market risk adjusted model, with value weighted market index excluding dividends, in which the estimation window lasts 255 days ending 45 days prior to the release. The release information is collected from Factiva and WSJ.

Table 12: Corporate Fraud and Reputation Risk

Panel A gives a summary of number of Accounting and Auditing Enforcement Releases (AAERs) issued by the SEC, the number of Securities Class Action Filings (SCAFs) from the Stanford Securities Class Action Clearinghouse (SSCAC), and cumulative abnormal stock return (CAR) of each individual firm in the sample. In particular, for the CAR, three sub-periods are estimated by market adjusted return model with value weighted index excluding dividends. Panel B reports the correlation matrix.

Panel A: Summary					
Company	# of AAERs	# of SCAFs	Cumulative Abnormal Return (%) (-1,0)	(-30, 0)	(-30,30)
Activision	0	1	3.51	-10.79	-15.37
Affiliated Computer Services	0	0	1.07	10.97	-0.94
Affymetrix	0	1	-2.52	-26.46	-31.49
Agile Software	0	1	-0.63	6.16	10.89
Alkermes	0	1	8.27	-1.17	-12.09
Altera	0	0	-3.42	-0.45	-9.65
American Tower	0	0	-13.78	-9.72	53.66
Amkor Technology	0	0	-6.80	-8.95	-14.83
Analog Devices	0	0	2.12	2.69	-1.76
Apollo Group	0	1	-1.71	-23.46	-29.79
Apple Inc.	0	1	-0.01	-6.98	3.10
Applied Micro Circuits	0	1	-4.60	-17.47	-38.69
ArthroCare	0	0	-1.88	5.86	10.00
Aspen Technology	2	2	-3.21	-30.85	-49.24
Asyst Technologies	0	0	-2.65	1.78	-13.43
Atmel	0	3	-11.32	-6.19	23.15
Autodesk	0	1	2.34	2.18	-0.14
Barnes & Noble	0	0	-1.08	-8.22	-5.98
BEA Systems	0	1	1.90	-3.68	2.55
Bed, Bath & Beyond	0	0	3.04	-7.53	-3.21
Black Box	0	1	-1.73	2.40	-1.06
Blue Coat Systems	0	1	-15.32	-6.30	10.62
Boston Communications Group	0	2	7.60	-6.81	-29.90
Broadcom	0	1	3.01	4.14	6.17
Brocade Communications Systems	0	1	-8.77	-6.69	-7.72
Brooks Automation	0	0	-0.06	-6.88	-22.88
CA (Computer Associates)	10	1	-3.07	-7.51	-1.88
Cablevision	0	0	1.93	6.00	4.64
Caremark Rx.	0	0	2.77	-15.02	-32.69
CEC Entertainment	0	0	-0.72	-8.01	-0.20
Ceradyne	0	0	-6.55	0.31	-7.97
Chordiant Software	0	1	2.36	-15.04	-14.83
Cirrus Logic	0	0	-4.91	-7.02	-2.93
Clorox	0	1	-0.51	-4.16	-5.81
CNET Networks	0	0	-2.31	-13.47	-14.68
Computer Sciences	0	0	-0.04	-1.68	-3.78
Comverse Technology	0	1	-2.53	-19.73	-23.30
Corinthian Colleges	0	2	-0.93	1.16	-8.75
Costco Wholesale	0	0	4.97	8.30	7.15
Crown Castle International	0	0	6.72	-0.46	-1.38
Cyberonics	0	1	1.84	8.24	-5.33
Dean Foods	0	0	-0.09	3.01	10.06
Delta Petroleum	0	0	0.41	-2.84	-7.17
Electronic Arts	0	1	-0.32	12.62	19.72
Emcore	0	0	-6.76	-10.18	-7.80
Eplus	0	0	-1.90	5.34	7.51
Equinix	0	1	-7.34	-32.05	-33.22

Extreme Networks	0	1	-2.84	-10.76	-5.18
F5 Networks	0	1	0.00	-35.85	-59.52
Forrester Research	0	0	-1.73	-12.49	-18.32
Foundry Networks	0	2	-3.91	-0.42	-22.07
Getty Images	0	0	-0.79	-16.87	-23.90
Hansen Natural	0	0	-14.38	-5.76	0.30
HCC Insurance Holdings	0	0	-0.33	-21.29	-22.44
Home Depot	0	1	-1.48	-2.70	-10.57
Ibasis	0	1	-0.99	12.06	6.33
Insight Enterprises	0	1	-5.51	9.49	4.54
Integrated Silicon Solution	0	0	-3.63	0.88	1.67
Intuit	0	0	-3.94	-1.35	15.25
J2 Global	0	0	-5.01	-20.34	-19.92
Jabil Circuit	0	0	1.83	-5.07	-4.49
Juniper Networks	0	2	1.69	-8.08	-11.68
KB Home	0	0	-7.20	-16.65	9.27
Keithley	0	1	-1.98	-9.64	-3.03
King Pharmaceuticals	0	1	3.06	-7.57	-11.01
KLA-Tencor	0	0	4.84	-15.52	-17.15
KOS Pharmaceuticals	0	1	1.83	9.82	22.54
Linear Technology	0	0	-5.71	-60.13	-59.06
Macrovision	0	0	-0.11	-4.83	-5.02
Marvell Technology Group	0	1	-11.22	-18.61	-55.16
Maxim Integrated Products	0	0	-1.91	-36.89	-50.41
McAfee Inc.	3	0	-3.63	-0.69	0.10
Meade Instruments	0	0	-1.50	13.64	2.78
Medarex	0	0	-4.18	-5.43	-20.43
Mercury Interactive	0	0	-1.41	-26.59	-23.95
Michaels Stores	0	1	-2.64	6.98	-4.43
Microtune	1	2	-3.27	-1.00	-18.16
Mips Technologies	0	0	-1.97	17.75	17.69
Molex	0	1	2.92	-5.00	9.08
Monster Worldwide	1	0	6.02	-5.37	-1.14
msystems	0	0	-14.19	-3.36	-12.12
Nabors Industries	0	0	-1.75	-7.04	-12.33
Newpark Resources	0	0	-1.57	-1.31	0.21
Nvidia	2	1	0.02	-5.25	-26.33
Openwave Systems	0	2	-14.28	-12.15	-18.94
Pediatrix	0	2	2.57	-3.18	4.92
PMC-Sierra	0	0	-0.78	-45.63	-34.51
Power Integrations	0	0	4.78	0.98	-30.59
Progress Software	0	0	-1.64	-7.52	-4.91
Quest Software	0	2	-4.21	-12.50	-22.99
QuickLogic	0	1	-26.01	-41.44	-58.73
Rambus	0	1	2.66	8.96	19.15
Redback Networks	0	3	3.12	-14.50	-21.79
Research In Motion	0	0	-2.25	10.90	46.95
Restoration Hardware	0	0	0.80	-6.93	28.23
RSA Security	1	0	-6.21	-0.56	7.44
SafeNet	0	0	-23.56	-46.48	-27.04
Sanmina-SCI	0	0	-0.97	6.95	17.93
Sapient	0	0	-11.81	1.31	6.18
Semtech	0	0	3.97	-18.72	-15.67
Sepracor	0	1	5.00	-36.60	-43.64
Sharper Image	0	1	-1.91	-17.60	-7.61
Sigma Designs	0	1	-1.34	-23.73	28.43
Silicon Image	0	3	-5.69	-7.52	2.40
Sonus Networks	0	3	2.54	-6.69	15.26

Stolt-Nielsen	0	0	-0.50	-0.51	-13.88
Sycamore Networks	0	2	3.08	15.21	11.94
Take-Two Interactive Software	3	2	-7.99	-46.02	-16.27
The Cheesecake Factory	0	0	-2.58	-7.80	13.63
THQ	0	1	-2.76	-14.35	-17.20
Trident Microsystems	0	0	-8.70	-13.77	-14.46
UnitedHealth	0	2	3.25	22.26	-31.41
Valeant Pharmaceuticals	0	0	-3.69	-1.50	-12.97
Verint	0	0	-2.43	-7.40	-9.22
VeriSign	0	1	-1.23	-29.37	-27.93
Vitesse Semiconductor	0	0	-5.96	-17.59	-13.99
Witness Systems	0	0	-6.87	-30.84	-8.33
Xilinx	0	0	0.28	-27.75	-23.10
Zoran	0	0	6.39	-3.30	-12.02
Mean	0.19	0.63	-2.14	-8.25	-8.43

Panel B: Correlation Matrix

	# of AAERs	# of SCAFs	CAR(-1,0)	CAR(-30, 0)	CAR(-30,30)
# of AAERs	1				
# of SCAFs	0.098	1			
CAR(-1,0)	-0.039	0.033	1		
CAR(-30, 0)	-0.060	-0.006	0.319	1	
CAR(-30,30)	-0.015	-0.077	0.082	0.637	1

Table 13: Regression Analysis of Abnormal Returns

This table provides OLS estimates of cumulative abnormal returns on firms subject to backdating issues. AAERs are the Accounting and Auditing Enforcement Releases issued by the SEC, and SCAFs are the Securities Class Action Filings from the Stanford Securities Class Action Clearinghouse (SSCAC). Panel A reports the correlations between explanatory variables and Panel B summaries the estimation results, in which some models control for industry effects coded using the first 2-digit NAICS codes. P-values are reported in the parentheses and the symbols *, **, and *** represent statistical significance at the 0.1, 0.05, 0.01 level, respectively.

Panel A: Correlations

	Size - log(sales)	Market to Book Ratio	Return on Assets	GIM Index	AAERs	GIM*AAERs	SCAFs	GIM*SCAFs
Size - log(sales)	1							
Market to Book Ratio	-0.145	1						
Return on Assets	0.325	-0.072	1					
GIM Index	0.073	0.048	0.030	1				
AAERs	0.082	-0.023	0.055	0.104	1			
GIM*AAERs	0.082	-0.021	0.049	0.118	0.994	1		
SCAFs	-0.121	0.035	-0.115	0.021	0.079	0.067	1	
GIM*SCAFs	-0.109	0.048	-0.124	0.155	0.098	0.094	0.970	1

Panel B: Estimation Results

Dependent Variable	CAR(-1,0)			CAR(-30,0)		
	(1)	(2)	(3)	(1)	(2)	(3)
Size - log(sales)	0.00485	0.00475	0.01115	0.01397	0.01328	0.01806
	(0.4362)	(0.4468)	(0.2382)	(0.5263)	(0.5480)	(0.5332)
Market to Book Ratio	0.00016**	0.00016**	0.00020**	0.00081***	0.00081***	0.00094***
	(0.0412)	(0.0435)	(0.0205)	(0.0035)	(0.0037)	(0.0019)
Return on Assets	0.00822**	0.00841**	0.00734	0.01095	0.01222	0.01135
	(0.0474)	(0.0443)	(0.1099)	(0.2086)	(0.1532)	(0.2610)
GIM Index	0.00420*	0.00389	0.00336	0.01109	0.00901	0.00649
	(0.0802)	(0.1057)	(0.2616)	(0.1288)	(0.1953)	(0.4517)
AAERs	-0.00504**	-0.04213***	-0.03898***	-0.01337	-0.25987***	-0.26523***
	(0.0204)	(0.0029)	(0.0064)	(0.2804)	(0)	(0.0003)
GIM Index*AAERs		0.00386***	0.00363***		0.02567***	0.02618***
		(0.0057)	(0.0072)		(0)	(0.0003)
Industry Effects	No	No	Yes	No	No	Yes
R^2	0.132	0.142	0.243	0.072	0.119	0.207
Adjusted R^2	0.085	0.086	0.046	0.021	0.061	0.001
Sample Size	98	98	98	98	98	98

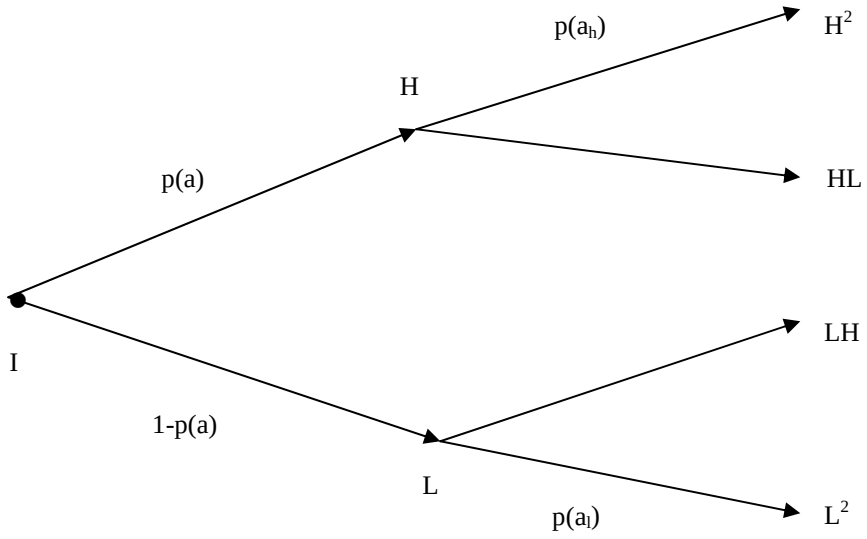

Figure 3: The evolution of information and distribution of final cash flows in the baseline model

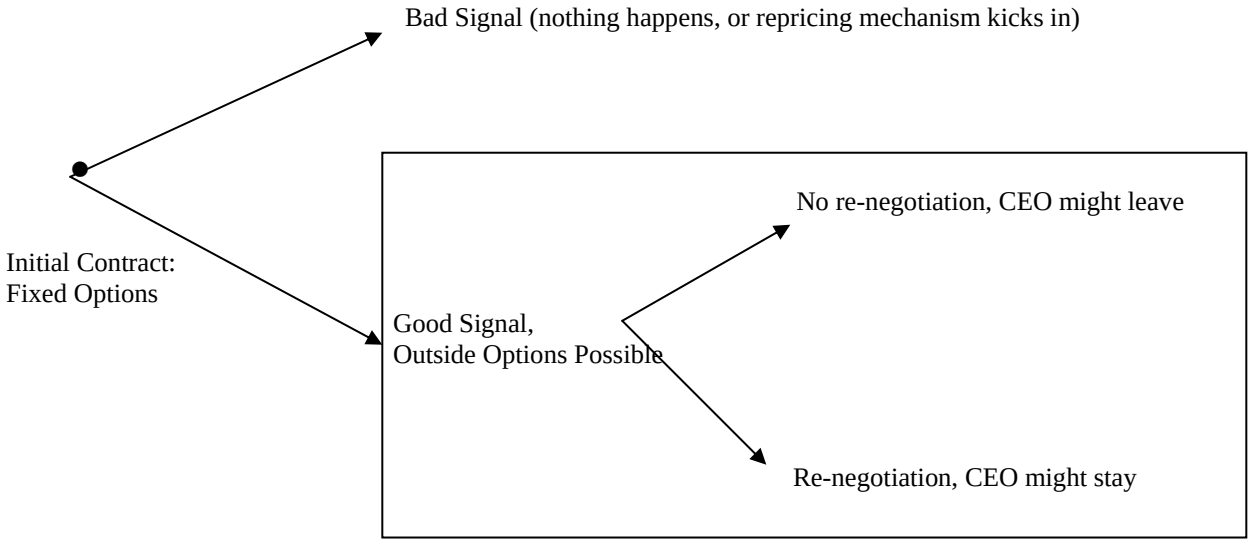

Figure 4: The simple evolution of the game with renegotiation prospects

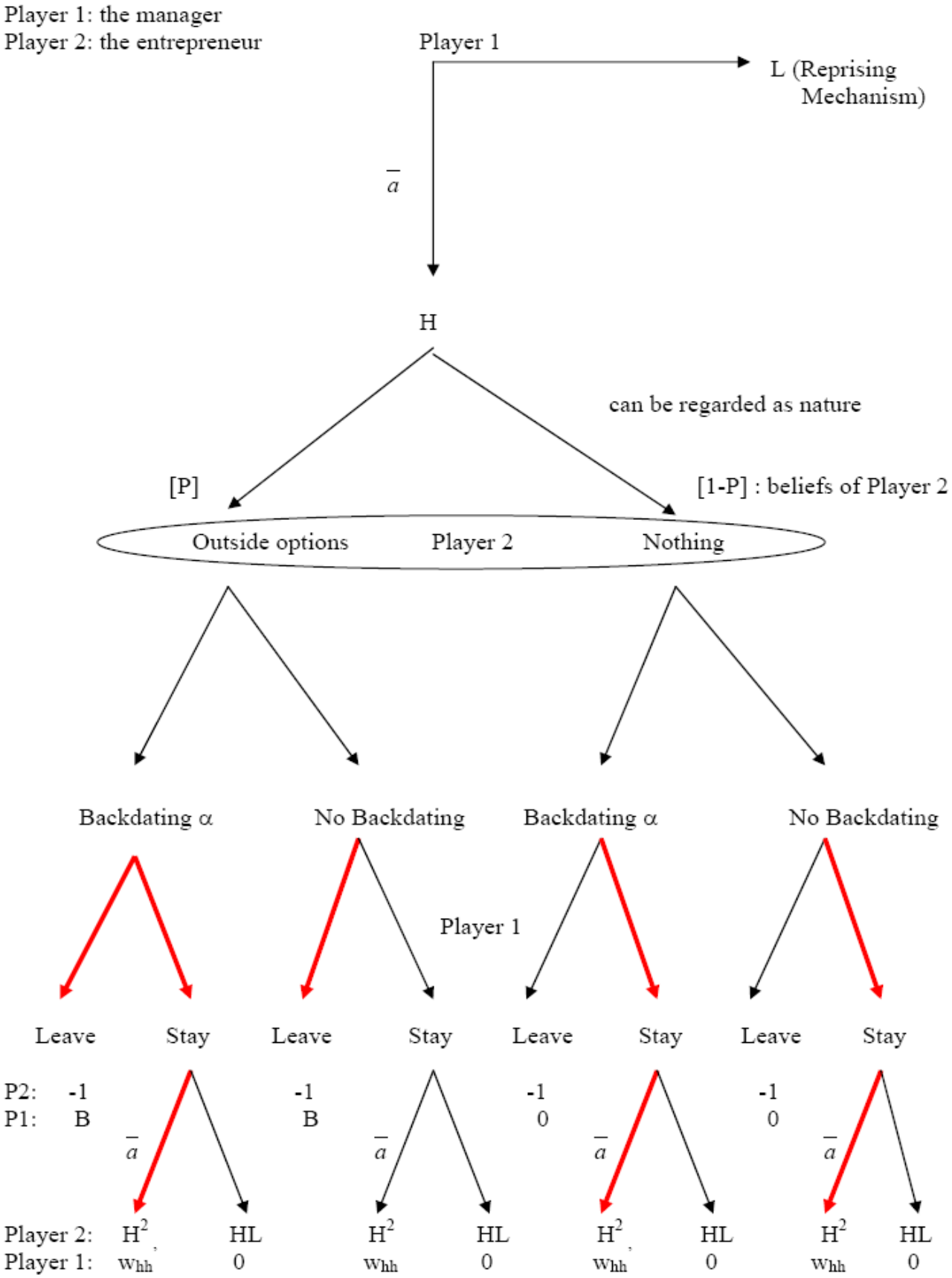

Figure 5: The extensive form of the dynamic game of imperfect information

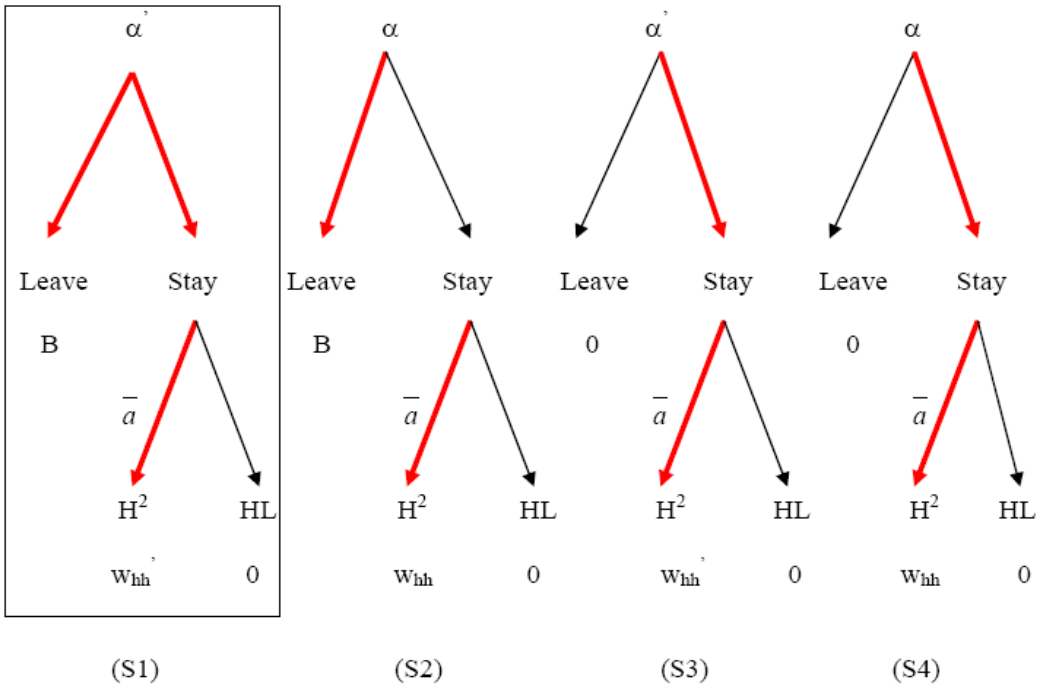

Figure 6: The four subgames for Player 1

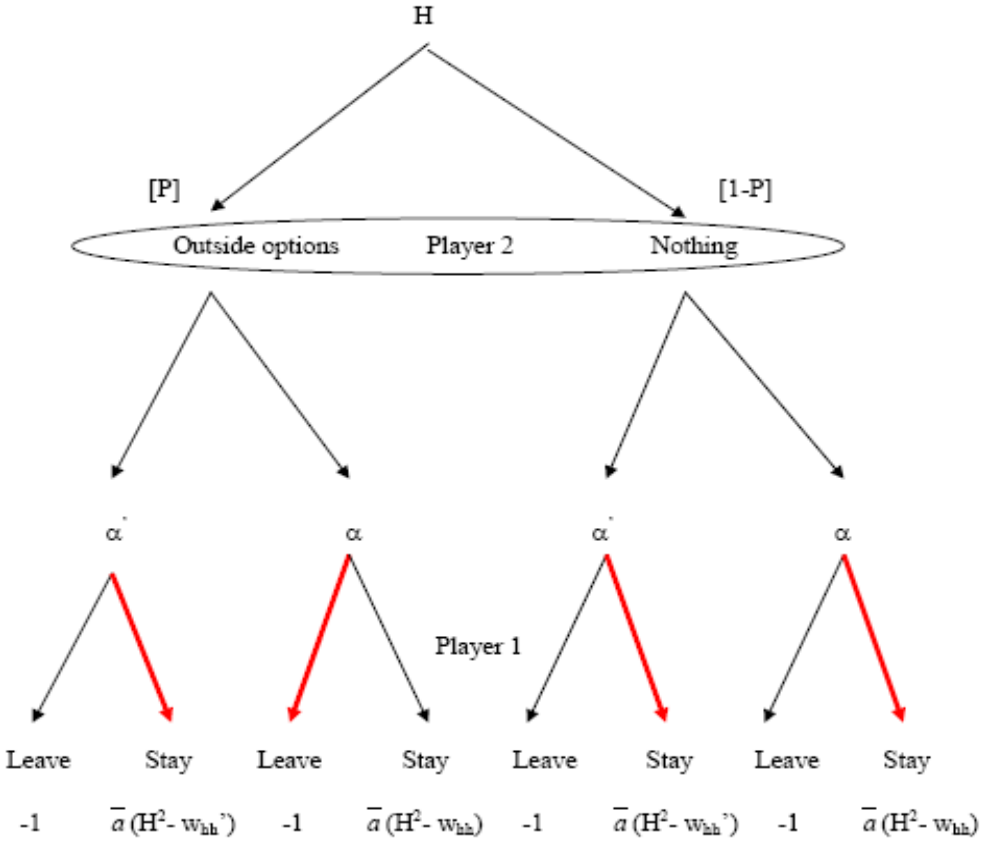

Figure 7: The extensive form of the subgame for Player 2 in Case 1