Financial Statement Information and Evaluation of Newly Listed High-Technology "Nano Caps"

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Initial version: August 30, 2008
This version: May 3, 2010

Abstract

This study examines the usefulness of financial statement information in evaluating very small newly listed high-technology nano cap firms' (i.e., market capitalization less than USD 50 million) by employing data from 36 countries during the high investor sentiment era of 1995-2000. I find that financial statement information is useful in screening nano caps from non-nano caps as well as explaining nano caps' delisting risk and valuing them. The evidence based on these three approaches is consistent with the view that financial statements provide useful information to investors for evaluating high financial risk, hard-to-value firms irrespective of the institutional setting during a high investor sentiment period.

Key words: financial statements, nano caps, newly listed firms, delisting, valuation
JEL: G15, G18, M41

Acknowledgments: I am grateful to Harri Kalliokoski, Juha Kinnunen, Joni Kokkonen, Antti Miihkinen Mikko Niemenmaa and Lasse Niemi, Mari Onkamo, Janne Seppänen, Pekka Suhonen as well as workshop participants at the Aalto University School of Economics for discussions and comments. Funding for this project was provided by Liikesivistysrahasto. Maarit Karvonen provided excellent research assistance with the data collection.

1. Introduction

In this study I examine whether financial statements provide useful information for evaluating future prospects of very small newly listed high-technology firms during a high investor sentiment period. Financial statements provide an important publicly available source of information for investors in their assessment of a firm's future prospects. However, their usefulness in the case of young high-technology firms especially during high investor sentiment periods, or "market bubbles," is ambiguous. The accounting system is shown to poorly capture the economics of such firms (e.g., Lev and Zarowin, 1999; Francis and Schipper, 1999; Core et al., 2003). Nevertheless, Penman (2003) argues that financial reporting should ideally serve as an anchor during market bubbles and suppress speculative tendencies.

Small newly listed high-technology firms represent a special challenge to investors and market regulators. For example, investors and analysts consider firms with low market capitalization to be highly speculative and risky in general (e.g., Pastor and Veronesi, 2003; Baker and Wurgler, 2006; Lui et al. 2007). Especially, firms with low market capitalization, newly listed and operating in the high-technology industry are likely to exhibit "high financial risk" (e.g., Duff and Phelps, 2008). In fact, the low market capitalization suggests that investors perceive nano caps to have only modest future potential to generate a substantial amount of future cash flows.

Similarly, the world's most prominent market regulator, the Securities Exchange Commission (SEC) in the U.S., considers small firms to be risky investments for investors due to the quality of firms, public information available, liquidity and susceptibility to fraud (e.g., U.S. Securities and Exchange Commission, 2004; see also Lui et al., 2007). Especially risky are considered to be so-called nano cap firms that have market capitalization less than USD 50 million.[1] Nevertheless, one should note that nano caps have been accepted for public trading, and hence they have passed the criteria imposed in listing standards.

[1] For example, the SEC revised the Penny Stock Reform Act of 1990 in 2005 and imposed minimum requirements for newly listed firms to have a positive net income, a market value of listed securities of USD 50 million and a minimum bid price of USD 4 per share. For various definitions of firm size classes used by market participants, see for example www.investordictionary.com, http://financial-dictionary.thefreedictionary.com/, and http://www.investopedia.com/. Nano caps are sometimes interchangeably called penny stocks, micro caps or small caps. However, the important distinction is that penny stock is sometimes defined based only on the maximum stock price level (e.g., less than USD 5.00) regardless of the total market capitalization. Hence, penny stocks are at least partly determined by the number of shares outstanding. Nano caps are, in turn, defined solely based on the total market capitalization.

On the other hand, young emerging high-technology firms are considered to be important for economic growth (see Levine, 1997, 2005). As a response to growing demand by investors seeking riskier but higher yielding investments, as well as riskier firms with undeveloped business models and uncertain future cash flows seeking funding for their growth opportunities, several stock exchanges have developed new, so-called junior or parallel marketplaces that aim to facilitate such firms' access to public equity financing.[2] The potential role of financial statement information in facilitating efficient capital allocation among such risky firms is pronounced due to high uncertainty and undeveloped information environment.

Motivated by the importance of and challenges presented by newly listed high-technology firms with very low market capitalization, I examine the relevance of financial statement information, or firm fundamentals measured with accounting data, of newly listed high-technology nano caps from all over the world during a high investor sentiment period of 1995-2000. I employ data on newly listed firms as they provide an interesting context in which to examine very small firms, as the initiation of public trading is the first time a firm is exposed to public market scrutiny and the resulting market valuation reflects investors' assessment of their future prospects and ability to generate free cash flows.[3] Moreover, the investors' irrational behavior and ignorance of firm fundamentals ('fundamentals don't matter') is argued to be prevalent for speculative firms during high investor sentiment periods (e.g., Malkiel, 1999; Baker and Wurgler, 2006). I employ international sample of firms to enhance the power of the statistical tests and to provide more generalizable evidence as the closely related existing evidence is based on the U.S. data (see Section 2.).[4]

I conduct my investigation of the usefulness of financial statement information in three complementary ways. First, I examine whether firm fundamentals provide information for

[2] These marketplaces include Alternative Investment Market (AIM) of the London Stock Exchange, the Kosdaq of the Korea Exchange and TSX Venture of the Toronto Stock Exchange. The junior or Small and Medium Enterprise (SME) marketplaces consist of roughly 30 marketplaces and the number of firms traded on SMEs was 7,271 with domestic market capitalization of USD 491.5 billion in 2006. See the Annual Reports of the World Federation of Exchanges for further statistics available at *www.-world-exchanges.org*.

[3] While the hurdle of market capitalization of USD 50 million may seem as an arbitrary cut-off, it has roots in the regulatory and investment practices motivating the upper limit for firm size as discussed above. Nevertheless, such numeric thresholds should be considered suggestive about firm size in relative terms especially across countries as well as to represent heuristic rules of thumb potentially employed by investors and regulators. An alternative method to define very small firms would be to use the sample distribution of market values. However, such definition may lack any intuitive foundation potentially used by investors and regulators.

[4] In sum, one may consider the sample in this study to provide an interesting international stress test of the usefulness of accounting information as the sample firms are newly listed, represent high-technology industry and were listed during a presumably irrational market bubble period.

categorizing, or screening, newly listed high-technology nano caps by their market capitalization in the global sample. Categorizing investment targets is argued to be an important mechanism that investors use to cope with uncertainty in their investment decisions (see Daniel et al. 2002; Hirshleifer and Teoh 2003; Chan et al. 2004; Hirshleifer et al. 2004). Second, I examine how firm fundamentals explain nano caps' tendency to exit after their initial listing year (i.e., delisting risk). Delisting represents an ultimate failure of a listed firm as a stand alone listed company and can be a high cost event to investors (e.g., Shumway, 1997; see also Demers and Joos, 2007). Finally, I examine how firm fundamentals explain the differences in relative valuation among the nano cap firms. Use of financial statement information in firm valuation is one of its primary purpose of use and it is a widely employed approach in accounting research (see Kothari, 2001). These tests aim to mimic three different ways that investors can use financial statement information, namely, for screening investment candidates, conducting firms' risk assessment and executing their relative valuation.

I assign the firm fundamentals measured with financial statement information in three groups for my empirical tests as follows. Maturity of a firm's business model is measured with total assets, return on assets and existence of no sales. A firm's investment activity is measured with capital expenditures, R&D expenses and indicators of negative operating income, negative operating cash flows and no dividends paid. A firm's financial position is measured with cash resources, financial leverage, an indicator of existence of no debt and an indicator of negative equity.

The descriptive evidence in this study reveals that nano caps are common among newly listed high-technology, comprising roughly 40% of my large sample of 3,915 firms even during a period of high investor sentiment. This is striking as newly listed high-technology firms are commonly asserted to exhibit extreme growth opportunities and excessive valuations (e.g., Pastor and Veronesi, 2003; Baker and Wurgler, 2006). Most of the 1,543 nano caps (82.9%) in my sample are located in strong investor protection countries that facilitate relatively better public external financing for new business ventures, but also relatively higher valuation of firms in general (e.g., Beck and Demirguc-Kunt, 2006; La Porta et al., 2002). Moreover, the emergence of nano caps is concentrated (roughly 79%) in the so-called Internet bubble years of 1998-2000, potentially reflecting low quality new listings during that period (e.g., Fama and French, 2004).

My screening analysis on firm fundamentals based on multivariate logistic regression model shows that firm fundamentals separate nano caps from non-nano caps. In particular, nano cap firms are more likely to have firm fundamentals that are associated with less mature business models, less investment activity to create both tangible and intangible future cash-generating assets, and more limited liquid resources to support future investments, and hence to exploit growth opportunities, than their non-nano cap counterparts.

Moreover, I document based on my risk assessment analysis using logistic regression method that firm fundamentals are significant determinates of nano caps' tendency to delist. That is, the evidence shows that firms that exit under poor financial conditions invest more in intangible assets and are financially weaker. There is also some evidence that more mature firms are more likely to exit. Furthermore, the speed of the exit after the initial listing year is higher for firms with more mature business models, higher investment activity and weaker financial positions based on the Cox proportional hazard model that accounts for the potential bias introduced by data being right-hand censored.

Finally, the evidence from my relative valuation analysis using multivariate ordinary least squares regression technique indicates that firms with less mature business models but relatively higher investment activity in tangible assets and operating and organizational intangible assets (but not in R&D) and weaker financial positions are valued relatively higher among the nano cap firms. The evidence also is consistent with prior research on the unconventional valuation of high-technology firms during the new economy era.

Overall, the evidence in this study indicates that the accounting-based firm fundamentals measuring the maturity of a small newly listed business venture, the intensity of activity to create tangible and intangible assets, and financial strength are important in screening nano caps, assessment of their survival as a stand alone listed company and valuation. The results are consistent with the view that financial statements provide useful information for evaluating future viability of small, newly listed high-technology business ventures that are potentially engaged in new, innovative business activities and exhibit high uncertainty regarding their future profitability. The results are robust to controlling for the level of investor protection in a firm's domain. In fact, the evidence suggests that country level factors including controls for investor

protection have relatively modest explanatory power relative to firm specific fundamentals measured with financial statement data.[5]

This study contributes to our understanding of the usefulness of financial statement information of young hard-to-value high-technology business ventures' in the context of a global new list markets in three main ways. First, this study is first to focus on the usefulness of financial statement information for newly listed high-technology firms that are presumably highly speculative, difficult to value and very small in terms of their market capitalization but large in number. Second, the study adds new evidence on the role of financial statement information in valuing (e.g., Demers and Lev, 2001; Bartov et al., 2002; Hand, 2003, 2005; Armstrong et al., 2006; Aggrawal et al., 2007) and assessing the delisting risks of newly listed high technology firms (e.g., Bhattacharya et al., 2009; Demers and Joos, 2007) showing that financial statement information is important for evaluating such high financial risk firms regardless of the institutional setting. Finally, my study uses three complementary approaches to examine and to validate the results on the usefulness of financial statement information, while the extant research typically employs only one of the approaches employed in this study.

This study is organized as follows. Section 2 discusses the relevant literature on the association between firm fundamentals and delisting and valuation and makes testable predictions. Section 3 discusses the sample. Section 4 presents the analysis and results. Section 5 concludes.

2. Relevant literature and predictions

In this section, I focus on studies that examine the relationships between firm fundamentals, performance and market valuation with emphasis on small firms and high-technology firms. In general, Pastor and Veronesi (2003) argue that young firms are likely to exhibit greater uncertainty about their future profitability. Baker and Wurgler (2006) suggest that newer (younger, newly listed), smaller, more volatile in terms of stock returns, unprofitable, non-dividend paying, distressed or with extreme growth potential (i.e., less stable firms) firms are highly sensitive to market sentiments. Lui et al. (2007) conjecture that analysts consider riskier

[5] While most of the nano caps in my sample are from strong legal investor protection countries (e.g., the English Law system), the country-specific factors associated with the legal protection of investors as suggested in the law and finance literature (see La Porta et al., 2000) add only marginally to the explanatory power of my empirical models.

firms to have high leverage, low market-to-book and low market capitalization. Smaller firms also earn on average higher returns than larger firms due to their higher riskiness (Banz, 1981; see also Ibbotson, 2005).

Moreover, the information environment is likely to be more challenging for investors in the case of newly listed smaller firms. Grinblatt and Titman (2002) argue that informational problems are the highest among new lists for which there is potentially little proven track record, historical information and comparative firms. The listing process in general is documented to be informationally inefficient, and not all public information is fully incorporated into the offer pricing range (Lowry and Schwert, 2004). The information environment is also poorer for smaller firms than for larger firms (e.g., Atiase, 1985).

2.1. Low valuation and firm performance

While valuation theory in general asserts that firms with relatively higher profitability and growth and/or lower risk are valued at a higher level, prior studies have not examined the determinants of nano caps or penny stocks relative to higher valued firms. However, the research on so-called penny stock IPOs (stock price less than USD 5.00) indicates that such firms are riskier in general. For example, Bradley et al. (2005) find that U.S. penny stock IPOs are more severely underpriced than other IPOs (that is, they have higher initial returns) and perform even worse than other IPOs in the long-run. Seguin and Smoller (1997) document that U.S. penny stocks are less likely to survive as listed firms and thus exhibit relatively higher exit or "mortality" rates. In contrast to expectations, they find no evidence that mortality is associated with market capitalization. Carpentier and Suret (2007) find that for Canadian penny stock IPOs, only firm size (equity over CAD 25 million) and industry are significantly associated with firm success, measured as graduation to a higher level exchange from a junior market, while profitability among other firm characteristics are not. Finally, a related study on small business IPOs in Young and Zaima (1988) finds that younger firms (a measure of risk) perform relatively more poorly than older firms after the listing of their stock.

2.2. Survival of newly listed firms

In general, there is considerable uncertainty regarding the long-term viability of newly listed technology firms (Jain et al., 2008). The evidence from small firms indicates that a strong

financial position is an essential protection against financial distress for small businesses in general (see Mudambi and Treichel, 2005). In fact, Welsh and White (1981) argue that liquidity is even more important than profitability. Hambrick and D'Aveni (1988), in turn, document that a higher financial leverage (debt-to-equity) ratio and a lower profitability (ROA) are associated with corporate failures. Similarly, Mudambi and Treichel (2005) find that the probability that newly listed Internet ventures run into cash crises is increasing in a weaker financial position, measured by debt to total assets and equity and firm size to total assets, among other criteria. However, the evidence on newly listed, young, high-technology firms also emphasizes investments in future assets as a key to survival. Jain and Kini (1999) find that while firms that go public early in their growth cycle (e.g., unprofitable firms) are more likely to risk failure, the firms in high R&D intensity industries are more likely to survive.

The evidence from newly listed high-technology firms suggests that the delisting risk is associated with firm fundamentals. In particular, Bhattacharya et al. (2009) and Demers and Joos (2007) examine the delisting risk for newly listed internet firms and high-technology (excluding internet) firms, respectively.[6] In particular, smaller firms (Bhattacharya et al., 2009; Demers and Joos, 2007), firms with lower profitability (Demers and Joos, 2007), firms with higher leverage (Bhattacharya et al., 2009; Demers and Joos, 2007) and firms with lower R&D (Demers and Joos, 2007) are more likely to delist. In addition to firm fundamentals, other factors are associated with survival. Jain et al. (2008) find that the probability of the future profitability of newly listed technology firms decreases with pre-IPO investor demand and changes with the top management team, but increases with venture capital participation, the proportion of outsiders on the board, and pre-market valuation uncertainty. On the other hand, a higher delisting risk is associated with a lower stock price (Bhattacharya et al., 2009; Demers and Joos, 2007) and a shorter firm age (Demers and Joos, 2007).[7]

2.3. Valuation of high-technology firms

The valuation theory demonstrates that a firm's value is a function of its expected profitability, growth and risk. In particular, value increases in profitability and growth but

[6] In general, the reasons for involuntary delisting by exchange or market regulators are due to (i) violations of listing rules related to market performance such as minimum market value and trading volume and (ii) adverse or poor operating performance-related insolvency or bankruptcy (e.g., Macey et al., 2005).

[7] Duff and Phelps (2008) suggest that small caps consists of a disproportionate number of high-technology firms, start-ups, and recent IPOs, which are inherently riskier than firms with a track record of viable performance.

decreases in riskiness of a business venture. However, the extant evidence provides mixed and perhaps seemingly contradicting evidence to the conventional valuation theory on the association between firm fundamentals and the value of newly listed high-technology firms.

2.3.1. Fundamental determinates of valuation multiples for high-technology firms

The evidence from valuation multiples of high-technology firms in Bhojraj and Lee (2002) shows that, in addition to average industry valuation multiples, operating profit margin, negative profitability, forecasted growth and R&D expenses, Enterprise Value/Sales (EVS) is an important determinate of a relative firm valuation multiple, while leverage and ROA are not. On the other hand, average industry valuation multiples, operating profit margin, negative profitability, growth, R&D expenses, leverage and ROE are all important determinates of a relative equity valuation multiple, price-to-book (P/B). Profitability, growth leverage and ROE and R&D were all positively associated with valuation multiple, while loss was negatively associated with it.

2.3.2. Value relevance of financial statement information in venture capital IPOs

Value relevance of financial statements for early stage high-technology firms during pre-IPO and post-IPO time periods is documented in Hand (2005) and Armstrong et al. (2006). Hand (2005) finds that the value-relevance of financial statement information increases as the firm matures consistently with financial statements, capturing the increasing intensity of assets-in-place relative to future investment options. In particular, Hand (2005) documents that for listed ventures, cash, noncash assets and sales are positively associated with the pre-money valuation of venture-backed biotechnology firms, while long-term debt is negatively associated. He finds no evidence that R&D, among other expenses, is significantly associated with firm value during the first year of listing. Armstrong et al. (2006) find that post-IPO venture-backed firms' sales are positively associated with market value ('value enhancing'), while cost is negatively associated with market value ('value diminishing'). However, for pre-IPO costs, sales, marketing, general and administrative expenses are all value enhancing. They argue that the evidence is consistent with venture-backed firms having a strong "investment aspect," as the companies build a platform/infrastructure to growth and validate their business model(s).

Moreover, Armstrong et al. (2006) suggest that cash is the single most important balance sheet asset for early-stage, venture-backed companies.

2.3.3. Valuation of Internet IPOs

Several studies have examined the valuation of Internet firms during the new economy era (1995-2000). In general, the evidence in these studies is mixed regarding the association between firm fundamentals and value. In particular, Trueman et al. (2000) find no significant association between net income and market prices. They find that the evidence is consistent with the claim that financial statement information has limited usefulness for the valuation of Internet firms. However, the decomposition of net income into its components shows that gross profits are positively associated with value. Bartov et al. (2002) find that cash flows, sales, and sales growth are significantly related to offer prices, while earnings, book value of equity, and R&D are not significantly associated with the IPO offer price. They argue that the valuation of Internet firms departs from conventional wisdom, with earnings not being priced and negative cash flows being priced perhaps because they are viewed as investments.

Moreover, Hand (2003) documents that IPO valuation is linearly and positively associated with book value of equity but negatively and concavely related to income before non-recurring items. However, Hand (2003) also documents that the value is not related to sales and cost of goods sold. Aggrawal et al. (2007) finds a V-shaped valuation relationship in which firms with more negative earnings have higher valuations than do firms with less negative earnings, and firms with more positive earnings have higher valuations than firms with less positive earnings. They suggest that negative earnings are a proxy for growth opportunities for internet firms. Furthermore, Hand (2003) and Demers and Lev (2001) find that R&D and marketing expenses are positively associated with value, consistent with the idea that such expenses are implicitly capitalized by investors to create intangible assets. Finally, Demers and Lev (2001) find that cash burn is a significant valuation driver. This finding is consistent with the positive valuation of various expenses and negative earnings, suggesting that the current period's reported expenses are considered value-enhancing investments in the future.

2.4. Empirical predictions

Based on the prior literature, I make the following predictions regarding the relationship between the newly listed nano caps' fundamentals, their exit from public trading and valuation. The predictions are summarized in Exhibit 1 together with the description of instruments measured with financial statement data employed to measure the underlying constructs. The measurement of variables is discussed in Section 4.

First, what are the firm fundamentals that distinguish nano cap from non-nano cap firms among newly listed high-technology firms; alternatively, what determines a firm's market capitalization based size category when it becomes a public company? I predict that nano caps are firms with relatively less mature business models, less activity in creating future tangible and intangible assets, as well as less financial resources. The above literature indicates that the market values relatively higher firms with larger sales, assets or profitability, which are considered here as measures of the maturity of a firm's business model.

Moreover, investment activity in creating future intangible assets, as reflected by higher R&D expenses, negative operating profitability and operating cash flows, as well as future tangible assets, as reflected by larger capital expenditures, is valued at a higher level. Also, a low or no dividends paid reflects that a firm invests its potential profits back into its future operations. Finally, the above evidence also suggests that an important determinant of a firm's financial strength for young innovative firms is liquid resources. However, the level of financial leverage, and especially a relatively higher level of debt financing, is also considered to reduce a firm's financial strength and flexibility, while no debt indicates that a firm has high debt capacity. Conventionally interpreted, a negative book value of equity reflects that a firm is in financial distress (e.g., Dichev, 1999).

Second, which nano caps are likely to exit from public trading? Essentially the predictions are the same as for the factors that separate nano caps from non-nano caps. I predict that nano caps that are more likely to exit relative to the other nano caps have relatively less mature business models, less activity in creating future tangible and intangible assets, as well as lower financial strength. The motivation for these predictions is the same as above.

Finally, I predict that nano caps that have higher relative valuation among the nano caps have, based on the evidence on the unconventional valuation of high-technology firms during the new economy period of 1995-2000 discussed in previous section, less mature business models, more activity in creating future tangible and intangible assets, as well as greater financial

resources (see also Pastor and Veronesi 2003). In other words, I expect that the fundamental laws of valuation are not applicable to nano caps in general in terms of firm maturity especially regarding firm size and profitability measures.

In sum, the above predictions suggest that financial statement data reflecting maturity of a firm's business model, firm's investment activity and its financial strength should provide useful information for evaluating newly listed high-technology nano caps.

3. Sample

My sample of nano cap firms consists of newly listed high-technology firms all over the world that were listed during 1995-2000. I collect the sample firms and data on them from the *Worldscope* (WS) database in *Thomson ONE Banker*. I require that the firms' primary industry is high-technology.[8] I further require that the sample firms have data on their market capitalization, total assets, sales, net income, equity, cash flow from operating activities, and cash and short-term investments at the end of a reporting year. The new lists are determined based on *Worldscope* and *Datastream* databases in *Thomson ONE Banker*.

Given the substantial differences even in the information regarding the initial listing year in these two databases, I include only firms for which the year of the initial recording of the market capitalization data at the end of the reporting year in *Worldscope* is the same or earlier than the year of the initial market price data in *Datastream.* This procedure aims to ensure that there is reasonable certainty that the correct year is selected as a firm's initial listing year and also that there is data on firm fundamentals available in *Worldscope*.

Finally, I eliminate firms that have re-entries to listing (i.e., missing data in the time-series of market capitalization) to avoid double counting firms with potentially multiple initial entries (i.e., an initial entry, exit and a re-entry). These criteria result in a sample of 3,915 newly listed high-technology firms in different stock exchanges in 48 countries from 1995-2000. Of these newly listed firms, I identify 1,543 (or approximately 40%) newly listed nano cap firms with a market capitalization less than USD 50 million at the end of the initial listing year from 36 countries.

[8] The classification of high-technology firms is based on Standard Industrial Codes (SIC) as defined in Kasznik and Lev (1995), Francis and Schipper (1999), Bhojrah and Lee (2002), Bushee et al. (2003) and AeA's High-Tech Industry Definition. AeA was formerly the American Electronics Association (http://www.aeanet.org/).

Panel A of Table 1 reports the distribution of the newly listed high-technology nano cap firms by country and initial listing year. The 1,543 sample firms are from 36 countries. The data shows that most sample firms are domiciled in the US (908 firms or 58.8%), while the countries with the second and third greatest numbers of newly listed high-technology firms are the U.K. (111 firms or 7.2%) and Canada (87 firms or 5.6%). All other countries have less than 5% of the all sample firms. Interestingly, most of the nano caps were listed during the bubble years 1998-2000 (1,212 firms or 78.5%) when market valuations were exceptionally high in general.

Panel B of Table 1 reports the newly listed nano caps by legal system as classified in La Porta et al. (1997). A large majority (82.9%) of the nano cap sample firms are from countries classified as having an English Legal System. While the evidence is consistent with the view that better legal protection of the investors enhances the public financing for new innovative business ventures (e.g., Rajan and Zingales, 1998; Beck and Levine, 2002), it is surprising as it contradicts the evidence that firms in English Law systems have, on average, higher valuations (La Porta et al., 2002). The other legal systems have a fairly similar portion of firms constituting each, roughly five percent of the nano cap sample firms.

Panel C of Table 1 reports the sample distribution of the newly listed sample firms by the three-digit SIC industry code. Roughly 40% or 625 sample firms are from the programming industry (SIC 737). The electronics industry (SIC 361-369) is the second largest with 279 (18.1%) nano caps. The biotechnology industry (SCI 283, 385 and 873) has 214 nano cap new lists (13.9%) and the measurement, analysis and control instruments sector has 196 (12.7%) nano caps. Communications (SIC 481-484 and 489) and Computers (SIC 357) have 123 (8.0%) and 79 (5.1%) newly listed nano caps, respectively.

Table 1 also reports the fraction of nano caps of all newly listed high technology firms in my sample. Interestingly, Germany and German legal system countries as well as the Communications industry have a considerably lower portion of nano caps of all the newly listed high-technology firms. On the other hand, several countries with a low number of newly listed firms tend to have a relatively higher portion of nano caps than the overall average, except for Korea. This is consistent with the evidence that countries with more constraint access to public equity financing in general also have lower valuation levels in general (e.g., La Porta et al., 2002).

4. Results

The empirical predictions in the previous section posit that the relative maturity of a firm's business model, investment activity and financial position are key factors affecting a firm's survival and valuation. My analysis of nano caps is conducted in three steps. First, I examine firm fundamentals that separate nano caps from non-nano cap firms. Second, I examine how firm fundamentals are associated with the delisting risk of nano caps. Finally, I examine how the firm fundamentals are associated with firm value among nano caps.

4.1. Description of key independent variables

The description of the variables that are related to firm fundamentals based on financial statement data constructed for the empirical analysis are summarized in Exhibit 1 along with the predictions of the signs for the three tests. Table 2, in turn, provides descriptive statistics on the variables.[9] All variables on firm fundamentals are measured at the end of the reporting year.

Maturity of the business model. Relatively more mature firms with relatively more proven business models are likely to be relatively larger and more profitable. I measure the maturity of a firm's business model with the following proxy variables. I measure firm size with total assets (Assets), which reflects the assets-in-place currently. I measure the profitability with return on assets (ROA) calculated as operating income divided by total assets. I also construct an indicator variable for firms that have no sales revenue (ZeroSales). A firm with no sales receives a value of one, and a firm with positive sales receives a value of zero. New lists that have no sales revenue are likely to be in the early stages of their life-cycle.[10]

Investment activity. Firms that invest in operations and various types of assets are relatively more likely to create tangible and intangible assets that generate relatively greater future cash flows. As proxies for firms' investment activity, I employ capital expenditure (Capex), measured as capital expenditure divided by total assets, to reflect investments in tangible assets and R&D expenses divided by total assets (RD) as investments in creating intangible assets. Moreover, I construct indicator variables for negative ROA (NegROA) and

[9] I do not report correlations among variables, as several of my variables are indicator variables for which a correlation analysis is not a proper method. Nevertheless, the correlations among the variable and also diagnostics of the multivariate analysis indicate no harmful multicollinearity.

[10] I also considered firm age as a measure of firm maturity. However, a thorough search for complete information on the sample firms' age in Worldscope and Datastream databases provided only scant data to calculate firm age. Consequently, I am not able to use such data. Also, growth of the firm's sales, a measure of the maturity of a firm, is not available for a large number of my newly listed sample firms in the WS database and, hence, is omitted here.

negative operating cash flows (NegCFO) that receive a value of one, if the profitability is negative, and zero otherwise. I also employ an indicator variable that receives a value of one if the firm pays no dividends (ZeroDiv) and zero if it does. New lists that have negative profitability or cash flows (that is, revenues do not cover expenses) and/or pay no dividends but potentially invest income back in operations if operations are profitable are likely to be in the early stages of their life-cycle and make investments in setting up their operating infrastructure as well as creating future intangible assets such as organizational assets and brand.

Financial position. Financial resources are invaluable for new, growth-seeking business ventures. Without sufficient financial resources, any attempt to create tangible or intangible assets is imperiled. I measure a firm's financial resources with liquidity calculated as cash and short-term investments divided by total assets (Cash). I further consider the degree of a firm's indebtedness as a measure of financial flexibility. In particular, I construct two measures. The first measure is long-term debt divided by total capital (Debt), where the total capital is long-term debt plus shareholders' equity. The other debt-related variable is an indicator variable that receives a value of one if the firm has no debt (ZeroDebt) and zero otherwise. In general, a firm with a relatively lower degree of debt financing or no debt is likely to have more financial flexibility due to better debt capacity. Moreover, a low debt burden allows management greater operating flexibility to execute its strategy. Finally, I include in my analysis an indicator variable that receives a value of one if a firm's book value of equity is negative (NegEquity) and zero otherwise. A negative book value of equity is considered an indicator of financial distress (Dichev, 1998). As a result, a firm's financial flexibility is likely to be severely limited. However, note that as my sample is constructed of newly listed high-technology firms, which have gone through the exchange listing application process and thus a test of viability, one could also argue that negative book value is due to heavy investments in future assets by a firm with growth opportunities.

4.1. What separates nano caps from non-nano caps?

My first empirical test aims to examine firms' accounting fundamentals that explain why a newly listed high-technology firm is "classified" by the equity market as a nano cap. That is, the market evaluates the present value of future cash flows discounted with the risk-adjusted required rate of return as less than USD 50 million. My prediction states that firms with

relatively less mature business models, less investment activity in future cash generating assets and less financial resources are more likely to become nano caps at the end of the initial listing year.

I employ the market price data at the end of the initial listing year for two main reasons. A pragmatic reason is that identification of the initial listing dates, access to financial statement data in tier prospectuses and the availability of market prices on the initial listing date are not available for my large sample of global new lists. A fundamental reason is that even the access to the initial pricing data of the new issues does not necessarily equalize the pricing process of new lists due to, for example, differential allocation and floatation of shares as well as market stabilization (see Ritter and Welch, 2002, and Eckbo et al., 2007), including differences in the existence of pre-markets (e.g., Cornelli et al., 2006). Moreover, even in the U.S., where stock markets are considered to be most informationally efficient, the pricing process is not fully efficient (Lowry and Schwert, 2004). Consequently, I choose to standardize the data across the sample firms by drawing stock market and financial statement data at the end of the initial listing year. This potentially allows both private and public information to be impounded into the stock price, generating an informationally more efficient estimate of a firm value and, hence, reflecting its future profitability.

Table 2 provides descriptive statistics on the variables in my sample of 1,543 newly listed high-technology nano caps and a sample of 2,372 newly listed high-technology firms for which the market capitalization exceeds USD 50 million at the end of the initial listing year. Potential influential outliers and extreme observations are not eliminated from the descriptive data. The evidence indicates that nano caps are significantly (Wilcoxon test p-value less than 0.05) smaller, in addition to the market capitalization (Mcap), in terms of sales (Sales) and total assets (Assets). They are also more likely to have no sales revenues (ZeroSales). Furthermore, they are less profitable (ROA).

Moreover, nano caps have a lower level of capital expenditures (Capex), and R&D expenses (RD)[11] are more likely to have negative profitability (both NegROA and NegCFO). Also, nano caps are slightly less likely to pay dividends than non-nano caps. Finally, nano caps

[11] A very low average R&D investment is puzzling, as the sample industries are from high-technology industries. An explanation for observed low R&D expenses is that firms, especially from non-U.S. reporting regimes, did not report such information in their public financial statements, and as a result, it was not available for the WS database. If this is the case, then the RD variable should be interpreted as a measure that reflects not only the level of R&D, but also the extent of reporting such presumably important information to investors.

carry less debt (Debt) and are more likely to carry no debt (ZeroDebt) but are more likely to have negative equity (NegEquity). Overall, the descriptive analysis indicates that nano caps have less mature business models, engage less in investment activity, and have weaker financial positions. Also, nano caps are valued at a lower level, as reflected by market capitalization (Mcap) and relative valuation measures (price-to-book ratio, PB, and Tobin's q, TQ).

I employ a logistic regression technique to examine the firm fundamentals that are associated with a firm being a valued as a nano cap by the capital markets. I eliminate potential influential observations in my multivariate analysis as they may cause violations of critical assumptions underlying the multivariate methods employed. The outliers are identified with an analog to Cook's D statistic for logistic regressions. Observations with D statistic values in excess of one are eliminated (e.g., Belsley et al., 1980) in Tables 2 through 6. The dependent variable is an indicator variable that receives a value of one if a newly listed firm's market capitalization at the end of its initial listing year is less than USD 50 million and zero otherwise. In addition to the key fundamental variables, the model controls for a firm's growth opportunities as measured with book-to-price ratio (BP), industry membership and listing year fixed-effects.

I further examine the sensitivity of the results to different country-specific controls employing the instruments developed in law and finance literature. Model 1 has no controls for country-specific factors. In Model 2 I employ controls for the disclosure levels in a country, as classified in Bhattacharya et al. (2003). Model 3 controls for judicial efficiency, as rated in La Porta et al. (1997). Model 4 controls for antidirector rights, as classified in La Porta et al. (1997). The legal system specific (English Law, French Law, German Law, Scandinavian Law and unclassified countries as a benchmark) controls are employed from La Porta et al. (1997). Models 2 to 5 also include a U.S. country dummy, as close to 60% of the 3,915 sample firms are from the U.S. The number of observations available for a particular model also varies by the number of observations available on country-specific control variables.

The results reported in Table 3 show that regardless of the type of the country-specific control, nano caps tend to have significantly (at a conventional five percent level) less assets-in-place, as measured with total assets (Assets), and engage less in investment activities to create tangible (Capex) and intangible assets (RD). Moreover, they have less financial resources, as measured with liquid assets (Cash). In contrast to expectations, the negative operating cash flows

(NegCFO) variable is significantly and negatively associated with a newly listed firm's tendency to be a nano cap, while negative profitability measured with accrual-based measure ROA (NegROA) is positively associated with nano cap firm category. One may speculate that this is due to newly listed nano caps' potential tendency to record more non-cash or accrual-based expenses such as write-offs of past investments during their initial listing year having a negative impact on their accrual result (ROA) but leaving the operating cash flows (CFO) intact.

All other proxies for financial strength except cash (that is, Debt, ZeroDebt, NegEquity) as well as a firm's tendency to pay dividends (DivPaid) and book-to-price ratio (BP), a market-based proxy for growth opportunities, are not significant. Of the country-specific controls, disclosure level and efficiency of the judicial system are significant and negatively associated with a firm being a nano cap, indicating that nano caps are more likely to emerge in countries with relatively lower disclosure requirements and/or judicial efficiency, after controlling for other factors. This is consistent with the evidence on lower valuation of firms in countries with weaker investor protection (La Porta et al. 2002). However, the various country-specific controls employed in this study contribute only marginally to the explanatory power of the models, suggesting that firm fundamentals are important cross-sectional drivers of a firm's size class, measured with market capitalization regardless of the firm domain.

In sum, the evidence in Table 3 indicates that nano caps are likely to have less mature business models reflected in assets-in-place, less investment activity to create both tangible and intangible future cash generating assets, and less liquid resources that can be employed to support future investments and, hence, exploit growth opportunities. The evidence on multivariate analysis does not suggest that nano caps are more likely to be financially distressed or exhibit a higher financial risk in general, beyond lower liquid resources, than their non-nano cap counterparts. The evidence provides support to the view that financial statement information provides important information for investors in order to evaluate a newly listed high-technology firms future growth opportunities and as a result in valuing them relative to other industry counterparts globally.

4.2. Delisting risk of nano caps

Next I examine whether fundamentals are associated with a nano cap's exit from public trading or delisting risk. My prediction states that firms with relatively less mature business

models, less investment activity in future cash generating assets, and less financial resources are more likely to exit public trading..

In my main analysis I employ a logistic regression. The dependent variable receives a value of one if the firm exited public trading under different scenarios and zero otherwise. In Model 1, the dependent variable is simply an exit from public trading under any condition, including both voluntary (e.g., acquisitions by another company) and involuntary (e.g., violations of listing standards) delistings. I identify the year in which a firm exited public trading by observing the omission of year end market capitalization data in the Worldscope database.[12] There are 413 firms, or 26.9% of the nano caps sample firms, that exited public trading. The problem with such a general exit variable is that the exit can be a positive or negative event. The analysis here is more concerned about firm exit under potential financial difficulties. Consequently, in Models 2 and 3, I employ exit variables that are associated with financial distress.

In Model 2, the dependent variable receives a value of one if the firm exited and its equity is negative at the end of the last available reporting year. There are 188 (12.3%) such firms. A negative book value of equity is considered to indicate a firm in financial distress (Dichev, 1998). In Model 3, the dependent variable receives a value of one if the firm exited and its price-to-book at the end of the last available reporting year is less than one. The valuation theory asserts that firms with a price-to-book ratio less than one are considered to destroy shareholders' wealth by the market (e.g., Penman, 2007). There are 290 (18.9%) such exit firms.

The exits are identified within a three-year tracking period; that is, a firm is considered to be delisted if there is no market capitalization data available at the end of the fourth year of being a listed firm. In addition to the variables discussed above, I also include the natural logarithm transformation of the total market capitalization (LnMcap) at the end of a firm's initial listing year and an indicator variable that receives a value of one if the firm's auditor is a Big N auditing firm (BigN) and zero otherwise. The two control variables have been documented to be associated with a firm's delisting risk (e.g., Li et al., 2006).[13] Also, the additional control variables, as all firm fundamental-related variables, are measured at the end of the initial listing

[12] I am not aware of any global database with data on the exits and, in particular, reasons for the exits. I examined the Worldscope and Datastream databases, but these included no statements regarding exits.

[13] Other potentially informative variables about a firm's delisting risk include the reputation of a firm's investment banker and involvement of a venture capitalist (e.g., Li et al., 2006). However, I do not have access to such data on a global basis.

year, except for BigN, which is measured at the moment of data collection in 2004, as the WS database does not provide historical information on the auditor by each reporting year. Again, I control for the industry and listing year fixed effects as well as U.S. country effects and the effect of legal system, measured by judicial efficiency (La Porta et al., 1997), as an important control for country-specific factors related to a firm's access to finance and growth opportunities. The results on country and jurisdiction-related controls are not reported in Table 4 in the interest of brevity.[14]

The results in Table 4 shows that market capitalization (LnMcap) is systematically significantly and negatively associated with firm exit across the three models. In other words, relatively larger nano caps are more likely to survive as listed firms. In contrast, relatively larger firms measured with the natural logarithm transformation of assets (LnAssets) are more likely to exit in general (Model 1) and under a low price-to-book ratio condition. This is in contrast to the idea that relatively more viable firms with mature business models are less likely to exit public trading. There is also evidence in Models 2 and 3 that nano caps that have engaged themselves relatively more in R&D activity (RD) or that have negative equity (NegEquity) and negative operating cash flows (NegCFO) are more likely to exit under financial distress conditions.

Also, assets-in-place (LnAssets) is positively associated with exit under a low price-to-book condition (Model 3). No other variable is statistically significantly associated with a nano cap firm's propensity to exit. Overall, the evidence suggests that nano caps that are relatively larger in terms of market capitalization but not necessarily in terms of assets-in-place. Also, financially stronger nano caps that have engaged relatively less in R&D activity as well as in creating operational and organizational assets (positive operating cash flows) are more likely to survive in public trading during the three-year tracking window employed in this study. Consequently, the evidence indicates that financial statement information is useful for investors in evaluating a newly listed nano cap's delisting risk.

I also estimated time to exit, or speed of exit, using the Cox proportional hazard model (a survival analysis) as an additional related analysis. The estimation procedure adjusts for the potential bias introduced by truncated data due to the unobservables of a firm's survival period beyond four years in my dataset. The results for the three exit conditions, as discussed above, are

[14] I employ JudEff (La Porta et al., 1997) in Tables 4 though 6, as it is significant in Table 3 and facilitates more observations than the Disclosure (Bhattacharya et al., 2003) variable, which is the only other investor protection and capital market functioning-related variable that is significant.

reported in Table 5. While the results are consistent regarding the market capitalization (LnMcap), assets-in-place (LnAssets), R&D activity (RD), negative equity (NegEquity) and liquid resources (Cash) in Table 4, the negative operating cash flow (NegROA) is not significant anymore. On the other hand, both operating profitability (ROA) and capital expenditures (Capex) become significantly and positively associated with the time to exit under the financial distress conditions in Models 2 and 3. Overall, the results suggest that nano cap firms with lower market capitalization, negative equity, relatively more investments in tangible and intangible assets, but higher profitability are likely to exit relatively sooner from public trading. The results are consistent with the idea that financial statement information provides a useful basis for investors to assess a newly listed nano cap's delisting risk.

4.3. Valuation of nano caps

My final analysis focuses on how firm fundamentals explain cross-sectional differences in firm relative valuation among the nano caps. The dependent variable, which measures relative valuation of a firm, is a natural logarithm of Tobin's q, calculated as total assets less book value of equity plus market value of equity divided by book value of total assets at the end of a reporting year, following the literature on international valuation (e.g., La Porta et al., 2002; Doidge et al., 2003).

In addition to the fundamental variables employed in the previous models, I also include auditor type (BigN) and an average industry valuation multiple of Tobin's q for a control of annual industry-wide valuation effects of all (3,915) newly listed firms, calculated based on global industry membership (e.g., Kim and Ritter, 1999; Bhojraj and Lee, 2002; Bhojraj et al., 2003). The models control for industry effects, listing year effects, U.S. country fixed-effects and judicial efficiency for each country (coefficients not reported).

I modify my benchmark model (Model 1) to include two naïve indicator variables as a proxy for a firm's delisting risk under negative equity (ExitNegEq) in Model 2 and low valuation (ExitLowPB) in Model 3, as defined in the previous analysis. This implicitly assumes that the market has perfect foresight of a firm's exit within the three year tracking window. I expect that the exit under poor financial conditions is costly to the firm and its investors and, consequently, expect that the sign of the exit indicator variables is negative in Models 2 and 3.

Table 6 reports the results. The results show that in all model specifications, the value of a firm is associated significantly and negatively with assets-in-place (LnAssets) and profitability (ROA). In contrast, it is significantly and positively associated with no sales variable (ZeroSales). These results are consistent with the unconventional valuation of high-technology firms during the high investor sentiment period under study, 1995-2000. Moreover, the value of a firm is significantly and positively associated with capital expenditures (Capex) and negative operating cash flows (NegCFO). These results are consistent with market valuing firms with relatively higher investment activity at a higher level. However, there is no evidence that R&D (RD), negative ROA (NegROA) or dividends paid (DivPaid) are significant factors in valuing nano caps. Further, only negative equity (NegEquity) is significantly associated with a firm's value with a positive sign. This is consistent with the unconventional valuation of high-techs and suggests that negative equity, through negative retained earnings, is considered a proxy for past investments made to achieve future profitable growth. Other variables of financial strength are not significantly associated with firm value. It is especially surprising that liquid cash resources (Cash) are not significantly associated with firm value or delisting propensity (Tables 4 and 5), as they are an important resource for high-technology firms (e.g., Armstrong et al., 2006).

Finally, the naïve indicator variable for a firm's delisting risk is significant and negatively associated with the firm value only in Model 2 but not in Model 3. This suggests that investors are able to rationally anticipate a firm's propensity to delist under some conditions, and it may provide them price protection, at least under some conditions. The evidence also suggests that investors use information from other sources, beyond the information reflected by the variables included in Model 3 in Table 6, to evaluate the delisting risk under poor conditions.

Overall the results suggest, consistently with the arguments in Pastor and Veronesi (2003) as well as with Baker and Wurgler (2006) and the evidence on unconventional valuation as discussed in Section 2, that firms with greater uncertainty about their future profitability (e.g., less mature business models, negative profitability due to relatively greater investments in assets that are expensed immediately and weaker financial position) are valued relatively higher among nano caps. Despite of the unconventional valuation of the fundamental signals, the evidence in

Table 6 provides support to the view that financial statement information is useful for valuing such hard-to-value business ventures.[15]

5. Conclusions

The usefulness of financial statement information in evaluation of hard-to-value firms such as small, young newly listed high-technology firms is an important question especially during the periods of high investor sentiment. In this study I aimed to answer three questions on the usefulness of financial statement information of newly listed high-technology nano caps.

First, do firm fundamentals measured with financial statement information provide useful information for separating, or classifying, nano cap firms from non-nano cap firms (i.e., firms with perceived remote growth opportunities from superior growth opportunities)? Measuring the firm characteristics with financial statement data, I find evidence that newly listed nano caps are likely to have less mature business models, less investment activity to create both tangible and intangible future cash generating assets, and less liquid resources than can be employed to support future investments and, hence, exploit growth opportunities as compared to their non-nano cap counterparts.

Second, do financial statement data explain which nano caps exit the public trading system or, alternatively stated, do not survive as listed companies and, hence, exhibit a relatively larger delisting risk? The evidence indicates that the likelihood of exit is greater for firms that invest more, especially in intangible assets, or that have weaker financial positions (i.e., negative equity) as well as firms that are valued lower among the nano caps. Similarly, nano cap firms with higher investment activity, weaker financial positions and higher market valuation but higher profitability tend to exit public trading sooner than their counterparts.

Finally, is financial statement information relevant for valuing nano caps among their size category? The evidence shows that firms with less mature business models, relatively higher investment activity on tangible assets and organizational intangible assets (but surprisingly not in R&D) and weaker financial positions (i.e., negative equity) are valued relatively higher among nano caps.

[15] The examination of the causes of unconventional valuation is beyond the scope of this paper and is conducted in a concurrent study.

Overall, the evidence suggests that the relative maturity of a newly listed business venture, intensity of activity to create tangible and intangible assets, and also financial strength, all measured with accounting-based data reflecting firm fundamentals, are important determinants of nano caps' valuation and survival as listed companies. The results are consistent with the view that financial statement information is useful for evaluating the future performance potential of a hard-to-value new business ventures during high investor sentiment (irrational) market periods. A potential area for future research is to examine whether accounting contributes to investors' misperception of difficult to value firms' prospects resulting in over- or undervaluation of such firms.

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Exhibit 1
Description of variables and predicted signs

Variable	Description	Expected signs: Size class	Exit	Valuation
Independent variables				
Maturity of the business model				
(Ln)Assets	Total assets at the end of the reporting year. LnAsset is a natural logarithm of one plus total assets.	-	-	+
ROA	Return on assets calculated as operating income divided by total assets at the end of the reporting year.	-	-	+
ZeroSales	Indicator variable that receives a value of one if sales is zero and zero otherwise.	+	+	?
Investment activity				
Capex	Capital expenditure divided by total assets.	-	-	+
RD	R&D expenses divided by total assets.	-	-	+
NegROA	Indicator variable that receives a value of one if profitability is negative and zero otherwise.	+	+	+
NegCFO	Indicator variable that receives a value of one if operating cash flows is negative and zero otherwise.	+	+	+
DivPaid	Indicator variable that receives a value of one if dividends are positive (i.e., paid) and zero otherwise.	-	-	?
Financial position				
Debt	Long-term interest-bearing debt-to-total capital (i.e., shareholders' equity plus long-term interest-bearing debt).	+	+	?
ZeroDebt	Indicator variable that receives a value of one if debt is zero and zero otherwise.	-	-	+
NegEquity	Indicator variable that receives a value of one if equity less than zero and zero otherwise.	+	+	+
Cash	Cash and short-term investments divided by total assets.	-	-	+
Controls				
Mcap	Total market capitalization at the end of the reporting year. LnMcap is a natural logarithm of one plus market capitalization.	na.	-	na.
Sales	Net sales for the reporting period. LnSales is a natural logarithm of one plus sales.	na.	na.	na.
BP	Total book value of shareholders' equity divided by total market capitalization at the end of the reporting year.	+	+	na.
IndMultiple	Listing year specific harmonic mean of Tobin's q calculated annual basis based on newly listed firms in the same three-digit SIC industry.	na.	na.	+
AuditBig	An indicator variable that receives a value of one if a firm's auditor is a member of Big N and zero otherwise.	+	-	+
Disclosure	Level of financial disclosure in a country. See Bhattacharya et al. (2003).	+	?	+
JudEff	Level of judicial efficiency in a country. See La Porta et al. (1997).	+	?	+
AntiDirRgth	Level of antidirector rights in a country. See La Porta et al. (1997).	+	?	+
Legal systems	Indicator of legal system (English, French, German, and Scandinavian) in a country. See La Porta et al. (1997).	na.	na.	na.

Exhibit 1 (cont.)
Description of variables and predicted signs

Variable	Description	Expected signs: Size class	Exit	Valuation
Dependent variables				
Firm size classification				
NanoCap	Indicator variable that receives a value of one if market capitalization is below USD 50 million at the end of the initial listing year.	na.	na.	na.
Exit				
Exit	Indicator variable receives a value of one if a firm exited public trading within a four-year period and zero otherwise.	na.	na.	na.
ExitEqNeg	Indicator variable receives a value of one if a firm's equity is negative at the end of the reporting year prior to exit and zero otherwise.	na.	na.	-
ExitPBLow	Indicator variable that receives a value of one if PB is below one at the end of the reporting year prior to exit and zero otherwise.	na.	na.	-
Valuation				
LnTQ	A natural logarithm of Tobin's q. Tobin's q calculated as total assets less book value of equity plus market capitalization at the end of the initial listing year divided by total assets at the end of the year.	na.	na.	na.

Table 1
Sample of newly listed (NL) high-technology nano caps by country, legal system, industry and listing year

Panel A: Nanocaps by country	1995	1996	1997	1998	1999	2000	Total	% of total	All NL	% of NL
Australia	2	1	2	4	5	40	54	3,5	87	62,1
Austria	0	1	0	0	0	2	3	0,2	13	23,1
Belgium	0	0	0	0	0	1	1	0,1	4	25,0
Bermuda	0	0	0	0	2	1	3	0,2	3	100,0
Brazil	0	0	0	1	6	3	10	0,6	13	76,9
Canada	1	3	3	25	28	27	87	5,6	189	46,0
Chile	0	0	0	0	3	0	3	0,2	4	75,0
Czech Republic	0	0	1	0	0	0	1	0,1	5	20,0
Denmark	0	2	0	1	0	0	3	0,2	19	15,8
Finland	0	1	1	0	3	4	9	0,6	30	30,0
France	0	8	5	8	10	12	43	2,8	103	41,7
Germany	0	0	0	2	5	23	30	1,9	164	18,3
Hong Kong	2	5	1	1	0	24	33	2,1	74	44,6
Indonesia	0	0	0	0	1	3	4	0,3	8	50,0
Ireland	0	0	0	0	1	0	1	0,1	5	20,0
Israel	1	1	0	0	2	3	7	0,5	28	25,0
Japan	0	0	0	0	0	6	6	0,4	44	13,6
Korea, Republic of	0	0	2	7	25	24	58	3,8	107	54,2
Malaysia	0	0	2	1	1	14	18	1,2	28	64,3
Mexico	0	0	0	1	0	0	1	0,1	5	20,0
Netherlands	0	0	0	1	1	1	3	0,2	24	12,5
New Zealand	0	0	0	1	0	0	1	0,1	2	50,0
Norway	0	2	1	2	1	3	9	0,6	22	40,9
Pakistan	0	1	0	0	0	1	2	0,1	3	66,7
Philippines	0	0	0	0	0	6	6	0,4	15	40,0
Poland	1	0	0	1	0	2	4	0,3	12	33,3
Portugal	0	1	0	0	0	0	1	0,1	7	14,3
Singapore	0	1	0	0	0	15	16	1,0	46	34,8
South Africa	1	0	1	8	19	9	38	2,5	70	54,3
Spain	0	0	0	0	1	0	1	0,1	2	50,0
Sweden	0	1	3	12	12	26	54	3,5	116	46,6
Switzerland	0	1	0	0	0	1	2	0,1	24	8,3
Taiwan	0	0	0	0	1	8	9	0,6	94	9,6
Thailand	0	0	0	1	0	2	3	0,2	4	75,0
U.K.	1	28	26	12	9	35	111	7,2	257	43,2
U.S.	88	64	65	485	96	110	908	58,8	2215	41,0
Total	97	121	113	574	232	406	1543	100,0	3846	-
% of total	6,3	7,8	7,3	37,2	15,0	26,3	100,0	-	-	40,1

Panel B: Nano caps by legal system	1995	1996	1997	1998	1999	2000	Total	% of total	All NL	% of NL
English	96	104	100	538	161	280	1279	82,9	3016	42,4
French	0	9	5	11	22	26	73	4,7	223	32,7
German	0	1	3	9	31	63	107	6,9	427	25,1
Scandinavian	0	6	5	15	16	33	75	4,9	187	40,1
Missing	1	1	0	1	2	4	9	0,6	62	14,5
Total	97	121	113	574	232	406	1543	100,0	3915	-
% of total	6,3	7,8	7,3	37,2	15,0	26,3	100,0	-	-	39,4

Table 1 (cont.)
Sample of newly listed (NL) high-technology nano caps by country, legal system, industry and listing year

Panel C: Nanocaps by industry	1995	1996	1997	1998	1999	2000	Total	% of total	All NL	% of NL
Biotechnology	14	24	10	93	42	31	214	13,9	501	42,7
Electronics	21	21	17	93	42	85	279	18,1	721	38,7
Measurement, analysis a	17	12	14	109	24	20	196	12,7	391	50,1
Computers	6	12	7	28	9	17	79	5,1	181	43,6
Programming	30	41	59	207	100	215	652	42,3	1681	38,8
Communications	9	11	6	44	15	38	123	8,0	440	28,0
Total	97	121	113	574	232	406	1543	100,0	3915	-
% of total	6,3	7,8	7,3	37,2	15,0	26,3	100,0	-	-	39,4

Notes: Legal system classification of countries is from La Porta et al. (1997). The three-digit SIC high-technology industry classification and identification scheme is a synthesis based on the classifications made in Kasznik and Lev (1995), Francis and Schipper (1999), Bhojrah and Lee (2002), Bushee et al. (2003) and AeA's High-Tech Industry Definition. Biotechnology (SIC 283, 385 & 873), Electronics (SIC 361-369), Measurement, analysis and control instruments (SIC 381, 382, 384, 386 excluding SIC 385 which is included in Biotechnology), Computers (SIC 357), Programming (SIC 737), and Communications (SIC 481-484 & 489). All NL refers to both newly listed nano cap and non-nano cap high-technology firms.

Table 2
Descriptive statistics on firm characteristics (independent variables) of newly listed high-technology nano caps and non-nano caps

	Nano caps			Non-nano caps			Wilcoxon
Continuous variables	N	Median	STD	N	Median	STD	p-value
Mcap	1543	14,7	14,1	2372	206,4	5553,8	0,000
Sales	1543	5,4	27,4	2372	34,8	1481,2	0,000
Assets	1543	8,5	32,0	2372	70,8	2974,6	0,000
ROA	1543	-0,143	85,370	2372	-0,003	1,637	0,000
Debt	1543	0,005	1,823	2372	0,010	0,667	0,000
Cash	1543	0,201	0,293	2372	0,428	0,301	0,000
RD	1543	0,000	1,518	2372	0,012	0,217	0,000
Capex	1543	0,036	0,133	2372	0,043	0,083	0,000
BP	1543	0,329	11,8	2372	0,205	0,380	0,000
TQ	1543	2,010	379593	2372	3,509	12108	0,000
Indicator variables	N	Event N	% of all	N	Event N	% of all	p-value
DivPaid	1543	201	0,130	2372	430	0,180	0,000
NegROA	1543	1008	0,653	2372	1196	0,504	0,000
NegCFO	1543	1046	0,678	2372	1261	0,532	0,000
ZeroSales	1543	139	0,090	2372	67	0,028	0,000
AuditBig	1543	582	0,380	2372	1810	0,760	0,000
ZeroDebt	1543	348	0,226	2372	491	0,207	0,167
NegEquity	1543	269	0,1743	2372	60	0,025	0,000

Notes: Description of the variables is provided in Exhibit 1.

Table 3
Logistic regression of firm characteristics associated with nano cap firms

Model	(1)	(2)	(3)	(4)	(5)
LnAsset	-1,569 ***	-1,618 ***	-1,621 ***	-1,567 ***	-1,607 ***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
ROA	0,000	0,000	0,000	0,000	0,000
	(0,881)	(0,866)	(0,874)	(0,891)	(0,877)
ZeroSales	-0,461	-0,409	-0,480	-0,448	-0,474
	(0,061)	(0,101)	(0,052)	(0,068)	(0,055)
RD	-0,371 **	-0,368 **	-0,352 **	-0,359 **	-0,363 **
	(0,002)	(0,002)	(0,004)	(0,003)	(0,003)
Capex	-1,622 **	-1,441 **	-1,599 **	-1,542 **	-1,672 **
	(0,002)	(0,005)	(0,002)	(0,002)	(0,001)
NegROA	0,426 **	0,468 ***	0,554 ***	0,453 ***	0,472 ***
	(0,001)	(0,000)	(0,000)	(0,000)	(0,000)
NegCFO	-0,283 *	-0,281 *	-0,272 *	-0,294 *	-0,293 *
	(0,025)	(0,028)	(0,033)	(0,020)	(0,020)
DivPaid	0,041	0,057	0,091	0,032	0,023
	(0,760)	(0,683)	(0,513)	(0,814)	(0,864)
Debt	0,051	0,049	0,051	0,049	0,052
	(0,161)	(0,186)	(0,154)	(0,185)	(0,148)
ZeroDebt	-0,229	-0,189	-0,180	-0,222	-0,197
	(0,069)	(0,141)	(0,160)	(0,081)	(0,122)
NegEquity	0,019	-0,120	-0,097	-0,009	-0,014
	(0,938)	(0,624)	(0,691)	(0,971)	(0,956)
Cash	-2,236 ***	-2,135 ***	-2,126 ***	-2,198 ***	-2,229 ***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
BP	0,011	0,010	0,010	0,010	0,011
	(0,077)	(0,092)	(0,089)	(0,094)	(0,075)
UScountryD	-	-0,132	0,165	-0,149	-0,093
	-	(0,273)	(0,196)	(0,371)	(0,484)
Disclosure	-	-0,03 ***	-	-	-
	-	(0,003)	-	-	-
JudEff	-	-	-0,29 ***	-	-
	-	-	(0,000)	-	-
AntiDirRgth	-	-	-	0,019	-
	-	-	-	(0,750)	-
English	-	-	-	-	0,109
	-	-	-	-	(0,807)
French	-	-	-	-	0,100
	-	-	-	-	(0,833)
German	-	-	-	-	0,622
	-	-	-	-	(0,173)
Scandinavian	-	-	-	-	-0,227
					(0,635)
Constant	5,774 ***	8,225 ***	8,572 ***	5,778 ***	5,859 ***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
Sample N	3912	3792	3869	3870	3912
Event N	1540	1503	1532	1532	1540
% of firms	0,394	0,396	0,396	0,396	0,394
Model chi-square	19,860	20,318	22,788	18,963	17,856
Pseudo adj. R^2	0,636	0,638	0,643	0,636	0,639

Table 3 (cont.)
Logistic regression of firm characteristics associated with nano cap firms

Notes: The sample consists of 3,915 newly listed high-technology firms during 1995-2000 from 48 countries. Dependent variable (NanoCap) is an indicator variable that receives a value of one if firm's market capitalization is less than USD 50 million at the end of the initial listing year and zero otherwise. Description of all variables is provided in Exhibit 1. Potential influential observations receiving value of equal or greater than one based on an analog of Cook's D statistic for logistic regression are eliminated. The model includes controls for industry and listing year fixed effects. p-values are reported in parentheses and * is significant at 0.05, ** at 0.01 and *** at 0.001 level.

Table 4
Logistic regression analysis of nano cap firms' propensity to exit public trading under different conditions

Model	(1) Exit	(2) ExitNegEq	(3) ExitLowPB
LnAssets	0,310 ***	-0,037	0,265 **
	(0,000)	(0,723)	(0,002)
ROA	0,001	0,043	0,033
	(0,705)	(0,052)	(0,080)
ZeroSales	-0,084	-0,095	-0,074
	(0,724)	(0,762)	(0,787)
RD	0,132	0,222 *	0,192 *
	(0,220)	(0,023)	(0,033)
Capex	0,733	1,046	0,854
	(0,105)	(0,071)	(0,082)
NegROA	0,136	0,407	0,184
	(0,406)	(0,118)	(0,336)
NegCFO	0,169	0,519 *	0,448 *
	(0,301)	(0,040)	(0,019)
DivPaid	-0,369	-0,201	0,104
	(0,073)	(0,564)	(0,657)
Debt	0,044	0,014	0,016
	(0,329)	(0,658)	(0,623)
ZeroDebt	-0,179	-0,362	0,018
	(0,283)	(0,146)	(0,928)
NegEquity	0,132	0,832 ***	0,542 **
	(0,463)	(0,000)	(0,005)
Cash	-0,010	-0,210	-0,370
	(0,968)	(0,553)	(0,203)
BP	-0,005	0,001	0,001
	(0,352)	(0,917)	(0,780)
LnMcap	-0,190 *	-0,387 ***	-0,445 ***
	(0,013)	(0,000)	(0,000)
AuditBig	0,124	-0,257	-0,064
	(0,361)	(0,219)	(0,693)
Constant	-2,375 **	-0,953	-1,462
	(0,001)	(0,403)	(0,093)
Sample N	1534	1534	1534
Event N	413	188	290
% firms	0,269	0,123	0,189
Model chi-square	8,343	7,086	10,314
Pseudo adj. R^2	0,082	0,241	0,156

Notes: The sample consists of 1,543 newly listed nano cap high-technology firms during 1995-2000 from 36 countries. Dependent variables measure a firm exit under different conditions. Description of all variables is provided in Exhibit 1. Potential influential observations receiving value of equal or greater than one based on an analog of Cook's D statistic for logistic regression are eliminated. Models control for the U.S. country fixed-effects, country specific judicial efficiency (JudEff) as well as industry and listing year fixed effects. p-values are reported in parentheses and * is significant at 0.05, ** at 0.01 and *** at 0.001 level.

Table 5
Cox proportional hazard model for nano cap firms time to exit from public trading

Model	(1) Exit	(2) ExitNegEq	(3) ExitLowPB
LnAssets	0,252 ***	0,068	0,273 ***
	(0,000)	(0,477)	(0,000)
ROA	0,001	0,020 **	0,018 *
	(0,699)	(0,008)	(0,018)
ZeroSales	-0,051	-0,086	-0,066
	(0,799)	(0,752)	(0,782)
RD	0,073	0,100 **	0,092 *
	(0,329)	(0,007)	(0,011)
Capex	0,536	0,866 **	0,753 *
	(0,055)	(0,005)	(0,012)
NegROA	0,144	0,436	0,217
	(0,296)	(0,072)	(0,197)
NegCFO	0,109	0,388	0,315
	(0,430)	(0,090)	(0,058)
DivPaid	-0,297	-0,223	0,054
	(0,098)	(0,489)	(0,793)
Debt	0,039	0,020	0,016
	(0,334)	(0,527)	(0,596)
ZeroDebt	-0,183	-0,399	-0,076
	(0,194)	(0,078)	(0,656)
NegEquity	0,129	0,669 ***	0,444 **
	(0,376)	(0,000)	(0,005)
Cash	-0,001	-0,212	-0,293
	(0,995)	(0,502)	(0,251)
BP	-0,002	0,000	0,000
	(0,460)	(0,908)	(0,881)
LnMcap	-0,151 *	-0,353 ***	-0,368 ***
	(0,016)	(0,000)	(0,000)
AuditBig	0,113	-0,072	0,040
	(0,324)	(0,710)	(0,783)
Sample N	1534	1534	1534
Event N	413	188	290
% of firms	0,269	0,123	0,189
Chi-square	93,206	225,589	161,641
p-value	0,000	0,000	0,000

Notes: The sample consists of 1,543 newly listed nano cap high-technology firms during 1995-2000 from 36 countries. Dependent variables measure a firm's exit time under different conditions. Description of all variables is provided in Exhibit 1. Potential influential observations receiving value of equal or greater than one based on an analog of Cook's D statistic for logistic regression are eliminated. Models control for the U.S. country fixed-effects, country specific judicial efficiency (JudEff) as well as industry and listing year fixed effects. p-values are reported in parentheses and * is significant at 0.05, ** at 0.01 and *** at 0.001 level.

Table 6
Valuation of nano cap firms

Model	(1) LnTQ	(2) LnTQ	(3) LnTQ
Constant	1,837 ***	1,856 ***	1,865 ***
	(7,004)	(7,073)	(7,125)
LnAssets	-0,581 ***	-0,583 ***	-0,579 ***
	(23,945)	(24,014)	(23,906)
ROA	-0,017 ***	-0,017 ***	-0,016 ***
	(12,295)	(12,238)	(12,248)
ZeroSales	0,647 ***	0,645 ***	0,643 ***
	(7,504)	(7,479)	(7,470)
RD	0,021	0,023	0,024
	(1,344)	(1,453)	(1,501)
Capex	0,547 **	0,561 **	0,563 **
	(3,211)	(3,288)	(3,309)
NegROA	-0,112	-0,109	-0,107
	(1,867)	(1,818)	(1,786)
NegCFO	0,149 *	0,153 *	0,157 **
	(2,504)	(2,570)	(2,641)
DivPaid	0,103	0,103	0,105
	(1,464)	(1,456)	(1,492)
Debt	-0,002	-0,001	0,000
	(0,145)	(0,106)	(0,079)
ZeroDebt	0,047	0,043	0,048
	(0,782)	(0,721)	(0,804)
NegEquity	0,762 ***	0,78 ***	0,782 ***
	(11,281)	(11,412)	(11,551)
Cash	0,138	0,134	0,125
	(1,547)	(1,499)	(1,396)
AuditBig	0,052	0,049	0,048
	(1,034)	(0,971)	(0,973)
IndMultiple	0,065	0,064	0,062
	(1,786)	(1,753)	(1,704)
Exit	-	-0,121	-0,174 **
	-	(1,687)	(2,982)
Adj. R^2	0,609	0,609	0,611
N	1534	1534	1534
F-statistic	92,808	89,585	90,168
F-statistic sig.	0,000	0,000	0,000

Notes: The sample consists of 1,543 newly listed nano cap high-technology firms during 1995-2000 from 36 countries. Dependent variable is natural logarithmic transformation of Tobin's q measured at the end of the initial listing year. Exit refers to ExitNegEquity in Model 2 and ExitLowPB in Model 3. Description of all variables is provided in Exhibit 1. Potential influential observations receiving value of equal or greater than one based on Cook's D statistic are eliminated. Model controls for the U.S. country fixed-effects, country specific judicial efficiency (JudEff) as well as industry and listing year fixed effects. t-values are reported in parentheses and * is significant at 0.05, ** at 0.01 and *** at 0.001 level.