

# **Initial Public Offerings in Hot and Cold Markets**

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## ABSTRACT

The literature on IPOs offers a wide variety of explanations to justify the dramatic swings in the volume of IPOs observed in the market. Many theories predict that hot IPO markets are characterized by clusters of firms in particular industries for which a technological innovation has occurred, suggesting that hot and cold market IPO firms will differ in quality, prospects, or types of business. Others suggest hot market IPOs are firms that take advantage of irrational investors. We compare firms that go public in a number of hot and cold markets during 1975-2000, examining them at the time of the IPO and during the following five years. We find that both hot and cold market IPOs are largely concentrated in the same narrow set of industries and hot markets for many industries occur at the same time. We also find few distinctions in quality and scant evidence that hot market IPOs have better growth prospects. Our results suggest that technological innovations are not the primary determinant of hot markets because IPO markets cycle with greater frequency than the underlying innovations, and are more in line with the view that hot markets reflect greater investor optimism, though not necessarily active manipulation by managers.

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## Initial Public Offerings in Hot and Cold Markets

The initial public offering (IPO) market follows a cycle with dramatic swings, often referred to as hot and cold markets (e.g., Ibbotson and Jaffe (1975) and Ritter (1984)). A hot IPO market has been characterized in the literature by an unusually high volume of offerings, severe underpricing, frequent oversubscription of offerings and, at times, concentrations in particular industries.<sup>1</sup> In contrast, cold IPO markets have much lower issuance, less underpricing, and fewer instances of oversubscription. Furthermore, Loughran, Ritter and Rydqvist (1994) note a “clear tendency for high volume to be associated with market peaks.”

The IPO literature offers a variety of ideas on how hot and cold market firms might differ. Early theoretical models of underpricing as a signaling mechanism characterize hot markets as periods when a greater number of high quality firms choose to go public (Allen and Faulhaber (1989), Grinblatt and Huang (1989) and Welch (1989)). In these models, firms are drawn into hot markets because offering prices are closer to their true (higher) valuations, and they are able to avoid the undervaluation of cold markets.

More recent theories analyze the decision to go public and shed some light on why the IPO market can vary sharply over time. Many of these theories share the prediction that hot markets are characterized by clusters of firms from particular industries for which a technological innovation or positive productivity shock has occurred. For example, information about the potential size of the market or quality of a new product is revealed as firms go public, and when this news is favorable, other firms in the same industry follow (see Stoughton, Wang and Zechner (2001), Benveniste, Busaba and Wilhelm (2002) and Maksimovic and Pichler (1998)). Others emphasize differences in the costs of information processing in private and public equity markets (such as Chemmanur and Fulgieri (1999) and Subrahmanyam and Titman (1999)). Another reason to go public is to gain the advantages of a dispersed shareholder base,

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<sup>1</sup>For example, Ritter (1984) shows that most of the underpricing in the hot issue market of 1980-1981 is attributable to underpricing among IPOs in the natural resources sector. Also, see Lowry and Schwert (2002) on the relationship between underpricing and volume in hot and cold markets, as well as James and Kriesnick (1997).

either in order to raise the subsequent acquisition price (Zingales (1995) and Mello and Parsons (1998)) or to avoid excessive monitoring by large shareholders (Pagano and Roell (1998)).

A third strand of the IPO literature on long-term stock performance suggests that hot market firms are lower quality firms because they appear to have worse stock returns (Loughran and Ritter (1995)). This literature tends to view hot markets as the result of wild bullishness on the part of irrational investors (Loughran and Ritter (1995), Lerner (1994), and Field (1997)), and thus a chance for smaller, riskier firms to take advantage of the “window of opportunity” to do an IPO. While these studies have pointed to a number of factors that are associated with poor returns, such as institutional ownership, analysts’ optimism, and the use of discretionary accruals, they have not addressed specifically whether the factors differ across hot and cold markets.

The purpose of this study is to determine how IPOs from hot and cold markets differ and evaluate which of these alternative characterizations of hot markets appears to best fit the data. First, we examine whether hot markets have a disproportionate concentration of firms in particular industries. Second, we examine firm-specific characteristics, including measures of growth opportunities, asymmetric information, and operating performance, to assess whether substantial distinctions in quality, prospects or type of business exist between hot and cold firms. To ensure sharp contrasts between markets, we emphasize hot market versus cold market IPOs and largely ignore the firms that came out in lukewarm or middling markets. We draw our sample from all nonfinancial firms that went public between 1975 and 2000, a period that includes a number of hot and cold markets. Our primary definition of hot and cold markets is based on the total number of IPOs completed per month. An alternative is based on the number of IPOs in particular industry groups that are completed each month, a definition that allows for a hot market to arise for a particular industry even when the overall market is not hot. Lastly, for comparison, we also define hot markets based on underpricing, which is specific to the individual firm.

Our principal findings are these: First, based on a number of measures, we find that IPOs in hot (high volume) markets are not more concentrated in particular industries than IPOs in cold markets. Rather, both hot and cold market IPOs are drawn largely from the same narrow set of industries that have accounted for most of the issuance in the 26-year period. However, during

periods of high IPO volume, offerings are more likely to arise from many of these industries, leading to lower concentration measures of industry clustering. These results do not contradict the idea that IPOs cluster or that clustering is related to new products and industries. Rather, the results reflect the fact that industries associated with new products, like the PC and its components in the early 1980s and the Internet in the late 1990s, have a long-term growth trajectory, while the IPO market cycles up and down at a higher frequency. Hot markets may be sparked by new products, with many firms preparing to go public, but the IPO market can turn cold well before all of these firms raise funds, leaving plenty of candidates from this new industry to do an IPO in a cold market. We also investigate “industry-specific” hot markets (i.e., is a particular industry enjoying a hot market, regardless of the state of the overall IPO market?). We find that most industries’ hot markets occur at about the same time - when the market for IPOs in general is hot. It is never the case that the overall market for IPOs is hot as a result of only one or two industries’ issuance, and it is very rarely the case that any industry is hot when the overall market is cold.

The wave of internet-related IPOs that began with Netscape’s debut in August 1995 illustrates this result. After several years of strong IPO markets, including two hot markets in which the number of issues topped more than 60 in some months, IPO volume dropped dramatically in late 1998 when financial markets were roiled by Russia’s default on its debt in August and failures of some hedge funds, notably Long Term Capital Management. Only twelve firms completed IPOs from September to November, yet one-half of the IPOs were in SIC industry code 73, including Ebay, Earthweb and theglobe.com. Thus, Internet firms represented a large fraction of the IPO market even when it turned cold. Not surprisingly, when the IPO market turned hot again in mid-1999, Internet firms were still a major part of the IPO market. Our data suggest this instance is not unusual, as hot and cold IPO markets appear to be on a cycle that is far more volatile than the lifecycle of a nascent industry.

Second, we find little support for the signaling models that imply hot market firms are better quality firms with greater asymmetric information than cold market firms, but neither do we find support for the opposing view that the long-term performance of hot market firms is sharply weaker. Hot issue market IPOs have higher market-to-book ratios and expected long-term growth rates projected by analysts than cold market IPOs, but relative to values for their

industry counterparts at the time they go public, the advantages disappear. Hot market IPOs also have lower earnings and are more likely to have negative earnings, especially those in the hot periods of the late 1990s, which could be indicative of greater growth potential. However, when we track the firms for up to five years following their IPO, there are few distinctions in profits or growth between hot market and cold market IPOs, and the only notable difference is that hot market IPOs spend less on capital expenditures. Thus, we find little support for the hypothesis that hot market IPOs are more likely to be start-ups in new technologies with greater growth potential than cold market IPOs.

Finally, we find little evidence that factors identified in the empirical literature that are associated with poor long-term stock returns of IPOs are unique characteristics of hot market IPOs. In particular, hot market IPOs do not have greater discretionary accruals and do not have lower institutional ownership after the IPO. Venture capital presence before going public is not significantly related to hot or cold market IPOs. While analysts' estimates of long-term earnings growth are higher, and assets and sales are smaller for hot market than cold market IPOs, once they are adjusted for their industry counterparts at the time they go public, these differences disappear. Our findings are consistent, however, with the view that investors are much more (perhaps overly) optimistic in hot markets, as hot market firms may be able to go public at a more favorable price, as suggested by the higher firm and industry market-to-book ratios, and they certainly raise more money in their offerings.

In summary, our results suggest that technological innovations are not the primary determinant of the frequent and dramatic swings in the volume of IPOs over time. Nor do we find evidence consistent with theories that predict hot market IPOs are of higher quality or have a greater need to change their ownership structure than cold market IPOs. Our results are more consistent with shifts in the willingness of investors to purchase IPOs as an important determinant of IPO cycles.

In the remaining sections of the paper we investigate hot and cold market IPOs in detail to determine why they went public at different points in the cycle. Section II discusses the relevant literature, Section III describes the data, defines hot and cold markets, and provides evidence that our definitions of hot and cold markets are appropriate. Section IV examines

industry clustering and differences in operating performance between the two types of firms. Section V is the conclusion.

## **II. IPO Cycles: Theory and Evidence**

In this section we discuss theories that relate to hot and cold IPO markets and the variables that we will use to examine these theories. The theoretical research includes (1) models of the existence of underpricing that are based on asymmetric information (the IPO signaling models, which are the basis for later models of seasoned equity offerings (SEOs); (2) models to explain the choice between going public or remaining private (the going public models) and (3) behavioral finance models of irrationality. We focus exclusively on theoretical models that generate predictions about hot and cold markets.

### **A. Signaling Models and Other Asymmetric Information Models**

Models based on asymmetric information yield uniformly the prediction that hot market IPOs reflect decisions of many better quality firms to go public, or issue equity, when the costs of asymmetric information are reduced. Allen and Faulhaber's (1989) IPO signaling model, for example, predicts a hot market when there are positive shocks to firms' expected profits. Likewise, Choe, Masulis and Nanda (1993) present a theory of SEO cycles based on asymmetric information and the business cycle. When the economy is growing, all firms receive projects with higher expected cash flows, so asymmetric information becomes less of a problem.<sup>2</sup> A direct prediction of their model is that announcement effects for SEOs should be less negative during hot markets. Bayless and Chaplinsky (1996) argue that hot issue markets need not occur solely because of swings in GDP. That is, a "window of opportunity" could occur in any period in which the cost of issuing equity is lower. Thus, they too predict that hot market issuers are expected to be better quality firms on average. Lucas and McDonald (1990) also predict that an upswing in the number of IPOs reflects incentives for a greater fraction of better quality firms to raise equity.

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<sup>2</sup>Korajczyk, Lucas and McDonald (1991) also have a model to explain the timing of seasoned equity issuance, but it does not explain swings in volume over time.

The empirical evidence on the quality of firms that issue equity in hot and cold markets is mixed. Choe et al. and Bayless and Chaplinsky find that the stock market reactions to announcements of equity offerings are less negative in hot markets, as predicted. However, empirical tests of IPO signaling models are less supportive of the hypothesis that better quality firms go public in hot markets (see Jegadeesh, Weinstein and Welch (1993), Michaely and Shaw (1994), and Spiess and Pettway (1997)).

## **B. Models of the Decision to Do an Initial Public Offering**

Another area in the IPO literature asks the question “Why do an IPO rather than stay private?” These theories vary greatly in their descriptions of the problems facing potential IPO firms: Some are based on information problems while others are more concerned with voting rights and corporate control. We consider each model in turn, and discuss their implications for hot and cold IPO markets. The empirical literature on this topic is quite limited, as few U.S. private firms provide data. Pagano, Panetta, and Zingales (1998), Fischer (2000), and Helwege and Packer (2000) examine the going public decisions of private firms and agree that IPOs are more common among firms with growth opportunities, although the results are mixed on size, reputation and leverage.

Most of the going public models predict that we should observe clustering of firms in high-growth industries in hot markets. These models often view the IPO process as exceptionally informative about the industry, giving groups of firms a large incentive to go public at the same time. Although the theories differ in the reasoning, all expect a high concentration of firms from a new or fast growing industry.

Chemmanur and Fulgieri (1999) consider the choice of an IPO versus obtaining venture capital financing in the face of asymmetric information and costly information gathering. Hot markets occur when productivity shocks that increase firm values induce more investors to produce information, which in turn leads to a greater incentive to go public. Thus, they characterize hot markets as a large number of offerings by unusually profitable firms or firms that are expected to be very profitable soon.<sup>3</sup> They also predict that firms might do IPOs at an earlier age if the market is hot. Hoffman-Burchardi (2001) also considers the choice of public

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<sup>3</sup>This model can also generate hot markets through variation in the cost of evaluating firms' prospects, but the authors emphasize the change in profitability as a more natural explanation for hot markets.



financing versus private benefits, and predicts hot markets when firms learn from the first IPO that industry prospects are high, raising the costs of staying private. This theory predicts clustering by industry in hot markets.

Stoughton, Wong and Zechner (2001) focus on the effect of doing an IPO when there is asymmetric information about the quality of the firm's product. Consumers will pay more for a firm's product if they learn it is a better product from stock prices. In this model, high IPO volume arises as a result of clusters of IPOs in the same industry. Moreover, hot market IPOs are more likely to be businesses with uncertain market size. This model shares the predictions of the signaling models that hot market firms are more often higher quality firms, especially in their ability to charge higher product prices (higher gross margins).

Maksimovic and Pichler (2001) also focus on the product market and set up a model where the decision to go public is intricately tied to the decision to start operating. Their model predicts that IPOs are more likely if the threat of a second technology is low, if prototypes are not expensive (low startup costs before major production), and the industry is likely to be viable. The model can also generate herding in a hot market.

Hot markets with clustering can also result from financial intermediaries. Benveniste, Busaba and Wilhelm (2002) highlight the information externalities that IPOs create for other firms in the industry. In their model, firm valuation has a high industry component to it, so if a firm does an IPO other firms in the industry learn about their own valuations from that offering. Investment banks can solve the externality problem by bundling IPOs in industries at the same time. Their model predicts two types of hot markets, which vary in the receptiveness of investors, but which both have a high degree of clustering by industry. Schultz (2000) has a similar theory, but which focuses on the venture capitalist's role in the IPO.

Subrahmanyam and Titman (1999) argue that IPOs are affected by two kinds of information: (1) costly information (e.g., research by analysts) and (2) "serendipitous information", which is free because it is news that ordinary people encounter as they deal with this firm. Peter Lynch's example of buying the Body Shop stock falls into this category - in the course of shopping at the mall, he costlessly discovers how valuable their stock is by observing how busy their stores are. Serendipitous information allows for greater precision in the stock price at no additional cost, and offers an advantage to being public to some firms. Because this

information is greater when more individuals are involved, the model predicts that hot markets have a larger proportion of involvement by retail investors.

Other going public models focus more on the advantages of a dispersed shareholder base. For example, Zingales (1995) considers the mix of shareholders for a company that plans to be acquired.<sup>4</sup> In this model, owners separate the sale of cash flows and control rights by first going public and then allowing a takeover. This two-step method takes advantage of the free rider problem in tender offers. Benninga, Helmantel and Sarig (2000) also consider the valuation of private control rights versus cash flows and develop a model where hot markets occur as industry cash flows increase. Pagano and Roell (1998) argue that IPOs prevent excessive monitoring by large shareholders, which is more often a problem when firms need a large amount of funds (so hot markets should be characterized by greater external financing needs). All three of these models predict that large shareholders will be replaced with small shareholders as a result of the IPO, so hot markets ought to be associated with greater institutional ownership before the IPO occurs.

### **C. Irrationality and Long Term Underperformance of Hot Market Firms**

The empirical literature on the underperformance of IPOs is quite extensive and still a subject of intense debate (see Ritter (1991), Loughran and Ritter (1995), Brav and Gompers (1997), Brav, Geczy and Gompers (2000)), but some evidence points to even worse performance among hot market IPOs. Much of the literature attributes the underperformance of IPOs in general to managers' taking advantage of investor overoptimism (Lerner (1994), Loughran and Ritter (1995), Rajan and Servaes (1997), Field (1997), and Teoh, Wang and Welch (1998), for example), but few studies directly compare hot and cold IPOs. Lowry (2001) indicates that aggregate IPO volume is a function of both investor sentiment and variation in the demand for capital.

Behavioral finance models focus on investor irrationality, which might explain the poor long term performance of IPOs and dramatic cycles in the number of IPOs sold. Few behavioral models specifically address the question of hot and cold IPO markets, but Ljungqvist, Nanda and Singh (2002) argue that the presence of irrational investors leads to hot markets and their worse

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<sup>4</sup>Mello and Parsons (1998) have a similar model based on takeovers, but they emphasize the information provided by the stock market.

long-term performance. These investors are overly optimistic about IPOs' prospects. Loughran and Ritter (2002) and Ritter and Welch (2002) suggest that these inefficiencies in the market give rise to abnormal profits which investment bankers allocate in their own best interests.

### **III. Data**

We start with all nonfinancial IPOs that are not reverse leveraged buyouts or spinoffs completed between January 1, 1975 and December 31, 2000 as reported by Securities Data Company (SDC).<sup>5</sup> We exclude 143 IPOs with a share price of less than \$1, and 18 IPOs which appeared to be duplicates (the same cusip appears in the database twice). These restrictions reduced our sample from 6,640 to 6,479.

A particular concern in our analysis is the fact that SIC codes are often inconsistent across data sources. As Kahle and Walkling (1996) show, SIC codes from Compustat and CRSP frequently disagree, even at the two-digit level and neither is clearly a superior source of information in such cases. To be certain that we are using the correct SIC codes, whenever Compustat and CRSP disagree on the code we consult the Directory of Companies Required to File Annual Reports with the SEC. These manuals, which are published annually by the SEC, are basically computer printouts that include company names and SIC codes. As SIC codes were changed in 1987, we convert the codes found in the pre-1987 manuals to post-1987 codes where necessary using Dun and Bradstreet's SIC manual. In process of checking SIC codes, we encountered some firms that SDC did not identify as financial firms, but which were identified as such from either the SEC books or on Compustat and CRSP. Elimination of these additional financial firms reduces our sample by 60 firms.

We use this sample of 6,419 IPOs to define our hot and cold issue markets and to address the issue of industry clustering. However, for the analysis of underpricing, we use only firms that have trading price histories on CRSP. Once we have defined hot and cold IPOs, either by date of issuance or by underpricing, we restrict our analysis of stock price and operating performance to firms with stock price information on CRSP and financial data on Compustat. In addition, we prefer to eliminate the unit offerings from this last group for stock return analysis.

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<sup>5</sup>SDC data start in 1970, but the majority of the IPOs before 1975 do not have financial data on Compustat. For example, of the 929 IPOs reported by SDC from 1970-73, only 35 percent have data on Compustat.

We next matched our sample with Compustat and CRSP. If firms did not have positive asset values on Compustat or did not appear in the dataset at all, they were dropped from the subsequent analysis. If the firm's stock was not on CRSP at all, or if it appeared more than ten days after the IPO date, or if it appeared with nonmissing trading prices more than two days before the IPO, we also deleted the firm from the subsequent analysis. In addition, we also excluded firms if in the first year of trading after the IPO their stock prices were missing in CRSP for more than four consecutive trading days (except when the missing prices were due to the closing of the stock market). After eliminating these observations, our sample includes 4,235 IPOs that are on CRSP that are used to define hot and cold IPOs based on underpricing. Matching these firms with Compustat reduces the sample to 3,702 IPO firms.

We obtain institutional ownership data from CDA/Spectrum, whose data are based on 13-F filings with the SEC in the quarters following the IPO. Spectrum data include holdings of banks, insurance companies, investment companies, independent investment advisors and other institutions (including pension funds). We calculate the fraction of shares held by these investors by combining the shares held by institutional investors with the shares outstanding for the same quarter-end in CRSP. Data on the presence of venture capital financing are from SDC. Analysts' long-term earnings estimates are consensus estimates from I/B/E/S. As documented in Rajan and Servaes, there is fairly limited coverage of IPOs, with no coverage from 1975 to 1983, and only limited coverage before 1986. We document that market-to-book ratios, which are available for all the firms, generally provide very similar information. We also examine discretionary accruals, which are calculated as described in Teoh et al. as the residual of actual accruals less expected accruals based on estimates from a regression of accruals for other firms in the same 2-digit SIC industry.

#### **A. Defining Hot and Cold IPO Markets**

The most frequently-used concept of "hot" IPO markets is based on volume. Loughran and Ritter (1995) describe the 1980s as "hot" because most of that decade had much higher issuance volume than the 1970s. Bayless and Chaplinsky (1996) define hot SEO markets using a moving average of gross equity issuance, as tabulated by the Federal Reserve Board. "Hot" IPO markets have also been defined based on underpricing (see Ritter (1984)). Lowry and Schwert

(2002) investigate the statistical relationship between volume and underpricing over hot and cold markets and find that periods of high underpricing are typically followed by high IPO volume.

Figure 1 shows the number of nonfinancial IPOs each month from 1975 to 2000. The series shows extreme variation over time, with the three-month moving average ranging from more than 60 IPOs per month to as few as zero. The graph indicates that very few IPOs were completed in the second half of the 1970s, but this period was preceded by several episodes of elevated activity. Ibbotson, Sindelar, and Ritter (1994) show that the early 1960s, the late 1960s, and most of 1972 are among the hottest IPO periods from 1960 to 1992.<sup>6</sup> In addition, 2001-2002 is among the coldest IPO periods since 1960, averaging only 6 IPOs per month. Indeed, September 2001 was the first month since the 1970s during which no IPOs were completed and August 2002 was the second such month.

Hot and cold periods do not line up directly with calendar years, so we define our periods based on months. To define hot and cold months according to volume of issuance, we calculate three-month centered moving averages of the number of IPOs for each month in the sample. The advantage of a moving average is that it avoids classifying seasonally low months as cold when they are in the middle of a neutral period.<sup>7</sup> We use the larger sample of IPOs (6,419 observations) that includes unit offerings and firms with insufficient data (on CRSP and Compustat) to determine which months are hot and which are cold. Those periods with at least three consecutive months that have a moving average of more than 33 IPOs (the top quartile of the monthly moving averages) comprise the hot months; those with 10 or fewer IPOs (which constitute the bottom third of the monthly moving average totals) are considered cold months. We include the bottom third of the sample for cold months because the bottom quartile includes a number of months with zero offerings, which results in an excessively small sample. Of the total 312 months in our sample, 77 are defined as hot, 103 are defined as cold, and 132 are defined as neutral. The final sample of IPOs, excluding unit offerings, with sufficient financial and stock price data includes 162 cold IPO firms and 2,011 hot IPO firms. The remaining 1,529 firms are classified as having done their IPOs in a neutral period.

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<sup>6</sup>We do not include these periods in our study because financial data for IPOs are difficult to obtain in those early years.

<sup>7</sup>August and January are typically cold months, because investment bankers go on vacation in late summer and because people avoid road shows for early January offerings during the Christmas season. Hence, during a slower, but not cold, IPO period, these months will appear as cold unless we use the moving average.

We also defined hot markets based on the firm's underpricing.<sup>8</sup> Thus, our underpricing-based definition of "hot" is that the firm itself has strong underpricing. If an IPO has underpricing of at least 25% (the cutoff for the top quartile of the sample with data on CRSP), it is hot; a cold IPO is defined as one with a return of 0.8% or less (including many negative and zero returns). Of the firms used in the remainder of our analysis (those with data on CRSP and Compustat), those in the cold underpricing group number 912 firms; the hot IPO group defined by underpricing includes 986 firms, while the remaining 1,804 firms are considered neutral. These groups do not constitute exact quartiles or halves of the sample because Compustat is slightly more likely to provide data on a firm if it has high underpricing.

## **B. Benchmarking stock return performance**

While the goal of our paper is not to explain long run stock performance, we document that our hot market IPOs are similar to those discussed in previous studies. We calculate buy and hold stock returns starting two weeks after the IPO to more closely replicate returns to a typical investor who may not be allocated shares in the IPO. Buy and hold returns are calculated by using monthly returns on CRSP, except for the month of the IPO, and in the case of anniversary date returns, the anniversary month, as these returns are less than a full month.<sup>9</sup> To avoid sample selection bias due to stocks with limited return histories, we keep these stocks when calculating the average of the individual stocks for as long as they appear in the sample. For example, if a stock trades for only seven months after the IPO, we use the seven-month IPO return for that stock when calculating one, three, and five year wealth relatives.<sup>10</sup> If an IPO was offered in the year 2000, it can only have returns in the calculations for one year after the IPO. So the sample sizes get smaller as the buy and hold horizon lengthens. As there are many IPOs

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<sup>8</sup>We considered an alternative definition of hot periods whereby a period is hot if the average underpricing in a given month is unusually high. However, the underpricing distribution is highly skewed - the low end of the distribution is nearly truncated at zero while the high end has fat tails, so the monthly averages are often not typical.

<sup>9</sup>Loughran and Ritter (1995) note that compounding daily returns on the equally weighted index leads to errors from the compounding of bid-ask bounce. When we calculate a partial month return, say for the month that the IPO is completed, we take the percentage difference in the price on two days, adjusted for splits and distributions, if there are any. Thus if a stock trades at \$15 ten days after the IPO, has no splits or dividends, and trades at \$20 at the end of the month in which the IPO was completed, the partial month return is  $(\$20 - \$15) / \$15$  or .33. Beginning with the next month, we switch to cumulating CRSP monthly returns on the stock as well as on the index.

<sup>10</sup>Unless we also adjust the benchmark return, however, inclusion of short histories will bias the wealth relative downward, and bias it more as the time horizon lengthens. To make sure that the time periods are appropriate, we create a pseudo-portfolio that includes one observation of the benchmark return for each IPO in the sample and each of those benchmark observations spans a time period equal to that of the corresponding IPO in our sample.

in the late 1990s, the sizes of the hot and neutral samples shrink considerably by the fifth year after the IPO.

#### **IV. Empirical Tests of Differences between Hot and Cold IPOs**

We first present wealth relatives for our IPO firms to determine if there is any indication of a difference in performance, as indicated by the long-term performance literature. Then we concentrate on characteristics of the firms that come out in hot and cold markets.

##### **A. Stock Price Performance of Hot and Cold IPOs**

Consistent with previous research, we find that our sample of IPOs as a group are underperformers, as most wealth relatives for the full sample (table 1) are less than one. Table 1 shows calendar year returns for a variety of benchmarks, including the equal- and value-weighted versions of indices using all CRSP stocks, just NYSE stocks, and just Nasdaq stocks. We also show the anniversary date returns using value- and equal-weighted Nasdaq indexes as benchmarks. The performance of IPOs as a whole is best when they are compared to the Nasdaq equal weighted index, likely reflecting the fact that the Nasdaq reflects the poor performance of a large number of recent IPOs.

If “hot” is defined by the volume of IPOs in the month of the offering, hot market firms are typically worse performers than cold firms. In particular, the wealth relatives in the volume-based definitions of hot range reach as low as .716, while the cold period IPOs have wealth relatives that range from 1.068 to 1.383. All but seven of the hot period IPO wealth relatives are below one, whereas none of the cold market IPOs are. Notably, though, the neutral IPOs have wealth relatives that are often as low as those of the hot market IPOs and are only above one in one instance.

The last three columns of Table 1, which show the wealth relatives for hot, cold, and neutral IPOs based on underpricing, do not indicate as strong an ordering of wealth relatives. The cold IPOs are far more likely than the other two groups to have wealth relatives of greater than one, but they too often underperform the benchmarks.

Our sample’s returns by hot and cold periods defined by IPO volume are similar to those documented in other studies. In contrast, the results based on the underpricing definition are not particularly close to the most relevant comparison in the literature, Krigman, Shaw, and

Womack (1999), who look at long term performance by the degree of underpricing. They find that the firms with the most underpricing perform the worst of all IPOs. Our definition of hot includes the top quartile of the sample with the most underpricing and we do not find this result. However, the cutoff for the top quartile is 25%, which may not be extreme enough to count as extremely hot.

## **B. Industry Clustering**

Our first major area of analysis is the degree to which IPOs are clustered in particular industries. We analyze the distribution of SIC codes across the two types of markets to determine if hot markets have a higher industry concentration, as predicted by several of the going public theories. By defining hot and cold markets based on volume, a cold market by design will always contain few IPOs and therefore the sample in any given cold period will be quite small. Due to this constraint, we cannot analyze the industry concentration in a cold market by using three or four digit industry codes and have reliable estimates of concentration. Hence, we describe the industry concentration using two-digit SIC codes.

Figure 2 presents the percent of total IPOs in the most frequent industry codes in the sample for both hot and cold issue markets. The industry distribution of IPOs is heavily concentrated: the top 11 industries account for about three-quarters of the total sample, with similar percentages of 80 percent and 77 percent for hot and cold markets, respectively. Furthermore, the five most frequent industries are identical in both the hot and cold markets. These industries (computer software (SIC 73) and hardware (SICs 35 and 36), advanced medical equipment (SIC 38), and retailing (SIC 52 thru 59)) account for 55 percent of the offerings in hot markets and 52 percent in the cold markets.

To test for whether industry frequencies are statistically different across the two types of markets, we estimate the likelihood of an IPO in a hot market versus doing an IPO in a cold market. The logit estimation is done with a series of dummy variables for the 11 SIC categories (excluding “other”). Five of the SIC variables had significant coefficients: The coefficients on SICs 73, 52-59, and 48 are positive, suggesting clustering of computer software firms, retail firms, and cable operators in a hot market. However, the coefficients on SICs 35 and 13 are negative, suggesting clustering of computer hardware and energy firms in cold markets. Thus, while there appears to be some evidence of clustering, it is not unique to hot markets.



To further assess clustering, we calculate a measure of industry clustering for each month, and then compare the average of this measure for hot versus cold months. For each month, we calculate the percentage of IPOs in each 2-digit SIC relative to the percentage of IPOs in that 2-digit SIC for the entire sample period. We then average across all the SICs represented in that month. We find that for the 77 hot months, this summary measure of clustering is 0.97, compared to the average of 1.18 for the 103 cold months. Although the values are not statistically different, they provide no support for greater clustering in hot markets. This variable reflects the fact that in hot markets, there are IPOs in many more SIC categories, leading to somewhat less clustering.

Because there are multiple hot periods, and clustering may occur in only a few of the hot periods, it is possible that the pattern of clustering is obscured when we look at all hot periods as one group. Table 2 measures the percentage of IPOs in a 2-digit SIC for each of the 9 hot periods and 7 cold periods. As found with the aggregated data, the data by period suggest that hot markets are not more likely to be clustered than cold markets. The largest industry concentration in any of the periods is the 52 percent of IPOs in the computer software industry (SIC 73) in the hot period identified from May 1999 through March 2000. Obviously, most of these offerings were completed by Internet-related firms, and this figure is consistent with the stylized facts about the Internet (e.g., see Schultz and Zaman (2001)). However, equally striking is the concentration of IPOs in that same industry during the cold market in late 1998, when SIC 73 firms accounted for 50 percent of all IPOs in that period. Thus, both hot and cold periods display an enormous degree of concentration by industry. This pattern is found for a number of other industries as well. Less striking, but also telling, is the concentration of energy firms (SIC 13) in the hot market of 1981. The share of SIC 13 firms in that hot market was 20 percent, the highest fraction for this industry of any hot markets, and the share in the cold market just preceding that period was 10 percent, again the highest representation of this industry in any cold markets. Similarly, the share of computer hardware firms (SIC 35) in the hot market of 1981 was 14 percent, and the share in the just preceding cold market was 17 percent. Likewise, the biotech industry (SIC 28) is a dominant IPO industry in the two cold markets that occurred in 1990 and 1991, and is never as strong in any hot market as it is in the hot market of 1992.

Our explanation for the similar degrees of concentration by industry across hot and cold markets is that the cycle of new entrepreneurial ideas and technological advancements is not equivalent to the cycle of hot and cold IPO markets. We observe a new business development with high growth opportunities, such as Internet applications, and these ideas may even lead to a hot IPO market, allowing many firms in this business line to tap the equity markets. However, a hot IPO market may end, and there are a number of firms in this new industry that still want to tap the equity markets. These firms may face unfavorable conditions in a cold market, yet they are among the few businesses that want to go public and can still convince investors they are a good growth story. While the period is too recent to include in our sample, the cold market of 2001-2002 is a case in point: 20 percent of these IPO firms are in SIC 73. Our data in table 2 show that the highest concentrations for an industry often occur in markets that follow chronologically. As discussed, the highest concentrations for computer software, energy, computer hardware, and biotech firms were in hot and cold periods that were chronologically close together.<sup>11</sup>

An alternative strategy for analyzing the industry concentration of hot issue markets is to define hot markets for each 2-digit SIC industry, regardless of the state of the overall market. By this definition, if a firm completes an IPO in its industry's hot period, then it is included in the group of firms we call "hot IPOs." This approach could be interpreted to be more in the spirit of some of the models that predict hot markets based on cost reductions or productivity gains that might be industry-specific. We define a hot market for a single industry using the same criteria

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<sup>11</sup>Given the high concentration of IPOs in these 11 industries, one wonders if this concentration simply represents the concentration of firms in general. We compare our IPO industry distribution to two samples: all publicly-traded firms (NYSE/AMEX/NASDAQ firms in the Compustat industrial file) and the 1998 Survey of Small Business Finances (SSBF), which includes mostly privately-held firms. The concentration of two-digit industries among publicly-listed firms has increased since 1975 to reflect the influx of IPOs. In 1975, 11 industries represented 61 percent of the (industrial) stock market, but only 7 of these 11 industries overlapped with the IPO industries in Table 2. By 2000, the top 11 industries represented nearly 75 percent of all listed firms, and 10 of these were among those shown in Table 2. In contrast, the firms in the SSBF survey are concentrated in other industries. While the 11 biggest industries in the SSBF account for 75 percent of small firms, only 5 of them overlap with our top IPO industries. Compared to 75 percent in the hot period ending November 1997 (which is closest in time to the date of the survey), the IPO industries represent only 55 percent of the SSBF sample. Moreover, even this owes in large part to retailing (SIC 52-59) which accounts for 21 percent of the SSBF firms (only 8 percent in Table 2). Of the other 10 industries, 6 have "market shares" in the SSBF that are less than one fourth of the figures in Table 2.

as for the whole market - periods in which at least three consecutive months exceed the top quartile of the monthly moving averages. We impose the additional criteria that the three-month period include at least 3 IPOs from that industry, since it is difficult to argue that 3 or fewer IPOs in a three-month window could possibly constitute a hot market. Because SICs 87 and 13 do not have enough observations to be able to define cold markets using the lower third and still have any IPOs, we exclude these industries and all other 2-digit industries that account for less than 2 percent of all IPOs for this part of the analysis. Based on this definition, we have 1,842 hot SIC firms, drawn from the most frequent 9 SIC categories. Of the 1,842 firms, 1,287 firms overlap with hot issue market firms as defined initially and 555 with neutral market firms. None of the 1,842 hot SIC firms are in the cold issue market defined by number.

Figure 3 shows the relationship between the volume of the IPO market in general and volumes in the most frequent industries. The figure reveals a considerable overlap between the months for industry-specific hot markets and our initial definition of a hot market based on the total number of IPOs. That is, a hot market in one industry tends to occur at the same time as hot markets in other industries. Thus, our definition of a hot market based on overall volume generally encompasses hot markets for individual industries, for which many of the going public models predict clustering. These theories often suggest that clustering results from new inventions or products that spawn hot markets in those industries. But the simultaneous occurrence of industry-specific hot markets would imply that new innovations happen at the same time in many different unrelated industries. While innovations across industries could be related, it is also plausible that new inventions are not the primary cause of hot markets.

### **C. Firm Characteristics in the Year of the IPO**

Next we consider characteristics of the firm at the time the IPO is completed. To measure the degree of industry concentration for each firm, each firm is assigned the industry cluster value, as defined above, for the month of its IPO. As shown in table 3, hot market IPOs have less industry clustering than cold market IPOs. In addition, hot market IPOs have significantly higher first-day returns, consistent with studies showing initial returns are closely related to IPO volume (e.g., Lowry and Schwert (2002)), and raise more funds than cold market

IPOs, whether measured in constant 2000 dollars or relative to capital expenditures.<sup>12</sup> While these two results are consistent with the idea that hot market IPO firms have greater investment opportunities, they are also consistent with the notion that hot markets are characterized by very favorable investor sentiment. Similarly, *industry* market-to-book ratios and expected long-term earnings growth are significantly higher for hot market IPOs, reflecting either greater growth opportunities or favorable pricing, since analysts' earnings estimates do not appear to be independent of investor optimism (Rajan and Servaes (1997)).

As with industry values, firm market-to-book ratios are higher for hot market IPOs than cold market IPOs, consistent with higher growth prospects, though both are higher than those for established firms in the industry at the time they go public. Long-term earnings growth projections do not vary between hot and cold market IPOs, though like the market-to-book ratios, they reflect extremely optimistic views for these firms relative to their more-established industry counterparts.

We next focus on operating performance measures that might differentiate the two sets of firms. Hot market IPOs are smaller, have lower operating income, and are more likely to have operating losses, characteristic of start-ups with greater growth potential. The degree to which IPOs manipulate earnings, as measured by discretionary accruals, does not differ between the two sets of firms. In addition, hot market IPOs have less tangible assets, as shown by lower fixed asset ratios, and less debt, suggesting greater asymmetric information. However, capital expenditures are significantly lower for hot market IPOs than cold market IPOs, which is not indicative of firms with especially great investment opportunities investing at a torrid pace.

To some extent, these results reflect the surge in IPOs in the second half of the 1990s, which includes a large fraction of internet IPOs (especially in the hot market of May 1999-March 2000). Compared to hot market IPOs during 1975-1995, hot market IPOs in this period had higher market-to-book ratios (2.85 vs 2.13), lower operating income-to-asset ratios (4.9 percent vs 13.3 percent), and were smaller (\$55 million vs \$120 million in sales). Distinctions in hot market IPOs between the two periods are even more stark if we focus only on firms in SIC 73, which includes many Internet-related firms. The median market-to-book ratio for SIC 73

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<sup>12</sup>For comparison, IPOs in neutral markets raise more funds than cold market IPOs, but less than hot market IPOs (see appendix table for other comparisons as well).

from 1996-2000 was 4.2, while operating income/assets was typically negative and median sales did not even reach \$45 million. These figures suggest high valuations for internet IPOs that had yet to prove their viability as a firm. However, the ease with which internet firms could go public in the late 1990s was also evident for other sectors during that time period. The IPO firms of that period that were not involved in the internet also had high market-to-book ratios (2.5), low operating earnings (7.2 percent), and were quite small (\$68 million). Thus, the late 1990s was a window of opportunity for many types of IPO firms besides the internet start-ups.

Because hot issue markets tend to arise when growth prospects for many firms are high, as suggested by the industry market-to-book ratios, comparisons between firms should be made after controlling for differences in macroeconomic conditions during hot and cold markets. Thus, to account for different points in the business cycle, we compute industry-adjusted measures of firm operating performance. The adjustments compare the values for the IPO firm to those for the median firm in the same two-digit SIC category if the two-digit industry sample had more than 15 firms during the five years following the IPO year, after excluding other IPOs and those from the previous four years.<sup>13</sup> For 23 companies, the two-digit SIC category did not have a sufficient sample size and the firms were matched at the 1-digit level.

Adjusted firm characteristics, shown in columns 5 to 8 of Table 3, show that hot market IPOs still have lower operating income, and lower fixed assets, consistent with the start-up characterization. However, industry-adjusted capital spending for hot market IPOs remains lower than for cold market IPOs, and industry-adjusted assets and sales are no longer smaller for hot market IPOs. Moreover, industry-adjusted market-to-book ratios are no longer significantly higher for hot market IPOs, and industry-adjusted long-term earnings growth rates are actually lower for hot market IPOs, defined by high volume months. Thus, the evidence is less persuasive that hot market IPOs are younger start-ups with greater growth potential.

Finally, to proxy for institutional ownership (or dispersed shareholders), we use the fraction of outstanding shares held by institutions, measured usually at the end of the first full quarter after the IPO. We find that hot market IPOs by number have significantly higher

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<sup>13</sup>Comparisons are made relative based on 2-digit SIC categories for consistency with the industry clustering analysis. We also calculated these figures using 4 digit SIC codes and found very few differences. In both cases, hot market IPOs have lower adjusted operating income-to-assets than cold market IPOs, and have greater adjusted assets and sales, but differences are significant based on only on 2-digit SIC comparison.

institutional ownership than cold market IPOs, 15.3 percent versus 8.2 percent. Field (1997) shows that institutional ownership in her sample of IPOs from 1979-89 averaged 11.5 percent, similar to ours. These results are not consistent with the idea that IPOs are a method by which firms reduce excess monitoring by private investors and acquire a higher retail investor base. The only model that strongly points to higher institutional ownership after the IPO for a hot market firm is Benveniste et al, who argue that the existence of a large institutional base allows for bundling of IPOs. However, that model also predicts that bundling would result in greater industry concentrations in hot markets, which we do not find.

We also find in the univariate comparisons that venture capitalists are more likely to be involved in hot market IPOs than cold, but the difference is statistically significant only for the hot and cold markets based on the same 9 SIC categories. The greater presence of venture capitalists could suggest the desire to reduce monitoring by private investors is a motive for going public, but because we do not know the share of the firm held by venture capitalists, this result is tentative.<sup>14</sup> It is possible that venture capitalists have a lower share of hot market IPOs because hot market firms can bypass an additional round of VC financing and go public at an earlier stage. But the models also predict greater financing needs, which are not supported by the lower capital spending-to-assets or lower ratio of IPO proceeds to capital spending.

To the extent firm characteristics in the IPO year are informative about higher expected profits, these univariate comparisons do not indicate that better firms go public in hot markets. Some of the measures suggest that hot market firms are more likely to be high-growth start-up firms, but the lower operating earnings could as well reflect lower standards on the part of investors in hot markets. Chemmanur and Fulghieri and Maksimovic and Pichler argue that hot market IPOs as start-ups may be initially unprofitable, but reveal their potential with time. It is possible that the differences in quality only become apparent later, an aspect of IPOs that we investigate in the next section.

#### **D. Characteristics of IPO firms in Years Subsequent to the IPO**

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<sup>14</sup>VC ownership stakes are typically substantial, close to 50 percent at the time of the IPO (Fenn, Liang, and Prowse, 1998). We also do not know management ownership. Lerner (1994) shows that the equity stake retained by managers and employees after the IPO is 7 percent if the venture capitalist is older, and more prestigious, and 12 percent if the venture capitalist is less prestigious. More prestigious VCs bring their firms public in hot markets, so hot market firms with VC backing may have lower insider ownership, and all else equal, a larger retail base.

Asymmetric information theory suggests that the quality of hot and cold market firms is difficult to differentiate at the time of the offering, but that eventually more positive information about the hot market IPO firms will become public knowledge. Thus, if asymmetric information or higher expected profits drive the IPO timing decision, hot market IPO firms should eventually outperform the cold market firms. An alternative view, suggested by the results of Jain and Kini (1994) and Mikkelson and Shah (1997), is that IPOs tend to underperform operationally after the IPO, and hot market IPOs are likely to be the main source of poor profitability. The models based on start-ups, such as Stoughton, Wong and Zechner, and Maksimovic and Pichler, suggest a faster pace of growth for hot market firms in the years after the IPO.

To analyze growth patterns after the IPO, we examine the industry-adjusted medians of operating performance for hot and cold market firms for up to five years after their respective IPOs. The data presented correct for possible survivorship bias. To do so, we carry through the latest operating results for firms that exit the sample prematurely. Thus, for example, the median operating income-to-assets figure for year five will be based mainly on firms that survived to year five, but will also be based on data for non-surviving firms from earlier years. Because our sample includes IPOs through 2000 and operating performance data through 2000, we include only those firms in this analysis if they could have existed for the full 1, 3, or 5 years after the IPO.

Table 4 shows medians of adjusted operating measures for one, three and five years after the IPO. Little of the evidence in the table suggests that hot market IPO firms are better or worse than cold market IPOs. As in the year of the IPO, hot market IPOs have lower profits than cold market IPOs in every year following the IPO, but the differences are not significant. Our evidence also suggests profit ratios tend to fall from IPO levels, supporting the results in Jain and Kini (1994) and Mikkelson and Shah (1997), although most are not significantly worse than the industry median. Our results add to their findings by showing that there is no difference in the weaker performance between hot and cold firms.

Industry-adjusted assets show that hot and cold market IPO firms do not differ significantly in size in the years after the IPO, though they are significantly larger than the industry median. The relatively larger size likely owes to the relatively strong sales growth rates of IPO firms. Although industry-adjusted sales growth does not differ between hot and cold

IPOs, both sets of firms clearly grow more quickly than their industry counterparts in the first several years after the IPO.

The only substantive difference between hot and cold market IPOs in the years after going public appear to be in capital expenditure intensity – hot market IPOs have significantly lower industry-adjusted capital expenditure ratios than cold market IPOs in year three if hot is defined by total IPO volume and in year 5 using the industry-specific definition of a hot market. To the extent they differ, the lower capital expenditures of hot market IPOs is not consistent with the view that they have greater investment opportunities in the years immediately after the IPO. Nor is it consistent with the idea that IPOs in hot markets were more likely to have been at an earlier stage in their life-cycle.

#### **E. Multivariate Logit of the Decision to Issue in a Hot or Cold Market**

So far we have considered each of the various factors in isolation. Next, we estimate a multivariate logit of the probability of doing an IPO in a hot market versus a cold market, conditional on doing an IPO at all. The definition of a hot market is based on the total number of IPOs completed. Results obtained when defining a hot market based industry-specific volume are remarkably similar.

The multivariate results, presented in Table 5, largely confirm the univariate findings. The coefficient on the SIC cluster variable is negative in all of the specifications, though not consistently significant, indicating that industry clustering is not greater in hot markets. As already discussed, this result is at odds with many of the going public models, nearly all of which predict industry clustering in hot markets.

Consistent with the univariate results, the coefficient on the industry market-to-book ratio is significant and positive in all the specifications presented. However, the coefficient on firm market-to-book ratio is negative, though much smaller and it becomes insignificant when other control variables are included. Using analysts' measures of the firm's long-term earnings growth instead of firm market-to-book, column 5, leads to the same comparison, as the coefficient on industry long-term earnings growth is positive and significant, and the coefficient on firm long-term earnings growth is not significant. Thus, hot market IPOs occur in periods when growth prospects for the industry are high, but those for the IPOs are not especially greater.



The multivariate results show that hot market IPOs have lower profits, consistent with start-up characteristics. However, controlling for other features of IPOs, the hot market IPO firms are no longer considered small. Moreover, R&D expenditures are significantly lower and fixed asset ratios are higher (though the coefficient is not significant), features not consistent with greater asymmetric information or growth opportunities. And, the coefficients on the capital expenditures-to-assets ratio are negative and generally significant. These combined results are at odds with models that characterize hot IPOs as firms with greater investment plans or greater growth opportunities than cold IPOs.

Coefficients on long-term performance variables are not significant, suggesting that hot market firms do not ultimately reveal themselves to be of higher quality. As shown in column 5, adjusted operating income-to-assets in year 3 after the IPO is not significant in the logit regression.<sup>15</sup> Nor are coefficients on assets, sales growth, or capital expenditures (not shown); the insignificant coefficient on capital expenditures in year 3 or 5 after the IPO appears to reflect that the lower capital spending intensity is already known in the year of the IPO. These results suggest that theories based on changes in asymmetric information costs cannot explain the bulk of the variation in IPO volume across time.

The amount of funds raised is higher in hot markets, as predicted by Pagano and Roell, but the coefficients are often not significant. Given the lower capital expenditures, the higher amount raised does not appear to be related to Pagano and Roell's theory, so much as it indicates the greater willingness of investors to hand over funds in a hot market. We also find no support for the hypothesis that hot market IPOs represent firms that want to reduce excessive monitoring. In particular, hot market firms have a higher fraction of shares in the hands of institutional owners immediately following the IPO, suggesting that excess monitoring has not been disproportionately reduced. In contrast to the univariate results, hot market firms are also less likely to have had venture capitalists, though the coefficient is not significant, suggesting less ownership by outside investors before going public.

Overall, the evidence from firm characteristics at the time of the IPO and performance in the years following the IPO contradicts the idea that hot market firms are a special type of IPO

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<sup>15</sup>We show measures for year 3 after the IPO to preserve observations since only IPOs completed before 1996 would be represented in regressions using performance measures in year 5.

firm in special types of businesses. Nonetheless, while the results do not support strongly any of the theoretical models, they do not strongly suggest that the irrational markets view stemming from the underperformance literature is on target either. Studies of long term performance suggest that hot market IPOs, which on average have worse stock performance, should be smaller, have fewer institutional owners, more discretionary accruals, or higher analysts' earnings growth rates. These characterizations are not supported by the multivariate logit results. We do find lower presence of venture capitalists among hot market IPOs, though the coefficients are not statistically significant, and operating earnings are lower on average in hot markets.

Although none of the characterizations of hot market IPOs in the literature draw overwhelming support from our results, the evidence is more consistent with the idea that hot markets are affected by behavioral patterns. In particular, it appears that firms with lower profits, lower capital expenditure intensity, but not necessarily greater growth opportunities, can go public in a hot market and receive a more favorable response from the investment community (higher valuations, as much if not greater proceeds for the typical IPO). We do not find much difference in the performance of firms that go public in hot and cold markets for up to five years after the IPO. Of the theoretical papers describing hot and cold IPO markets, the behavioral approach of Ljunqvist et al. draws the most empirical support.

#### **F. Multivariate Analysis of Whether the IPO Will Experience High or Low Initial Returns**

So far in our discussion of how hot and cold IPOs differ, we have focused on the samples that differ by the volume of IPOs in the period the firm went public. Another dimension along which IPOs could differ sharply is the degree to which they are underpriced. In this section we present the estimates of a logit equation where the dependent variable is whether the firm experienced "hot" initial returns or "cold" initial returns.

Table 6 presents several logit estimations that predict whether underpricing will be extremely high or extremely low. The results of these estimations are more in line with the stylized facts about hot IPOs. The results strongly suggest that firms with a high degree of underpricing have high growth opportunities, as measured by significantly greater firm market-to-book, capital expenditures, long term growth expectations, and lower fixed asset ratios. Oddly, R&D is significantly lower for firms with high underpricing. In addition, IPOs with high

underpricing raise more money, and like hot volume IPOs, are in months with less industry clustering.

However, while high underpricing firms have higher growth opportunities at the time of the IPO, there is no evidence that these firms have a high success rate with these opportunities. Future operating measures - assets, income and capital expenditures - are not different for the firms with the most underpricing.

There are no apparent differences in the size of the firms grouped by hot and cold underpricing, as measured by assets, though high underpricing firms raise more funds. Moreover, both sets of firms have similar investors, as there is no significant difference in the likelihood of venture capital funding or the number of institutional investors.

We know from previous studies that there is a close temporal relationship between average underpricing and volume, but as we noted earlier the underpricing distribution has fat tails. One is tempted to say that hot market periods are periods with high underpricing, but the evidence in Table 6 suggests that one should not refer to IPO hot periods and IPOs with hot initial returns interchangeably.

## **VI. Conclusions**

In this study we examine IPO firms in hot and cold markets to determine if the firms in the two markets are distinctly different types of firms, such as in the nature of their business or the newness of their industry, or in their desire to change the ownership structure of their firms. Previous research on the long-run performance of hot and cold IPOs suggests that their most important difference may lie in the ease with which managers can fool investors.

Using a large sample of IPO firms that went public between 1975 and 2000, we investigate the characteristics of the firms that went public in cold and hot markets, and ignored those that went public in lukewarm periods. To a lesser extent, we also examine hot and cold IPOs defined by the extremities of the underpricing distribution.

We find that IPOs in both hot and cold firms are drawn from the same handful of industries, and that cold markets may actually exhibit more industry concentration. The lower industry concentration in hot markets is because many industries tend to have their hot markets at the same time. While the simultaneous occurrence of industry-specific hot markets could imply innovations across industries are highly related, it is also plausible that new inventions are

not the primary cause of hot markets. Thus, this result is difficult to reconcile with any of the theories that explain the decision to go public. Or more precisely, these theories could explain the prevalence of certain industries in the IPO market over a number of years, but they do not offer a reason why a growing industry should see such violent swings in the number of IPOs during the period.

In addition, though we find that hot market IPOs are more likely to have lower earnings, they have less R&D and more fixed assets, and do not exhibit faster sales growth in the five years following the IPO than cold market IPOs. Moreover, hot market IPOs were less likely to have venture capital financing before the IPO, and greater institutional ownership after the IPO. Thus, there is no clear support for theories that hot market firms are more likely to be start-ups in highly innovative sectors, or to have a greater desire to change their ownership.

While the theoretical models of the decision to go public do not draw strong support from the characteristics in the first year of the IPO, neither does the irrational markets view of hot IPOs found in the long-term underperformance literature. Researchers have associated poor stock performance with small size, greater use of discretionary accruals, higher analysts' forecasts, a lack of institutional investors or venture capital. Yet, in the multivariate analysis, we do not find much support for this view, except that valuations seem to be higher in hot markets. Hot market IPOs actually have higher institutional ownership than the cold market IPOs, which is at odds with previous studies that suggest certification by professional investors would avoid long-term underperformance.

Our focus is primarily on periods of high and low IPO issuance volume, but we also consider hot and cold IPOs as defined by initial returns. The results provide some support that hot underpricing IPOs have higher growth opportunities than cold underpricing IPOs, although many other important features do not differ between the two sets of firms.

Our results have implications for modeling the going public decision. Hot markets are not accurately characterized by clustering of a single industry, but rather, times when many industries have hot markets. The notion that hot market firms are more likely to be start-ups draws only weak support in our analysis. Thus, even if the theoretical models to explain why firms go public are largely on target, many of their implications regarding booms and busts are not. It is not the case that the IPO market suddenly turns from a hot market for high-growth firms into a cold market that allows only mature, stable businesses. Rather, it is always a market

for high-growth firms, and in some periods, only a small fraction of them are palatable to investors. IPOs are largely from the same industries, the main difference being that hot markets include more of these firms and, to a lesser degree, a greater number of unprofitable firms. Our results are consistent with the characterization of hot markets as periods when investors are more willing to purchase IPO stocks, rather than periods in which private firms experience a greater need for financing or change in ownership structure.

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Table 1

## Long-Run Stock Returns (Wealth Relatives) for All IPOs 1975-2000

The sample consists of all nonfinancial firm IPOs in the SDC database from 1975-2000, except reverse LBOs, unit offerings, spinoffs, offerings that raised less than \$2.5 million, IPOs offered at less than \$1 a share, IPO firms that were not listed on Compustat or CRSP, and IPO firms that did not have complete trading data on CRSP at the time of the IPO (traded less than eleven days, had a four day or longer gap in trading during the first year after the IPO, or trading data began more than two weeks after or more than three days before the SDC IPO date). Wealth relatives for the firms in the sample are constructed by comparing average raw returns on the IPOs to the average return on an equal number of benchmark observations for the same time period as each IPO trades. "Calendar year returns" for year *i* are returns from the time of the IPO until December 31 of the *i*th full year after the IPO. Hot IPOs are all IPOs in the sample that were completed in the top quartile of the issuance distribution (defined by three month moving averages of monthly counts of IPOs); cold IPOs were completed in the months that constituted the bottom third in the moving average counts; neutral months are neither hot nor cold. Hot underpricing IPOs are those in the top quartile of the underpricing distribution; cold underpricing IPOs are those in the bottom quartile of the underpricing distribution; the remainder are neutral.

			Year	Volume Definition			Underpricing Definition			
				All	Hot	Cold	Neutral	Hot	Cold	Neutral
Calendar year returns:	All CRSP firms	Value weighted	1	.888	.791	1.220	.979	.877	.910	.883
			3	.839	.775	1.383	.867	.917	.815	.821
			5	.910	.964	1.334	.782	.772	1.310	.769
		Equal weighted	1	.888	.798	1.183	.970	.847	.911	.898
			3	.888	.868	1.259	.865	.814	.851	.869
			5	.962	1.049	1.175	.816	.709	1.383	.815
	NYSE firms	Value weighted	1	.899	.798	1.225	.995	.871	.924	.900
			3	.893	.846	1.376	.897	.987	.861	.873
			5	.981	1.052	1.339	.836	.829	1.411	.829
		Equal weighted	1	.929	.839	1.192	1.014	.876	.955	.945
			3	.937	1.023	1.252	.956	1.132	.960	.988
			5	1.042	1.279	1.190	.952	.954	1.630	.968
	Nasdaq firms	Value weighted	1	.904	.856	1.123	.933	.926	.906	.891
			3	.811	.730	1.280	.876	.862	.792	.800
			5	.906	.973	1.253	.770	.778	1.279	.769
Equal weighted		1	.964	.918	1.103	.999	.936	.973	.973	
		3	.997	1.026	1.143	.939	1.094	.947	.984	
		5	1.137	1.313	1.095	.934	.954	1.606	.973	
Anniversary date returns:	Nasdaq firms	Value weighted	1	.930	.899	1.146	.941	.932	.911	.938
			3	.802	.716	1.227	.872	.865	.816	.781
			5	.803	.764	1.252	.792	.777	.872	.786
		Equal weighted	1	.946	.932	1.112	.942	.915	.936	.968
			3	.942	.943	1.078	.919	1.039	.919	.916
			5	.972	1.009	1.068	.910	.948	1.027	.953

Table 2

## Percent of IPOs by Industry, by Individual Hot and Cold Periods

The sample consists of all nonfinancial firm IPOs in the SDC database from 1975-2000, except reverse LBOs, unit offerings, spinoffs, IPOs offered at less than \$1 a share. Hot IPOs defined by number include 3,296 firms that completed IPOs in periods of high issuance volume (defined by three month moving averages of monthly counts of IPOs); neutral period IPOs total 2,715 in the sample; the remaining 408 cold IPOs were completed in the months that constituted the bottom third in the moving average counts.

2-digit SIC	COLD							HOT								
	Jan 75 Jun 79	Jan 82 Oct 82	Nov 87 Apr 88	Aug 88 Apr 89	Jan 90 Mar90	Sep 90 Feb 91	Sep 98 Dec 98	Apr 81 Jun 81	May 83 Jan 84	May 86 Nov 86	Jun 87 Sep 87	Feb 92 Apr 92	Jun 93 Jun 94	May 95 Jan 97	Jun 97 Nov 97	May 99 Mar 00
73	9	21	0	16	4	4	50	6	20	17	13	10	12	26	19	52
36	13	18	13	3	12	4	4	10	15	7	9	7	9	8	7	9
52-59	6	8	3	6	4	12	8	4	13	12	7	11	10	7	8	6
38	9	13	15	4	12	12	0	11	11	6	8	12	4	9	9	2
35	17	11	5	14	16	12	0	14	7	6	9	7	7	6	6	4
28	3	2	8	7	16	12	4	3	5	9	8	16	7	7	6	2
50-51	5	3	13	6	4	8	8	6	5	4	5	6	8	5	6	3
48	1	3	5	6	0	0	8	0	3	5	4	1	5	5	4	11
80	1	5	0	4	8	4	0	2	5	5	3	12	4	4	2	0
87	1	2	3	3	4	4	0	6	1	1	2	2	2	3	7	3
13	10	2	0	1	0	8	0	20	0	0	2	0	2	1	2	0
Other	25	13	38	30	20	20	17	18	14	28	31	16	31	19	25	7

Table 3  
Firm and Industry Characteristics at time of IPO for Hot and Cold Market IPOs from 1975-2000

The sample consists of all nonfinancial firm IPOs in the SDC database from 1975-2000, except reverse LBOs, unit offerings, spinoffs, IPOs offered at less than \$1 a share, IPO firms that were not listed on Compustat or CRSP, and IPO firms that did not have complete trading data on CRSP at the time of the IPO. Hot IPOs defined by number include 2011 firms that completed IPOs in periods of high issuance volume (defined by three month moving averages of monthly counts of IPOs); neutral period IPOs total 1529 in the sample; the remaining 162 cold IPOs were completed in the months that constituted the bottom third in the moving average counts. Hot IPOs defined by SIC include 1842 that completed IPOs in periods of high issuance volume for 9 most frequent SIC Industries, and cold IPOs by SIC include 90 IPOs in the 9 most frequent SIC categories. Firm financial characteristics are from Compustat and are year-end data for the IPO year (see text for details). Adjusted firm characteristics are the median of values for the IPO less the median for the industry, defined by the same 2-digit SIC category, excluding other IPOs in the same year and the previous 5 years. \*\* and \* represent that hot market characteristics are significantly different from cold market characteristics at 99 and 95 percent, respectively, where hot market by number is compared to cold market by number, and hot market by SIC is compared to cold market by SIC. All variables are median values except as denoted.

<u>IPO Characteristics</u>	<u>Markets by Number</u>		<u>Markets by SIC</u>		<u>Adjusted Firm Characteristics</u>			
	<u>HOT</u>	<u>COLD</u>	<u>HOT</u>	<u>COLD</u>	<u>Markets by Number</u>		<u>Markets by SIC</u>	
					<u>HOT</u>	<u>COLD</u>	<u>HOT</u>	<u>COLD</u>
SIC Cluster	.92**	1.03	.90	1.00				
Mean First-day return	27.7**	20.5	30.6*	17.0				
IPO amount (\$million, year 2000)	51.4*	44.2	50.8*	44.2				
IPO amount-to-capital expenditures	9.5**	3.2	10.7**	4.5				
Industry market-to-book	1.6**	1.3	1.8**	1.3				
Industry long-term earnings growth rate	20.0**	15.0	22.5**	19.5				
<u>Firm Financial Characteristics</u>								
Market-to-book	2.5*	2.1	2.8**	2.0	0.87	0.91	1.03	0.76
Long-term earnings growth <sup>1/</sup>	30.0	30.0	35.0	30.0	9.8*	15.5	10.1	14.3
Operating income-to-assets	8.6**	15.9	5.7**	13.9	0.1**	3.8	-1.6*	3.2
Capital expenditures-to-assets	5.0**	9.3	4.6**	7.5	0.8**	3.8	0.6**	2.7
Debt-to-assets	3.8	9.7	2.8**	12.6	-9.1*	-13.0	-9.1*	-10.6
R&D-to-assets	0.8	2.8	4.2	2.9	0.0*	1.3	0.0	0.0
Fixed assets-to-assets	11.2**	19.4	9.5**	18.8	-5.6	-4.8	-5.9*	-3.8
Assets (\$million, year 2000)	108.4**	186.3	106.9*	159.3	10.0*	-17.7	25.4	-1.3
Sales (\$million, year 2000)	72.9**	193.0	61.0**	186.5	-20.6*	-55.9	-13.1	-24.0
<u>Other Firm Characteristics</u>								
Percent with negative earnings (mean)	43.6**	31.1	49.9**	34.4				
Discretionary accruals-to-assets	5.2	5.4	7.7	2.3				
Institutional ownership	15.3**	8.2	15.2*	10.8				
Percent with venture capital (mean)	46.8	41.0	54.7**	38.9				

1. Data available for only 1,302 hot market and 48 cold market IPOs by number, and 1,178 hot and 31 cold market IPOs by SIC.

Table 4

Firm Characteristics and Excess Returns in Years Following the IPO  
for Hot and Cold Market IPOs

The sample consists of all nonfinancial firm IPOs in the SDC database from 1975-2000, except reverse LBOs, unit offerings, spinoffs, IPOs offered at less than \$1 a share, IPO firms that were not listed on Compustat or CRSP, and IPO firms that did not have complete trading data on CRSP at the time of the IPO. Year 1 sample includes IPOs before 2000, year 3 sample includes IPOs before 1998 and year 5 sample includes IPOs before 1996. Year values include firms that fail or are acquired and used the value for the last year the firm is in the sample. Industry-adjusted assets is the median of the difference between firm assets and the median assets for firms in its industry, defined by 2-digit SIC, excluding IPOs and IPOs in and the previous 5 years, as a percent of median assets for firms in its industry. Industry-adjusted operating income, capital expenditures, and sales growth are the difference between the firm value and the median value for firms in its industry. Operating income is operating income before depreciation, as defined on COMPUSTAT research tapes. \* and \*\* denote values are significantly different for hot and cold IPOs at 95 and 99 percent, respectively; + and ++ denote values are significantly different from zero at 95 and 99 percent, respectively.

		Year After IPO		
		<u>Year 1</u>	<u>Year 3</u>	<u>Year 5</u>
Industry-Adjusted Medians (%)				
Oper. Inc.-to-Assets	Hot by number	-0.8 <sup>+</sup>	0.4	-0.8 <sup>+</sup>
	Cold by number	2.5	1.2	0.9
	Hot by SIC	-1.4 <sup>++</sup>	-1.3 <sup>+</sup>	-2.1
	Cold by SIC	2.2	1.2	0.2
Cap. Exp.-to-Assets	Hot by number	2.1 <sup>++,**</sup>	0.6 <sup>++,**</sup>	0.5 <sup>++,**</sup>
	Cold by number	5.0 <sup>++</sup>	2.3 <sup>++</sup>	1.8 <sup>++</sup>
	Hot by SIC	1.9 <sup>++,**</sup>	0.6 <sup>++</sup>	0.5 <sup>++,*</sup>
	Cold by SIC	4.1 <sup>++</sup>	1.6 <sup>++</sup>	2.1 <sup>++</sup>
Assets	Hot by number	20.3 <sup>++</sup>	19.2 <sup>++</sup>	1.1
	Cold by number	5.9	19.1 <sup>++</sup>	32.5
	Hot by SIC	35.4 <sup>++</sup>	30.6 <sup>++</sup>	17.7 <sup>+</sup>
	Cold by SIC	33.5	67.7 <sup>+</sup>	68.9
Sales growth	Hot by number	30.5 <sup>++</sup>	9.4 <sup>++</sup>	5.1 <sup>+</sup>
	Cold by number	24.7 <sup>++</sup>	7.3 <sup>+</sup>	5.9 <sup>+</sup>
	Hot by SIC	32.7 <sup>++</sup>	9.6 <sup>++</sup>	5.1 <sup>++</sup>
	Cold by SIC	27.4	12.2 <sup>+</sup>	10.0 <sup>++</sup>

Table 5

## Probability of Hot Market IPO Defined by Number of IPOs

Values are coefficients from a logit estimation of a hot or cold market IPO defined by number of IPOs. The sample consists of all nonfinancial firm IPOs in the SDC database from 1975-2000, except reverse LBOs, unit offerings, spinoffs, IPOs offered at less than \$1 a share, IPO firms that were not listed on Compustat or CRSP, and IPO firms that did not have complete trading data on CRSP at the time of the IPO. Hot IPOs defined by number include 2011 firms that completed IPOs in periods of high issuance volume (defined by three month moving averages of monthly counts of IPOs); 162 cold IPOs were completed in the months that constituted the bottom third in the moving average counts. Firm financial characteristics are from Compustat and are year-end data for the IPO year (see text for details). Adjusted firm characteristics are the median of values for the IPO less the median for the industry, defined by the same 2-digit SIC category, excluding other IPOs in the same year and the previous 5 years. \*\* and \* represent coefficients are significant at 99 and 95 percent, respectively.

IPO Amount	.07	.15	.02	.10	.10
SIC Cluster	-.95**	-.16	-.71	-.27	-.84
Firm market-to-book	-.05**	-.05**	-.02		.14
Industry market-to-book	3.37**	3.63**	3.43**		8.21**
Firm long-term earnings growth				-.01	
Industry long-term earnings growth				.27**	
Industry-adjusted					
Assets		-.00	-.00	-.00	.00
Operating income-to-assets		-.75	-2.10*	-3.34*	-4.05*
Cap exp-to-assets		-2.61*	-3.42*	-4.82*	-.04
R&D-to-assets		-1.89*	-4.96*	-5.60*	-9.93**
Fixed assets-to-assets		.68	1.51	.82	.42
Negative earnings		-.09	-.20	.07	.21
Discretionary accruals-to-assets		-.03	-.10	-.11	-.22
Institutional ownership			1.99*	2.00*	3.95*
Venture capital			-.43	-.76	-.56
Industry-adjusted					
Operating income-to-assets, year 3					.54
Number of observations	2,172	1,873	1,612	1,116	942

Table 6

## Probability of Hot Market IPO Defined by Underpricing

Values are coefficients from a logit estimation of a hot or cold market IPO defined by IPO underpricing. The sample consists of all nonfinancial firm IPOs in the SDC database from 1975-2000, except reverse LBOs, unit offerings, spinoffs, IPOs offered at less than \$1 a share, IPO firms that were not listed on Compustat or CRSP, and IPO firms that did not have complete trading data on CRSP at the time of the IPO. Hot IPOs include 986 firms with underpricing in the top quartile, more than 25%, cold IPOs include 912 firms with underpricing in the bottom quartile, less than .8%. Firm financial characteristics are from Compustat and are year-end data for the IPO year (see text for details). Adjusted firm characteristics are the median of values for the IPO less the median for the industry, defined by the same 2-digit SIC category, excluding other IPOs in the same year and the previous 5 years. \*\* and \* represent coefficients are significant at 99 and 95 percent, respectively.

IPO Amount	.15*	.22*	.37*	.62**	.35*
SIC Cluster	-.62**	-.71**	-1.05**	-.99**	-.38
Firm market-to-book	.35**	-.33**	.31**		.51**
Industry market-to-book	.39**	.48**	.43*		.91*
Firm long-term earnings growth				.04*	
Industry long-term earnings growth				.07*	
Industry-adjusted					
Assets		.00	.00	-.00	-.00
Operating income-to-assets		-.17	-.21	.37	-.37
Cap exp-to-assets		2.24**	2.36**	2.58*	3.18*
R&D-to-assets		-2.45**	-3.22**	-1.99*	-5.43*
Fixed assets-to-assets		-2.07**	-2.16**	2.96**	-1.60*
Negative earnings		-.00	-.10	-.50	-.41
Discretionary accruals		.01	-.01	.05	.05
Institutional ownership			-.09	-.26	.08
Venture capital			.11	.14	-.29
Industry-adjusted					
Operating income-to-assets, year 3					.32
Number of observations	1,898	1,641	1,399	1,006	667

## Appendix

### Firm and Industry Characteristics at time of IPO for Hot, Cold, and Neutral Market IPOs from 1975-2000

The sample consists of all nonfinancial firm IPOs in the SDC database from 1975-2000, except reverse LBOs, unit offerings, spinoffs, IPOs offered at less than \$1 a share, IPO firms that were not listed on Compustat or CRSP, and IPO firms that did not have complete trading data on CRSP at the time of the IPO. Hot IPOs defined by number include 2011 firms that completed IPOs in periods of high issuance volume (defined by three month moving averages of monthly counts of IPOs); neutral period IPOs total 1529 in the sample; the remaining 162 cold IPOs were completed in the months that constituted the bottom third in the moving average counts. Firm financial characteristics are from Compustat and are year-end data for the IPO year (see text for details). Adjusted firm characteristics are the median of values for the IPO less the median for the industry, defined by the same 2-digit SIC category, excluding other IPOs in the same year and the previous 5 years. \*\* and \* represent that hot market characteristics are significantly different from cold market characteristics at 99 and 95 percent, respectively, where hot market by number is compared to cold market by number. All variables are median values except as denoted.

<u>IPO Characteristics</u>	<u>Markets by Number</u>			<u>Adjusted Firm Characteristics</u>		
	<u>HOT</u>	<u>COLD</u>	<u>NEUTRAL</u>	<u>HOT</u>	<u>COLD</u>	<u>NEUTRAL</u>
SIC Cluster	.92**	1.03	.95			
Mean First-day return	27.7**	20.5	18.6			
IPO amount (\$million, year 2000)	51.1**	42.4	47.6			
IPO amount-to-capital expenditures	9.5**	2.8	7.4			
Industry market-to-book	1.6**	1.3	1.5			
Industry long-term earnings growth rate	20.0**	15.0	20.0			
<u>Firm Financial Characteristics</u>						
Market-to-book	2.5*	2.1	2.4	0.87	0.91	0.80
Long-term earnings growth $\frac{1}{t}$	30.0	30.0	30.0	9.8*	15.5	9.5
Operating income-to-assets	8.6**	15.9	11.1	0.1**	3.8	1.9
Capital expenditures-to-assets	5.0**	9.3	5.6	0.8**	3.8	1.3
Debt-to-assets	3.8**	9.7	6.4	-9.1*	-13.0	-10.0
R&D-to-assets	0.8	2.8	0.8	0.0*	1.3	0.0
Fixed assets-to-assets	11.2**	19.4	12.8	-5.6	-4.8	-5.9
Assets (\$million, year 2000)	108.4**	186.3	127.8	10.0*	-17.7	19.7
Sales (\$million, year 2000)	72.9**	193.0	106.0	-20.6*	-55.9	-16.6
<u>Other Firm Characteristics</u>						
Percent with negative earnings (mean)	43.6**	31.1	38.7			
Discretionary accruals-to-assets	5.2	5.4	6.5			
Institutional ownership	15.3**	8.2	15.5			
Percent with venture capital (mean)	46.8	41.0	44.5			

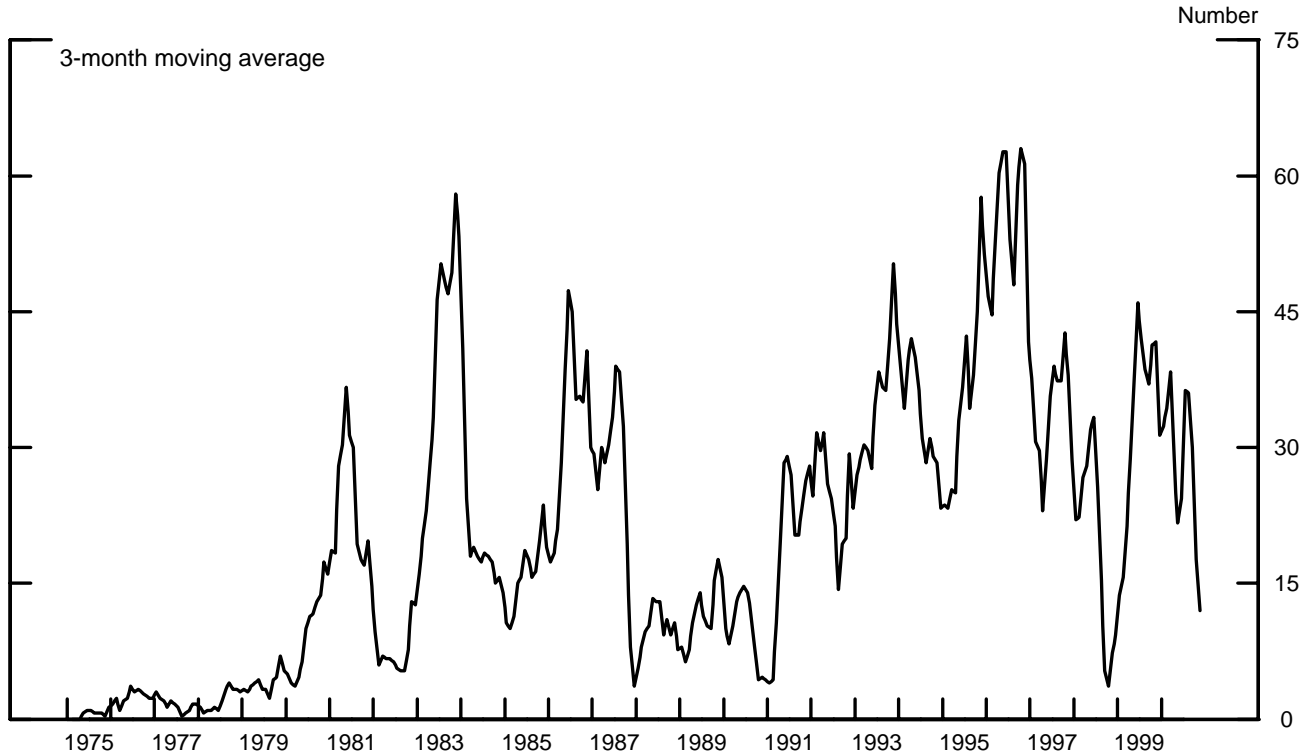
1. Data available for only 1,302 hot market, 48 cold market and 874 neutral market IPOs by number.



Figure 1  
**Number of IPOs and Underpricing**

The sample for number of IPOs consists of 6,419 firm-commitment, non-financial IPOs in the SDC database from 1975-2000, except reverse LBOs, spinoffs, and IPOs offered at less than \$1 a share. The sample for IPO underpricing consists of first-day return data on 4,235 firms that were found on CRSP of the 6,419 firms in the sample for number of IPOs.

Number of IPOs



IPO Underpricing

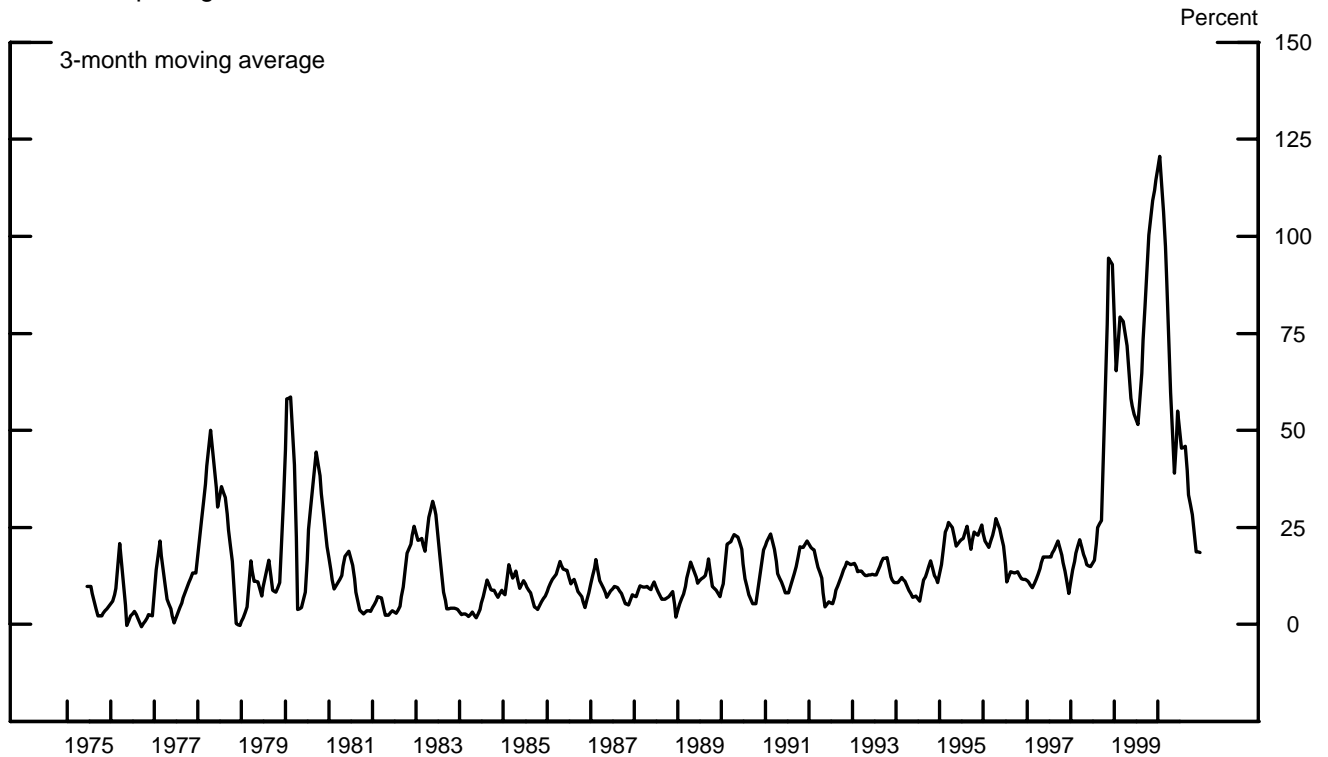
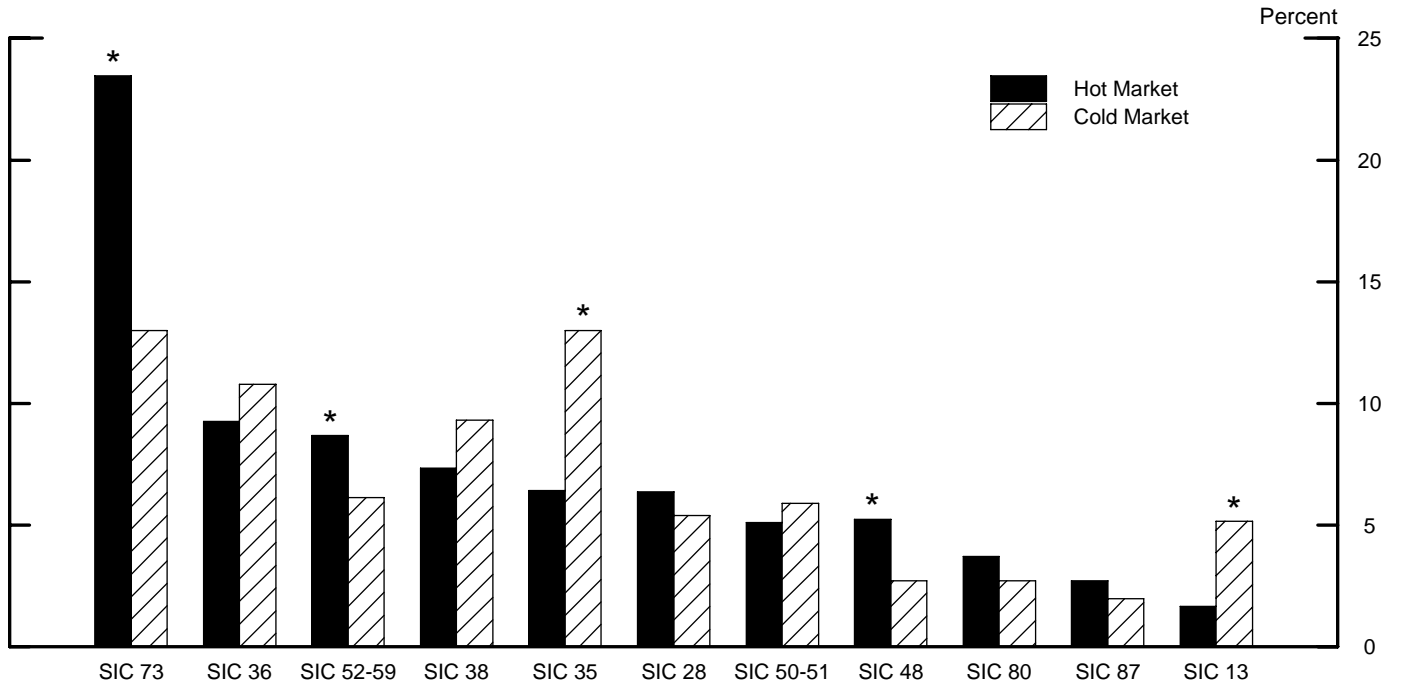


Figure 2  
**IPOs by Industry, 1975-2000**

The sample consists of 6,419 firm-commitment, non-financial IPOs from 1975-2000, except reverse LBOs, spinoffs, and IPOs offered at less than \$1 a share. SIC codes are from the Directory of Companies Required to File Annual Reports with the SEC.



\* Significantly different at 95% confidence interval.

The industries shown account for 80 percent of IPOs in hot markets and 76 percent of IPOs in cold markets.

Figure 3  
**Hot IPO Markets Defined by SIC and Hot and Cold Markets by Number**

The sample consists of 6,419 firm-commitment, non-financial IPOs from 1975-2000, except reverse LBOs, spinoffs, and IPOs offered at less than \$1 a share. Hot and cold markets by number are based on the top quartile and lower third, respectively, of three-month centered moving averages of the number of IPOs for each month. Hot markets by SIC are defined for each 2-digit SIC industry; based on the top quartile of three-month centered moving averages of the number of IPOs in each SIC category. SIC 73 has 1294 IPOs, SIC 36 has 650 IPOs and SICs 52-59 have 558 IPOs. SICs 38, 35, and 28 each have between 428 and 475 IPOs. SICs 50-51 have 319 IPOs, SIC 48 has 283 IPOs, and SIC 80 has 259 IPOs.

