The choice between an IPO, sellout, and reverse takeover: Korean evidence

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Abstract

We investigate the characteristics of firms that choose between three different methods, IPOs, sellouts, or reverse takeovers to obtain exchange listings using Korean data over the period of 2000-2006. We first document that Korean firms, unlike U.S. firms, use reverse takeovers more frequently than IPOs to go public. We find that firm size, profitability, asymmetric information, and venture capital backing are important factors in determining the choice of the firms. Small and profitable firms tend to choose IPOs to go public, and they are subject to less information asymmetry. Large and unprofitable firms tend to choose sellouts and reverse takeovers to obtain public status. Compared to sellout firms, reverse takeover firms tend to be venture-capital backed and time stock markets. We also investigate the long-run stock return performance after these firms go public. Although all the firms underperform the market on average, the firms using reverse takeovers perform the worst.

JEL code: *G30, G34, G24*
Key words: *initial public offering, mergers and acquisitions, sellout, reverse takeover*

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I. Introduction

Private firms go public to access capital markets for continued growth and expansion, for owners to liquidate their ownership, or both. Previous literature has focused upon the privately held firm's choice of going public by way of an initial public offering (IPO) or a takeover by a publicly-traded acquirer (sellout). In an IPO, the entrepreneur of the private firm sells off a portion of its outstanding equity, but the entrepreneur retains significant ownership and control of the public firm. In a sellout, a public firm generally buys all of the outstanding shares of the private firm. Recently, many private firms have gone public using an alternative method such as a reverse takeover. A reverse takeover occurs when a privately held firm acquires a publicly traded firm (shell) to obtain its public status. Little research has been conducted on reverse takeovers since only a small number of U.S. firms use the method to go public. Gleason, Rosenthal, and Wiggins (2004) investigate the characteristics and motivation of firms that engage in reverse takeovers, and also examine the short- and long-term performance following the reverse takeovers. However, their sample consists of only 121 reverse takeovers in the U.S. over the sample period of 1987-2001. The reverse takeovers are rare events in the U.S. markets, considering that 5,642 firms went public using the IPO method over the same period[1]. In addition, previous literature has not investigated what factors drive the choice among IPO, sellout, and reverse takeover since the sample size of reverse takeovers is very small compared to those of IPOs and sellouts.

In Korea, the reverse takeover has been a very popular method that private firms utilize to obtain exchange listings over the past decade. The private firms in Korea have used reverse

[1] Refer to Jay Ritter's Home Page.

takeovers more frequently than IPOs to obtain public status. Out of 483 firms that obtained the public status in our sample period, 2000-2006, 63 firms (13%) used IPOs, 252 firms (52%) used sellouts, and 168 firms (35%) used reverse takeovers. Therefore, the Korean data provides us a unique opportunity to investigate what factors influence the choice among IPO, sellout, and reverse takeover of a privately held firm to obtain public status.

Previous literature has compared sellouts to IPOs. Poulsen and Stegemoller (2008) examine whether firm-specific factors such as growth opportunities, financial constraints, and asymmetric information in firm valuation are associated with the method chosen to move assets from private to public status. In contrast, Brau, Francis, and Kohers (2003) primarily examine industrial and macroeconomic determinants of the sellout compared to the IPO decision. They find that industry characteristics, market timing, and demand for fund factors are important determinants. Brown, Dittmar, and Servaes (2005) analyze a third alternative, roll-up IPOs, whereby small and private firms merge into a shell company, which goes public simultaneously. They find that the future performance of these roll-ups depends on the continued involvement of the original private firms' owners and managers. However, these papers do not investigate reverse takeovers, which is one of the important ways to move assets from private to public status. Through our research, we attempt to fill this gap in the literature.

In this study, we compare three alternatives for moving assets from private to public ownership using Korean data. Our sample consists of 483 private firms which used sellouts, IPOs, or reverse takeovers to obtain exchange listings over the period of 2000-2006. We investigate the firm-specific factors that determine the mechanism by which a private firm moves to public status after the firm has decided to access the public equity markets. We first document that small and profitable firms tend to conduct IPOs. This is inconsistent with Brau et al's

(2003) and Poulsen and Stegemoller's (2008) findings that larger firms tend to choose IPOs due to higher costs during the IPO process. The IPO firms have less intangible assets and are older, which means that they are less subject to information asymmetry. Large and unprofitable firms tend to choose sellouts or reverse takeovers to move assets from private to public ownership. Unlike sellout firms, firms choosing reverse takeovers are more likely to do businesses in high-tech industries and they tend to be venture-capital backed.

We then investigate the long-run stock return performance during 18 months after these firms go public. The mean market-adjusted buy-and-hold return for reverse takeover firms is -52 percent while those for IPO and sellout firms are -13 and -19 percent, respectively. The survival rate of reverse takeover firms over the period is significantly lower than those of IPO and sellout firms. These results are consistent with Gleason et al.'s (2005) finding that reverse takeover firms fail to generate long-term wealth.

In this study, we also contribute to the understanding of why firms choose to reverse takeovers to go public. Previous literature indicates that small firms might use reverse takeovers due to higher costs incurred in the IPO process. Interestingly, we find that larger and unprofitable firms use reverse takeovers. These private firms also tend to be venture-capital backed, and acquire shell companies (or public firms) when the stock market is relatively hot. These results indicate that since the private firms might not be qualified for IPOs due to the lower profitability, the venture capitalists investing in the firms try to exit from the investments through reverse takeovers. Even though the venture-capital backed firms are qualified for IPO in terms of firm age, size and profitability, some of them still prefer reverse takeovers over the IPO. Since the IPO process takes more than one year on average in Korea, the venture capitalist can quickly exit from its investment using reverse takeovers. Lerner (1994) finds that venture

capitalists take firms public through the IPO at market peaks, relying on private financings when valuations are lower. Our result suggests that venture capitalists also resort to reverse takeovers to take firms public.

The paper proceeds as follows. Section II reviews previous literature and develops hypotheses. Section III describes the data and Section IV explains the empirical findings. Section V presents our conclusions.

II. Literature review and hypotheses development

When private firms move to public status, the fundamental decision is whether to do so through IPOs, sellouts, or reverse takeovers. We focus on the firm characteristics that can influence the relative attractiveness of one choice versus the others in examining their decisions. Since IPOs or public sellouts mainly give the firm, its managers, and investors access to public capital markets in the U.S., academic studies have neglected reverse takeovers as an alternative to go public. While considering the reverse takeover as one of the methods private firms can choose to go public, we examine what factors drive the choice between IPOs, public sellouts, or reverse takeovers.

First of all, we expect that information asymmetry between insiders and outside investors may play an important role in determining the method by which a firm moves to public ownership. It is well known that firms facing more information asymmetry tend to be more underpriced when they go public through an IPO. Ritter (1984) and Beatty and Ritter (1986) find that underpricing increases in the *ex ante* uncertainty about the value of an IPO firm. That is, for an issuing firm, IPOs are more costly (or more underpriced) when there is increased uncertainty on the part of the investor regarding the value of a firm. We expect that firms with

assets that are not easily valued by outside investors are likely to avoid using IPOs. Chemmanur and Fulghieri (1999) develop a theoretical model showing that a firm's decision to go public through an IPO or to remain a private firm is determined by asymmetric information. They show that firms go public only when a sufficient amount of information about them has accumulated in the public domain. Bayar and Chemmanur's (2006) model develops the analysis of a private firm's choice of exit mechanism between IPOs and acquisitions. They show that firms in the earlier stage, with products that are untested against competition, prefer to sell out since the acquisition creates synergy in the product market. Later stage firms that are more viable against the competition in the product market are more likely to go public through an IPO. Empirically, Poulsen and Stegemoller (2008) find that firms with more intangible assets and firms in the development stage are more likely to be involved in a sellout to a public firm than they are to use an IPO.

Following the theory of asymmetric information, we hypothesize that firms facing a greater extent of information asymmetry tend to use a sellout to obtain the public status, instead of going public through an IPO. We also expect that firms facing higher information asymmetry tend to use reverse takeovers rather than IPO to go public. These findings suggest that IPO firms are less subject to information asymmetry. As a proxy for information asymmetry, we use the ratio of intangible assets to total assets or firm age.

Capital structure and liquidity constraints can affect the decision to go public through an IPO, a sellout, or a reverse takeover. When evaluating private firms, investors may consider high debt levels a potential risk factor since profitability and leverage are important factors for the investors' evaluation. Highly levered firms would be more severely underpriced if they go public through an IPO. In addition, highly levered firms may have difficulty in obtaining

approval to conduct IPOs from the authorities of the Korean stock markets. Brau et al. (2003) find that private firms belonging to highly leveraged industries tend to use sellouts rather than IPOs. Yet, they do not use the debt ratios of individual firms due to the limited availability of data. Poulsen and Stegemoller (2008) find that firms that use an IPO to go public have significantly less debt than do the sellout firms. Gleason et al. (2005) argue that public firms involved in reverse takeovers are unprofitable prior to the event and that private partner has the solid financial position. Therefore, we hypothesize that sellout firms have higher leverage than the firms using IPOs or reverse takeovers. We use the ratio of long-term debt to total assets to measure leverage.

Poulsen and Stegemoller (2008) also argue that firms that have positive investment projects, but experience liquidity constraints raise funds by issuing public equity instead of going public using sellouts. Since private firms acquiring public firms in reverse takeovers need to have sufficient cash holdings, those firms tend not to experience liquidity constraints prior to the transaction. Accordingly, we hypothesize that firms that go public using sellouts have higher liquidity constraints than IPO or reverse takeover firms. We use the ratio of earnings before interest, tax, depreciation, and amortization (EBITDA) to interest expenses to measure liquidity constraints.

When private firm owners decide their method of going public, their level of ownership before and after the reorganization can be an important factor. In a sellout, the majority of the ownership stake in a private firm changes hands at the time of completing the transaction. When cash is used as a method of payment, the owners of the private firm relinquish their ownership in the firm. In an IPO, the owners of private firms give up some portion of their ownership, although they typically control their firms even after going public. Zingales (1995) argues that

the decision of going public through an IPO is made by initial owners who want to eventually sell his company. To maximize the proceeds they obtain, the initial owners can change the proportion of cash flow and control rights which they will retain after the IPO. That is, there will be gradual changes in the level of inside ownership in the IPO process. In a reverse takeover, the inside ownership of a private firm does not change abruptly even after acquiring a public firm, when compared to a sellout or an IPO. The owners of the private firm still have a majority ownership stake in a combined firm. By comparing sellouts and IPOs, Brau et al. (2003) find that the inside ownership percentage is positively related to the probability of an IPO. However, Poulsen and Stegemoller (2008) find that sellout firms have higher inside ownership than IPO firms prior to the transaction. Therefore, the effect of ownership on the choice of sellout, IPO, or takeover is an empirical question.

Related to ownership structure, the ownership of venture capital or affiliation with a public firm can also be an important factor. Venture capital investment in a private firm does affect the decision to choose the optimal method of going public. The venture capitalist tends to exit from its investment in a private firm through an IPO to maximize their profits. Poulsen and Stegemoller (2008) find that venture-capital backed firms use IPOs more frequently than sellouts. In addition, since the venture capitalist needs to exit from its investment in a relatively short horizon, the private firms with venture capital backing can use reverse takeovers since the IPO process usually takes more than one year in Korea. Therefore, we conjecture that the venture-capital backed firms tend not to choose sellouts over IPOs or reverse takeovers.

Another factor is the affiliation of the private firm with a public firm. A public firm can found a private firm or a joint venture to test a new technology or to develop a new product. If the private firm is founded for this purpose, it can be easily merged with or acquired by the

public firm, whether it is successful or not. Therefore, we expect that the private firm will choose a sellout if a public firm has some ownership in the private firm.

The profitability of a private firm may have a significant impact on the choice. Poulsen and Stegemoller (2008) argues that the ability of a firm to produce sustainable profits increase the marketability of the firm which also enhance the ability of investors to value the firm. In addition, the profitability is an important requirement for firms to qualify for listing in the Korean stock markets. Therefore, profitable firms are more likely to go public using IPOs rather than reverse takeovers or sellouts. We use the ratio of EBITDA to assets to measure the profitability of a private firm.

Firm size can be another important factor to determine the means of going public. Since IPOs involve high direct and indirect costs, conducting IPOs are very costly for small private firms. Small firms might also have lower probability of being successful as independent public entities. Gleason et al. (2005) find that reverse takeovers involve substantially lower costs relative to IPOs, and argue that smaller firms that may find traditional IPOs beyond their reach or excessively costly can obtain a public listing through reverse takeovers. In addition, firms need to satisfy size requirements to list in the Korean Stock Exchange or KOSDAQ through public offerings. Therefore, we expect that large firms tend to choose IPOs rather than reverse takeovers to obtain public status. Brau et al. (2003) also argue that there is a positive relation between the firm size and the choice of IPO (or a negative relation between the firm size and the choice of sellout) since small firms can be valuable for acquiring firms which could share their own resources and skills with the target firms. The firm size might serve as a proxy for the information asymmetry as well as the costs associated with going public. Following the theory

of information asymmetry, we also expect that large firms tend to conduct IPOs rather than sellouts or reverse takeovers. We use a natural log of sales to measure the firm size.

Market timing can influence the choice between an IPO, sellout, or reverse takeover. Ritter (1984), among others, documents the existence of hot issue periods in the U.S. IPO market, which can be explained by time variation in adverse selection costs or windows of opportunities for issuing equity. Managers (or underwriters) might avoid issuing equity during periods where high information asymmetry leads to high adverse selection costs. Shleifer and Vishny (2003) argue that the volume of mergers and acquisitions (M&A) activities can be driven by the valuation of stock markets. If M&A waves and IPO volumes are co-moved, a market timing variable may not have an effect on the choice between IPO and sellout. The managers of private firms may avoid reverse takeovers during periods of hot stock markets since shell companies might be overvalued in these periods. However, Gleason et al. (2005) find that the relative volume of reverse takeovers is higher during periods of hot stock markets. Therefore, whether a market timing variable affects the choice of methods to go public is an empirical question. We use market returns prior to each transaction to measure the market timing factor.

The distinct types of industries are also likely to determine the choice between an IPO, sellout, or takeover. High-tech firms have recently tended to go public early to respond to investors' enthusiasm toward high-tech IPOs. Brau et al. (2003) find that high-tech firms are more likely to go public by way of an IPO rather than a sellout. If those high-tech firms want to capitalize on the investors' enthusiasm, they can go public using reverse takeovers as well since the IPO process is more time consuming. We expect that privately held high-tech firms might use IPOs or reverse takeovers rather than sellouts to obtain public status. We use a dummy variable to control for companies operating in the high-tech industries.

After we investigate the firm characteristics involved in determining the choice of an IPO, sellout, or reverse takeover, we then examine the short- and long-term stock return performance after the transactions. We examine the effects of sellout or reverse takeover announcements on stock returns despite the fact that we cannot directly compare the announcement effects. We investigate the stock returns of acquiring companies for sellout cases and the stock returns of shell (target) companies for reverse takeover cases. Numerous studies have investigated the stock returns of acquiring and target companies around the time the takeovers are announced[2]. They usually find that the abnormal returns for target companies are much higher than those for acquiring companies. Gleason et al. (2005) also find that shell companies earn an abnormal return of 25.10% on average when they are taken over by privately held firms.

We also investigate long-term stock return performance up to 18 months after the three transaction types, IPO, sellout, and reverse takeover. Previous literature usually finds the long-term underperformance after each of these events. For instance, Ritter (1991) documents the long-run underperformance of IPO firms. Moeller et al. (2005) also find significantly negative long-run buy-and-hold returns in the portfolio of large acquiring firms. Yet, Dutta and Jog (2009) find that Canadian acquiring firms do not show the long-term underperformance after M&As, contrary to stylized facts reported in the U.S. Gleason et al. (2005) find that firms do not improve their operation and profitability over the two years after reverse takeovers. We compare the long-run stock return performances of the three sub-samples.

III. Data

In this research, we compare and contrast three different methods of obtaining exchange listings, which are an IPO, sellout, and reverse takeover. We first include all Korean firms which were

[2] For a summary, refer to Betton et al. (2008).

newly listed on the Korean Stock Exchange (KSE) or Korea Securities Dealers Automated Quotation (KOSDAQ) over the period of 2000-2006. Our sample period begins in 2000 since reverse takeovers have not been popular until the 1990s. Some of our data extends to 2008 because we investigate the long-run stock return performance during 18 months after the transactions. We only select newly listed companies and exclude re-listing companies since the re-listing companies are already known in the markets. We initially collect the data on mergers and acquisitions from the *Securities Data Company* (SDC) database. We only include the transactions (sellouts) in which acquiring companies are public and target companies are private. We select only the cases where the acquiring firms acquire 50% or more of the private firm's shares. We compare the data with announcement reports of each transaction collected from the *Data Analysis, Retrieval and Transfer (DART) System* of the Korean Financial Supervisory Service and the Korea Exchange (KRX) web site. We also collect the announcement reports of IPOs and reverse takeovers from the DART System and the KRX website.

The reverse takeovers appear to be the same transactions as sellouts. However, the acquiring firms are private and the target firms are public, which is counter to what occur in sellouts. For the cases of mergers, the new controlling shareholders of the merged firms come from the private firms. In acquisitions, the two firms, a private firm and a public firm, can remain separate legal entities even after the transactions. Even though the private firm holds more than 50 percent of the ownership stake in the public firm, the two firms can be legally independent in Korea. Yet, the private firm is the new major shareholder of the public firm after the transaction.

We collect accounting and ownership data for the companies which announced one of the three transaction types over the sample period from TS2000, a database of the *Korean Listed*

Companies Association. We exclude companies that do not have accounting information available from the database during the two years prior going public. We also exclude financial companies since they are heavily regulated by the government. Our final sample includes 483 firms going public, which consists of 63 IPOs (13%), 252 sellouts (52%), and 168 reverse takeovers (35%). Then, we combine the accounting and ownership data of the sample with stock return data from the *Korean Information Service* (KIS-Value).

Table 1 reports descriptive statistics on the sample of firms. Panel A of the table reports the number of firms going public by year. The percentage of firms using an IPO to obtain exchange listings have been 20% or lower over the sample period of 2000-2006 with a peak of 20% in 2003. The percentage of firms using sellouts starts at 70% and gradually decreases to 40% in 2006. The percentage of firms using reverse takeovers starts at 23% and gradually increases to 49%. Gleason et al. (2005) find that the U.S. firms do not use reverse takeovers frequently to obtain public status, but instead prefer to use IPOs. Yet, Korean firms use reverse takeovers more frequently than IPOs. This suggests that Korean data is ideal for investigating the characteristics of the firms using IPOs, sellouts, or reverse takeovers to go public.

[Insert Table 1 here]

To investigate whether the transactions are clustered in a specific industry, we report the distribution of the sample by industry in Panel B of Table 1. Out of the IPO sample, 19% of the firms do business in a distribution industry and another 19% belong to a service industry. The rest of the firms do not seem to be clustered in any industries. We also document that the firms using sellouts and reverse takeovers are not clustered in any specific industry as reported in the table. This indicates that the firms' choices of an IPO, sellout, or reverse takeover are not affected by industry clustering.

Panel C of Table 1 reports the descriptive statistics of the variables we use to measure the firm characteristics. The panel reports the number of observations used to measure each variable, and the means, standard deviations, and 25^{th}, 50^{th} (median), and 75^{th} percentiles of the variables. A pre-transaction market return is a buy-and-hold return of an equally weighted index of the stocks listed in Korean Stock Exchange (KSE) and KOSDAQ over 150 days (day -180 to day -31) before each firm goes public. Other variables are measured at the end of year before each firm goes public. We measure firm size as a natural log of sales and liquidity as a ratio of EBITDA to interest expense. Total debt, EBITDA, and intangible assets are normalized by total assets. The mean pre-transaction market return is 21 percent with a standard deviation of 29 percent. The mean ratio of total debt to assets is 58 percent and the median is 55 percent. The mean firm size is 15.52 while the mean ratio of EBITDA to assets is 7 percent. The mean ratio of EBITDA to interest is 34.47 and the median is 4.10, which means that the ratio of EBITDA to interest is highly skewed to the right. The mean ratio of intangible assets to assets is 8 percent with a standard deviation of 15 percent. The mean firm age is 10.84 years from the time of inception while the mean inside ownership is 46.58 percent.

We define that the sample firms are affiliated with public firms if exchange-listed firms have equity ownership in our sample private firms. We also define that the sample firms are venture-capital backed if venture capital funds have investments in the sample private firms. We find that 36 percent of the sample firms are affiliated with public firms, and 20 percent of the firms are venture-capital backed. We also determine whether each sample firm does a business in high-tech industries. The high-tech industries include digital contents, communications,

electronics, internet, computer services, and IT hardware industries[3]. About 36 percent of sample firms belong to the high-tech industries.

IV. Empirical findings

4.1 Determinants of the choice

We first investigate whether the firm characteristics are different across the firms that go public using the three different methods; IPO, sellout, or reverse takeover (RT). We report the number of observations, the means, standard deviations, and medians of each variable, and the results of non-parametric median difference tests (Wilcoxon rank sum tests) in Table 2. We compare the firm characteristics based on the medians of each variable and the median difference tests. The median of pre-transaction market return (37%) is significantly higher for the firms using reverse takeovers than those (8% and 11%, respectively) for the firms using IPOs and sellouts. This interestingly suggests that the firms using reverse takeovers tend to time stock markets more rigorously compared to the firms using IPOs and sellouts.

[Insert Table 2 here]

Next, we compare leverage ratios (total debt/assets) among the sample firms. Sellout firms have the highest median leverage of 63 percent, reverse takeover firms have a median leverage of 54 percent, and IPO firms have the lowest median leverage of 49 percent. The differences in the median debt ratios among the three sub-samples are statistically significant.

The median firm size of sellout firms is the largest and that of IPO firms is the smallest. The differences in the median firm sizes among the three groups are statistically different at the 1

[3] To classify a high-tech industry, we use the definition of the American Electronics Association (AeA). Based on SIC codes, the AeA classifies high-tech firms that fall into three general groupings; high-tech manufacturing, communications services, and software and computer-related services. We follow the definition of the AeA to classify the Korean firms as high-tech firms.

percent level. This result is inconsistent with our expectation that large firms use IPOs to go public due to the higher costs involved in the IPO process.

We measure the profitability of a sample firm as the ratio of EBITDA to assets. IPO firms are significantly more profitable than sellout or reverse takeover firms. To measure liquidity, we use the ratio of EBITDA to assets. The IPO firms have better liquidity than other sample firms.

We use the ratio of intangible assets to assets or firm age to measure the information asymmetry of the firms. IPO firms have lower intangible assets and they are older compared to the sellout or reverse takeover firms. Therefore, the IPO firms are less subject to information asymmetry.

In comparing inside ownership, we find that the reverse takeover firms have the lowest inside ownership and the sellout firms have the highest inside ownership. About 49 percent of IPO firms and 51 percent of reverse takeover firms are affiliated with public firms while only 18 percent of sellout firms are affiliated with public firms. A larger portion (35 percent) of reverse takeover firms are venture-capital backed compared to IPO and sellout firms (16 and 10 percent, respectively). About 52 percent of reverse takeover firms belongs to high-tech industries, which is much higher than IPO and sellout firms.

The univariate tests in Table 2 suggest that IPO firms are smaller, less leveraged, and profitable. IPO firms are also subject to less information asymmetry. Reverse takeover firms tend to be larger, less profitable, and venture-capital backed. The reverse takeover firms are younger and have more intangible assets, which demonstrates that they are subject to more information asymmetry. The reverse takeover firms tend to go public when the market is hot, and a larger portion of them does business in high-tech industries. In comparison, sellout firms

tend to be larger, highly leveraged, and less profitable, compared to IPO firms. The sellout firms also have higher inside ownership and tend to not be affiliated to public firms.

To investigate further what kinds of firm characteristics determine the choice of IPO, sellout, or reverse takeover, we run two multinomial logit regressions, the results of which are shown in Table 3. We report the results of binary logits of IPO versus sellout, reverse takeover versus sellout, and IPO versus reverse takeover. For the comparison of IPO versus sellout, the positive coefficient of a variable indicates that there is a positive relation between the variable and the probability of choosing the first option (IPO). The negative coefficient indicates that there is a positive relation between the variable and the probability of choosing the second option (sellout). Since we use the ratio of intangible assets to assets and firm age to measure information asymmetry, we use the variables alternately in models 1 and 2. We also use the dummy variables indicating venture-capital backed firms and high-tech industries alternately in model 1 and 2 since venture-capital backed firms tend to do businesses in high-tech industries. The numbers in parentheses are p-values related to t-statistics of each coefficient.

[Insert Table 3 here]

For the comparison of IPO versus sellout, the coefficients on pre-transaction market return and leverage (total debt/asset) are not statistically significant. The coefficient on firm size (natural log of sales) is significantly negative with p-values of less than 0.01 in both models 1 and model 2, which indicate that larger firms tend to choose sellouts. This is inconsistent with Brau et al's (2003) argument that conducting an IPO is very costly for small private firms. The coefficient of the profitability measure (EBITDA/asset) is significantly positive with a p-value of less than 0.01, which shows that profitable firms tend to choose IPOs. The coefficient on a liquidity measure (EBITDA/interest) is not significant. The coefficient of the ratio of intangible

assets to assets is significantly negative and the coefficient on firm age is significantly positive, which suggests that the firms facing less information asymmetry tend to conduct IPOs to obtain exchange listings. The coefficients on other variables, inside ownership and the dummy variables for affiliation with public firms, venture-capital backed, and high-tech industries, are not statistically significant. In short, the table shows that firm size, profitability, and information asymmetry are important factors for the binary choice of IPO or sellout. Small and profitable firms tend to choose IPOs, and they are older and have less intangible assets.

For the choice of reverse takeover versus sellout, the coefficients on pre-transaction market return are significantly positive with p-values of less than 0.01 in models 1 and 2. This indicates that the private firms tend to conduct reverse takeovers when the stock market performs better. Other important factors to determine the choice of reverse takeover or sellout are presence of venture capital and whether the private firms do business in high-tech industries. The table shows that venture-capital backed firms tend to use reverse takeovers, and that private firms in high-tech industries also tend to use reverse takeovers.

For the choice of IPO versus reverse takeovers, the table shows that firm size, profitability, and information asymmetry are important factors. The coefficient on firm size is significantly negative and the coefficient on EBITDA/asset is significantly positive, which means that small and profitable firms tend to choose IPOs to go public over reverse takeovers to go public. The coefficient on the ratio of intangible assets to assets is significantly negative and the coefficient on firm age is significantly positive, which suggests that IPO firms are subject to less information asymmetry. The table also shows that reverse takeover firms tend to belong to high-tech industries. Gleason et al. (2005) argue that smaller firms that may find traditional IPOs beyond their reach or excessively costly can instead obtain a public listing through reverse

takeovers. Contrary to their argument, we find that large and unprofitable firms choose reverse takeovers.

In short, the results in Tables 2 &3 suggest that small and profitable firms choose IPOs while large and unprofitable firms use sellouts or reverse takeovers to obtain public status. The IPO firms are also less subject to information asymmetry. Compared to sellout firms, reverse takeover firms tend to be venture-capital backed, and time the stock market in deciding when to go public.

4.2 Stock return performance after the deal

First, we investigate the market's immediate response to the announcements of sellouts or reverse takeovers. We conduct a standard event study to test whether there are any significant market responses around the announcements. We estimate cumulative abnormal returns (CARs) during day -1 to day +1 based on a single-factor market model. We use equally-weighted returns of all listed firms in the KSE or KOSDAQ as returns of market index, and the estimation period is from day -180 to day -11 before the announcements of sellouts or reverse takeovers. We report the results of the event studies in Panel A of Table 4. We cannot compare the effects of sellout versus reverse takeover announcements directly since we use acquiring firms in sellout cases and target firms in the cases of reverse takeovers to measure abnormal returns. The panel shows that the mean CAR around sellout announcements is 2.17 percent while that around reverse takeovers is 10.26 percent. Consistent with Gleason et al.' (2005) findings, the shell (or target) companies in the events of reverse takeovers earn higher abnormal returns.

[Insert Table 4 here]

Next, we investigate the survival rates for 18 months after the firms go public, and report the results in Panel B of Table 4. We assume that the sample firms have not survived if they are delisted from the stock exchanges within 18 months after they go public. The panel shows that about 98 percent of sellout firms and 93 percent of reverse takeover firms have survived while 100 percent of IPO firms have survived. The difference tests in proportion indicate that the survival rate of reverse takeover firms is significantly lower than those of IPO and sellout firms. This result is consistent with Gleason et al.'s (2005) finding.

We also compare the long-term stock performances of the sample firms after they go public using IPOs, sellouts, or reverse takeovers. Using monthly returns of sample firms and equally-weighted monthly returns of all KSE and KOSDAQ listed firms, we calculate market-adjusted buy-and-hold returns (BHR) up to 18 months after the deals, the results of which are shown in Panel C of Table 4. We report the mean market-adjusted BHRs of each sub-sample, and the results of mean difference tests in the panel. The mean BHRs for IPO firms and acquiring firms in sellout cases are -13 percent and -19 percent, respectively, over 18 months after the transactions. This is consistent with Ritter's (1991) finding that IPO firms underperform the market in the long run. This is also consistent with Moeller et al.'s (2005) finding that large acquiring firms in M&As earn negative buy-and-hold returns in the long run. The mean BHR for the reverse takeover firms is -52 percent, which is significantly worse than those for IPO and sellout firms. Consistent with Gleason et al.'s (2005) finding, the firms choosing reverse takeovers are very risky and fail to generate long-term wealth.

In short, the results in Table 4 suggest that reverse takeover firms have a lower survival rate, and their long run stock performance is much lower than IPO and sellout firms. This also

suggests that unprofitable private firms choose to use reverse takeovers to go public, although they do not show successful performance after they go public.

4.3 Robustness tests

To go public using an IPO, private firms should satisfy the listing requirements. If they do not satisfy these requirements, they cannot use the IPO method to obtain exchange listings. This might limit our findings in previous sections. To compare "lemons" with "lemons", we now limit the sample into the firms which satisfy the listing requirements. The KOSDAQ market has three explicit requirements that the firms need to satisfy to be listed. The firms need to be older than three years, have a ROE of higher than 10%, and have equity of greater than 3 billion won. Only 30 percent of sellout and reverse takeover firms satisfy the three requirements. Most of the disqualified firms do not satisfy the ROE requirement. This indicates that profitability is a very important factor for firms to go public using an IPO in Korean stock markets. We repeat the multinomial logistic regressions using the IPO qualified sample, and these results are shown in Table 5.

[Insert Table 5 here]

Since unprofitable firms are removed from the sample, the table shows that the coefficients on profitability (EBITDA/assets) are not significant in the IPO qualified sample. IPO firms are smaller and older than other firms. Large firms tend to choose sellouts and reverse takeovers. Sellout firms tend to be affiliated with public firms while reverse takeover firms tend to be venture-capital backed. Reverse takeover firms also tend to time stock markets. The results are qualitatively similar to the results in Table 3.

V. Conclusion

We investigate the characteristics of private firms that move assets from private to public status using three different mechanisms, IPOs, sellouts, or reverse takeovers, using Korean data over the period of 2000-2006. Our results show that small and profitable firms tend to choose IPOs and they tend to be subject to less information asymmetry. Large and unprofitable firms tend to use sellouts and reverse takeovers to obtain exchange listings. Unlike sellout firms, reverse takeover firms tend to be venture-capital backed and they are more likely to acquire shell companies (public target companies) when the stock market is relatively hot.

We also examine the long run stock performance after the private firms go public. We document that the reverse takeover firms have the lowest survival rate during the 18 months following the transactions. We also find that the reverse takeover firms also have the lowest market-adjusted buy-and-hold returns over the period compared to sellout and IPO firms.

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Table 1. Sample size and descriptive statistics

Panel A. Year-by-year breakdown

	2000	2001	2002	2003	2004	2005	2006	Total
IPO	4	3	11	12	11	11	11	63
	(7%)	(5%)	(19%)	(20%)	(17%)	(13%)	(11%)	(13%)
Sellout	42	42	29	33	31	36	39	252
	(70%)	(75%)	(51%)	(56%)	(47%)	(41%)	(40%)	(52%)
Reverse takeover	14	11	17	14	24	40	48	168
	(23%)	(20%)	(30%)	(24%)	(36%)	(46%)	(49%)	(35%)
Total	60	56	57	59	66	87	98	483

Panel B. The number of firms by industry

	IPO		Sellout		Reverse Takeover		Total	
Constructions	2	(3.2%)	10	(4.5%)	-	-	12	(2.7%)
Machinery & Equipments	6	(9.5%)	19	(8.5%)	12	(9.0%)	37	(8.4%)
Textiles & Clothes	4	(6.3%)	10	(4.5%)	3	(2.3%)	17	(3.9%)
Digital contents	-	-	9	(4.0%)	20	(15.0%)	29	(6.6%)
Distributions	12	(19.0%)	26	(11.6%)	14	(10.5%)	58	(13.2%)
Communications	2	(3.2%)	13	(5.8%)	8	(6.0%)	25	(5.7%)
Food production	1	(1.6%)	15	(6.7%)	-	-	16	(3.6%)
Electronics	6	(9.5%)	18	(8.0%)	8	(6.0%)	34	(7.7%)
Chemistry	8	(12.7%)	17	(7.6%)	3	(2.3%)	30	(6.8%)
Internet business	-	-	6	(2.7%)	6	(4.5%)	12	(2.7%)
Computer services	-	-	7	(3.1%)	11	(8.3%)	18	(4.1%)
Entertainments	-	-	1	(0.4%)	7	(5.3%)	8	(1.8%)
Service	12	(19.0%)	15	(6.7%)	7	(5.3%)	36	(8.2%)
Metal & Steel	4	(6.3%)	3	(1.3%)	1	(0.8%)	8	(1.8%)
Nonmetallic minerals	2	(3.2%)	11	(4.9%)	-	-	13	(3.0%)
IT Hardware	-	-	9	(4.0%)	16	(12.0%)	25	(5.7%)
R&D	-	-	3	(1.3%)	3	(2.3%)	6	(1.4%)
Electricity & Gas	1	(1.6%)	1	(0.4%)	-	-	2	(0.5%)
Papers & Woods	2	(3.2%)	2	(0.9%)	-	-	4	(0.9%)
Publication related	-	-	4	(1.8%)	4	(3.0%)	8	(1.8%)
Others	1	(1.6%)	25	(11.2%)	10	(7.5%)	41	(9.3%)
Total	63	(100%)	224	(100%)	133	(100%)	439	(100%)

Panel C. Descriptive statistics

Variables	N	Mean	Std. Dev.	Percentiles		
				25^{th}	50^{th} (Median)	75^{th}
Pre-transaction market return	391	0.21	0.29	-0.06	0.21	0.42
Total debt / assets	405	0.58	0.33	0.37	0.55	0.73
Firm size	400	15.52	2.36	14.04	15.88	17.00
EBITDA / assets	405	0.07	0.21	0.01	0.08	0.15
EBITDA / interest	357	34.47	315.61	0.79	4.10	16.06
Intangible assets / assets	371	0.08	0.15	0.00	0.01	0.09
Firm age	402	10.84	9.77	4.00	7.00	14.00
Inside ownership (%)	386	46.58	29.04	24.87	40	66.82

Dummy Variables	Proportion	Mean
Affiliation with public firms	137/386	0.36
Venture-capital backed	83/411	0.20
High-tech industry	139/387	0.36

The table describes the number of sample firms and descriptive statistics. The sample firms obtain public status on Korean Stock Exchange (KSE) or Korea Securities Dealers Automated Quotation (KOSDAQ) market using IPOs, sellouts, or reverse takeovers over the period of 2000-2006. We measure all variables at the end of the previous fiscal year before they go public. Panel A shows the number of sample firms and the proportion of each transaction year by year. Panel B reports the number of firms in each transaction by industry. Panel C describes the number of firms (N), mean, standard deviation, and 25^{th}, 50^{th}, 75^{th} percentiles of each variable for the whole sample. Pre-transaction market return is a buy-and-hold return of Korean market index, equally-weighted index of all KSE and KOSDAQ listed stocks over the period of day -180 to -30 before each transaction. Leverage is measured as the ratio of total debt to total assets. Firm size is measured as a natural log of total sales. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets. Liquidity is measured as a ratio of EBITDA to interest expenses. Information asymmetry is measured as the ratio of intangible assets to total assets or firm age. Firm age is measured from the inception date of each firm. Inside ownership is the percentage of shares held by executives and directors. Affiliation with public firms is a dummy variable which takes 1 if the firm is affiliated to a public firm and 0 otherwise. Venture-capital backed is a dummy variable which takes 1 if venture capital has an investment in the firm and 0 otherwise. High-tech industry is a dummy variable which takes 1 if the firm belongs to the high-tech industry and 0 otherwise. We use the definition of the American Electronics Association (AeA) to classify the firms as high-tech industry firms.

Table 2. Comparison of firm characteristics

Variables	Type	N	Mean	Std. Dev.	Median	Median Difference (Wilcoxon rank sum test)		
						IPO-Sellout	IPO-RT	Sellout-RT
Pre-transaction market return	IPO	60	0.17	0.30	0.08	-0.03	-0.29	-0.26
	Sellout	198	0.15	0.28	0.11	(0.80)	(0.01)	(< 0.01)
	RT	133	0.31	0.28	0.37			
Total debt / assets	IPO	63	0.46	0.14	0.49	-0.14	-0.05	0.09
	Sellout	192	0.64	0.36	0.63	(< 0.01)	(0.02)	(0.01)
	RT	150	0.56	0.33	0.54			
Firm size	IPO	63	12.05	1.35	11.79	-4.73	0.58	-4.16
	Sellout	188	16.51	2.04	16.52	(< 0.01)	(< 0.01)	(< 0.01)
	RT	149	15.74	1.62	15.94			
EBITDA / assets	IPO	63	0.16	0.09	0.15	0.08	0	0.08
	Sellout	192	0.05	0.2	0.07	(< 0.01)	(< 0.01)	(0.74)
	RT	150	0.05	0.24	0.07			
EBITDA / interest	IPO	56	157.94	641.37	13.73	11.24	10.09	-1.15
	Sellout	168	9.33	253.94	2.49	(< 0.01)	(< 0.01)	(0.25)
	RT	133	14.25	89.28	3.64			
Intangible assets / assets	IPO	63	0.02	0.03	0.00	-0.02	-0.01	-0.03
	Sellout	160	0.09	0.17	0.02	(< 0.01)	(< 0.01)	(0.17)
	RT	148	0.1	0.16	0.03			
Firm age (year)	IPO	63	17.46	11.53	17.00	10	1	11
	Sellout	189	11.39	10.52	7.00	(< 0.01)	(< 0.01)	(0.01)
	RT	150	7.37	5.56	6.00			
Inside ownership (%)	IPO	63	43.34	20.69	39.7	-11.24	19.98	8.74
	Sellout	176	55.61	31.27	50.94	(0.01)	(0.02)	(< 0.01)
	RT	147	37.17	26.04	30.96			
Affiliation with public firms	IPO	31/63	0.49					
	Sellout	31/176	0.18					
	RT	75/147	0.51					
Venture-capital backed	IPO	10/63	0.16					
	Sellout	20/198	0.1					
	RT	53/150	0.35					
High-tech industry	IPO	8/63	0.13					
	Sellout	62/191	0.33					
	RT	69/133	0.52					

The table compares characteristics of IPO, sellout, and reverse takeover (RT) firms. It provides the number (N), means, standard deviations, and medians of each variable for the three sub-samples, and the results of median difference tests (non-parametric Wilcoxon rank-sum tests). Pre-transaction market return is a buy-and-hold return of the Korean market index, an equally-weighted index of all KSE and KOSDAQ listed stocks over the period of day -180 to -30 before each transaction. Leverage is measured as the ratio of total debt to total assets. Firm size is measured as a natural log of total sales. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets. Liquidity is measured as a ratio of EBITDA to interest expenses. Information asymmetry is measured as the ratio of intangible assets to total assets or firm age. Firm age is measured from the inception date of each firm. Inside ownership is the percentage of shares held by executives and directors. Affiliation with public firms is a dummy variable which takes 1 if the firm is affiliated to a public firm and 0 otherwise. Venture-capital backed is a dummy variable which takes 1 if venture capital has an investment in the firm and 0 otherwise. High-tech industry is a dummy variable which takes 1 if the firm belongs to the high-tech industry and 0 otherwise. We use the definition of the American Electronics Association (AeA) to classify the firms as high-tech industry firms. The numbers in parentheses are p-values related to each median difference test.

Table 3. Multinomial logistic regression results

Variables	IPO-Sellout		Reverse takeover-Sellout		IPO-Reverse takeover	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Intercept	32.82	28.30	5.25	3.51	27.57	24.79
	(< 0.01)	(< 0.01)	(< 0.01)	(0.06)	(< 0.01)	(< 0.01)
Pre-transaction market return	0.99	0.07	2.25	2.25	-1.25	-2.18
	(0.52)	(0.97)	(< 0.01)	(< 0.01)	(0.40)	(0.22)
Total debt / assets	-2.38	-0.86	-0.96	-0.76	-1.42	-0.10
	(0.17)	(0.67)	(0.07)	(0.12)	(0.41)	(0.96)
Firm size	-2.25	-2.22	-0.31	-0.17	-1.94	-2.05
	(< 0.01)	(< 0.01)	(< 0.01)	(0.16)	(< 0.01)	(< 0.01)
EBITDA / assets	8.38	11.08	-0.43	-0.37	8.80	11.46
	(< 0.01)	(< 0.01)	(0.62)	(0.69)	(< 0.01)	(< 0.01)
EBITDA / interest	0.00	0.00	0.00	0.00	0.00	0.00
	(0.53)	(0.83)	(0.73)	(0.94)	(0.65)	(0.61)
Intangible assets / assets	-17.88	-	-0.03	-	-17.85	-
	(< 0.01)		(0.98)		(< 0.01)	
Firm age	-	0.15	-	-0.06	-	0.21
		(< 0.01)		(0.01)		(< 0.01)
Inside ownership	-0.01	-0.02	-0.01	-0.01	-0.01	0.00
	(0.46)	(0.49)	(0.26)	(0.01)	(0.73)	(0.94)
Affiliation with public firms	1.34	1.66	-0.19	-0.46	1.53	2.12
	(0.16)	(0.15)	(0.58)	(0.17)	(0.10)	(0.07)
Venture-capital backed	-0.12	-	1.40	-	-1.51	-
	(0.93)		(< 0.01)		(0.25)	
High Tech Industry	-	-1.91	-	1.03	-	-2.94
		(0.15)		(< 0.01)		(0.03)
-2 Log Likelihood	300.44	286.27				
Sig. (p-value)	(< 0.01)	(< 0.01)				
McFadden pseudo R^2	0.49	0.52				

The table shows the results of two multinomial logistic regressions, model 1 and 2. We report the results of three pairs, IPO-sellout, reverse takeover-sellout, and IPO-reverse takeover. The positive (negative) coefficient indicates a positive relation between the variable and the first (second) choice. Pre-transaction market return is a buy-and-hold return of the Korean market index, an equally-weighted index of all KSE and KOSDAQ listed stocks over the period of day -180 to -30 before each transaction. Leverage is measured as the ratio of total debt to total assets. Firm size is measured as a natural log of total sales. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets. Liquidity is measured as a ratio of EBITDA to interest expenses. Information asymmetry is measured as the ratio of intangible assets to total assets or firm age. Firm age is measured from the inception date of each firm. Inside ownership is the percentage of shares held by executives and directors. Affiliation with public firms is a dummy variable which takes 1 if the firm is affiliated with a public firm and 0 otherwise. Venture-capital backed is a dummy variable which takes 1 if venture capital has an investment in

the firm and 0 otherwise. High-tech industry is a dummy variable which takes 1 if the firm belongs to the high-tech industry and 0 otherwise. We use the definition of the American Electronics Association (AeA) to classify the firms as high-tech industry firms. The numbers in parentheses are p-values.

Table 4. The stock return performance after going public

Panel A. Cumulative abnormal returns (CARs)

Sellout	Reverse takeover	Mean Difference
2.17%	10.26%	-8.09%
(< 0.01)	(< 0.01)	(< 0.01)

Panel B. Post-transaction survival rates up to 18 months

	N	Survived / Delisted	Survival rate	Difference in proportion tests (p-value)
IPO	63	63 / 0	100.00%	IPO-Sellout (0.01)
Sellout	252	247 / 5	98.02%	Sellout-RT (<0.01)
Reverse Takeover	168	156 / 12	92.86%	IPO-RT (<0.01)

Panel C. Market-adjusted buy-and-hold returns up to 18 months

Month [0,6]	N	Mean		Mean Difference (p-value)	
IPO	63	-0.07	IPO-Sellout	0.02	(0.96)
sellout	252	-0.08	Sellout-RT	0.18	(< 0.01)
RT	168	-0.26	IPO-RT	0.20	(0.01)
Month [0,12]	N	Mean		Mean Difference (p-value)	
IPO	63	-0.13	IPO-Sellout	0.02	(0.97)
sellout	251	-0.15	Sellout-RT	0.32	(< 0.01)
RT	168	-0.47	IPO-RT	0.34	(< 0.01)
Month [0,18]	N	Mean		Mean Difference (p-value)	
IPO	63	-0.13	IPO-Sellout	0.06	(0.87)
sellout	247	-0.19	Sellout-RT	0.33	(< 0.01)
RT	156	-0.52	IPO-RT	0.39	(< 0.01)

The table reports the stock return performances after IPOs, sellouts, and reverse takeovers, and the survival rates after each transaction. Panel A presents the mean cumulative average abnormal returns (CARs) over the period of day -1 to 1 around sellout or reverse takeover announcements, and the result of the mean difference test. Abnormal returns are calculated based on a single-factor market model. The estimation period is from day -180 to -11, and the market index is an equally-weighted index of all KSE or KOSDAQ listed firms. Table B reports the number of IPO, sellout, and reverse takeover firms (N), the number of surviving and delisted firms (Survived / Delisted), survival rates (%) up to 18 months after each transaction, and the results of difference in proportion tests. Panel C shows the results of long-term stock return performances measured by market adjusted buy-and-hold abnormal returns during 6 months, 12 months and 18 months after IPOs, sellouts, and reverse takeovers (RT), and the results of mean difference tests. The numbers in parentheses are p-values.

Table 5. Multinomial logistic regression results using IPO qualified sample

Variables	IPO-Sellout		RT-Sellout		IPO-RT	
	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	47.32	31.09	-6.43	-3.03	53.75	34.12
	(< 0.01)	(< 0.01)	(0.19)	(0.43)	(< 0.01)	(< 0.01)
Pre-transaction market return	0.51	0.39	5.71	4.63	-5.20	-4.24
	(0.82)	(0.84)	(< 0.01)	(< 0.01)	(0.04)	(0.05)
Total debt / assets	2.59	-0.89	1.67	1.60	0.92	-2.49
	(0.62)	(0.80)	(0.33)	(0.35)	(0.86)	(0.52)
Firm size	-3.32	-2.28	0.21	0.08	-3.53	-2.36
	(< 0.01)	(< 0.01)	(0.43)	(0.72)	(< 0.01)	(< 0.01)
EBITDA / assets	-1.35	5.58	-0.40	-0.44	-0.95	6.02
	(0.89)	(0.40)	(0.89)	(0.89)	(0.92)	(0.39)
Intangible assets / assets	-1.70	-	5.10	-	-6.79	-
	(0.84)		(0.20)		(0.42)	
Firm age	-	0.12	-	-0.02	-	0.13
		(0.06)		(0.72)		(0.05)
Inside ownership	-0.03	-0.01	0.01	-0.01	-0.04	-0.01
	(0.22)	(0.73)	(0.55)	(0.55)	(0.16)	(0.95)
Affiliation with public firms	3.84	1.11	-1.31	-1.25	5.15	2.36
	(0.11)	(0.45)	(0.06)	(0.06)	(0.04)	(0.49)
Venture capital back	-1.68	-	2.40	-	-4.08	-
	(0.46)		(< 0.01)		(0.08)	
High Tech Industry	-	-1.30	-	1.69	-	-2.99
		(0.56)		(0.01)		(0.18)
-2 Log Likelihood	94.10	99.33				
Sig. (p-value)	(< 0.01)	(< 0.01)				
McFadden pseudo R^2	0.69	0.66				

The table shows the results of two multinomial logistic regressions, models 1 and 2, for only IPO qualified firms. We report the results of three pairs, IPO-sellout, reverse takeover-sellout, and IPO-reverse takeover. The positive (negative) coefficient indicates a positive relation between the variable and the first (second) choice. Pre-transaction market return is a buy-and-hold return of the Korean market index, an equally-weighted index of all KSE and KOSDAQ listed stocks over the period of day -180 to -30 before each transaction. Leverage is measured as the ratio of total debt to total assets. Firm size is measured as a natural log of total sales. Profitability is measured as the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets. Liquidity is measured as a ratio of EBITDA to interest expenses. Information asymmetry is measured as the ratio of intangible assets to total assets or firm age. Firm age is measured from the inception date of each firm. Inside ownership is the percentage of shares held by executives and directors. Affiliation with public firms is a dummy variable which takes 1 if the firm is affiliated to a public firm and 0 otherwise. Venture-capital backed is a dummy variable which takes 1 if venture capital has an investment in the firm and 0 otherwise. High-tech industry is a dummy variable which takes 1 if the firm belongs to the high-tech industry and 0 otherwise. We use the definition of the American Electronics Association (AeA) to classify the firms as high-tech industry firms. The numbers in parentheses are p-values.