

Listing Standards and IPO Performance: Is More Regulation Better?

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Abstract

Decline in confidence in free market mechanisms in the past decade has provoked an increase in interest in regulatory issues. This paper seeks to answer one question: Are exchange listing rules an effective screening mechanism? Using a sample of IPO firms listing on major U.S. exchanges in 1984-2005, I find that (i) firms listing on different trading floors exhibit different characteristics; (ii) introduction of higher standards on one market tier does not prevent entry of low quality firms. My findings call in question the exchanges' ability to create effective screens by changing listing rules, but speak in favour of further market segmentation.

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Keywords Exchanges, Listing Rules, Listing Requirements, Initial Public Offering, Regulation

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1 Introduction

The deregulation of the financial services industry continued for almost two decades since the beginning of the 1980s. It was followed by the tech bubble burst in 2000 and a number of corporate scandals in the developed economies, the financial crisis that began in 2008 and demise of several bulge bracket investment firms on the Wall Street. These events led to reassessment of the current level of regulation of financial institutions and led to adoption of additional protective measures, including regulation Fair Disclosure in 2000 and the Sarbanes-Oxley Act in 2002. Significant international initiatives, such as the update of the Basel Accords, are being discussed to provide for greater stability of financial markets.

The current paper attempts to address one aspect of regulation. I examine whether entry of private firms into public markets can be controlled by exchanges that force public firms to comply with listing rules. I study changes in listing rules on three major U.S. exchanges – the New York Stock Exchange (NYSE), the American Stock Exchange (Amex) and Nasdaq in using 22 years of data, beginning with 1984, the first year when the NYSE listed its first Initial Public Offering. My primary interest is to investigate whether exchanges can prevent poor performing firms from obtaining a listing on the exchange by changing listing rules. I put to test the *gatekeeping hypothesis*, which predicts that tighter standards should result in higher quality listing firms.

There is a large body of academic literature that suggests that the traditional role of exchanges has declined. Macey and O'Hara (2002) argue that listing fees and listing requirements no longer serve their original purpose because the exchanges' reputational role has diminished. Harris (2006) asserts that, due to competition and the economics of the exchange industry, "the listing decision is the last traditional function that remains unique to stock exchanges." This view is in sharp contrast with the policymakers and exchanges' belief that more regulation is better and that an average investor is better protected by tighter rules.

I contribute to existing literature in three ways. Numerous papers study effects of one particular change in securities laws and/or listing rules. Klein and Mohanram (2007) document how introduction of market capitalization standard led to a fundamental shift in the riskiness of new securities listed on Nasdaq. Leuz et al (2008) and Marosi and Massoud (2007) find that enactment of the Sarbanes-Oxley legislation led to an increase in voluntary delistings. I examine changes in listing rules in 1984-2005. No other study that I am aware of examined effects of listing rules' changes over extended period of time. Fama and French (2004) examine characteristics of newly listed firms in 1973-2001 and conclude that quality of new lists has deteriorated over the period, shifting supply curve of the new lists. However, their study does not examine impact of listing standards on firms' quality.

My empirical results are as follows. I document that higher quality firms conduct Initial Public Offerings (IPOs) on the NYSE, lowest quality firms conduct IPOs on Nasdaq SmCap market, and that Nasdaq National Market System (NMS)

IPO firms are similar to firms listing on Amex. Finally, I show that introduction of higher listing standards by one exchange does not result in increase in quality of listing firms on that exchange.

My analysis proceeds as follows. Discussion of the central hypothesis and variables used to measure firm quality in the context of existing literature is undertaken in the next section. Section 3 introduces the dataset, section 4 presents and discusses the results, and section 5 concludes.

2 Related Literature and Hypothesis Development

2.1 The Gatekeeping Hypothesis

There is a large body of literature that examines the role exchanges play in certification of listing firms and signalling effect associated with listing. Doidge et al (2004) show an increase in foreign firms' value after cross-listing in U.S. markets, citing listing as one mechanism through which controlling shareholders commit to a lower consumption of private benefits of control. Simon (1989) demonstrates that investors' forecast errors before 1933 were significantly lower for NYSE-listed companies than for unlisted companies. Harris (2006) quotes NYSE public statements, referring to investors' interest in the reputational function of listing requirements. At the same time, several studies, including Benston (1973), Bainbridge (2002), Baumol and Malkiel (1993) and Teoh et al (1998), suggest that tighter regulation does not increase market efficiency and quality of listing firms. Baumol and Malkiel (1993) review academic studies that compare the efficiency of stock markets in the United States and those in the major foreign countries and conclude that investors in the stocks of U.S. corporations would not benefit from any additional disclosure. Teoh et al (1998) report that managers firms manage earnings around the IPO, showing that issuers with higher discretionary accruals have poorer stock return performance in the subsequent three years. This reinforces the view that formal quantitative requirements set by the exchanges are not effective screening mechanisms. Contradictory evidence in academic research can only be resolved through an empirical study that encompasses a large sample of firms and trading floors, and covers a sufficient period of time. I include three national exchanges in my study and examine how changes of listing rules over 22 year period affected quality of 5,679 firms that conducted IPOs during that period.

The major question I seek to answer is whether listing rules can be used as a screen to prevent low quality firms from gaining access to public markets. I put to test the following hypothesis:

H_0 : *Gatekeeping Hypothesis*: higher barriers for entry set by exchanges leads to improvement in the quality of listing IPO firms. Setting lower barriers for entry will lead to decline in the quality of IPO firms. Exchanges with the highest level of protection will list the best IPO firms.

2.2 Methodology and Measurements of IPO Firms' Quality

2.2.1 Sample Choice

My choice of IPO firms to analyze effect of changes in listing standards is based on evidence that exchanges are less likely to waive application of existing listing rules when they make a decision to list a new firm as opposed to a situation when they have to delist firms that have a trading history on that exchange.

There is evidence that exchanges relax requirements to keep existing clientele. In October 2008, Nasdaq put on hold some of the minimum requirements that companies must ordinarily meet to maintain a listing on the exchange following a period of sharp declines in the stock market. The NYSE followed suit with a similar move in January 2009. Some of the lenience with which exchanges apply existing rules can be motivated by pure economic reasons. The Washington Post article indicated that the NYSE would lose \$38,000 to \$500,000 in annual fees if it delists companies traded on the Exchange.² Macey et al. (2008) examine delisting process from the NYSE in 2002 and document that delisting policies are applied inconsistently.

Firms listing Initial Public Offerings on the public trading floor face requirements that are more stringently applied than rules for firms already listed. Analysis of IPOs listed on the NYSE, Amex and Nasdaq in 1984-2005 shows that all of them complied with initial quantitative listing standards set by the above trading floors. Choice of IPOs to test effect of change in listing rules on the quality of firms provides a cleaner sample, whose composition is not affected by exchanges' enforcement of listing rules.

2.2.2 Quality of Firms

I use the following variables to measure quality of listed firms:

A. Performance variables

- survival rate over three-year period following Initial Public Offering. Survival rate is widely used in academic literature to measure quality of IPO firms. Kooli and Meknassi (2007) examine survival profile of U.S. IPOs in 1985-2005. Bach and Smith (2007) examine whether characteristics of Chief Executive Officer affect five-year survival rate of IPO firms in high technology industries. Peristiani and Hong (2004) examine survival rates in a sample of IPO firms that went public in 1980-2000 and link it to pre-IPO operating performance. Going concern variable attains a value of zero when a firm is in financial distress or involuntarily delisted within three years of the IPO date, and has a value of one otherwise. I classify firm as being in financial distress if its' operating profit/sales ratio is below 100 percent in the last twelve months for which data are available;

² The Washington Post, January 24, 2009.

- three-year holding stock returns. Ritter (1991) and Loughran and Ritter (1995) examine three-year and five-year returns. Choice of a three-year return in my study is dictated, among other reasons, by the length of the lock-up period, during which company insiders are prohibited from selling stock they own. The lock-up period usually lasts 180 days, but can be set at three to 24 months. Return is set to negative 100 percent if a company goes bankrupt within three years after the IPO. If a firm is delisted, the last trading price from Datastream is used to calculate returns. Use of one-year and five-year windows leads to similar conclusions for survival rates, stock returns and operating performance measures. I omit reporting performance statistics for these windows for to save journal space, but results are available upon request;
- operating return on assets and asset turnover, which measures efficiency of asset utilization. Both of these measures were used by Jain and Kini (1994) in their study of operating performance of IPO firms. Return on assets is calculated as three-year average of operating income/loss divided by total assets over a period of three years, or less if data are not available for a three-year period. Asset turnover is three-year average of sales divided by assets. Following Jegadeesh and Livnat (2006), Pontiff and Woodgate (2008) and Sufi (2009), I winsorize operating data at five percent value to mitigate influence of outliers.

I perform logit analysis to examine effects of changes in listing rules on performances. The dependent variable is binary: 0 if the firm is delisted or does not qualify as a going concern three years after the IPO, its stock returns are negative, operating return on assets is negative and asset turnover is below 100 percent over a three-year period following the IPO. The variable takes on a value of 1 for the remaining firms. I employ logit models to focus on changes on the left tail of the distribution of performance measures rather than change in averages. When exchanges impose screens to act as gatekeepers, they should prevent poor performers from gaining access to their trading floors. I expect to observe fewer companies with negative stock returns and negative measures of operating performance as well as smaller percentage of firms that are involuntarily delisted or do not qualify as going concerns after entry barriers are raised. I also test if changes in listing rules have impact on liquidity and market efficiency characteristics.

B. Liquidity and Market Efficiency variables.

- underpricing, which shows by how much the closing price on the first day of trading is above the offer price. Several studies – Rock (1986), Beatty and Ritter (1986) - have pointed out that underpricing is a result of information asymmetries arising in the process of the Initial Public Offering. Underpricing is calculated as close price on the IPO day compared to offer price. If exchanges are able to reduce information asymmetries between investors and the firm by imposing stricter listing criteria, underpricing should decline when listing rules are tightened.

- liquidity, measured as natural logarithm of inflation-adjusted average daily dollar volume in the first year after the IPO³. Prior studies, including Welker (1995) and Leuz and Verechia (2000), suggest that increased disclosure reduces information asymmetries and increases market liquidity. Amihud (2002) concludes that illiquidity is associated with small firms stocks, suggesting an explanation for the “small firm effect” over time. Liquidity – logarithm of inflation-adjusted average daily dollar volume of trading. I expect liquidity to increase when entry barriers are raised.
- volatility measured as standard deviation of returns. Pastor and Veronesi (2006) suggest that volatility of stock prices is positively related to firm-specific uncertainty about average future profitability. Standard deviation of daily residual returns is based on stock returns minus matching equally weighted index returns. If listing standards can reduce such uncertainty over future cash flows, I expect volatility of IPO stocks to decline;
- ratio of variance of five-day returns to daily returns to measure under- and over-reaction of stock prices. Previous studies - Lo and MacKinlay (1988), Bessembinder (2003), etc. - have indicated that in a high quality market, price changes will be permanent and transitory volatility low, so the ratio of a long-term return variance to short-term variance should be close to one. I do not distinguish between over-reaction, when the variance ratio drops below one, and under-reaction, when the variance ratio exceeds a value of one. I calculate an absolute value of deviation of variance ratio from the value of one. I will refer to the absolute value of deviation from one as variance ratio consistently throughout this paper. I construct the ratio of return variances over a longer horizon (five days) and a short horizon (one day) in the first year following the Initial Public Offering as follows:

$$\text{Variance ratio deviation} = \left[1 - \frac{\text{Var}(R_{5\text{days}})}{5 \times \text{Var}(R_{1\text{day}})} \right] \quad (1)$$

- R-squared of regression of daily stock returns on returns of matching index in the first year after the IPO. The test is based on previous studies that include the work of Wurgler (2000), Bushman et al (2004) and Durnev et al (2003), among others. These researchers find that greater idiosyncratic variation corresponds to higher efficiency of the stock market in capital allocation. Earlier, Roll (1988) shows that the extent to which stocks move together depends on the relative shares of firm-level and market-level information capitalized into prices. My prediction, therefore, is that stocks should exhibit lower R-squared following introduction of tighter rules.

³ Consumer Price Index data were obtained from the U.S. Department of Labor, Bureau of Labor Statistics.

3 Data and Variables Description

3.1 Sample Description

My sample includes 5,679 initial public offerings listed on the New York Stock Exchange, Nasdaq and American Stock Exchange in 1984-2005. It excludes 2,124 financial institutions, unit investment trusts, closed-end funds and real-estate investment trusts (SIC codes 6,000-6,799⁴), 183 observations with mission data in the Center for Research in Security Prices (C.R.S.P.), 12 repetitive observations, 532 IPOs listed over-the-counter or not on major exchanges, 2 observations with trading data in C.R.S.P. for less than one week and 527 observations for which coverage in C.R.S.P. begins before or more than one day after the IPO date reported in Securities Data Company (SDC) database. My sample includes 667 IPOs listed on NYSE, 191 IPOs listed on Amex and 4,821 IPOs listed on Nasdaq. I obtain data on stock trading from the CRSP and extract operating data from Compustat.

I restrict my sample to IPO firms because Initial Public Offerings allow for a stricter test of efficiency of entry listing rules as IPOs allow new, often previously unknown, companies to gain access to public capital markets. Also, if I focus my study on all listing firms, IPO firms should be treated as a separate subsample in a population of all firms that obtain exchange listing to avoid potential biases. If trading floors have different proportion of listing IPO firms relative to all listings, my results could be affected by sample composition.

My study focuses on listings on four trading floors: NYSE, Amex, Nasdaq NMS Market and Nasdaq SmCap Market. In 1982-1983, Nasdaq separated the National Market System stocks from stocks traded on regular Nasdaq. In August 1991, the Nasdaq SmallCap Market (Small Cap) was formed from regular Nasdaq. In order to distinguish between NMS firms and firms listing on regular Nasdaq prior to 1991, I classify all companies that were eligible to list on the upper tier after introduction of Nasdaq/NMS inclusion standards in February 1983 as NMS firms. This enables us to perform a comparison between firms listed on the upper and lower tiers of Nasdaq not only in 1991-2007, but also in 1984-1991. My sample includes 4025 firms that listed on the Nasdaq/NMS tier and 796 firms that listed on the SmallCap/Regular tier⁵.

⁴ One unit investment trust has SIC code 1311.

⁵ My numbers are in line with Nasdaq statistics. As of December 31 2005, The Nasdaq National Market included 2,645 companies and the Nasdaq Capital Market, renamed from the Nasdaq SmallCap Market in September 2005, included 563 companies, or 17.5 percent of total number of companies. In our sample, 16.5 percent of companies going public list on the SmallCap/Regular Market tier.

3.2 Listing Rule Variables

I focus on changes in entry listing rules for two reasons. First, maintenance listing rules are changed either at the same time as entry rules or shortly thereafter. Second, exchanges are known to apply continuing listing criteria with discretion and that such discretion varied over time. There is little evidence that suggests that exchanges give themselves a lot of leeway in applying initial listing criteria.⁶

I create indicator variables to identify listing rules on each exchange and two tiers of Nasdaq during different time periods. Appendices 1, 2 and 3 provide a brief description of changes in entry listing standards respectively on the New York Stock Exchange, the American Stock Exchange and two tiers of Nasdaq in 1984-2005.

In order to track impact of changes in listing rules on the New York Stock Exchange, I create indicator variables to represent listing rules in place in January 1984 – September 1986 (base level), September 1986 – April 1995 (“One share, one vote policy” waived), April 1995 – September 1999 (“Cash flow standard”), September 1999 – November 2003 (“Global market capitalization standard”), November 2003 – December 2005 (Sarbanes-Oxley (SOX) rules).

Changes in rules on Amex are coded for January 1984 – March 1987 (base level), March 1987 – March 1991 (quantitative requirements), March 1991 – Dec. 2003 (additional listing rules), Dec. 2003 – Dec. 2005 (SOX rules and two additional listing standards).

I assign indicator variables to represent listing rules on the Nasdaq/NMS tier in 1984-1985 (base level for NMS firms), 1985-1987 (profitability standards), 1987-1989 (corporate governance rule), 1989-1997 (quantitative requirements), 1997-2001 (market capitalization rule), 2001-2003 (quantitative requirements) and 2003-2005 (SOX rules). I assign indicator variables to represent listing standards on the Nasdaq SmallCap market tier in 1984-1991 (base level for SMC firms), 1991-1997 (market capitalization alternative), 1997-2003 (quantitative requirements) and 2003-2005 (SOX rules and two additional listing standards).

3.3 Control variables

The following variables are used to control for differences in the characteristics of IPO firms:

- size, measured as logarithm of book value of assets in my regression models to control for size effects. I obtain the data on book value of assets from

⁶ Sometimes exchanges will indicate that some entry listing rules are applied with discretion. For example, The Amex 1987 listing rules set a minimum listing price for base criteria of \$3, but stated that “in certain instances, however, the Exchange may favorably consider listing an issue selling for less than \$3 per share after considering all pertinent factors.” Source: The official Constitution and Rules of the American Stock Exchange. Revised to October 1, 1980. Reprinted from the American Stock Exchange Guide.

the first quarterly report in Compustat after the IPO date, or, if missing, the first financial report filed with the Securities and Exchange Commission, or the SDC database;

- underwriter ranking obtained from Jay Ritter's IPO Underwriter Reputation Rankings (1980-2009) database;

- venture capital backed IPOs. Dummy variable attains value of one if the IPO was backed up by VC firm(s);

- growth – the indicator variable attains a value of one if the purpose of the share placement is to fund capital expenditures, research and development, or acquisitions;

- debt – the indicator variable attains value of one if the purpose of the share placement is to repay debt or refinance. Information on use of proceeds is obtained from SDC database;

- tech dummy. Following Loughran and Ritter (2004), I define tech stocks as those in SIC codes 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3674 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (telephone equipment), 4899 (communications services), and 7370, 7371, 7372, 7373, 7374, 7375, 7378, and 7379 (software);

- hotmarket – dummy variable that equals one when the IPO market is hot. I employ methodology adopted by Ibbotson and Jaffe (1975) and used by Ritter (1984) to assign a value of one to all months with the average value of returns above the median, and zero otherwise;

- market return measured as return of equally weighted index from C.R.S.P. for matching exchange and time period.

4 Results

4.1 Effect of Listing on Different Trading Floors

The gatekeeping hypothesis asserts that firm quality should improve when listing standards are raised and deteriorate when these standards are relaxed. Since different trading floors have different set of listing rules, I expect to observe higher quality IPO listings on exchanges with tighter entry rules. A comparison of descriptive statistics for performance, liquidity and market efficiency measures reported in Table 1 in Appendix 4 reveals that NYSE firms are the highest in quality and the Nasdaq SmCap firms are the lowest in quality, based on most reported measures. NYSE firms have the highest survival rates, proportion of firms with positive stock returns and operating performance measures, highest liquidity, lowest variance ratio and volatility. Nasdaq SmCap stocks rank lowest in most categories. Low R-squared can be explained by low liquidity: if prices do not change, daily price differences are not explained by index movements.

The American Stock Exchange IPOs are similar to IPOs listing on the Nasdaq NMS. There is no statistical difference in proportion of delisted or distressed firms and with positive three-year raw returns and measures of operating performance. Statistics for means are similar for some categories; NMS firms have higher liquidity and lower R-squared, but higher underpricing and volatility.⁷ Results of regression models reported in Table 2 in Appendix 4, in which IPOs listed on Amex are coded with zero (base case), confirm conclusion from analysis of univariate statistics for separate trading floors.

My finding that quality of firms listed on the American Stock Exchange is not different from quality of firms that listed on Nasdaq, together with gravity model, which suggests that increase in order flow on one floor should increase its attractiveness to listing firms, to some extent explain why Amex lost market share to its major competitor and was finally acquired by the NYSE.

4.2 Effects of Changes in Listing Rules on the New York Stock Exchange

Three new rules introduced in 1984-2005, including waiving of “one share, one vote policy,” introduction of the cash flow standard and the global market capitalization standard, allowed more firms to list on the exchange. I therefore could observe deterioration of firm quality in 1986, 1995 and 1999. Yet, univariate statistics and pairwise tests reported for each period in Table 3 in Appendix 4 and regression models reported in panel B of Table 4 in Appendix 4, in which the quality of IPO firms that list under previous standard is compared with the quality of firms that list under the new standard, does not provide enough evidence that the quality of NYSE-listed IPOs declines. For example, introduction of market capitalization standard in 1999 led to decline in the number of firms that qualify as going concerns three years after the IPO and increase in the volatility of their stocks as evidenced by, respectively, negative coefficient of 1.7 and positive coefficient of 0.003 on the indicator variable representing new set of rules (see panel B in Table 4)⁸. However, changes in other measures, including percentage of firms with positive three-year returns, measures of operating performance, underpricing, variance ratio and R-squared, are not statistically significant.

⁷ Statistics for pairwise t-tests are omitted for parsimony, but are available upon request.

⁸ Data shows that more firms were eligible to list under global market capitalization standard after its introduction in 1999. Out of 159 firms that listed their IPOs on the NYSE, 47 met the market capitalization criteria. Out of 508 IPOs in 1984-1999, only 64 met the criteria imposed by market capitalization standard in 1999. Likewise, more firms listed under cash flow standard after 1995 than prior to 1995, judging by market capitalization and revenue criteria. Data on operating cash flows are not available prior to 1995, when cash flow statement was introduced by the Financial Accounting Standards Board.

Regressions in which quality of the firms is examined for the whole period (see panel A in Table 4), and univariate statistics (see Table 3) do not show consistent deterioration in the quality of IPOs in 1984-2003, a period to which I attribute three listing standards that lowered entry barriers for new entrants. I do not observe evidence that quality of IPO firms decreases gradually as more firms are allowed to list on the exchange following rule changes in 1986, 1995 and 1999. Likewise, incorporation of the Sarbanes-Oxley regulations into listing rules, which represents tightening of entry barriers in 2003, had marginal effects: first day returns and volatility of stock returns decreased, whereas share of systematic component in stock returns increased. I conclude that none of the four major changes in listing rules I identified on the NYSE in 1984-2007 affected the quality of IPO listings.

4.3 Effects of Changes in Listing Rules on the American Stock Exchange

Two changes in listing rules on the American Stock Exchange in 1984-2007 – reduction in quantitative requirements in 1987 and introduction of additional listing criteria in 1991 – represent relaxation of listing rules. Phasing in of Sarbanes Oxley rules and introduction of two new listing criteria in 2003 represent tightening and relaxation of entry barriers at the same time, so I classify the 2003 change as neutral.

Relaxation of listing rules in 1987 and 1991 does not lead to lower quality of listings. For example, introduction of three additional listing standards in 1991 led to lower survival rate, but also resulted in higher liquidity and lower share of systematic risk in stock returns. Univariate statistics reported in Table 5 in Appendix 4 show marginal increase in average raw three-year stock returns and point to slightly worse operating performance as well as higher underpricing, higher variance ratio and volatility of stock returns. However, when controlled for other factors, most of these changes become statistically insignificant as evidenced by results of multivariate regression models reported in Table 6 in Appendix 4. Changes in listing rules in 2003 have no effect on the quality of IPO firms.

4.4 Effects of Changes in Listing Rules on the Nasdaq NMS market

Five out of six changes in listing rules on the upper tier of Nasdaq in 1984-2005 – introduction of profitability rule in 1985 and corporate governance requirements in 1987, increase in quantitative standards in 1989 and 2001, and phasing in of the Sarbanes-Oxley rules in 2003 – represent increase in entry barriers for IPO firms. Only increase in quantitative requirements in 2001 resulted in improvement in the quality of IPO firms (see Table 7 in Appendix 4). However,

comparison of univariate statistics reported in Table 7 and regressions for the 1984-2005 period reported in panel A of Table 8 in Appendix 4 reveal that this change represents return to firm characteristics observed prior to 1997. Therefore, I am unable to conclude that tighter listing requirements increased the quality of the IPO firms in 2001.

One change in listing rules on the upper tier of Nasdaq – introduction of market capitalization standard in 1997 - led to an increase in the riskiness of newly listed firms. By allowing firms with market capitalization, revenue or total assets of \$75 million to obtain listing, Nasdaq effectively allowed non-going concerns to gain entrance to its trading floor. Klein and Mohanram (2007) report that out of 837 firms that obtained listing on Nasdaq NMS market between Aug. 22, 1997, and Jun. 29, 2000, 661 firms listed under the market capitalization standard.⁹ I document that the percentage of firms with negative stock returns, negative operating performance and firms in distress or delisted three years after the IPO is the highest in 1997-2001 compared to all other time periods. Comparison of firms that listed in 1997-2001 with firms that listed in 1989-1997 shows deterioration in all characteristics, except liquidity of stock and variance ratio (see panel B of Table 8). It should be noted that I compare NMS firms listed in 1997-2001 with those listed in 1989-1997, a period in which performances were also lower than in other periods. Univariate statistics reported in Table 7 and models reported in panel A of Table 8 reveal that firms that listed on Nasdaq NMS in 1997-2001 had the worst performance among all firms that obtained listing on the upper tier of Nasdaq in the period covered by my study. They were also the most volatile and subject to the largest underpricing, reflecting large information asymmetries in the market for high tech firms in the bubble period.

I conclude that tightening of listing rules on the upper tier of Nasdaq did not lead to increase in the quality of the IPO firms. Yet, waiving profitability and operating history requirements in 1997 allowed a large number of firms that did not qualify as going concerns, to obtain listing on Nasdaq.

4.5 Effects of Changes in Listing Rules on the Nasdaq SmCap Market

Two out of three changes in listing rules implemented on the Nasdaq SmCap market tier in 1984-2005 – increase in quantitative requirements in 1991 and phasing in of the Sarbanes-Oxley rules in 2003 – should have improved characteristics of the IPO firms. Introduction of market capitalization standard in 1997 should have allowed lower quality firms to obtain listing.

There is no evidence of improvement in the quality of the IPO firms after 1991 or deterioration of quality of IPO firms after 1997 (see Table 9 and Table 10 in Appendix 4). The number of firms listing on the lower marker tier dropped

⁹ Klein, Mohanram (2005), p.32

significantly after 1997, which I attribute to the ease of obtaining a listing on the NMS market in that period. Only 50 firms listed on the SmallCap market tier in 1997-2001.¹⁰ This may have mitigated negative impact of introduction of market capitalization standard on the lower tier of Nasdaq.

In summary, I conclude that separation of the U.S. stock market into three major trading floors and separation of Nasdaq upper and lower tiers in 1982-1983 confirm my hypothesis that tighter listing rules improve the quality of listing firms whereas looser listing standards work in the opposite direction. However, my conclusions are mitigated by results of changes in listing standards on the NYSE, Amex and Nasdaq. Neither tightening nor relaxation of the listing rules affected changes in the quality of the listing IPO firms. The only exception was introduction of market capitalization standard on Nasdaq in 1997, which allowed non-going concern to gain access to public capital markets. A decline in the quality of IPO firms following relaxation of listing rules in 1997 also lends support to the gatekeeping hypothesis which I formulated at the beginning of my study.

5 Conclusion

The key findings of my paper can be summarized as follows. I find partial support for the gatekeeping hypothesis, which predicts that tighter listing rules result in an improvement in the quality of listing firms. Different listing standards for various market tiers result in a separating equilibrium, in which high quality firms distinguish themselves from low quality firms. This finding, as well as evidence that quality of Amex IPO firms was not different from the quality of IPO firms on Nasdaq in 1984-2007, help to some extent explain why the American Stock Exchange lost its market share to Nasdaq.

Separately, I document that changes of listing rules on various trading floors have a limited effect on the performance of the listing firms, market efficiency and liquidity measures. At first glance, this result might seem counterintuitive, but it falls in line with finding by Fama and French (2004) that characteristics of newly listed firms changed in 1973-2001. Fama and French show that while profitability of newly listed firms becomes more left skewed, growth measured by change in sales becomes more right skewed. The attribute these changes to increase in the number of listed firms caused by a downward shift in the supply curve for new lists. The other possible explanation is that although exchanges modify their listing rules, they apply them with discretion even with regards to firms that conduct an initial public offering.

¹⁰ Only one firm listed on Nasdaq SmCap market in 2003-2005, so I do not report regression models comparing 2003-2005 period with the 1997-2001 period. I report univariate statistics for 2003-2005 in Table 9.

My study provide empirical support to suggestions to look beyond quantitative rules and give more weight to qualitative issues in assessing riskiness of listing firms (see Macey and O'Hara 2002). It speaks in favour of further market segmentation in line with Harris' (2006) suggestion to create separate trading floors on one exchange as one possible solution to the conflict of interest resulting from the exchanges' willingness to sacrifice reputational capital in order to exploit market inefficiencies for their shareholders' benefit.

It is worth mentioning that Nasdaq preserved its two-tier structure up until February 2006, when it introduced a third trading floor. Currently, it includes three market tiers: the Nasdaq Global Select Market, the Nasdaq Global Market (formerly National Market) and the Nasdaq Capital Market (formerly SmallCap). In March 2006, Pink Sheets, LLC introduced OTCQX, a new tiered listing service, which incorporates two tiers: PremierQX, which has a higher inclusion criteria, and PrimeQX for smaller-sized companies. Separately, after the New York Stock Exchange completed acquisition of the American Stock Exchange in November 2008, it set listing requirements for NYSE Amex stocks at a lower level. Recent developments in the U.S. exchanges fall in line with my empirical predictions.

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Appendices

Appendix 1: Description of Changes in Initial Listing Rules on the New York Stock Exchange in 1984-2005

The table describes changes in listing rules on the New York Stock Exchange in 1984-2005. Data were obtained from the archives of the New York Stock Exchange.

Feb. 22, 1984 - Sep. 16, 1986 *Listing standards introduced*

Cumulative net income for three years should be at least \$6.5 million, with at least \$4.5 million in the last fiscal year; listing company should show record of profitability for at least three years. Number of shares in public hands set to be no less than 1,100,000 million. Market value of listing company or book value of net tangible assets set at \$18 million.

Sep. 16, 1986 – Apr. 5, 1995 *Stocks with unusual voting rights cleared for listing*

NYSE modifies "one share, one vote policy" rule. It waived requirement that prohibited creation of a class of stock which has unusual voting provisions or which has voting power that is not in proportion to the equity interest of the class. Under certain conditions, a class or classes of common stock having other than one vote per share or a class or classes of common stock having other than one vote per share are allowed. Beginning December 22, 1988, companies were allowed to list non-voting stock.

Apr. 5, 1995 – Sep. 3, 1999 *"Cash flow standard"*

Companies with market capitalization of at least \$500 million and revenues of \$200 million in the most recent 12 month period can list if cash provided by operating activities, excluding changes in operating assets and liabilities, amounts to \$25 million. Separately, market capitalization rule for base standard is raised to \$40 million; alternatively, net tangible asset value has to be equal to \$40 million.

Sep. 3, 1999 – Nov. 3, 2003¹¹ *"Global market capitalization standard", numerical requirements increase, corporate governance rules*

Companies with market capitalization of \$1 billion MCAP and revenues of \$250 mln can list without additional requirements. Earlier, on Jun. 9, 1999, NYSE raised requirement for the market capitalization of listing companies to \$60 million. Net tangible asset requirement replaced with stockholders' equity test; requirement set at \$60 million. On Dec. 14, 1999, NYSE set a requirement for listed companies to have audit committees of at least three independent directors, and set requirements for independence and financial expertise of audit committees.

Nov. 4, 2003 – Dec. 31, 2005 *Sarbanes-Oxley requirements*

Rules on corporate governance, director independence and the duties of the audit, nomination and compensation committees, are incorporated in the listing rules.

¹¹ Several changes were made in 1999. Introduction of Global Market Capitalization Standard was the most important one, so I set September 3, 1999 – the date that listing alternative was introduced – as the cut-off date for new listing rules in place since 1999.

Appendix 2: Description of Changes in Initial Listing Rules on the American Stock Exchange in 1984-2005

The table describes changes in listing rules on the American Stock Exchange in 1984-2005. Data were obtained from the archives of the New York Stock Exchange.

Jan. 1, 1984 - Mar. 1, 1987¹² *Entry listing standards as of January 1, 1984*

Base criteria includes the following requirements: net tangible assets of \$4 million, net income after tax of \$400,000, pre-tax net income of \$750,000 and public float of 500,000 shares. Free float market value of no less than \$3 million and share price should be no less than \$5 required. Alternate listing standard requires operating history of 5 years, net tangible assets of \$12 million, public float of 1,000,000 shares and market capitalization to \$10 million. For both base and alternate listing criteria, alternative distribution rules were put in place.

Mar. 1, 1987 – Mar. 31, 1991 *Quantitative requirements*

For both base and alternate listing criteria, net tangible assets requirement is replaced by stockholders' equity requirement; cut-off lowered to \$4 million from \$12 million. For the base listing criteria, initial listing price is lowered to \$3 from \$5. For the alternate listing criteria, history of operations is lowered to 3 years from 5 years. For alternate listing criteria, minimum public distribution lowered to 500,000 shares, but free float market value raised from \$10 million to \$15 million.

Mar. 31, 1991 – Dec. 1, 2003 *Additional listing criteria*

Three additional listing criteria introduced. The first alternate listing criteria is the former base criteria. The three new listing rules (#2, #3, #4) are as follows: total assets equal \$100 million, net tangible assets equal \$10 million and pre-tax income is at least \$750,000 in the last year or two years out of the last three; total assets equal \$200 million and net tangible assets equal \$10 million; this standard was complemented by a requirement to have stockholders' equity of \$4 million in 2005. Total assets were set equal \$100 million and net tangible assets equal \$20 million. For all three standards, minimum public distribution is set at 1,000,000 shares and market value of public float should be no less than \$20 million. Profitability requirement for this standard complemented with an alternative rule in 1996. Companies were required to either meet profitability rule or have operating history of 3 years. On May 14, 2002, Listing Standard #3 was replaced with "Market Capitalization" standard. Requirements included shareholders' equity is \$4 million, market capitalization of \$50 million and public float of \$15 million.

Dec. 8, 2003 – Dec. 31, 2005 *Sarbanes-Oxley requirements; two additional listing standards*

Rules on corporate governance, director independence and the duties of the audit, nomination and compensation committees, are incorporated in the listing rules. In addition, Amex introduced two additional listing standards. Companies meeting one of the two following criteria can list: (1) net tangible assets equal \$3 million, pre-tax

¹² I do not have data for exact dates of changes in listing rules on Amex in 1980-1987. I use date of publication of the American Stock Exchange Guide with new set rules as the date of change.

income equals \$500,000 in the previous year or previous two out of three years, public float is no less 400,000 shares, free float market value equals \$2 million or (2) net tangible assets equal \$3 million, operating history equals 2 years, market value of public float equals \$10 million. Standards #2, #3 and #4 introduced in 1991 are modified.

Appendix 3: Description of Changes in Initial Listing Rules on Nasdaq National Market System and Nasdaq Small Cap Market in 1984-2005

The table describes changes in listing rules on Nasdaq, including Nasdaq National Market System (NMS) and Nasdaq Small Cap (SMC) market tier in 1984-2005. Panel A describes changes for NMS stocks. Panel B describes changes for Small Cap Market (Regular Nasdaq). Data were obtained directly from Nasdaq.

Panel A. Changes in Listing Rules on Nasdaq National Market System trading floor

Jan. 1, 1984 - Jan. 21, 1985 *Entry listing standards as of January 1, 1984*

Companies listing on NMS are required to have net tangible assets of \$2 million, capital&surplus of \$1 million, minimum bid price of \$5, average trading volume of 100,000 shares per month over six months, public float of 250,000 shares, 300 shareholders and 4 market makers.

Jan. 22, 1985 - Aug. 3, 1987 *Profitability rule*

The first listing alternative included requirement to report net income of \$300,000 in last fiscal year or two of the last three fiscal years, have capital&surplus of \$1 million, minimum bid price of \$3, market value of public float of \$2 million, public float of 350,000 shares and 2 market makers. The second alternative required the listing firm to have operating history of 4 years, have capital&surplus of \$8 million, market value of public float of \$8 million, public float of 800,000 shares and 2 market makers. Requirement to have total assets of \$2 million remains unchanged.

Aug. 4, 1987 - Feb. 6, 1989 *Corporate governance requirement*

Companies listing on NMS are required to distribute quarterly reports, maintain a minimum of two independent directors on the board, establish an audit committee consisting primarily of independent directors, solicit proxies for shareholder meetings, review related party transactions and maintain a quorum of at least 50 percent of outstanding common voting stock for any shareholder meetings.

Feb. 7, 1989 - Aug. 21, 1997 *Quantitative requirements*

Companies listing under the first alternative must have net tangible assets of \$4 million (instead of total assets of \$2 million previously), net income of \$400,000, pretax income of \$750,000, minimum bid price of \$5, market value of public float of \$3 million, public float of 500,000 shares and number of shareholders of either 400 or 800 depending on the number of shares publicly held. Companies listing under the second alternative are required to report net tangible assets of \$12 million, have operating history of 3 years, market value of public float of \$15 million, public float of 1,000,000 shares and 400 shareholders.

Aug. 22, 1997 - Jun. 28, 2001 *Market capitalization standard*

Market capitalization standard introduced, allowing firms to list based on either market capitalization, total assets or total revenue of \$75 million. Quantitative requirements increased for alternatives one and two, including minimum cut-off level for net tangible assets to respectively \$6 million and \$18 million, For alternative one, pre-tax income of \$1 million was introduced; number of shareholders was set at 400 for alternative one, replacing scale from 400 to 800 depending on the number of shares publicly held. Operating history requirement for Alternative 2 was lowered to two years from three years. Public float, market value of public float and minimum bid price were set at different levels for each standard.

June 29, 2001 - Nov. 4, 2003 *Quantitative requirements*

Stockholders' equity requirement increased for Alternatives one and two to respectively \$15 million and \$30 million. Market capitalization rule was unchanged.

Nov. 5, 2003 - Dec. 31, 2005 *Sarbanes-Oxley requirements*

Rules on corporate governance, director independence and the duties of the audit, nomination and compensation committees, are incorporated in the listing rules.

Panel B. Changes in Listing Rules on Nasdaq Small Cap Market (Regular Nasdaq)

Jan. 1, 1984 - Aug. 29, 1991 *Entry listing standards as of January 1, 1984*

Regular Nasdaq standards included requirements to have total assets of \$2 million, capital & surplus of \$1 million, public float of 100,000 shares and 300 shareholders.

Aug. 30, 1991 - Aug. 21, 1997 *Quantitative requirements*

Nasdaq SmallCap Market was formed from regular Nasdaq. Requirements for total assets and capital & surplus were increased to respectively \$4 million and \$2 million. Minimum bid price of \$3 and market value of public float of \$1 million requirements were added. Rules for number of shares in public hands of 100,000 and number of shareholders of 300 remained unchanged.

Aug. 22, 1997 - Nov. 4, 2003 *Market capitalization standard, corporate governance rules, quantitative requirements*

Market capitalization standard allowing companies to list based on criteria of their choice replaced the old set of rules. Listing companies required to have net tangible assets of \$4 million, net income in the last year or two of the last three fiscal years of \$750,000 or market capitalization of \$50 million. Nasdaq raised requirements for minimum bid price, market value of public float, public float and introduced one-year operating history rule for firms not listing under market capitalization standard. Corporate governance requirements previously in force for NMS market segment were extended to SmallCap stocks.

Nov. 5, 2003 - Dec.31, 2005 *Sarbanes-Oxley requirements*

Rules on corporate governance, director independence and the duties of the audit, nomination and compensation committees, are incorporated in the listing rules.

Appendix 4

Table 1: Selected Characteristics of IPO Firms Listed on National Exchanges in 1984-2005

	NYSE	Amex	NMS	SmCap	Total
Trading floor					
Number of observations	667	191	4025	796	5679
A. Proportion of firms					
- delisted or in distress three years after IPO	3%	16%	20%	45%	21%
- with positive three-year stock returns	56%	38%	38%	24%	38%
- with positive return on assets	82%	55%	49%	18%	49%
- with asset turnover above one	50%	49%	47%	41%	46%
B. Mean statistics for:					
- three-year stock returns	32%	10%	23%	-9%	19%
- return on assets	5%	-6%	-11%	-32%	-12%
- asset turnover	117%	111%	109%	96%	108%
- underpricing	10%	6%	24%	15%	20%
- liquidity	13.7	11.6	13.1	11.0	12.8
- deviation of variance ratio from value of one	0.18	0.23	0.24	0.33	0.24
- st. deviation of residual stock returns	0.026	0.037	0.048	0.051	0.045
- R-squared	9%	9%	7%	4%	7%
C. Chi-Square statistic for:					
		NYSE&Amex	NYSE&NMS	NYSE&SmCap	
- percentage of firms delisted or in distress three years after IPO		47.6***	115.3***	341.1***	
- percentage of firms with positive three-year stock returns		19.0***	82.00***	161.6***	
- percentage of firms with positive return on assets		78.3***	263.4***	635.9***	
- percentage of firms with asset turnover above one		0.44	3.21*	14.73***	

Chi-Square statistic for:	Amex&NMS	Amex&SmCap	NMS&SmCap
- percentage of firms delisted or in distress three years after IPO	1.81	55.7***	236.9***
- percentage of firms with positive three-year stock returns	0.04	16.9***	56.3***
- percentage of firms with positive return on assets	1.57	112.3***	283.6***
- percentage of firms with asset turnover above one	0.08	3.45*	10.6***

D. T-test statistic for means for:	NYSE&Amex	NYSE&NMS	NYSE&SmCap
- three-year stock returns	2.48**	1.70*	5.76***
- return on assets	6.68***	28.8***	30.3***
- asset turnover	1.15	2.56**	5.56***
- underpricing	2.82***	14.3***	4.25***
- liquidity	21.4***	11.8***	37.14***
- deviation of variance ratio from value of one	2.82***	6.22***	12.48***
- st. deviation of residual stock returns	22.8***	41.9***	25.52***
- R-squared	0.05	5.45***	11.55***

T-test statistic for means for:	Amex&NMS	Amex&SmCap	NMS&SmCap
- three-year stock returns	1.47	1.88*	4.77***
- return on assets	2.88***	13.3*	17.2***
- asset turnover	0.23	2.47**	4.54***
- underpricing	12.7***	5.63***	7.03***
- liquidity	17.7***	6.15***	33.6***
- deviation of variance ratio from value of one	0.50	6.05***	9.69***
- st. deviation of residual stock returns	7.90***	8.91***	3.64***
- R-squared	2.39**	5.81***	10.3***

Table 2: Difference in Quality of IPO Firms on Different Trading Floors in 1984-2005

Dependent variable	Logistic models		Multivariate (OLS) models					
	Going concern	Three year stock return	Return on assets	First day return	Liquidity	Volatility ratio	Variance	R-squared
Intercept	0.69	-1.23***	-0.38*	-0.16***	7.98***	0.039***	0.405***	0.024***
NYSE	1.56***	0.51***	1.45***	-0.07*	0.36***	-0.008***	0.037*	-0.042***
Nasdaq NMS	-0.33	-0.18	-0.03	0.08**	0.73***	0.007***	0.040**	-0.022***
SmCap	-1.25***	-0.53***	-1.52***	0.11***	0.47***	0.010***	0.044**	-0.013**
LogAssets	0.06	0.09***	-0.02	0.04***	0.68***	-0.000	-0.019***	0.011***
Underwriter ranking	0.14***	0.06***	0.12***	0.00	0.11***	-0.001***	-0.016***	0.006***
Venture capital	-0.78***	-0.04	-0.67***	0.04***	0.27***	0.005***	-0.005	0.004*
Growth	-0.20	-0.22	-0.18	-0.09***	-0.16**	0.001	0.020	-0.004
Debt	0.60	0.13*	0.73***	-0.09***	-0.37***	-0.002***	0.024***	-0.008***
High Tech	0.08	-0.12*	-0.44***	0.13***	0.67***	0.008***	-0.037***	0.024
Hotmarket	-0.59***	-0.46***	-0.55***	0.19***	0.51***	0.009***	-0.015**	-0.001
Market return	0.38***	0.28***	0.22***	3.76***	0.90***	-0.006***	0.006	-0.070***
N. of obs.	5679	5423	5423	5679	5679	5679	5679	5679
Adjusted R-Sq				0.13	0.60	0.24	0.07	0.19
Loglikelihood Ratio Chi-Sq	826.6***	389.1***	1269.9***					

Table 3: Selected Characteristics of IPO Firms Listed on the New York Stock Exchange in 1984-2005

Listing standards	1984-1986	1986-1995	1995-1999	1999-2003	2003-2005	NYSE
Number of observations		32	256	220	72	87
A. Proportion of firms						
- delisted or in distress three years after IPO		3%	1%	3%	8%	1%
- with positive three-year stock returns		63%	63%	46%	53%	61%
- with positive return on assets		78%	89%	73%	79%	89%
- with asset turnover above one		34%	60%	51%	36%	37%
B. Mean statistics for:						
- three-year stock returns		27%	44%	17%	27%	41%
- return on assets		4%	6%	4%	3%	5%
- asset turnover		98%	129%	119%	105%	98%
- underpricing		2%	6%	13%	15%	10%
- liquidity		12.9	13.3	13.7	14.7	14.6
- deviation of variance ratio from value of one		0.15	0.19	0.20	0.17	0.14
- st. deviation of residual stock returns		0.023	0.024	0.030	0.034	0.020
- R-squared		5%	12%	7%	8%	11%
C. Chi-Square statistic for:						
- perc. of firms delisted/in distress		0.79	2.32	3.37*	4.83**	
- perc. of firms with positive stock returns		0.01	14.4***	1.02	1.07	
- perc. of firms with positive return on assets		1.88	10.9***	0.16	1.57	
- perc. of firms with asset turnover above one		6.79***	1.22	7.10***	0.00	

D. T-test statistic for means for:

- three-year stock returns	0.86	2.69***	0.70	0.83
- return on assets	0.67	2.67***	0.29	1.32
- asset turnover	2.34***	1.53	1.43	0.54
- underpricing	2.79***	4.70***	0.99	2.31**
- liquidity	2.59**	4.37***	5.93***	0.90
- variance ratio	1.36	0.92	1.63	1.66*
- st. deviation of residual stock returns	0.36	6.41***	2.42**	8.29***
- R-squared	6.39	5.51***	1.81*	2.03**

Table 4: Impact of Changes in NYSE Listing Standards on Firms' Quality in 1984-2005

Dependent variable	Logistic models			Multivariate (OLS) models				R-squared
	Going concern	Three year stock return	Return on assets	First day return	Liquidity	Volatility ratio	Variance	
Panel A.								
Intercept	0.87	-1.47	1.26	-0.04	9.09***	0.035***	0.223***	0.052
NYSE1986_1995	1.83	0.16	0.75	0.03	0.26	-0.002	0.026	0.038**
NYSE1995_1999	1.46	-0.15	0.12	0.07**	0.54***	0.003	0.043	0.004
NYSE1999_2003	-0.70	-0.39	0.00	0.10***	1.01***	0.007***	0.031	-0.011
NYSE2003_2005	2.33	0.24	0.99	0.05*	0.85***	-0.005**	0.001	0.022
LogAssets	0.03	0.18***	-0.04	-0.02***	0.51***	-0.001***	-0.009	0.013***
Underwriter	0.10	-0.00	-0.00	0.02***	0.09*	-0.000	-0.001	-0.002
Venture capital	-1.21**	0.16	0.38	0.03*	-0.08	0.001	-0.039*	0.010
Growth	-1.25	-0.40	-0.37	-0.08*	-0.13	0.003*	0.027	-0.005
Debt	-0.73	0.14	0.04	-0.02*	-0.14*	0.002**	0.035**	-0.009
High Tech	0.77	0.00	-0.40	0.08***	0.79***	0.006***	0.015	0.002
Hotmarket	-0.19	-0.14	0.04	0.07***	0.27***	0.001	-0.005	0.024***
Market return	5.09***	2.08***	1.49**	1.63*	0.90***	-0.019***	-0.058	-0.219***
N. of obs.	667	667	633	667	667	667	667	667
Adjusted R-Sq				0.15	0.51	0.26	0.01	0.18
Log. Ratio Chi-Sq	29.32***	49.92***	22.09***					

Panel B.

1. 1984-1995 period. "One share, one vote" rule waived in 1986.

NYSE1986_1995	4.67*	-0.10	0.37	0.03	0.37**	0.000	0.027	0.020
Loglikelihood								
Ratio Chi-Sq	29.6***	9.07	15.4*					
Adj. R-Sq				0.09	0.38	0.06	0.01	0.25

2. 1986-1999 period. "Cash flow standard" introduced in 1995.

NYSE1995_1999	-0.63	-0.41*	-0.87**	0.04***	0.28***	0.005***	0.019	-0.031***
Loglikelihood								
Ratio Chi-Sq	29.6***	39.9***	16.0*					
Adj. R-Sq				0.15	0.47	0.23	0.00	0.200

3. 1995-2003 period. "Global market capitalization standard" introduced in 1999.

NYSE1999_2003	-1.7**	-0.50	-0.22	0.04	0.44***	0.003**	0.003	-0.000
Loglikelihood								
Ratio Chi-Sq	10.8	29.0***	10.0					
Adj. R-Sq				0.14	0.55	0.25	0.06	0.10

4. 1999-2005 period. Sarbanes-Oxley rules incorporated in listing rules in 2003.

NYSE2003_2005	2.6	0.6	0.47	-0.04*	-0.09	-0.012***	-0.030	0.032***
Loglikelihood								
Ratio Chi-Sq	22.1***	20.5**	25.4***					
Adj. R-Sq				0.13	0.36	0.35	-0.01	0.08

Table 5: Selected Characteristics of IPO Firms Listed on the American Stock Exchange in 1984-2005

Listing standards	AMEX 1984-1987	AMEX 1987-1991	AMEX 1991-2003	AMEX 2003-2005
Number of observations	44	50	86	11
A. Proportion of firms				
- delisted or in distress three years after IPO	2%	6%	27%	27%
- with positive three-year stock returns	50%	38%	33%	36%
- with positive return on assets	68%	62%	47%	36%
- with asset turnover above one	73%	54%	33%	55%
B. Mean statistics for:				
- three-year stock returns	33%	-2%	9%	-17%
- return on assets	2%	0%	-11%	-23%
- asset turnover	141%	115%	89%	135%
- underpricing	9%	3%	6%	8%
- liquidity	11.7	11.6	11.6	11.4
- deviation of variance ratio from value of one	0.25	0.19	0.24	0.20
- st. deviation of residual stock returns	0.033	0.032	0.041	0.042
- R-squared	12%	17%	4%	3%
C. Chi-Square statistic for:				
- perc. of firms delisted/in distress	0.80	8.80***	0.00	
- perc. of firms with positive stock returns	1.37	0.41	0.06	
- perc. of firms with positive return on assets	0.43	2.82*	0.55	
- perc. of firms with asset turnover above one	3.71*	5.79**	1.82	

D. T-test statistic for means for:

- three-year stock returns	1.66*	0.50	0.65
- return on assets	1.02	3.35***	1.40
- asset turnover	1.72*	2.25**	1.42
- underpricing	1.32	1.57	0.45
- liquidity	0.63	0.08	0.32
- variance ratio	1.27	1.52	0.69
- st. deviation of residual stock returns	0.33	3.24***	0.13
- R-squared	1.97**	6.75***	1.07

Table 6: Impact of Changes in Amex Listing Standards on IPO Firms' Quality in 1984-2005

Dependent variable	Logistic models			Multivariate (OLS) models				
	Going concern	Three year stock return	Return on assets	First day return	Liquidity	Volatility	Variance ratio	R-squared
Panel A.								
Intercept	0.42	-0.14	0.19	0.09*	10.17***	0.062***	0.381***	0.139***
AMEX1987_1991	-1.45	-0.51	-0.32	-0.06*	-0.38*	0.000	-0.050	0.032*
AMEX1991_2003	-2.90***	-0.78*	-0.53	-0.06*	-0.13	0.004	-0.012	-0.047***
AMEX2003_2005	-1.93	-0.44	-1.00	-0.04	0.01	-0.001	-0.078	-0.046
LogAssets	0.91***	-0.06	0.20	0.01	0.38***	-0.004***	-0.022	-0.009
Underwriter	-0.04	0.03	0.02	-0.00	0.02	-0.001**	-0.001	0.007**
Venture capital	-0.69	0.27	-0.64	0.04	-0.04	0.001	-0.025	-0.004
Growth	-0.13	0.69	0.41	0.01	-0.23	-0.006	0.043	0.056**
Debt	0.84	0.00	0.22	-0.03	-0.21	-0.001	-0.045	0.029**
High Tech	0.18	-0.02	-0.28	-0.02	0.02	-0.001	-0.053	-0.021
Hotmarket	-0.85	-0.39	-0.48	0.05*	0.40**	0.006**	0.018	-0.008
Market return	1.68***	0.41	-0.23	1.30	0.00	-0.021***	-0.122	-0.291***
N. of obs.	191	191	186	191	191	191	191	191
Adjusted R-Sq				0.01	0.17	0.27	0.00	0.51
Log. Ratio Chi-Sq	50.30***	7.89	19.59***					

Panel B.

1. 1984-1991 period. Quantitative requirements lowered in 1987.

AMEX1987_1991	-1.16	-0.56	0.05	-0.06	-0.40*	-0.001	-0.038	0.02
Loglikelihood								
Ratio Chi-Sq	11.0	11.0	11.6					
Adj. R-Sq				0.05	0.19	0.16	0.02	0.57

2. 1987-2003 period. Three additional listing criteria introduced in 1991.

AMEX1991_2003	-2.03**	-0.17	0.12	0.02	0.35*	0.003	0.039	-0.083***
Loglikelihood								
Ratio Chi-Sq	34.9***	9.8	20.6**					
Adj. R-Sq				-0.01	0.29	0.29	-0.03	0.51

3. 1991-2005 period. SOX rules incorporated in listing rules, two additional listing standards introduced in 2003.

AMEX2003_2005	1.24	0.74	-0.08	0.04	0.30	-0.005	-0.047	-0.006
Loglikelihood								
Ratio Chi-Sq	20.7***	18.3**	14.7*					
Adj. R-Sq				-0.02	0.14	0.27	-0.02	0.03

Table 7: Selected Characteristics of IPO Firms Listed on the Nasdaq National Market System in 1984-2005

Listing standards	NMS 1984- 1985	NMS 1985- 1987	NMS 1987- 1989	NMS 1989- 1997	NMS 1997- 2001	NMS 2001- 2003	NMS 2003- 2005
Number of observations	135	461	111	2040	998	93	187
A. Proportion of firms							
- delisted or in distress three years after IPO	12%	11%	6%	14%	37%	15%	25%
- with positive three-year stock returns	41%	40%	42%	44%	18%	57%	47%
- with positive return on assets	56%	67%	68%	58%	21%	57%	48%
- with asset turnover above one	53%	67%	77%	54%	21%	40%	32%
B. Mean statistics for:							
- three-year stock returns	25%	12%	61%	45%	-23%	44%	21%
- return on assets	-3%	0%	2%	-6%	-27%	-7%	-14%
- asset turnover	130%	144%	147%	118%	72%	106%	87%
- underpricing	5%	8%	8%	15%	57%	12%	12%
- liquidity	11.2	11.7	11.9	12.9	14.4	13.8	13.5
- deviation of variance ratio from value of one	0.34	0.32	0.28	0.24	0.19	0.19	0.15
- st. deviation of residual stock returns	0.028	0.037	0.040	0.043	0.069	0.041	0.032
- R-squared	4%	9%	11%	5%	12%	7%	6%
C. Chi-Square statistic for:							
- perc. of firms delisted/in distress	0.11	2.05	5.69**	194.8***	17.4***	3.36*	
- perc. of firms with positive stock returns	0.08	0.18	0.13	195.1***	75.6***	2.45	
- perc. of firms with positive return on assets	4.92***	0.01	5.38**	338.1***	56.4**	2.58	
- perc. of firms with asset turnover above one	9.58***	2.83*	24.5***	275.8***	15.2***	2.28	

D. T-test statistic for means for:

- three-year stock returns	0.93	1.38	0.45	7.95***	3.94***	1.20
- return on assets	1.35	1.25	5.45***	18.8***	6.01***	1.76*
- asset turnover	1.84*	0.33	3.89***	17.5***	4.16***	2.04**
- underpricing	2.45**	0.05	3.03***	15.5***	13.9***	0.09
- liquidity	3.98***	1.17	8.31***	24.5***	4.13***	0.15
- variance ratio	0.83	1.22	1.60	7.38***	0.21	1.96*
- st. deviation of residual stock returns	6.72***	1.56	1.73*	36.2***	15.1***	4.68***
- R-squared	7.28***	1.70*	5.43***	24.3***	8.77***	1.50

Table 8: Impact of Changes in Nasdaq National Market System Listing Standards on IPO Firms in 1984-2005

Dependent variable	Logistic models			Multivariate (OLS) models				
	Going concern	Three year stock return	Return on assets	First day return	Liquidity	Volatility	Variance ratio	R-squared ratio
Panel A.								
Intercept	0.70**	-1.29***	-0.40**	-0.12***	8.46***	0.036***	0.498***	-0.019***
Nasdaq1985_1987	-0.27	-0.16	0.10	0.04	0.26**	0.012***	-0.012	0.043***
Nasdaq1987_1989	0.24	-0.15	0.05	0.01	0.12	0.015***	-0.037	0.052***
Nasdaq1989_1997	-1.62***	-0.51**	-0.91***	0.01	0.44***	0.020***	-0.069***	0.007
Nasdaq1997_2001	-2.30***	-1.49***	-2.08***	0.34***	1.34***	0.044***	-0.082***	0.049***
Nasdaq2001_2003	-1.23***	0.08	-0.60*	-0.06	0.74***	0.019***	-0.089**	-0.004
Nasdaq2003_2005	-1.28***	-0.05	-0.66***	-0.04	0.78***	0.009***	-0.138***	-0.015**
LogAssets	0.18***	0.16***	0.14***	0.03***	0.58***	-0.003***	-0.011**	0.012***
Underwriter	0.13***	0.07***	0.11***	0.00	0.13***	-0.0004**	-0.020***	0.004***
Venture capital	-0.73***	-0.03	-0.75***	0.04***	0.28***	0.005***	0.016*	0.002
Growth	-0.14	-0.17	-0.08	-0.15***	-0.34***	-0.002**	0.015	-0.010**
Debt	0.76***	0.10	0.77***	-0.10***	-0.35***	-0.003***	0.019**	-0.011***
High Tech	0.34***	-0.01	-0.24***	0.11***	0.60***	0.005***	-0.044***	0.027***
Hotmarket	0.02	-0.19**	-0.13	0.12***	0.31***	0.002***	-0.017*	0.000
Market return	0.58***	0.27***	0.32***	5.95***	1.04***	-0.006***	0.012	-0.037***
N. of obs.	4025	4025	3841	4025	4025	4025	4025	4025
Adjusted R-Sq				0.21	0.58	0.48	0.07	0.27
Log. Ratio Chi-Sq	500.8***	338.0***	830.8***					

Panel B.

1. 1984-1987 period. Profitability rule introduced in 1985.

Nasdaq1985_1987	-0.17	-0.23	0.32	0.05***	0.32***	0.011***	-0.003	0.06***
Loglikelihood								
Ratio Chi-Sq	80.6***	29.4***	51.2***					
Adj. R-Sq				0.08	0.45	0.19	0.01	0.29

2. 1985-1989 period. Corporate governance requirements introduced in 1987.

Nasdaq1987_1989	0.97*	-0.18	-0.19	0.01	-0.11	0.002*	-0.034	0.001
Loglikelihood								
Ratio Chi-Sq	67.1***	39.2***	47.3***					
Adj. R-Sq				0.07	0.45	0.22	0.02	0.35

3. 1987-1997 period. Quantitative requirements raised in 1989.

Nasdaq1989_1997	-1.90***	-0.18	-0.91***	0.03	0.61***	0.005***	-0.020	-0.046
Loglikelihood								
Ratio Chi-Sq	176.8***	56.8***	226.6***					
Adj. R-Sq				0.11	0.40	0.18	0.13	0.16

4. 1989-2001 period. Market capitalization standard introduced in 1997.

Nasdaq1997_2001	-0.62***	-0.99***	-1.11***	0.30***	0.89***	0.024***	-0.006	0.043***
Loglikelihood								
Ratio Chi-Sq	371.3***	273.9***	686.3***					
Adj. R-Sq				0.20	0.52	0.47	0.10	0.34

5. 1997-2003 period. Quantitative requirements raised in 2001.

Nasdaq2001_2003	1.05***	1.45***	1.46***	-0.31***	-0.43***	-0.021***	0.004	-0.046***
Loglikelihood								
Ratio Chi-Sq	74.0***	142.3***	202.8***					
Adj. R-Sq				0.15	0.47	0.31	0.01	0.24

6. 2001-2005 period. Sarbanes-Oxley rules incorporated in listing rules in 2003.

Nasdaq2003_2005	0.01	0.76*	0.31	0.02	-0.07	-0.012***	-0.06***	-0.006
Loglikelihood								
Ratio Chi-Sq	56.1***	30.9***	50.0***					
Adj. R-Sq				0.13	0.33	0.35	0.03	0.15

Table 9: Selected Characteristics of IPOs Listed on the Nasdaq Small Cap Market in 1984-2005

Listing standards	SmCap 1984- 1991	SmCap 1991- 1997	SmCap 1997- 2003	SmCap 2003- 2005
Number of observations	461	284	50	1
A. Proportion of firms				
- delisted or in distress three years after IPO	41%	49%	58%	0%
- with positive three-year stock returns	28%	20%	6%	0%
- with positive return on assets	21%	13%	18%	0%
- with asset turnover above one	39%	44%	34%	0%
B. Mean statistics for:				
- three-year stock returns	-4%	-7%	-63%	-18%
- return on assets	-28%	-38%	-35%	-38%
- asset turnover	94%	101%	87%	53%
- underpricing	13%	19%	8%	-4%
- liquidity	10.8	11.2	11.3	15.5
- deviation of variance ratio from value of one	0.28	0.42	0.37	0.24
- st. deviation of residual stock returns	0.041	0.061	0.081	0.072
- R-squared	6%	1%	3%	7%

C. Chi-Square statistic for:

- perc. of firms delisted/in distress	4.65***	1.29	n.a. ¹³
- perc. of firms with positive stock returns	4.78**	5.92**	n.a.
- perc. of firms with positive return on assets	7.21***	0.79	n.a.
- perc. of firms with asset turnover above one	1.34	2.07	n.a.

D. T-test statistic for means for:

- three-year stock returns	0.25	3.63***	n.a
- return on assets	4.04***	0.59	n.a
- asset turnover	1.41	1.28	n.a
- underpricing	2.79***	2.97***	n.a
- liquidity	3.09***	0.55	n.a
- variance ratio	6.93***	1.57	n.a
- st. deviation of residual stock returns	11.5***	3.79***	n.a.
- R-squared	11.4***	3.75***	n.a.

¹³ I do not report tests comparing IPO firms listing in 1997-2003 and those listing in 2003-2005 because there is only one observation available for the 2003-2005 period.

Table 10: Impact of Changes in Nasdaq Small Cap Market Listing Standards in 1984-2005

Dependent variable	Logistic models			Multivariate (OLS) models				
	Going concern	Three year stock return	Return on assets	First day return	Liquidity	Volatility ratio	Variance	R-squared
Panel A.								
Intercept	-0.73***	-1.95***	-2.50***	0.17***	8.52***	0.048***	0.343***	0.019***
SmCap1991_1997	-0.50**	-0.52**	-0.46*	-0.05**	0.15	0.024***	0.144***	-0.018***
SmCap1997_2003	-0.83**	-1.88***	-0.19	-0.20***	0.16	0.042***	0.096**	-0.014
LogAssets	0.46***	0.31***	0.47***	0.01	0.71***	-0.001	0.026**	0.012***
Underwriter	0.04	0.02	0.02	-0.02***	0.08***	-0.001	-0.002	0.005***
Venture capital	-0.67***	-0.24	-0.06	-0.03	0.27**	0.003	-0.036	0.001**
Growth	0.34	0.21	0.09	0.08	0.26	-0.004	-0.003	0.012
Debt	0.06	0.18	0.69***	0.04	-0.09	0.000	-0.012	-0.002
High Tech	0.10	0.14	-0.23	0.04*	0.23**	0.001	-0.012	0.008
Hotmarket	-0.40**	-0.12	-0.14	0.17***	0.20**	-0.008	0.005	-0.007
Market return	0.28***	0.23***	0.01	-1.26	1.21***	-0.013***	-0.029	-0.050***
N. of obs.	796	796	763	796	796	796	796	796
Adjusted R-Sq				0.12	0.41	0.25	0.07	0.21
Log. Ratio Chi-Sq	77.7***	52.4***	58.7***					

Panel B.

1. 1984-1997 period. Quantitative requirements raised in 1991.

SmCap1991_1997 -0.62*** -0.54** -0.42 -0.06** 0.13 0.022*** 0.145*** -0.015**

Loglikelihood

Ratio Chi-Sq 69.5*** 41.5*** 59.4***

Adj. R-Sq 0.13 0.43 0.19 0.07 0.22

2. 1991-2003 period. Market capitalization standard and corporate governance rules introduced in 1997.

SmCap1997_2003 0.48 -0.77 0.92* -0.16*** -0.04 0.019*** -0.027 0.013***

Loglikelihood

Ratio Chi-Sq 84.1*** 26.0*** 28.5***

Adj. R-Sq 0.11 0.11 0.09 0.01 0.12
