Earnings Management and Delisting Risk of IPO Firms

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Abstract

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Keywords: Earnings Management, Initial Public Offerings, Delisting Risk

JEL classification: M41

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Abstract

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1. Introduction

Involuntary delisting is a traumatic event for both firms and shareholders. Macey, O'Hara and Pompilio (2004) find huge costs to delisting using a sample of NYSE firms delisted in 2002. More specifically, they find that share prices fall approximately in half, percentage spread triples and stock price volatility doubles when a stock moves from NYSE to the Pink Sheets. Consistent with this, Shumway (1997) documents an average delisting return of -30% for firm delisted during 1962 - 1993. Moreover, investment loss had incurred before the delisting date. In our sample of IPOs going public during 1980-1999, firms on average lost more than 80% of their initial market value before delisting date¹.

Given the high cost associated with involuntary delisting, understanding its economic determinants becomes an important question. In this study, we hypothesize and show that earnings management in the IPO year has significant power in predicting subsequent delisting risk of newly issued firms. We expand the definition of delisting risk

¹ This refers to firms delisted within first five post-issue years due to performance failure. Definition of delisting due to performance failure is elaborated in Section 3.

by including not only the probability of involuntary delisting but also the longevity of post-issue listing of IPOs, a dimension relatively overlooked in previous studies. IPOs associated with more aggressive earnings management are more *likely* to delist due to performance failure and they tend to delist *sooner*. Interestingly, IPOs associated with less earnings inflation are more likely to be merged or acquired. Our results survive various robustness checks and hold after controlling for other variables related to the delisting rates of IPOs, such as firm size, underwriter prestige, price-to-book ratio, profitability, growth, and industry.

The rationale behind our evidence is that earnings management is a corporate decision endogenous to the fundamental of the issuing firm, and the firm fundamental is related to the delisting risk of the issuing firm. In a market with information barriers, where the true firm value is not observed by public investors, IPO issuers need to signal the quality and value of their firms. Compared to some fundamental variables that are hard to manipulate, such as firm age, asset size and net cash flow, accounting earnings can be boosted at a cost in order to illude investors with inflated firm value. Aggressive earnings management (boosting) benefits the original entrepreneurs of low-quality IPOs because they tend to receive high cash proceeds vis-à-vis the true value of their offerings (e.g., DuCharme, Malatesta, and Sefcik, 2001). However, earnings management in the IPO process cannot be maintained in the long run and tend to have detrimental impact on the shareholders. In other words, earnings management has real economic costs and bears potential legal liability (e.g., Fudenberg and Tirole, 1995; DuCharme, Malatesta, and Sefcik, 2004). Accordingly, good companies with solid earnings streams and prospects have lower incentives to manipulate accounting numbers in a way that may spell trouble later on. Thus, the degree of earnings management in the IPO process should decrease with the quality of IPO, while the quality of IPO is inversely related to future delisting risk.

This study intersects the literature on delisting risk and the literature on earnings management. Several studies have investigated the delisting risk of IPOs, and suggest that factors related to the quality of IPOs help predict delisting risk. For example, Seguin and Smoller (1997) document higher mortality rates of lower-priced stocks than those of higher-priced issues. Michaely and Shaw (1994) report that IPOs underwritten by

prestigious investment banks perform significantly better in the long run. Chadha (2003) finds that underwriter reputation is significantly negatively related to the likelihood of delisting shortly after going public. Fama and French (2004) find that new lists with higher profitability tend to have lower delisting rates. Our study further establishes the predictability of delisting risk and the relation between firm fundamental and the fate of failure of newly issued firms.

Recent studies suggest that earnings management is pervasive in the IPO process because of its inherent information asymmetry. Teoh, Wong, and Rao (1998) report that IPOs with boosted earnings have poorer long-run earnings performance. Toeh, Welch and Wong (1998) suggest that poor long-run stock performance (e.g., Ritter, 1991; Gompers and Lerner, 2003) of IPOs is associated with earnings reversal due to earnings management in the IPO process. Pioneers in bringing up the important role of earnings management in the IPO pricing and marketing, these authors haven't provided a comprehensive investigation on the information content of earnings management in the IPO process nor its economic determinants. Another intriguing question is whether the under performance of IPOs with aggressive earnings management is caused by the overpricing due to the inflated offer price.² Consistent with Teoh, Welch and Wong (1998), our study show that the long-term stock performance of IPOs isn't monotonically related to the sort by their degree of earnings management. It seems that a univariate sort by the degree of earnings management is not adequate in investigating the information content of earnings management in the IPO process. Our study documents a continuous distribution of earnings management across firm fundamental of IPOs. Our probit and Cox proportional hazard analyses show that earnings management contains significant information revealing the quality of IPOs in addition to the information contents of other popular fundamental variables. We also find that IPOs associated with most aggressive earnings management are generally smaller and less recognized firms. Hence, their long term underperformance is due to their weak fundamental. Our study provides a comprehensive view on the economic determinants and consequence of earnings management in the IPO process. This complements previous studies that investigate the

² That is, IPOs with aggressively boosted-earnings are overpriced in the market and generates lower future stock returns, *ceteris paribus*.

role of earnings management in the IPO process, which is tested on unvariate sort of firms by discretionary accruals. Furthermore, we establish that earnings management is endogenous to the quality of the IPOs, and is hence a natural predictor of the delisting risk of these firms.

In addition, we show that stock price, underwriter prestige and firm profitability are all negatively related to the Cox Proportional hazard. These results suggest that firms with higher share price, associated with prestigious underwriters and higher profitability are going to list for a longer time period on exchanges. Furthermore, we document that firms with less inflated-earnings in the IPO process are more likely be merged or acquired and these firms provide abnormal returns to their investors. Finally, we show that market-wide earnings management interacts with the IPO cycle recently documented by Lowry and Schwert (2002). We investigate the dynamic relation between earnings management, price-to-book, initial returns and volume of IPOs. Our results show that IPO issuers manage their earnings in response to market demand and valuation: firms on average boost earnings less aggressively in hot IPO market. More interestingly, IPO issuers seem to have the capability to predict the market demand in the subsequent months. Our earnings management measure Granger causes initial returns of IPOs.

The remainder of the paper is organized as follows. Section 2 reviews the literature and develops our primary hypotheses. Section 3 presents the data and statistics. Section 4 presents the analysis on delisting risk. Section 5 investigates the stock performance of IPO firms across listing status and earnings management. Section 6 examines earnings management and its relation with the IPO cycle. Finally, Section 7 concludes.

2. Literature Review and Hypothesis Development

2.1 Earnings Management in the IPO Process

Earnings management is a natural and pervasive corporate phenomenon under the current market regulation and condition (e.g., Leuz, Nanda and Wysocki, 2003; Liang, 2004). Information asymmetry between managers and shareholders is a necessary condition for earnings management (e.g., Dye, 1988; Trueman and Titman, 1988).

IPOs provide a powerful setting to investigate the relation between earnings management and firm fundamental (and hence delisting risk) for several reasons. First,

the direction of earnings management is clear in the IPO process. IPO firms have incentives to engage in income-increasing activities to ensure that the issues are fully subscribed and are priced sufficiently high to garner high proceeds³. Second, the IPO process is characterized by information asymmetry between managers and investors (e.g., Leland and Pyle, 1977) and between informed and uninformed investors (e.g., Rock, 1986; Beatty and Ritter, 1986). Third, *Accounting Principles Board Opinion* 20 allows IPO firms to change accounting principles in the prospectus as long as financial statements of previous years are restated. This gives managers an opportunity to engage in earnings management.

IPO firms have incentives to boost earnings through discretionary accruals⁴ in the IPO process and the quarters immediately after the IPO (Toeh, Wong, and Rao, 1998; DuCharme et al., 2001). There are several institutional reasons. First, entrepreneurs and venture capitalist have incentives to sell shares after the lockup period. During the lockup period, normally 180 days or longer, the entrepreneurs commit not to sell any shares. To maximize possible proceeds from share sale after the lockup period, the firm has incentives to boost earnings during and after the lockup period. Second, the investment banker normally engages in price stabilization after the IPO as permitted under Rule 10b-7 by the SEC. Accordingly, the investment banker can exercise pressure on the firms to continue boosting earnings immediately after the IPO. Finally, a rapid decline in earnings immediately after IPO often leads to a rapid decline in stock price. This decline can in turn cause potential class action lawsuits against the IPO firms and their investment bankers.

Despite the benefits of earnings management, it also has real economic costs. Fudenberg and Tirole (1995, p.76) state that "such costs of earnings management include poor timing of sales, overtime incurred to accelerate shipments, disruptions of the suppliers' and customers' delivery schedules, time spent to learn the accounting system and tinker with it, or simple distaste for lying". Further, as the degree of information

³ In contrast, non-issuing companies may not always engage in income-increasing activities. DeFond and Park (1997) find that firms engage in income-smoothing (as opposed to income-increasing) activities because of managers' job security concerns.

⁴ Earnings management measure describing management's accrual choices is called various names in the literature: discretionary accruals, abnormal accruals and unexpected accruals. We use discretionary accruals for consistency in the paper.

asymmetry alleviates as time goes on, investors gradually discover the underlying stock value. IPO investors can file class action lawsuits against the IPO issuers when they incur investment loss and realize a substantial amount of earnings management was present. DuCharme et al. (2004) find that the incidence of shareholder lawsuits involving stock offers and settlement amounts are significantly positively related to discretionary current accruals around the offer and significantly negatively related to post-issue stock returns. Alexander (1991) and Drake and Vetsuypens (1993) find that class-action lawsuits are normally filed by IPO investors when there are significant post-offering stock price declines. Finally, the market often has a memory about IPO firms' abuse of earnings management once investors discover the lower quality of the IPO issues relative to the inflated earning and offering prices. Consistent with this, Toeh, Welch and Wong (1998) find that IPO issuers in the most aggressive quartile of earnings management issue about 20 percent fewer seasoned equity offerings.

In summary, an equilibrium level of earnings management should arise in the IPO process, given the benefits and costs of earnings management. In particular, a cross-section distribution of earnings management should exist across firm quality.

2.2 Delisting of New IPOs

The availability of the history of IPO firms allows us to observe and track their delisting. We postulate that delisting risk due to performance failure is related to the quality of IPOs. The delisting criteria from stock exchanges are mostly performance-related. For example, NYSE sets out three numerical requirements for delisting, minimum distribution requirement (at least 400 shareholders), minimum market capitalization of 15 million dollars, and minimum price of one dollar. NASDAQ and AMEX set up similar but less strict requirements. In addition to the numerical criteria, the exchanges will consider delisting a company if it fails to meet a number of discretionary criteria. Specifically, the exchanges will consider delisting if the company's operating assets have been substantially reduced in size, regardless of the reasons for the reduction. The exchanges will consider delisting if the company files for bankruptcy, or announces its intention to file.⁵ Essentially, the exchanges aim to maintain a relatively liquid market for the listed companies because such companies are profitable to them.

⁵ See Macey et al. (2004) for a detailed discussion on the delisting process.

In contrast to the aforementioned involuntary delisting, more companies voluntarily delist themselves as a result of merger/acquisition. In our sample of 3898 IPOs, roughly 17% delisted involuntarily due to performance failure in the first five years after IPO, while 25% were merged or acquired and stopped their listing as an individual entity. The involuntarily delisted firms exhibit significantly *weaker* fundamental at IPO time compared to the firms that are merged/acquired within the five post-issue years and the firms that maintain listing for longer than five years. Here we refer to fundamental as the economic, financial, and managerial strength of a firm. Firm fundamental is not fully observable in a market where investors trade the stock based on their heterogeneous belief about it. However, some corporate variables help to proxy the fundamental, such as firm size, profitability, operating cash flow, financial leverage, and stock return variability. By these corporate variables, we show that the final fate of failure of a newly issued firm is related to its fundamental to start with. This finding is consistent with prior studies on the relation between delisting risk and corporate characteristics related to firm quality (i.e., Michaely and Shaw, 1994; Seguin and Smoller, 1996; Chadha, 2003; Fama and French, 2004).

2.3 The Information Content of Earnings Management in the IPO Process

IPO firms engage in and benefit from earnings management because investors cannot see through the true value of the firm at IPO time (Toeh, Welch, and Wong, 1998). The aggressiveness of earnings management of an IPO firm thus reveals asymmetric information about its true quality besides those usual corporate variables that investors track. Firms of weak fundamental benefit more from aggressive earnings management in the IPO process, *ceteris paribus*. Low-quality IPOs engage in more earnings management to mask their true performance, while high-quality IPOs engage in less earnings management to avoid the cost of earnings management such as potential risk of lawsuits (DuCharme et al., 2004). Earnings management in the IPO process is hence a natural predictor of the delisting (failure) risk of newly issued firms.

We study two dimensions of delisting risk: (i) the probability of involuntary delisting; and (ii) the expected longevity of post-issue listing of the IPO firms. Two key hypotheses are thus developed as:

Hypothesis 1: *Firms associated with aggressive earnings management in the IPO process are more likely to be involuntarily delisted from the stock exchanges.*

Hypothesis 2: *Firms associated with aggressive earnings management in the IPO process tend to be delisted sooner for performance failure from the stock exchanges.*

Although intuitive, the logic of our hypotheses relies on two crucial associations. First, IPO earnings management is inversely associated with the quality of the IPO. Second, the quality of the IPO is inversely associated with its delisting risk.

3. Data and Statistics

Our primary data source for IPOs in the period 1980-1999 is the Thomson Financial Securities Data, also known as Securities Data Corporation (SDC). We investigate all domestic IPOs during 1980-1999 recorded in the SDC New Issues database and track their listing status till the end of 2004. Units and tracking stocks are excluded. SDC includes NYSE, AMEX, and NASDAQ National Market and Small Caps, but excludes best-effort IPO offerings. We have corrected all known data errors in SDC as listed on Jay Ritter's website. We also use data from CRSP and Compustat for our empirical analysis. The final sample consists of 3898 new issues satisfying the following criteria: (1) IPO company name, offering date, and number of shares outstanding after the IPO are available from the SDC; (2) necessary data for calculating discretionary current accruals, price-to-book ratio, profitability and growth are available from the annual Compustat database; (3) The offer price is no less than one dollar and the market capitalization of the offered company as of first trading day market close is no less than \$20 million in 1997 prices⁶.

3.1 Delisting and Earnings Management

Figure 1 plots the IPO sample across years. The number of IPOs in each year exhibits a volatile pattern while more IPOs went to the market in the 1990s. There are about 500 IPOs in 1996 alone. Meanwhile, the delisting rates have been relatively stationary across the years. We define involuntary delisting due to performance failure if the firm has a listing code between 400 and 600 except 501, 502, 503 and 573 within five years after IPO. The listing codes 501, 502, and 503 denote exchange switch to NYSE,

⁶ Consistent with Teoh, Welch and Wong (1998).

AMEX and NASDAQ, respectively. Listing code 573 denotes going private voluntarily. This definition of delisting due to performance related reasons includes those switching from a major stock exchange to a regional exchange or OTC.⁷ This dentition is consistent with prior studies (e.g., Seguin and Smoller, 1997). Firms with listing code between 200 and 300 within five years are defined as delisting due to mergers and/or acquisitions. Involuntary delisting rate varies around 10% to 25%. In contrast, more mergers and acquisitions took place to firms that went public in 1995 and 1996, percentage wise. This is associated with the high-tech boom in the late 1990s. Together 659 (16.9%) firms were delisted due to performance failure, 962 (24.7%) were merged or acquired (Table 1). 2277 (58.4%) firms continued listing after five years.

Following Teoh, Welch and Wong (1998) and DuCharme et al. (2004), we measure earnings management in the IPO process using discretionary current accruals (DCA) in the fiscal year of IPO. This practice allows us to obtain a large sample of Compustat data for the IPO firms⁸. By regressing the current accruals on total assets and revenue changes cross firms in the same industry, we capture the unexpected current accruals that is idiosyncratic and discretionary. This measure is well established in accounting and is controlled for size, growth, and industry effects. Specification of the calculation of DCA is presented in the appendix.

We estimate the DCA of each IPO and sort all IPOs by DCA. Each quartile of IPOs includes about 974 firms. Panel A of Table 1 presents the sample distribution across listing status and earnings management levels. About 19% of the IPOs of most conservative earnings management (Q1) failed to survive after five years. This attrition rate⁹ is significantly lower than that of firms associated with most aggressive earning management (Q4), 25% of which were delisted due to performance failure. The t-statistic

⁷ As a robustness check, we alternatively define involuntarily delisting excluding exchange switching to a regional exchange (code 510-519). This alternative definition yields consistent empirical results.

⁸ Only a small percentage of firms have financial information available for pre-issue years in Compustat. Teoh, Welch and Wong (1998) and DuCharme et al. (2004) find that discretionary current accruals are more powerful than discretionary total accruals in the IPO setting. We report the empirical results using discretionary current accruals in this article. We find that our findings hold when we use discretionary total accruals or performance-matched discretionary total accruals.

⁹ To be distinctive from merger/acquisition, we use attrition, IPO failure, involuntary delisting as alternative term to delisting due to performance failure.

for the difference in delisting rate of Q1 and Q4 is -2.99, significant at the 1% level¹⁰. The two middle quartiles (Q2 and Q3) exhibit lower attrition rates. This is caused by other corporate characteristics related to delisting risk. Firms in the first and fourth quartiles on average have smaller capitalization. The firms with most aggressive earnings management are less likely to be merged or acquired in the first five years. This is consistent with our initial hypothesis: Firms of weaker fundamental tend to aggressively manage their earnings for IPO purpose, and these weak firms with inflated prices are less attractive for merger/acquisition. Interestingly, the survival rate of firms in Q1 and Q4 are close.

[Insert Table 1 about here]

Now let us look at the distribution of earnings management across listing status, reported in Panel B of Table 1. We estimate the mean and median DCA of firms by their listing status. The average discretionary current accruals for the failed firms are 0.092. That is, these firms inflate their earnings by 9.2% of their prior year asset value. This number is significantly above the DCA of merged/acquired firms (0.028) and of survivor firms (0.056). The right most columns report the Satterthwaite t-statistics for the difference in mean and Wilcoxon Z score for the difference in median statistics. The t-statistic of the mean DCA for failed IPOs versus others is 3.80, while the t-statistic of the mean DCA for merged/acquired firms versus others is -4.59. Both are significant at the 1% level. The median comparison shows similar results. Consistent with results in Panel A, failed IPOs were associated with more income increasing earnings management, and merged/acquired firms were associated with less earnings management.

3.2 Distribution of Corporate Characteristics

In this section we examine the distribution of key corporate characteristics across listing status and earnings management. We show that corporate variables associated with firm fundamental are, in general, inversely related to both attrition rates and earnings management of IPO firms.

[Insert Table 2 about here]

¹⁰ In this table, Satterthwaite t-statistics are calculated because the standard deviations of the compared groups are significantly different from each other.

Table 2 reports the mean and median statistics. The average pre-IPO age is 14.2 years for all firms, and their post-IPO listing lasts on average 6.8 years censored as of December 2004. The average DCA is 0.055 for all firms. This confirms prior studies (e.g., Teoh, Wang, Rao, 1998) that companies boost their earnings through discretionary current accruals in the IPO process. While the profitability, net earnings scaled by lagged total assets, is merely zero, all IPO on average report negative operating cash flow.

3.2.1 IPO Failures

The failed IPO firms exhibit substantial weaker fundamental at IPO time relative to other firms. They are substantially younger (10.1 years) at IPO time relative to the merged/acquired firms (14.1 years) and continual listing firms (15.3 years). Their exchange listing lasts on average 2.9 years, coincidentally as long as the listing of merged/acquired firms. Discussed in the preceding section, failed firms are associated with most aggressive earnings management. They have lower offer price (\$9.11), and smaller market capitalization (\$280 million) as of the first trading day. We also report the Cater and Manaster (1990) rank of the lead underwriter. Investment banks with a rank of 8 or 9 (on the scale of 0 - 9) are considered prestigious national underwriters, which have an over 50% market share in the 1980s and 1990s (Loughran and Ritter, 2004). The average and median rank of our sample is 7.0 and 8, respectively. The failed firms were on average underwritten by less prestigious investment banks (mean rank 5.4; median rank 5). The failed firms are over priced at IPO. Their price-to-book is averaged 5.1 with median 3.5, while the price-to-book of all firms is averaged 4.1 with median 2.8. Failed firms are value destructors for shareholders. Their profitability (mean -0.191, median -0.015) and operating cash flow (mean -0.589, median -0.258) are substantially below the other firms.

Intuitively, riskier firms are more likely to fail. We thus estimate the financial leverage of all IPO firms. While the riskiness of a firm cannot be fully captured by its financial leverage, we use the market response to capture the additional risk. We thus estimate the standard deviation of daily returns of the IPO firms in the first six post-issue months $(6^{th} - 126^{th} \text{ trading days})^{11}$. The failed firms exhibit higher risk by both financial

¹¹ We also investigate the standard deviation of the daily stock returns in the first 12 months and 24 months. Their relations with the listing status and earnings management are consistent. We report and use the 6-

leverage (mean 0.494; median 0.443) and stock return volatility (mean 4.92%; median 4.47%).

3.2.2. Mergers and Acquisitions

A quarter of the IPOs voluntarily delist from exchanges as a result of merger and acquisition in the first five years after IPO. An investigation of these firms has important implications in its own right. From Table 2, we find that the merged/acquired firms have stronger fundamental and higher relative value compared to the failed firms. This suggests that the acquirers do differentiate and recognize the quality and valuation of their merger/acquisition targets.

Specifically, the average pre-IPO age of merged/acquired firms is 14.1 years, with median 8 years. On average, the merger/acquisition takes place in 2.9 years after IPO. Interestingly, the merged/acquired firms are associated with the most conservative earnings management in the IPO process (mead DCA 0.028; median 0.012). Their average offer price is 13 dollars, substantially higher than that of the failed firms. Again IPO offer price is very informative on the quality of the issue (Seguin and Smoller, 1997). The capitalization of the merged/acquired firms, on average \$440 million, falls in the middle between continual and failed firms. This is consistent with common sense that these medium size firms have the fundamental to survive and are affordable for merger/acquisition.

More than half of the merged/acquired firms are underwritten by a prestigious investment bank (median rank 8). They have a substantially smaller price-to-book ratio (3.7) than those failed at IPO time. They have substantially higher profitability (0.018) and operating cash flow (-0.074) than the failed firms. The risk of these merged/acquired firms, financial leverage and stock return volatility, are in between those of failed and continual firms.

Overall, the firms merged/acquired soon after IPO have stronger fundamental and conservative valuation at IPO time, in contrast to the firms that are delisted due to performance failure. The market seems to recognize the quality of the IPO firms after 3 years of listing.

month volatility in our empirical analysis, since this shorter period volatility is usually observed when the annual financial results in the IPO year is available.

3.2.3. Earnings Management and Corporate Characteristics

The lower panel of Table 2 reports the corporate variables of firms grouped by DCA in the IPO year. Q1 – Q4 refer to the quartiles of IPO firms with the lowest to highest DCA in the IPO year. There is a large dispersion of the amount of earnings management that IPO firms engaged in. The mean DCA for the most conservative quartile is negative (-0.200), and positive (0.352) for the most aggressive firms. This implies that the most aggressive IPO firms inflate their earnings by 35.2% of prior year total assets, while the most conservative underestimate their earnings by 20% of prior year total assets. These numbers are comparable to those reported in Teoh, Welch and Wong (1998). It is hard to justify that these conservative firms intentionally underestimate their earnings by this much. A potential explanation could be that the most conservative firms are sufficiently valued and subscribed and they have the lowest incentive to artificially boost earnings. Instead, their main concern at IPO time is to sustain the earnings and the market valuation after IPO. This is evidenced by their price-to-book ratio (4.9), the highest in the four quartiles, even though they report on average - 8.1% of loss over equity.

Overall, the distribution of corporate characteristics across the earnings management quartiles show that firm quality decreases with earnings management that the firm engaged in at IPO time. The most aggressive quartile (Q4) exhibits the lowest offer price, smallest capitalization and lowest underwriter reputation rank. Even though these firms manage to report a barely positive profitability (mean 0.006; median 0.095), they report the lowest operating cash flow (mean -0.493, median -0.204). Their price-to-book ratio is averaged 4.2 (median 3.0), which is higher than the two middle quartiles. This high price-to-book suggests that the market subscribes to the inflated earnings of these firms at IPO time.

The three conservative quartiles exhibit similar attributes as offer price, capitalization, underwriter reputation, and financial leverage. However, the most conservative quartile reports negative average profitability and cash flow. The stock price volatility of this quartile is highest (4.55%) among all quartiles. This is consistent with its highest price-to-book ratio. It seems that these most conservative firms are growth companies in hot demand.

3.3 Economic Determinants of Earnings Management

Earnings management is a corporate decision endogenous to firm quality and associated economic costs. In the preceding section, we have shown that corporate characteristics related to firm quality generally decreases with the degree of earnings management. However, such sub-grouped statistics does not show whether the relation between firm fundamental and earnings management is harmonically smooth. In this section, we run OLS regression of earnings management on corporate variables related to firm fundamental.

Becker et al. (1998) find that companies with non-Big 5 auditors (a proxy for lower audit quality) report discretionary accruals that significantly increase income compared to companies with Big 5 auditors. We thus include the variable AUDIT to control for the effect of auditor quality on unexpected current accruals. Watts and Zimmerman (1978) and Hagerman and Zmijewski (1979) suggest that large firms face greater political costs than small firms. Larger firms are subject to more scrutiny from financial analysts and investors because they have more influence on the stock market due to their larger market capitalization. Accordingly, larger firms have less flexibility and weaker incentives to overstate earnings. We thus include market capitalization to control for the size effect.

Firms with strong operating cash flow are less likely to engage in incomeincreasing earnings management because they already have good operating performance. Following Becker et al. (1998), we include operating cash flow deflated by lagged total assets to control for this effect. Finally, DeFond and Jiambalvo (1994) and Sweeney (1994) report that managers use discretionary accruals to satisfy debt covenant requirements. Because highly leveraged firms have greater incentives to manage earnings upwards, we include leverage to account for the influence of leverage on earnings management. Leverage also accounts for the financial risk.

[Insert Table 3 about here]

Table 3 reports the regressions results. The dependent variable is the discretionary current accruals in the IPO year of each firm. In the first regression, we regress DCA on the company capitalization, pre-IPO age, profitability, operating cash flow, growth,

banker reputation dummy, and venture capital dummy. The results show that firms of larger size, higher operating cash flow, underwritten by a prestigious investment bank, or funded by a venture capital are associated with lower amount of earnings management. These coefficients are significant at the 1% or 5% level. Profitability is significantly and positively related to DCA. As shown in Table 2, firms aggressively engaged in earnings management manage to report inflated profitability but negative operating cash flow. The causality here, hence, is that earnings management is an effective tool to boost earnings and profitability. This implies that investors shall place more weight on operating cash flow in analysis since earnings are subject to manipulation. The regression also shows that firm age, capital structure, and current growth rate play no significant role in issuer's earnings management.

Recent studies suggest that initial price is informative on the quality of IPOs. We thus replace the market capitalization with the first trading day price and the number of outstanding shares (both in logarithm) in the regression. Surprisingly, both price and number of shares exhibit significant and negative relation with DCA. A potential explanation is that initial price reflects the confidence of the issuer and hence the fundamental of the firm. So firms with high initial price have less incentive to manipulate earnings. In the contrary, since larger firms (larger number of shares) are more widely and carefully monitored, the issuers face higher costs in managing the earnings. The banker dummy no longer retains significant explanatory power on DCA in this regression. This may be due to the fact that prestigious investment banks lead the underwriting of more than half of the IPOs in the sample period, and they tend to underwrite large firms.

Both regressions exhibit fairly high R-square. We retain the unexpected DCA (the residuals) from these two regressions. These residuals of DCA will be used in further analysis on delisting risk, as a substitution to DCA.

There is a potential argument that premium auditors constrain earnings management. A look at the raw data shows that (Big 5) audit dummy is significantly and negatively correlated with DCA. We include audit dummy in the regression. The results show no significant explanatory power of audit dummy after controlling for the other variables.

4. Modeling Delisting Rate and Longevity of Post-issue Listing

In this section, we first conduct probit analyses on the *ex ante* probability of delisting due to performance failure and the probability due to merger/acquisition. We then investigate the economic determinants of the expected longevity of post-issue listing. Various robustness checks are also discussed.

4.1 Predicting IPO Failure

Our Hypothesis 1 states that firms associated with aggressive earnings management in the IPO process are more likely to fail and involuntarily delist from the stock exchanges. Probit analyses are conducted to test this hypothesis. We start with the following specification:

DELIST = f (DCA, LOGMKV, LEV, STD, LogAge, Banker, PROF, Growth,PTB), (1)

where DELIST is the dummy that equals to 1 for the firm involuntarily delist from the exchange within the first five post-issue years. Other variables are defined in Table 3.

4.1.1. Discretionary Current Accruals

Our main interest lies on the predictive power of DCA on involuntary delisting probability. We include firm capitalization (LOGMKV) to control for the size effect. Financial leverage (LEV) is included to control for capital structure risk. Highly leveraged firms are more likely to fail due to interest and principal payment. Stock price volatility (STD) in the first 6 post-issue months is included to control for firm variance. Presumably, the market perception (STD) captures the firm risk (business, operation, etc.) in addition to the capital structure risk. Following previous studies on IPO earnings management (e.g., Teoh, Welch and Wong, 1998), the time point of this predictive model is when the IPO year financial data is released. On average, this usually allows us to observe six months of market trading assuming the average firm takes IPO in the middle of its fiscal year. Regressions excluding this variable report consistent results. The other control variables in the right-hand side of equation (1) are motivated by previous studies on delisting rate in the post-issue period (e.g., Seguin and Smoller, 1997; Fama and French, 2004; Chadha, 2003; Demers and Joos, 2005).

[Insert Table 4 about here]

Results of the primary probit model are reported in Regression 1 of Table 4. DCA is positively related to the attrition rate, with coefficient estimate of 0.666 and standard error of 0.128. This coefficient is significant at the 1% level. Expectedly, both financial leverage and price volatility are positively and significantly related to attrition rate. Meanwhile, firms with larger size and greater age are less likely to fail. The results show that prestigious investment banks are selective in choosing strong IPOs. Venture capitals seem to play a significant role in laying out a strong foundation of the funded firms. Results also show that firms with high profitability and strong (income) growth have a significantly lower attrition rate. These coefficients are all significant at the 1% level. Though failed IPOs exhibit high price-to-book (Table 2), PTB exhibits no significant predictive power on the attrition rate of IPOs after controlling for the other variables. This is consistent with our initial argument that there may be an endogeneity circuit between PTB and DCA. Weaker firms inflate earnings to boost PTB, and stronger firms are reluctant to inflate earnings since they are already fairly priced, evidenced by high price-to-book.

4.1.2. Stock Price

Seguin and Smoller (1997) find that offer price predicts the delisting rate. They also suggest that it is easier for a naïve investor to follow a rule that requires purchasing a given amount of stock at the close price of the first trading day rather than at the opening price. We thus use the closing price of the first trading day. We replace the logarithm capitalization (LOGMKV) with the logarithm stock price and logarithm number of shares outstanding after IPO in the probit regression (1). Results are presented in Regression 2 of Table 4.

Firms with high initial price are less likely to delist due to performance failure. Stock price captures the significant predictive power of firm size on attrition rate while number of outstanding shares carries insignificant predictive power. Consistent with Seguin and Smoller (1997), the results suggest that larger firms are not necessarily stronger. High offer (initial) price reflects the confidence of the issuer and conveys significant information about firm quality. The other variables retain their significant predictive power and the estimates are close to those in Regression 1, except price-tobook. In the following regressions, we include stock price instead of capitalization as an explanatory variable.

In Table 3, we show that DCA is significantly related to variables that reveal firm fundamental. To control for the potential colinearity and endogeneity, we use the residuals of DCA from Regressions 1 and 2 of Table 3 to replace the raw DCA in the regression, respectively. The results are reported in Regressions 3 and 4 of Table 4. These coefficient estimates are consistent with the preceding results. The key variables retain the predictive power of same significance level.

4.1.3. Technology Firms and Internet Firms

The surge of technology and Internet IPOs in the late 1990s was phenomenal. Contemporaneous with the declining survival rates of new lists, Fama and French (2004) document a decline in new list profitability and an increase in the firms' expected growth prospects, characteristics that are consistent with the profile of young technology firms. Ritter and Welch (2002) similarly report that technology stocks have significantly increased as a percentage of all IPO offerings since the 1980's, and particularly so during the late 1990's and 2000. It is thus plausible to examine the delisting of these IPOs and their impact on the role of DCA. We classify the technology and Internet IPOs following Jay Ritter. The results of Regression 5 show that technology IPOs are less likely to delist due to performance failure. This is not surprising since technology companies were generally successful throughout the 1990s. Similarly, Demers and Joos (2005) report that technology companies exhibit lower delisting rate relative to non-technology companies in their sample of IPOs during 1985-2000. Furthermore, the inclusion of the Tech dummy does not qualitatively change the predictive power of other variables. In Regression 6, we include the Internet dummy. The results suggest that Internet IPOs exhibit higher attrition rate but the estimate is not significant at the conventional level. The inclusion of the Internet dummy doesn't change the estimates of other variables qualitatively.

Overall, the predictive power of DCA on attrition rate is robust controlling for the technology and Internet mania.

4.1.4. Industry Heterogeneity

Different industries may have their industry wide risk characteristics. We track the industry (SIC) code of each IPO, and add industry dummies to control for industry effect following Seguin and Smoller (1997). We control for six major industries in our sample: SIC28 (Chemicals and allied products), SIC35 (Industrial, commercial machinery, computer equipment), SIC36 (Electronics), SIC38 (Measurement instruments), SIC48 (Communications), SIC73 (Business Services). We include these six industries because they are the major industries represented in our sample. The remaining industries are grouped as others, which are the default group in regression. Results are reported in Regression 7 of Table 4. IPOs in the industries of Chemicals and allied products (SIC28), Electronics (SIC36), Measurement instruments (SIC38), and Business services (SIC73) exhibit a significantly lower attrition rate. Industrial IPOs (Sic 35) are less likely to delist, and IPOs in Communications tend to have higher attrition rate. However, these two industry effects are insignificant. Overall, the inclusion of these industry dummies does not alter the significance of the predictive power of other key variables.

In summary, we find significant cross-industry heterogeneity in the distribution of delisting rate. Our results are consistent with Seguin and Smoller (1997). Since their sample goes from 1974 to 1988 while ours spans from 1980 to 1999, we extend their results to a more recent time period.

4.2. Probability of Merger/Acquisition

In our sample, mergers and acquisitions happen more often compared to involuntarily delisting. In this section, we run regressions similar to the preceding section to investigate whether earnings management in the IPO process is related to the probability of mergers and acquisition. We start with the following specification:

MergAcq = f (DCA, LOGMKV, LEV, STD, LogAge, Banker, PROF, Growth,PTB), (2)

where MergAcq is the dummy variable for the event of merger/acquisition. MergAcq is set to 1 if the stock listing code is between 200 and 300 within the first five post-issue years. Table 5 presents the regressions results.

[Insert Table 5 about here]

4.2.1. Discretionary Current Accruals

DCA exhibits significant predictive power on the probability of mergers and acquisition. Its coefficient estimate in Regression 1 is -0.346 with standard error of 0.118,

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significant at the 1% level. It suggests that firms associated with conservative earnings management are more likely to be the target of mergers and acquisitions. We control for the same variables used in the preceding section. The coefficient of the venture capital dummy is positive and significant. Meanwhile, the price-to-book ratio is significantly and negatively related to merger/acquisition likelihood. Interestingly, firm size is positively related to merger/acquisition. Given that IPOs generally have smaller capitalization, it is reasonable that larger IPO firms have a stronger tendency to grow and survive. Other variables that are significantly related to attrition rate show no significant tie with the probability of merger/acquisition.

We also decompose the market capitalization into stock price and number of shares outstanding, and include them in the regressions. The results in Regression 2 show that both stock price and number of shares are significantly and positively related to the likelihood of merger/acquisition. As discussed earlier, initial price is a strong signal of firm quality. So firms of stronger fundamental tend to be merged/acquired. The significant predictive power of the number of shares is a confirmation on the size effect in merger/acquisitions.

In Regressions 3 and 4, we replace the raw DCA with the residuals of DCA estimated from Regressions 1 and 2 of Table 3. The parameter estimates are consistent with the preceding regressions. The significant predictive power of DCA on merger/acquisition likelihood is thus robust after controlling for all other variables.

4.2.2. Technology, Internet, and Industry

We further examine the patterns of technology and Internet companies, and varying industries in the merger/acquisition trends. Regressions 5, 6, and 7 of Table 5 show that technology companies are more likely to be merged/acquired soon after IPO. This is reasonable since technology companies grow fast and merger/acquisition is an important venue for growth. The coefficient estimate of the Tech dummy is 0.129, significant at the 5% level. The Internet dummy is also positively related to the probability of merger/acquisition, but not significant at the conventional level. Along with regression results in Table 4, Internet companies are more likely to be delisted for both performance failure and merger acquisition. The inclusion of the Tech and Internet

dummies does not qualitatively change the significant predictive power of other key variables.

We now add the six industry dummies and check the potential industry characteristics in the merger/acquisition probability. The results show that IPOs in Chemicals and allied products (SIC28) exhibits lower likelihood of merger and acquisition. On the contrary, firms in Measurement instruments (SIC38) and Business services (SIC73) experience more merger/acquisitions. These parameter estimates are significant at the 1% or 5% level. After controlling for the industry effect, the significant predictive power of DCA remains intact. Interestingly, financial leverage gains significance (5%) in predicting lower chance of merger/acquisition. This relation is intuitively appealing since firms with higher financial leverage are riskier and less attractive to an acquirer.

Overall, earnings management is powerful in predicting merger/acquisition, and this predictive power remains controlling for various relevant variables.

4.3. The Longevity of Post-issue Listing

We now test whether the aforementioned explanatory variables predict the longevity of post-issue listing of the IPOs. Intuitively, delisting risk is comprised of both the likelihood of involuntary delisting (delisting rate) in a given time span and the expected longevity of listing (duration). Factors that reveal the quality of an IPO should presumably explain both aspects of delisting risk. In particular, Hypothesis 2 states that firms engaged in aggressive earnings management in the IPO process are more likely to have shorter post-issue listing: Their weak fundamental gives them lower chance of surviving market competition. Previous studies on delisting risk ignored the latter aspect and hence forego the information conveyed in the observed longevity of IPO listing.

To test this hypothesis, we estimate the Cox (1972) proportional hazard model for the listing longevity of IPOs. The Cox proportional hazard model is a powerful method for identifying the explanatory variables on the longevity of an entity.¹² The strength of the model lies in its ability to model and make inferences on the timing of delisting without making any specific assumptions about the distribution form of life expectancy.

¹² Shumway (2001) suggests that hazard models are more appropriate than single-period models for forecasting bankruptcy. Simonoff and Ma (2003) use the Cox proportional hazard model to investigate the factors that relate to the longevity of Broadway shows.

It is free from the potential bias associated with the time window of tracking the listing status. In this analysis we lift the restriction of five-year tracking window. Instead, we estimate the listing longevity of each IPO by December 2004. Firms delisted due to performance failure in the sample period are classified as IPO failure.

The specific form of the Cox proportional hazard model we estimate is as follows:

 $h_i(t) = h_0(t) \exp(\text{DCA}, \text{LogPrice}, \text{LogShare}, \text{LEV}, \text{STD}, \text{LogAge}, \text{Banker}, \text{PROF},$ Growth, PTB), (3)

where the dependent variable, $h_i(t)$, is the hazard rate for firm *i* at time *t* (i.e., the probability of delisting from the exchanges at time *t*, conditional on continual listing), $h_0(t)$ is the "baseline" hazard rate shared by all firms at time *t*. All explanatory variables are defined as those in the probit model (1).

4.3.1. Earnings Management and Listing Longevity

In general, consistent with Hypothesis 2, we find that firms associated with aggressive earnings management in the IPO year tend to have shorter listing. We define listing longevity as the calendar days between the IPO and delisting date. If the firm does not delist by December 31, 2004, the longevity is equal to the days between IPO date and December 31, 2004, and this observation is categorized as right censored in the Cox proportional hazard analysis.

[Insert Table 6 about here]

Table 6 presents the results of the Cox proportional hazard model that links earnings management in the IPO year with the post-offer listing of these firms. We first examine the full sample of 3898 IPO firms. This full sample provides us a dataset that is complete and free from survivorship bias. In this full sample, the listing longevity of merged/acquired firms is censored as of their delisting date.

The full sample results show that DCA correlate positively with the hazardous function after we control for the other factors influencing delisting. This evidence suggests that firms associated with aggressive earnings management in the IPO year are expected to delist *sooner*, *ceteris paribus*. Furthermore, other variables such as log-price, leverage, price volatility, pre-IPO age, banker reputation, venture capital funding, profitability and growth that are important in explaining attrition rate also exhibit significant power in explaining the *a prior* longevity of listing. Firms with higher initial

prices, longer history, prestigious investment bankers, venture capital funding, higher profitability and higher earnings growth tend to survive longer after the IPO. On the other hand, firms with higher financial leverage and higher price volatility tend to delist sooner after initial issuance. Finally, the number of shares and price-to-book ratio do not exhibit a significant relation with the hazard function.

In Regression 2 of Table 6, we replace the raw DCA with the residuals of DCA estimated from Regression 2 of Table 3 for robustness check. It generates consistent parameter estimates.

4.3.2. Technology, Internet, and Industry Effects on Listing Duration

We now include the tech, Internet and industry dummies in the Cox Hazard function to check their potential effects on the listing longevity of IPO firms. The results show that technology firms tend to list longer while Internet firms have a shorter *ex ante* post-issue listing. These two parameter estimates are significant at the 1% level. The significant estimate of Internet dummy is intriguing given that this dummy yields no significant estimates in the probit analyses. It supports the use of Cox Hazard function analysis. The Cox Hazard model captures the observed longevity of listing, which is mostly ignored in the dichotomization process of probit models.

In addition, Firms in the industries of Chemicals and allied products (SIC28), Industrial (SIC35), Electronics (SIC36), Measurement instruments (SIC38) and Business Services (SIC73) have longer *ex ante* post-issue listing. Besides these industry effects, the estimates of other key variables are consistent with prior regressions.

4.3.3. The Continual Sample

Given the large occurrences of merger/acquisitions, one would suggest to investigate the listing longevity excluding these censored observations, for which the real listing longevity is not observed and truncated at merger/acquisition date. We now turn to a sub-sample of continual firms for robustness check. Regressions 6 and 7 of Table 6 report the estimates. The residual of DCA from Regression 2 of table 3 is used in Regression 7. The continual sample results are largely consistent with the full sample results. In particular, DCA is positively related to the hazard rate, which is significant at the 1% level. The estimates of log-price, firm age, banker reputation, venture capital funding, profitability and income growth remain negative and significant at the 1% level.

The estimates of financial leverage and price volatility remain positive and significant at the 1% level.

4.4. Robustness Checks

In addition to other checks, we conduct three types of robustness checks in this section: (1) use alternative measures of earnings management; (2) track the delisting status within three post-IPO years instead five post-issue years; (3) consider the impact of the Sarbanes-Oxley Act.

4.4.1. Alternative Measures of Earnings Management

We have used the discretionary current accruals from Jones model in this study. There are some debates regarding the validity of this discretionary current accruals model. For example, accruals correlate with a firm's contemporaneous and past performance (e.g., Guay, Kothari and Watts, 1996; Dechow, Kothari and Watts, 1998; Barth, Cram and Nelson, 2001). Kothari, Leone and Wasley (2005) suggest that discretionary accruals from the modified Jones model, adjusted for a performancematched firm's discretionary accruals, is a well specified measure of discretionary accruals. Other alternative measures of earnings management include performance matched DCA and non-performance-matched discretionary accruals from the modified Jones model.

Following Kothari, Leone and Wasley (2005), we match each IPO firm with another non-IPO firm from the same two-digit SIC code industry and year with the closest return on assets (ROA), where ROA is net income divided by lagged total assets. The ROA matching is done in the same year as the year for which the discretionary accruals are being calculated. The performance-matched discretionary accruals are the difference in modified Jones model discretionary accruals between each IPO firm and its matching observation.¹³ We also calculate performance-matched discretionary current accruals using the same method.

¹³ The following numerical example for calculating performance matched discretionary current accruals is explanatory. Assume IPO Company A's discretionary current accruals are 0.008 and the two-digit SIC code is 31. Company A went through IPO in 1996. Non-IPO Company B is also in the same two-digit SIC code as Company A and has the closest return on assets (ROA) to Company A's ROA from among all non-IPO firms in SIC code 31 in 1996. Company B's discretionary current accruals are 0.006 for 2001. Then, the performance matched discretionary current accruals is 0.002 for Company A.

We replace our DCA estimate from Jones model with the three alternative measures of earnings management: performance matched DCA (from Jones model), discretionary accruals and performance matched discretionary accruals from modified Jones model. The results of the probit regressions and Cox Proportional Hazard regressions with these alternative earnings management measures are largely close and consistent with the reported results. These results show that various measures of earnings management are positively related to involuntary delisting rate and hazard rate, and also negatively related to post-issue longevity of listing.

Hence our conclusion on the predictive power of earnings management is robust to the alternative measures of earnings management.

4.4.2. Tracking Delisting within Three Post-IPO Years

One limitation of probit analysis is the subjective choice of the tracking window in which an event is followed. In this study, we have used a five-year tracking window. A five-year tracking window is appropriate for two reasons. First, previous studies often use five post-issue years as tracking window for portfolio performance. Second, five years is generally long enough to evaluate an IPO firm. Previous studies show that firms surviving the first five post-issue years behave like seasoned firms. To test whether our results are sensitive to the five year cut-off, we impose the tracking window to be three post-issue years. In addition, Ritter (1991) finds that much of the underperformance of the IPOs occurs in the third post-issue year. The regression results under three-year tracking window are qualitatively unchanged (not reported for brevity). This evidence suggests that unexpected current accruals retain significant predictive power on delisting risk in the long term (5 years), as well as in the near term (3 years).

4.4.3. Considering the Impact of the Sarbanes-Oxley Act (SOX)

The Sarbanes-Oxley Act of 2002 has significantly increased the regulatory burden and compliance cost of public companies. Ellen, Rachel and Wang (2004) find that the quarterly frequency of companies going private has modestly increased after the passage of the SOX. Although going private is not the same as delisting due to performance failure in our sample, we still consider the potential impact of the SOX on involuntary delisting risk. Here we define involuntary delisting as a firm delisted for performance failure within five post-issue years or by 12/31/2001, whichever is earlier. The truncation time, 12/31/2001 is the last year before the enactment of SOX. This reduced sample excludes the delistings due to the enactment of SOX after 2001. It truncates the tracking window of firms that went to IPO between 1997 and 1999. However, empirical results on this reduced sample are consistent with the full sample. It shows that our results are robust to the consideration of the SOX.

5. Investment Implications

Thus far, we have established the predictive power of discretionary current accruals in the IPO year on future IPO failure. In this section, we investigate the implication of our predictive model in investment practice.

5.1. Long-term Performance of IPOs

Numerous studies have cast light on the long-term performance of IPOs. We estimate the investment returns on the IPOs in our sample. We estimate the equal weighted buy-and-hold returns of all IPOs for investment period month τ to month T after IPO as follows:

$$BH_{\tau,T} = \frac{\sum_{j=1}^{N} (\prod_{t=\tau}^{T} (1+r_{j,t}) - \prod_{t=\tau}^{T} (1+m_{j,t}))}{N},$$
(4)

where $r_{j,t}$ is the return of stock *j* starting second trade session, and $m_{j,t}$ is the benchmark portfolio return matching the trade time of stock *j*, and *N* is the number of surviving firms in month *t*. We also estimate the cumulative abnormal return (CAR) of the sample portfolio for the period τ to *T* as

$$CAR_{\tau,T} = \sum_{t=\tau}^{T} \left[\frac{\sum_{j=1}^{N} (r_{j,t} - m_{j,t})}{N} \right].$$
 (5)

These methods are consistent with prior studies (i.e., Teoh, Welch and Wong, 1998). Table 7 reports the investment performance for two different holding periods: the 4th month to 60th month; the 7th month to 60th month. If we invest equally in all IPOs in the end of the third month and hold them till the end of fifth year, the raw buy-and-hold return is 36.9%. This return is merely -39.2% after adjustment for value-weight market

returns, and -29.4% after adjustment for the returns of smallest decile of NYSE stocks. The raw CAR for the same portfolio is 47.3%. After adjustment for market, it comes up as a loss of -16.7%. This is consistent with the well documented long-term underperformance of IPOs. The returns are similar when we start investing at the end of sixth month.

[Insert Table 7 about here]

5.2. Stock Performance of Delisted Firms

Now we group firms according to their listing status. The average buy-and-hold returns of all 659 failed firms are shockingly -80% if we hold them from the 4th month to 60th. It implies that these weak firms have lost 80% of their initial value before the delisting date. Loss due to the delisting event is not included yet. If we hold these firms starting the second day to the sixtieth month, the buy-and-hold return is roughly -81%. Hence, these failing firms do not appreciate in price in the first three months. After adjustment of market return, or NADAQ returns, or small firm returns, the loss is strikingly large: -137%, -149%, and -124%, respectively. The CAR of the same portfolio is overwhelming. When we use CAR, we assume that the same initial amount of principal is equally invested in these firms every month. Hence, for these persistent losers, such investment strategy costs the investor 275.6% of the initial principal. Adjusting for market, NASDAQ and small firm returns, this loss is well above 300%. If we invest in these failing firms starting the 7th month till the 60th, returns are similar. It seems that in the first 6 months, these failing firms exhibit no big change in price.

Returns of the merged/acquired firms are contrastingly higher. The buy-and-hold $(4^{th} - 60^{th})$ return of merged/acquired firms is 58.2% on average. Controlling for market returns and NYSE small firm returns, this buy-and-hold return stays positive. The CAR of these firms are more appealing since by re-investing the same amount of initial principal at these firms, there is a upward bias due to the persistence in positive returns from merged/acquired firms. The performance of these firms for the period $7^{th} - 60^{th}$ is similar. This suggests that the merged/acquired firms are exceptional compared to the average underperforming IPOs.

The performance of the continual firms is above the average performance of the full sample. However, they still under-perform the market. Overall, investment return

from those doomed failing firms is detrimental. If investors gain insight from our predictive model and make use of the information content of earnings management, they can by some extent enhance their portfolio returns. We conclude that earnings management in the IPO process is an informative indicator of firm quality for investment purpose.

5.3. Stock Performance Across Earnings Management

We now turn to the stock performance of firms across earnings management. The portfolio construction is similar to Teoh, Welch, and Wong (1998). We sort all firms into four quartiles by DCA, and estimate the returns of these quartiles according to equations (4) and (5). For either holding period, 4th-60th month or 7th-60th month, the returns of the first three quartiles (conservative earnings management) are close, and substantially above the forth quartile (aggressive earnings management). A first implication is that the IPOs associated with the most aggressive firms should be avoided in investments. The results also suggest that the relation between earnings management and stock performance is not monotonic. Similarly, the relation between earnings management and firm fundamental is not monotonic. The incremental information content of earnings management is significant while other key variables play an informative role in revealing the quality of the IPO firm. A univariate sort of IPO firms on earnings management is not sufficient to disclose the information content of earnings management (DCA), which ignores significant information from other readily available corporate variables. Our multi-factor predictive models thus make significant contribution to the literature on this topic, following Teoh, Welch and Wong (1998).

6. IPO Cycle and Earnings Management

Financial market observers have suggested that periods of high initial returns to IPOs are associated with excessive demand for IPOs and that this high demand subsequently attracts new issues of a lower quality being taken to market (e.g., Loughran and Ritter, 2004). Lowry and Schwert (2002) investigate the initial returns and timing of IPOs and provide evidence of IPO cycle. They also find that initial returns of IPOs Granger cause IPO volume. If the motivation of earnings management is mainly to secure high offer price and full subscription, IPO issuers shall learn from the IPO cycle and the information

content of IPO initial returns. Thus, the degree of earnings management shall interact with the IPO cycle. In this section we examine the dynamic relation between earnings management and IPO cycle. We estimate the equal weighted DCA and price-to-book of IPOs in each month. Price-to-book reflects the market valuation on initial public offers and hence, it may be an informative variable related to IPO cycle. We are interested in the inter-temporal changes of DCA with IPO volume, IPO initial returns, and IPO relative valuation in the sample period 1980-1999. We get the monthly time series of IPO volume and initial returns from Jay Ritter. These series are also used by Lowry and Schwert (2002). The IPO volume is the number of IPOs (NIPO) in each month. The initial return is defined as the equal-weighted average price appreciation in the first trading day over offer price.

6.1. Autocorrelations of DCA, PTB, Initial Returns, and Volume of IPOs

Table 8 presents the autocorrelations of the interested variables up to 12 orders. Consistent with prior studies, IPO initial returns and NIPO exhibit strong autocorrelations. The first order autocorrelation is 0.64 for initial returns and 0.78 for NIPO. Their autocorrelations up to the 12th order decay with time lags but all are significant at the 5% level.

[Insert Table 8 about here]

On the contrary, there is no evidence of clear cycles in DCA and price-to-book. Their autocorrelations of the first 12 orders are mostly insignificant. DCA exhibits a second order autocorrelation of 0.22. Interestingly, its 12th autocorrelation is 0.17, significant at the 5% level. This suggests that there is an annual seasonality in the amount of earnings management for IPOs. The autocorrelations of price-to-book are less conclusive. The second, sixth, and eighth order autocorrelations of PTB are positive and significant at the 5% level.

6.2. Cross-Correlations

In this subsection, we show that DCA interacts with IPO initial returns. Higher initial returns result from high demand and partial adjustment of IPO offer prices (i.e., Loughran and Ritter, 2002; Lowry and Schwert, 2002). In a hot market, evidenced by higher IPO initial returns, IPO issuers have lower incentive to boost earnings since an average IPO is better welcome relative to in a cold market. Therefore, high IPO returns

should be associated with and lead to low degree of earnings management, due to the strong autocorrelation of initial returns. On the other hand, if IPO issuers predict a hot market for their initial offers, they tend to constrain in earnings management. This would suggest DCA to be negatively related to subsequent IPO initial returns. Put together, there should be a negative lead-lag correlation between DCA and initial returns of IPOs.

Figure 2 plots the average DCA and initial returns of IPOs per month for the period 1980-2003. Both DCA and initial returns exhibit high variation overtime. DCA spikes are associated with lower current and subsequent initial returns. For example, DCA in early 1983 was as high as 0.20 across IPOs, associated with the initial returns of 22%, a drastic drop from the past hike of 60% initial returns observed in late 1982. The high DCA in early 1983 leads to lower initial returns in late 1983 and throughout year 1984. Meanwhile, the low initial returns in 1984 are associated with high level of DCA throughout 1984 and 1985. Similar pattern is observed across years. Throughout the sample, DCA tends to be high in years of chilled IPO market, such as in mid 1982, and it tends to be constrained in hot IPO markets such as in 1999. Overall, there is a significant inverse lead-lag relation between DCA and initial returns.

While the plot in Figure 2 provides a visual dynamics between DCA and initial returns, we now estimate the cross-correlation of the two series for a quantitative check on their lead-lag relation. The cross-correlation between DCA_{t+k} and initial returns (IR_t) is negative for k=-12 to 11. These correlations are not persistent in value across time lags, partially due to the variability of DCA. On the other hand, the variability of DCA may be the very information content of earnings management. It shows that DCA is inversely related to current and subsequent IR, vice versa.

IPO volume is another variable associated with IPO cycle. Lowry and Schwert (2002) show that IR is positively related to subsequent NIPO and negatively related to past NIPO. We also estimate the cross-correlation between DCA and NIPO. Plotted in Figure 2, NIPOs is negatively related to the concurrent and immediate subsequent DCA. This suggests that earnings management is constrained in a hot IPO market, evidenced with high IPO volume, *ceteris paribus*. NIPO is negatively related to the preceding DCA up to 12 months back. None of these cross-correlations are significant at the conventional level. On the other hand, NIPO is positively related to DCA in the third to twelfth

months. This is consistent with the evidence that NIPO is negatively associated with subsequent IR, and IR is negatively associated with subsequent DCA. However, because of the high variability of DCA, lead-lag correlations between DCA and IR, and between DCA and NIPO are less persistent relative to the lead-lag correlations between NIPO and IR.

Price-to-book reflects the relative valuation of IPOs. High price-to-book of IPOs is a confirmation of hot market, and should be positively associated with current and subsequent IR. This is confirmed in Figure 3. The contemporaneous correlation between PTB and IR is as high as 0.38. Furthermore, the PTB exhibit strong correlations with subsequent IR up to the 12th month, and all these correlations are significant at the 5% level. Meanwhile, the lead-lag correlation between IR and PTB are also positive, but of lower value. The cross-correlations between PTB and NIPO are smaller in level. PTB are positively related to subsequent NIPO and positively related to past NIPO.

6.3. Timing of Earnings Management

The strong negative lead-lag correlation between DCA and IPO initial returns suggest that IPO issuers manage earnings in response to market demand and valuation. This strong negative correlation is consistent throughout the lead-lag orders. It is more intriguing when we show that DCA is highly variable with weak and less persistent autocorrelation across time lags and IR exhibits strong and persistent autocorrelation across time lags.

To test the reliability of this relation and check the causality between DCA and IR, we conduct vector autoregressive (VAR) analyses, following Lowry and Schwert (2002). The VAR models allow for substantial serial correlation of each time series. These models enable us to test the incremental predictive ability of lagged DCA to predict future IR and vice versa, using Granger (1969) F-tests. The sixth order VAR models as well as the Grander F-tests are reported in Table 9. The optimal order of the VAR is determined according to Akaike's Information Criterion. Lowry and Schwert (2002) state that coefficient estimates and causality tests from third order and sixth order VAR models are consistent. This consistency is observed in our analysis. Another reason that we report the sixth order VAR is that we use the annual financial statement of the IPO year to estimate DCA. According to Teoh, Welch and Wong (1998), such annual

data are released three-six months after the IPO date. They argue that IPO issuers have a tendency to maintain the same earnings management policy through the IPO process and in the subsequent quarters. So the DCA estimated from the first year financial statement is representative of the degree of earnings management of this IPO issuer throughout the IPO process and the subsequent quarters. It should be consistent with the DCA estimate from the financial data in the IPO investment prospectus that is released before the IPO date. The latter has a perfect timing match with the IR estimate for each month.

[Insert Table 9 about here]

In the VAR(6) model on DCA and IR, DCA is positively related to its past two realizations, and negatively related to the past initial returns. This suggests that in a hot IPO market and the subsequent period, IPO issuers engage in less earnings boosting. The negative contemporaneous correlation between DCA and IR is reported in the preceding subsection. We focus on the causality (predictability) in the VAR analysis. The more intriguing question is whether IPO issuers, when they prepare the prospectus and report the earnings, predict the market demand and valuation at their IPO offer time. The VAR(6) results show that IR is significantly and negatively related to the past DCA, controlling for its positive serial correlation. The Granger F-tests show that lagged DCA Granger causes IR for the next six months, while no significant causality from lagged IR to DCA is found. This finding is exciting, which suggests that IPO issuers do follow the market, and manage their earnings in response to market demand and valuation. When they observe and predict a continued chilled IPO market, evidenced by low IR, they boost their earnings more aggressively. When they observe and predict a continued hot market, they engage in less earnings boosting.

To check the reliability of the timing of DCA, we run VAR(6) model on DCA and PTB. Price-to-book reflects the relative valuation of the market on IPO offers. Apparently, if the market favors IPOs and place high valuations, the IPO issuers have less incentive to engage in aggressive earnings management. The VAR results in Table 9 show that lagged DCA Granger causes PTB, and lagged PTB granger causes DCA. The implication is that when IPO issuers observe a continued hot market, evidenced by high PTB, they engage in less earnings boosting. On the other hand, since a hot IPO market

lasts several months, past high PTB predicts a continued high market demand, and hence a lower DCA.

In summary, the VAR analyses thus suggest that IPO issuers manage their earnings in response to the demand and relative valuation of IPO market.

6.4. Relative Valuation and Market Demand

Lowry and Schwert (2002) suggest that the information content of IR is related to the partial adjustment of market information into offer price. The clustering of initial returns across IPOs reflects market demand. Meanwhile, price-to-book reflects the relative valuation of IPOs. The strong positive contemporaneous correlation between IR and PTB (in Figure 3) and the positive lead-lag correlation between IR and PTB suggest that both IR and PTB are proxies of market demand and valuation. Lowry and Schwert also suggest that underwriters update the initial offer price based on market information and information that they gain through the road show. Hence, the realized initial returns are endogenous to the amount of offer price update, *ceteris paribus*. Given a fair value of an IPO, the greater the offer price update, the lower the initial returns, which is defined as the difference between final offer price and the first-day market close price. In Figure 3, we see that the correlation between PTB_{t-1} and IR_t is about 0.15, substantially lower than their contemporaneous correlation (0.38). Given the strong serial correlation of IR, this weak first order lead correlation between PTB and IR implies the inverse dynamic relation vis-à-vis. This implication is supported by the VAR(6) analysis.

The VAR(6) analysis on IR and PTB (reported in Table 9) shows that PTB Granger causes IR. IR is significantly and negatively related to PTB of the past month after controlling for the serial correlations of both variables. Along with the less persistent serial correlation of PTB (reported in Table 8), this negative response of IR to the lagged PTB suggests that PTB conveys more dynamic information on market valuation of IPO. This could explain why the previous VAR(6) analyses show that PTB Granger causes DCA, while IR does not.

Lowry and Schwert (2002) find that IPO volume lags initial returns and exhibit no predictive power on initial returns. Consistently, we find no significant predictive information content of IPO volume. There is no significant lead-lag causality between NIPO and DCA, and between NIPO and PTB. Interestingly, IR doesn't Granger cause

NIPO while it does Granger cause the logarithm of NIPO. This is understandable given the exponential growth and volatility of the number of IPOs per month in 1980s and 1990s.

7. Conclusion

Earnings management in the IPO process involves both benefits and costs. IPO firms with weak fundamental use boosted earnings to signal an inflated firm value. Thus, the amount of earnings management of an IPO firm reveals insider information about the fundamental of the firm. We document the existence of an equilibrium level of earnings management in IPO firms. In particular, the degree of earnings management decreases with firm quality, *ceteris paribus*. Since firm quality is directly linked to involuntary delisting rate and longevity of post-issue listing, we hypothesize and show that the degree of earnings management in the IPO process is positively related to the delisting rate and negatively related to the post-issue listing of IPO firms. Our empirical results strongly support the significant predictive power of earnings management on IPO failure.

From the probit analyses, we find that discretionary current accruals (DCA) in the IPO year, proxy for earnings management, are significantly and positively related to the probability of involuntary delisting after IPO. From the Cox proportional hazard analyses, we find that DCA in the IPO year is positively and significantly related to the hazard rate of IPO firms. Put it different, firms associated with aggressive earnings management in the IPO process tend to delist for performance failure *sooner*. On the other hand, conservative earnings management in the IPO year predicts higher chance of merger/acquisition, and merged/acquired firms outperform the market in terms of investment returns. We also find that IPO issuers manage earnings in response to market demand and valuation. The market wide DCA of IPOs interacts with the IPO cycle documented in Lowry and Schwert (2002).

Overall, our results show that IPO failure is very costly, and it can be predicted by discretionary current accruals in the IPO process in addition to other predictive variables. Both earnings management and delisting risk are related to the fundamental of IPO firms. These findings hold after various robustness checks. Our study proposes an effective

model to predict IPO failure. It investigates the motivation, economic determinants and consequence of corporate decision on earnings management in the IPO process.

Appendix: Measuring Earnings Management

We use unexpected current accruals based on Jones (2001) model to proxy the amount of earnings management (Teoh, Welch and Wong, 1998; DuCharme et al., 2004). As in Teoh, Welch and Wong (1998, page 1967), we calculate current accruals in the IPO year as follows (Compustat annual data item number is in the bracket):

 $CA = \Delta [accounts receivable (2) + inventory (3) + other current assets (68)] - \Delta [accounts payable (70) + tax payable (71) + other current liabilities (72)].$ (A1)

We run the following cross-sectional OLS regression for the expected current accruals of an IPO firm i in year t:

$$CA_{it}/TA_{it-1} = a_0 1/TA_{it-1} + a_1 \Delta Rev_{it} + \varepsilon_{it}, \qquad (A2)$$

where ΔRev_{it} is the change in revenue, and TA is the total assets. This cross-sectional regression is estimated each year for each two-digit SIC industry using all available firms. At least ten firm-year observations are required in a two-digit SIC industry. To prevent the undue influence of extreme observations on unexpected current accruals, the upper and lower 1% observations of these variables (except the residuals) in the unexpected current accruals model are winsorized. Using the estimated coefficient from the above regression, we estimate the unexpected current accruals as follows:

$$DCA_{it} = CA_{it} - a_0 1/TA_{it-1} - a_1 (\Delta REV_{it} - \Delta REC_{it})$$
(A3)

where Δ REC is the change in account receivable and DCA is the unexpected current accruals. Normal levels of working capital accruals related to sales are controlled for through the changes in revenue adjusted for changes in accounts receivable. And total assets of the previous period are used as a deflator to control for potential scale bias. The cross-sectional model reflects common industry factors applied to unexpected current accruals. Accordingly, estimated unexpected current accruals are more likely to reflect management's choice rather than industry factors. Since the model is estimated annually, changes in industry conditions are also factored in the model.

References

Alexander, J., 1991, "Do the merits matter? A study of settlements in securities class actions", *Stanford Law Review* 43 (February), 498-598.

Barth, M., D. P. Cram, and K. Nelson, 2001, "Accruals and the prediction of future cash flows", *The Accounting Review* 76(1), 27-58.

Beatty, R., and J. Ritter, 1986, "Investment banking, reputation, and the underpricing of initial public offerings", *Journal of Financial Economics* 55, 213-232.

Becker, C., M. DeFond, J. Jiambalvo, and K. R. Subramanyam, 1998, "The effect of audit quality on earnings management", *Contemporary Accounting Research* 15, 1-24.

Carter, R.B. and S. Manaster, 1990, "Initial Public Offerings and Underwriter Reputation," *Journal of Finance* 45, 1045-1068.

Chadha, S. 2003, "Do insiders knowingly issue overvalued equity? Evidence from IPOs that get delisted", *working paper*, University of Alabama.

Dechow, P., S. Kothari, and R. Watts, 1998, "The relation between earnings and cash flows", *Journal of Accounting & Economics* 25, 133-168.

Dechow, P., R. Sloan, and A. Sweeney. 1995, "Detecting earnings management", *The Accounting Review* 70 (April), 193-225.

DeFond, M. and J. Jiambalvo, 1994, "Debt covenant effects and the manipulation of accruals", *Journal of Accounting and Economics* 17 (January), 145-176.

Demers, E. and P. Joos, 2005, "IPO failure risk: determinants and pricing consequences", *working Paper*, University of Rochester.

Drake, P., and M. Vetsuypens, 1993, "IPO underpricing and insurance against legal liability", *Financial Management* 22 (Spring), 64-73.

DuCharme, L., P. Malatesta, and S. Sefcik, 2001, "Earnings Management: IPO Valuation and Subsequent Performance", *Journal of Accounting, Auditing and Finance* 16, 369-396.

DuCharme, L., P. Malatesta, and S. Sefcik, 2004, "Earnings management, stock issues, and shareholder lawsuits", *Journal of Financial Economics* 71 (January), 27-49.

Dye, R., 1988, "Earnings management in an overlapping generations model", *Journal of Accounting Research* 26 (Autumn), 195-235.

Engel, E., R. Hayes and X. Wang, 2004, "The Sarbanes-Oxley Act and Firms' Going-Private Decisions", *working paper*, University of Chicago.

Fama, E., and K. French, 2004, "New lists: Fundamentals and survival rates", *Journal of Financial Economics* 73, 229-269.

Fudenberg, K., and J. Tirole, 1995, "A theory of income and dividend smoothing based on incumbency rents", *Journal of Political Economy* 103, 75-93.

Gompers, P.A., and J. Lerner, 2003, "The Really Long-Run Performance of Initial Public Offerings: The Pre-Nasdaq Evidence", *Journal of Finance* 58, 1355-1392.

Guay, W., S. Kothari, and R. Watts, 1996, "A Market-based evaluation of discretionaryaccrual models", *Journal of Accounting Research* Supplement 34, 83-115.

Hagerman, R. and M. Zmijewski, 1979, "Some Economic Determinants of Accounting Policy Choice", *Journal of Accounting and Economics* (August), 141-161.

Healy, P., and J. Whalen, 1999, "A review of the earnings management literature and its implications for standard setting", *Accounting Horizons* 13 (December), 365-383.

Jones, J., 1991, "Earnings management during import relief investigations", *Journal of Accounting Research* 29 (Autumn), 193-228.

Kothari, S.P., A. Leone, and C. Wasley, 2005, "Performance matched discretionary accruals measures", *Journal of Accounting and Economics* (forthcoming).

Leuz, C., D. Nanda, and P.D. Wysocki, 2003, "Earnings management and investor protection: An international comparison", *Journal of Financial Economics* 69, 505-527.

Liang, P.J., 2004, "Equilibrium earnings management, incentive contacts, and accounting standards", *Contemporary Accounting Research* 21, 685-717.

Lowry, M., and Schwert, G. W., 2002, "IPO market cycles: Bubbles or Sequential Learning?" *Journal of Finance* 57, 1171-1198.

Loughran, Tim and Jay R. Ritter, 2002, "Why don't issuers get upset about leaving money on the table in IPOs?" *Review of Financial Studies* 15, 413-443.

Loughran, T., and J. Ritter, 2004, "Why has IPO underpricing changed over time?" *Financial Management* 33, 5-37.

Macey, J., M. O'Hara, and D. Pompilio, 2004, "Down and Out in the Stock Market: The Law and Finance of the Delisting Process", *working paper*, Yale Law School and Cornell University.

Michaely, R., and W.H. Shaw, 1994, "The pricing of initial public offerings: Tests of adverse-selection and signaling theories", *Review of Financial Studies* 7, 279-319,

Rangan, S., 1998, "Earnings management and the performance of seasoned equity offerings", *Journal of Financial Economics* 50, 101-122.

Rao, G., 1993, "The relation between stock returns and earnings: A study of newly-public Firms", *working paper*, Kidder Peabody and Co., New York.

Ritter, J., 1991, "The long-run performance of initial public offerings", *Journal of Finance* 46, 3-27.

Ritter, J., and I. Welch, 2002, "A Review of IPO Activity, Pricing, and Allocations", *Journal of Finance* 57 (4): 1795-1828.

Rock, K, 1986, "Why new issues are underpriced", *Journal of Financial Economics* 34 (January/February), 187-212

Sanger, G., and J. Peterson, 1990, "An empirical analysis of common stock delistings", *Journal of Financial and Quantitative Analysis* 25 (2), 261-272.

Schipper, K., 1989, "Commentary on earnings management", *Accounting Horizons* 3, 91-102.

Seguin, P.J., and M. M. Smoller, 1997, "Share price and mortality: An empirical evaluation of newly listed Nasdaq stocks", *Journal of Financial Economics* 45, *333-363*.

Shumway, T., 1997, "The Delisting Bias in CRSP Data", *Journal of Finance* 52 (1), 327-340.

Shumway, T., 2001, "Forecasting Bankruptcy More Accurately: A Simple Hazard Model", *Journal of Business* 74(1), 101-124.

Shumway, T., and V. Warther, 1999, "The Delisting Bias in CRSP's Nasdaq Data and Its Implications for the Size Effect", *The Journal of Finance* 54 (6), 2361-2379.

Simonoff, J., and L. Ma, 2003, "An Empirical Study of Factors Relating to the Success of Broadway Shows", *Journal of Business* 76, 135-150.

Subramanyam, K.R., 1996, "The pricing of discretionary accruals", *Journal of Accounting and Economics* 22, 249-281.

Sweeney, A. 1994, "Debt covenant violations and managers' accounting responses", *Journal of Accounting and Economics* 17 (May), 281-308

Teoh, S.H., I. Welch, and T.J. Wong, 1998, "Earnings management and the long-run market performance of initial public offerings", *Journal of Finance* 53, 1935-1974.

Teoh, S., T.J. Wong, and G. Rao, 1998, "Are accruals during initial public offerings opportunistic?" *Review of Accounting Studies* 3, 175-208.

Trueman, B., and S. Titman, 1988, "An explanation for accounting income smoothing", *Journal of Accounting Research* 26 (Supplement), 127-132.

Watts, R. and J. Zimmerman, 1978, "Towards a Positive Theory of the Determination of Accounting Standards", *The Accounting Review* 53 (January), 112-134.

White, H., 1980, "A heteroskedasticity-consistent covariance matrix estimator and a direct test for Heteroskedasticity", *Econometrica* 48, 817-838.

The sample consi listing code betwo defined as a firm	sts of 3898 domestic L een 400-600, except 50 with CRSP listing cod	POs during 1980-1999 11, 502, 503 and 573.,v e between 200-300 wit	. Delisting due to performance failure is defined as a firm with CRSP within five years after IPO. Delisting due to merger/acquisition is thin five years after IPO.
Panel A. Sample The full sample is the IPO year. Q1 Satterthwaite t-st row.	Distribution across Lis s divided into four qua and Q4 refer to the qu atistic (p-value in pareı	ting Status and Earnin triles by the amount of artiles with most conse atheses) for the differe	gs Management Levels cearnings management (discretionary current accruals) of each firm in struative and most aggressive earnings management, respectively. nce in delisting and survival rates of Q1 and Q4 are reported in the las
	Delisted due to	Delisted due to	
	pertormance tailure	merger/acquisition	Continual firms
All Firms	659	962	2277
	(16.9%)	(24.7%)	(58.4%)
01 (m - 074)	185	253	536
(+/ <i>k</i> _II) 17	(19.0%)	(26.0%)	(55.0%)
	101	278	596
(C/6-II) 7)	(10.4%)	(28.5%)	(61.1%)
	140	228	606
(+/k=u) cy	(14.4%)	(23.4%)	(62.2%)
	233	203	539
(c/6-II) +2	(24.9%)	(20.8%)	(55.3%)
T otatiotic O1 O4	-2.99	2.96	-0.04
I -Statistic マューマチ	(0.002)	(0.003)	(0.970)

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Panel B. Mean and Median Comparison of Unexpected Accruals between Delisted and Survivor Firms

The full sample is divided into three groups by the listing status of each firm. Satterthwaite t-statistic for the difference in mean and Wilcoxon Z score for the difference in median are reported in last two columns (P-value reported below the statistics).

atistic	(2) - (1+3)	-4.59 (<0.001)	-3.931 (<0.001)
test- st	(1) – (2+3)	3.80 (<0.001)	3.713 (<0.001)
(3)	Continual firms	0.056	0.025
(2)	Delisted due to merger/acquisition	0.028	0.012
(1)	Delisted due to performance failure	0.092	0.066
Discretionary	Current Accruals	Mean	Median

Table 2. Distribution of Corporate Characteristics

associated with most conservative and most aggressive earnings management in their IPO year, respectively. PROF is the profitability, the first five post-issue years: delisted due to performance failure; delisted due to merger/acquisition; and continual listing. In the last The sample consists of 3,898 domestic IPOs during 1980-1999. Reported are the mean (above) and median (below) of key corporate variables across firms. From the third to fifth rows, the firms are divided into three subgroups according to their listing status within standard deviation (%) of daily stock returns in the first six months post IPO; Initial Return is the appreciation of stock price at the OCF is the operating cash flow scaled by last year total assets; Leverage is the ratio of total debt over total assets; Volatility is the four rows, firms are divided into four quartile groups by the rank of their DCA in the IPO year. Q1 and Q4 include the firms close of first trading day over the offer price.

	N	Pre-IPO Age	Post-Issue Listing	DCA	Offer Price	Market Cap (\$mil)	Under- writer Rank	Price To Book	PROF	OCF	Leverage	Volatility
All Firms	3898	14.2 8	6.8 5.7	0.055 0.025	12.15 12.0	643 85.0	7.0 8	4.1 2.8	0.000 0.089	-0.156 0.049	0.424 0.382	4.06 3.68
Delisted due to perf. failure	659	10.1 6	2.9 2.8	0.092 0.066	9.11 8.0	280 43.2	5.4 5	5.1 3.5	-0.191	-0.589 -0.258	0.494 0.443	4.92 4.47
Merger/ acquisition	962	14.1 8	2.9 2.8	0.028 0.012	13.00 12.5	440 113.5	7.6 8	3.7 2.9	$0.018 \\ 0.083$	-0.074 0.070	0.419 0.372	4.01 3.63
Continual Firms	2277	15.3 9	9.5 8.4	0.056 0.025	12.69 12.0	835 84.9	7.2 8	3.9 2.7	0.047 0.102	-0.065 0.076	0.405 0.367	3.82 3.53
QI	974	10.9 7	6.4 5.3	-0.200 -0.156	12.07 12.0	480 97.2	7.1 8	4.9 3.3	-0.081 0.059	-0.110 0.158	0.419 0.351	4.55 4.00
Q2	975	17.1 9	7.0 5.9	-0.013 -0.011	13.70 13.0	1376 117.0	7.6 8	3.4 2.5	$0.030 \\ 0.090$	0.010 0.102	0.465 0.439	3.57 3.19
Q3	974	17.7 10	7.0 6.2	0.081 0.077	12.28 12.0	480 77.9	7.0 8	3.8 2.7	0.044 0.098	-0.028 0.047	0.432 0.401	3.82 3.56
Q4	975	11.2 8	6.6 5.5	0.352 0.311	10.45 10.0	237 60.6	6.3 7	4.2 3.0	0.006 0.095	-0.493 -0.204	0.378 0.336	4.29 3.93

Table 3. Determinants of Earnings Management: OLS Regressions

reported in parentheses. The parameters in bold are significant at the 1% level. The parameters in italic and bold are significant at the The sample consists of 3,898 domestic IPOs during 1980-1999. The dependent variable is discretionary current accruals (DCA) in the IPO year of each firm. The explanatory variables are log market value (LogMKV), log price (LogPrice), log share (LogShare), log underwriting is led by a prestigious national investment bank (rank 8 or 9), venture capital (VC) dummy if the IPO is funded by a venture capitalist, premium auditor dummy if the IPO is audited by a top 8 accounting firm. Standard errors of the estimates are age (LogAge), profitability, operating cash flow, leverage, growth (change of percentage income), banker dummy if the IPO 5% level. Intercepts in the regressions are not reported for brevity.

R-square	0 112	C11.0	0.115	C11.0	0 115	C11.U
Audit					-0.014	(0.012)
VC	-0.020	(0.009)	-0.018	(0.008)	-0.017	(0.008)
Banker	-0.204	(0.010)	-0.016	(0.011)	-0.015	(0.011)
Growth	0.014	(0.010)	0.016	(0.010)	0.016	(0.010)
LEV	-0.005	(0.020)	-0.009	(0.020)	-0.009	(0.020)
OCF	-0.085	(0.006)	-0.085	(0.006)	-0.085	(0.006)
PROF	0.257	(0.021)	0.260	(0.022)	0.259	(0.022)
LogAge	-0.004	(0.004)	-0.004	(0.004)	-0.004	(0.004)
LogShare			-0.014	(0.005)	-0.014	(0.005)
LogPrice			-0.037	(0.00)	-0.035	(0.00)
LogMKV	-0.019	(0.003)				
Regression	-	I	c	7	ç	C

significar for brevit	it at the y.	: 1% lev	el. <i>Par</i> i	ameters	in itali	c and b	old are :	signific	ant at tŀ	ie 5% le	svel. In	tercepts	in the 1	regression	ons are	not rep	orted
Regression	DCA	Log- Price	Log- Share	LEV	STD	Log- Age	Banker	VC	PROF	Growth	PTB	Log- MKV	Tech	Internet			
1	0.666 (0.128)			0.668 (0.151)	8.512 (1.671)	-0.103 (0.033)	-0.410 (0.079)	-0.279 (0.068)	-0.689 (0.124)	-0.368 (0.073)	0.003 (0.005)	-0.074 (0.029)					
c	0.662	-0.267	0.022	0.623	8.389	-0.101	-0.381	-0.256	-0.659	-0.352	0.003						
1	(0.128)	(0.067)	(0.042)	(0.152) 0 7 00	(1.670) • 440	(0.033)	(0.081)	(0.069)	(0.125)	(0.074) 0.344	(0.005)						
б	(0.133)	-0.274 (0.067)	(0.042)	(0.153)	0.440 (1.671)	-0.107 (0.033)	CCC.U- (0.081)	-0.274 (0.069)	-0.001 (0.124)	-0.074) (0.074)	(0.005)						
~	0.607	-0.283	0.011	0.589	8.441	-0.107	-0.390	-0.273	-0.599	-0.343	0.003						
4	(0.133)	(0.067)	(0.042)	(0, 153)	(1.671)	(0.033)	(0.081)	(0.069)	(0.124)	(0.074)	(0.005)						
ų	0.691	-0.259	0.028	0.577	8.950	-0.101	-0.381	-0.232	-0.674	-0.353	0.003		-0.184				
C	(0.129)	(0.068)	(0.042)	(0.153)	(1.688)	(0.033)	(0.081)	(0.070)	(0.125)	(0.074)	(0.005)		(0.075)				
2	0.672	-0.295	0.016	0.620	7.502	-0.09	-0.374	-0.259	-0.623	-0.349	0.003			0.206			
٥	(0.128)	(0.070)	(0.040)	(0.152)	(1.773)	(0.033)	(0.081)	(0.069)	(0.127)	(0.074)	(0.005)			(0.137)			
												Sic28	Sic35	Sic36	Sic38	Sic48	Sic73
ſ	0.677	-0.304	0.012	0.375	8.323	-0.088	-0.349	-0.178	-0.796	-0.358	0.004	-0.658	-0.167	-0.388	-0.604	0.180	-0.215
,	(0.131)	(0.069)	(0.043)	(0.161)	(1.737)	(0.033)	(0.082)	(0.071)	(0.129)	(0.075)	(0.005)	(0.145)	(0.141)	(0.132)	(0.154)	(0.141)	(0.092)
SIC28: Che	micals a	nd allied	products														
SIC35: Ind	ustrial, c	ommerci	al machii	nery, com	puter equ	uipment											

Table 4. Earnings Management and Delisting Due to Performance Failure: A Probit Analysis

The sample consists of 3,898 domestic IPOs during 1980-1999. The dependent variable, delist dummy, is defined to equal one if the firm is involuntarily delisted within the first five years after IPO. Discretionary Current Accruals (DCA) is the measure of earnings

regressions 1 and 2 of Table 3, respectively. Standard errors of the estimates are reported in parentheses. Parameters in bold are management. In regressions 1, 2, 5, 6, 7, the raw DCA is used. In regressions 3 and 4, we use the residuals of DCA from the

SIC36: Electronics

SIC38: Measurement instruments

SIC48: Communications SIC73: Business Services

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(DCA) is the measure of earnings management. In regressions 1, 2, 5, $\vec{6}$, 7, the raw DCA is used. The DCA used in regressions 3 and The sample consists of 3,898 domestic IPOs during 1980-1999. The dependent variable, delist dummy, is defined to equal one if the 4 are the residuals from the regressions 1 and 2 of Table 3, respectively. Standard errors of the estimates are reported in parentheses. firm was delisted within the first five years after IPO, with CRSP listing code between 200-300. Discretionary Current Accruals Parameters in bold are significant at the 1% level. Parameters in italic and bold are significant at the 5% level. Intercepts in the regressions are not reported for brevity.

Regression	DCA	Log- Price	Log- Share	LEV	STD	Log- Age	Banker	VC	PROF	Growth	PTB	Log- MKV	Tech	Internet			
-	-0.346			-0.042	-2.029	-0.045	0.067	0.151	0.102	0.062	-0.013	0.132					
1	(0.118)			(0.130)	(1.546)	(0.026)	(0.066)	(0.055)	(0.123)	(0.065)	(0.005)	(0.023)					
ſ	-0.343	0.1576	0.129	-0.041	-2.038	-0.045	0.059	0.149	0.098	0.060	-0.013						
4	(0.118)	(0.060)	(0.033)	(0.150)	(1.547)	(0.026)	(0.067)	(0.056)	(0.123)	(0.066)	(0.005)						
ç	-0.315	0.161	0.137	-0.043	-2.079	-0.045	0.066	0.151	0.075	0.052	-0.013						
n	(0.122)	(0.060)	(0.033)	(0.131)	(1.550)	(0.026)	(0.067)	(0.056)	(0.123)	(0.066)	(0.005)						
-	-0.315	0.167	0.135	-0.041	-2.079	-0.045	0.065	0.151	0.075	0.052	-0.013						
4	(0.122)	(0.060)	(0.033)	(0.131)	(1.550)	(0.026)	(0.067)	(0.056)	(0.123)	(0.066)	(0.005)						
v	-0.354	0.153	0.125	-0.003	2.603	-0.044	0.057	0.128	0.095	0.059	-0.013		0.129				
C	(0.118)	(0.060)	(0.033)	(0.132)	(1.573)	(0.026)	(0.067)	(0.057)	(0.127)	(0.066)	(0.005)		(0.060)				
9	-0.327	0.126	0.125	-0.049	-3.094	0.043	0.065	0.148	0.142	0.063	-0.013			0.218			
0	(0.118)	(0.062)	(0.033)	(0.131)	(1.670)	(0.026)	(0.068)	(0.056)	(0.126)	(0.066)	(0.005)			(0.124)			
												Sic28	Sic35	Sic36	Sic38	Sic48	Sic73
г	-0.369	0.119	0.134	0.055	-3.462	-0.049	0.069	0.133	0.083	0.049	-0.015	-0.232	0.001	-0.073	0.240	-0.093	0.304
1	(0.119)	(0.061)	(0.034)	(0.134)	(1.617)	(0.027)	(0.068)	(0.058)	(0.125)	(0.067)	(0.005)	(0.118)	(0.114)	(0.105) ((0.107)	(0.141)	(0.074)
SIC28: Ché	micals a	nd allied	products														

SIC35: Industrial, commercial machinery, computer equipment SIC36: Electronics

SIC38: Measurement instruments

SIC48: Communications SIC73: Business Services

Table 6. Earnings Management and Duration of Listing of IPO Firms: Cox Proportional Hazard Model

The dependent variable is duration of listing: the number of calendar days between IPO offering and delisting dates. Firms which are not delisted for performance failure related reasons are censored on 12/31/2004. Discretionary Current Accruals (DCA) is the measure of earnings management. In regressions 1, 3, 4, 5, 6, the raw DCA is used. The DCA used in regressions 2 and 7 are the parameters in bold are significant at the 1% level. The parameters in italic and bold are significant at the 5% level. Intercepts in residuals from the regressions 1 and 2 of Table 3, respectively. Standard errors of the estimates are reported in parentheses. The the regressions are not reported for brevity. The Full Sample includes all firms. The firms merged/acquired before year end 2004 and the firms continue to list as of year end of 2004 are categorized as censored. The firms delisted for performance related reasons are not censored. The Continual Sample excludes firms delisted for merger/acquisition by end of 2004. The firms continue to list as of year end of 2004 are categorized as censored. The firms delisted for performance related reasons are not censored.

r VC PROF Growth PTB Tech Internet	-0.309 -0.886 -0.367 - 0.005	(0.083) (0.125) (0.087) (0.006)	- -0.330 -0.807 -0.356 - 0.004) (0.083) (0.125) (0.087) (0.006)	-0.282 -0.931 -0.363 -0.004 -0.322) (0.083) (0.126) (0.087) (0.006) (0.094)	-0.308 -0.788 -0.372 -0.004 0.575 (0.083) (0.128) (0.089) (0.006) (0.166)	Sic28 Sic35 Sic36 Sic38 Sic48 Sic73	-0.133 -1.105 -0.392 -0 .003 -1.018 -0.406 -0.616 -0.798 0.098 -0.309 (0.085) (0.126) (0.087) (0.066) (0.168) (0.164) (0.152) (0.189) (0.170) (0.113)	-0.293 -0.876 -0.370 -0.006) (0.083) (0.125) (0.087) (0.006)	- -0.314 -0.798 -0.360 -0.005) (0.083) (0.125) (0.087) (0.006)
/ STD ^{Log-} Age	6 13.075 -0.084	4) (1.856) (0.037)	4 13.211 -0.092 6) (1.836) (0.038)	4 13.862 -0.087 6) (1.838) (0.038)	2 11.576 -0.082 2) (1.944) (0.038)		1 12.916 -0.075 5) (1.796) (0.037)	0 12.326 -0.085	4) (1.844) (0.038)	5 12.435 -0.093 6) (1.834) (0.038)
Log- Share LEV	0.059 0.93	0.046) (0.17	0.051 0.89 (0.046) (0.17	0.063 0.86 (0.046) (0.17	0.054 -0.9 2 (0.046) (0.17		0.059 0.62 (0.046) (0.18	0.071 0.88	0.045) (0.17	0.063 0.83 (0.045) (0.17
Log- Price	-0.341	(0.076)	-0.366 (0.077)	-0.316 (0.077)	-0.401 (0.078)		-0.389 (0.076)	-0.304	(0.076)	-0.328 (0.076)
DCA	0.777	(0.158)	0.690 (0.165)	0.839 (0.159)	0.779 (0.156)		0.798 (0.159)	0.749	(0.157)	0.669 (0.164)
Regression	-	-	7	mpje	1 IßZ 4		2	ע ; מו	o əlqr	San
				IIu	а			1e	iiu	+u0)

Table 7. Delisting and Stock Performance

The sample consists of 3,898 domestic IPOs during 1980-1999. Reported are the equal-weighted average of cumulated excess returns and buy-and-hold returns of the full sample and sub-samples. The holding period starts from the 4^{th} or 6^{th} post-issue month and ends at the 60th post-issue month or till the delist date within five years after IPO. The buy-and-hold abnormal return of each sample portfolio for the period τ to T is estimated as

$$BH_{\tau,T} = \frac{\sum_{j=1}^{N} (\prod_{i=\tau}^{T} (1+r_{j,i}) - \prod_{i=\tau}^{T} (1+m_{j,i}))}{N}$$

stock j, and N is the number of surviving firms in month t. The cumulative abnormal return of each sample portfolio for the period τ to where $r_{j,t}$ is the return of stock j starting second trade session, and $m_{j,t}$ is the benchmark portfolio return matching the trade time of ≽ ∟ T is estimated as

$$CAR_{\tau,T} = \sum_{i=\tau}^{T} \left| \sum_{j=1}^{N} (r_{j,i} - m_{j,i} - m_{j,i}) \right|$$

The investment strategy implied by the calculated CAR is to monthly reinvest the initial principal equally to the remaining stocks. We include the value-weighted portfolios of the market (NYSE/AMEX/NASDAQ) index, NASDAQ national market index, and the first decile (smallest size) of size-based NYSE stocks as benchmarks.

			Buy-and-Hold F	teturns (%)			Cumulative Abnorn	nal Returns (%)	
	 Z	Raw Returns	Market adj. value-weighted	Market adj. NASDAO	Market adj. NVSF Small	Raw Returns	Market adj. value-weiøhted	Market adj. NASDAO	Market adj. NVSF Small
	i		norraro a ontra	Investme	ent period: 4 th to 60) th months post	-IPO		
All Firms	3898	36.9	-39.2	-49.4	-29.4	47.3	-16.7	-25.3	-15.4
Delisted due to Performance Failure	659	-80.0	-137.1	-149.4	-124.4	-275.6	-333.8	-338.6	-329.0
Delisted due to Merger/Acquisition	962	58.2	4.9	-13.3	17.3	161.9	95.9	78.0	104.7
Continual Firms	2277	61.9	-29.4	-35.5	-21.5	73.2	9.5	1.9	9.3
Q1	974	38.9	-27.8	-24.0	-24.7	55.2	-4.8	-10.6	-8.0
Q2	975	53.9	-27.0	-40.8	-14.0	58.8	-7.2	-18.0	-4.6
Q3	974	36.0	-41.5	-60.7	-32.6	46.4	-17.5	-26.5	-16.5
Q4	975	19.0	-60.4	-71.9	-46.3	28.7	-37.4	-45.9	-32.5
				Investm	ent period: 7^{th} to 60) th months post	-IPO		
All Firms	3898	34.0	-48.0	-28.6	-39.4	45.8	-14.7	-22.6	-14.5
Delisted due to Performance Failure	659	-78.2	-156.4	-160.8	-138.4	-273.6	-327.7	-331.3	-324.2
Delisted due to Merger/Acquisition	962	54.0	0.5	106.1	9.5	160.7	98.4	80.9	105.8
Continual Firms	2277	58.1	-37.0	-47.0	-31.3	70.6	10.0	3.2	8.9
Q1	974	32.4	-38.1	-89.9	-38.2	50.6	-5.4	-9.7	-9.5
Q2	975	51.2	-36.8	-48.3	-23.2	57.3	-5.5	-15.5	-3.9
Q3	974	36.0	-46.8	-72.3	-39.8	46.9	-13.6	-21.9	-13.5
Q4	975	16.6	-70.1	-84.1	-56.3	28.2	-34.6	-43.1	-31.2

Table 8. Autocorrelations

The sample includes 3898 IPOs going public during 1980-2003. Average DCA, initial returns, and price-to-book of the IPOs and number of IPOs per months are estimated. Autocorrelations (up to 12 orders) in **bold** are significant at the 5% level.

	$ ho_1$	$ ho_2$	$ ho_3$	$ ho_4$	$ ho_5$	$ ho_6$	$ ho_7$	$ ho_8$	$ ho_9$	$ ho_{10}$	$ ho_{11}$	$ ho_{12}$
Initial Returns	.64	.56	.40	.38	.30	.33	.31	.32	.26	.25	.18	.14
<u>NIPO</u>	.78	.67	.62	.58	.51	.42	.36	.31	.25	.16	.14	.16
DCA	.02	.22	01	.02	.03	09	01	12	01	.04	02	.17
Price-to-Book	.04	.15	.02	01	.12	.21	.11	.13	.09	.04	.05	.07

Table 9. Does DCA Predict Market Demand?

reported for brevity. The F-tests indicate the incremental explanatory power of the six lags of the predictive variable, given six lags of 2003. DCA is the average discretionary current accruals of the IPOs offered in each month. IR is the average percentage appreciation of first day market close price over offer price of IPOs offered in each month. PTB is the average price-to-book ratio of IPOs offered Sixth order vector autoregressive (VAR(6)) analysis is conducted on DCA, initial returns, and price-to-book of IPOs during 1980incremental predictability are also corrected for heteroskedasticity. Only the coefficients of the first three lags of the variables are in each month. The t-statistics use White's (1980) heteroskedasticity-consistent standard errors, and the Granger F-tests for the dependent variable. R² is the coefficient of determination for the univariate model, adjusted for degrees of freedom.

	DC	\mathbf{A}_{t}	IR	t.	DC	\mathbf{A}_{t}	PT	B_t	IR	- 7	PT	Br Br
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Regressors												
DCA_{t-1}	0.033	0.48	-17.639	-2.04	0.094	1.73	-5.390	-3.01				
DCA _{t-2}	0.148	2.16	-4.757	-0.55	0.142	2.00	-1.187	-0.65				
DCA_{t-3}	-0.066	-0.96	-17.705	-2.01	-0.010	-0.14	-2.837	-1.54				
IR_{t-1}	0006	-1.10	0.517	7.44					0.533	7.28	0.028	1.84
IR _{t-2}	0003	-0.48	0.362	4.76					0.330	4.12	-0.007	-0.43
IR _{t-3}	0005	-0.87	-0.016	-0.20					0.034	0.42		
PTB_{t-1}					-0.004	-1.56	0.010	0.14	-0.736	-2.10	-0.043	-0.60
PTB_{t-2}					0.005	1.73	0.162	2.34	0.358	1.02	0.198	2.74
PTB_{t-3}					-0.006	-2.30	0.004	0.05	-0.123	-0.35	-0.044	-0.61
\mathbb{R}^2	0.10		0.65		0.11		0.17		0.65		0.13	
Granger F-1	tests											
	Lagged	IR	Lagged I	DCA	Lagged P	TB	Lagged I	DCA	Lagged l	PTB	Lagged I	R
	causes E	DCA	causes II	~	causes D(CA	causes P'	TB	causes II	~	cases PT	В
	11.75 (0	(690)	14.88 (0.	.021)	14.27 (0.0	023)	17.33 (0.	008)	18.80 (0.	.005)	8.08(0.2	32)





Figure 1. Frequency of IPOs over years.







