How Persistent Is the Impact of Market Timing on Capital Structure?*

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Abstract

This paper examines the capital structure implications of market timing. I isolate timing attempts in a single major financing event, the initial public offering, by identifying market timers as firms that go public in hot issue markets. I find that hot-market IPO firms issue substantially more equity than cold-market firms do. The difference represents a genuine timing effect, as it cannot be explained by firm-level or industry characteristics. Market timing depresses the leverage ratio significantly in the very short-run. However, the timing effect on leverage quickly reverses. Immediately after going public, hot-market firms start increasing their leverage ratios by issuing more debt and less equity relative to cold-market firms. This active reversal policy is strongly visible for two years. At the end of the second year following the IPO, the market timing impact on leverage completely vanishes. The results contrast with recent findings that suggest high persistence of market timing effects on capital structure.

Equity market timing is one of the primary factors that shape corporate financing decisions. A large body of work documents the tendency of firms to issue equity when the cost of equity capital appears to be temporarily low. The evidence is convincing. Studies on market valuations around equity issues are complemented by other findings such as the long-run underperformance of the issuers, or survey results of managers.[1] While the collective evidence makes a strong case for the presence of market timing attempts, quantifying their impact on financing activity is difficult. Most direct tests of market timing are based on the positive relationship between market valuations of firms and their equity issues. However, a host of other factors that affect financing policy are likely to contribute to this relationship. For example, firms with growth opportunities, which typically have high market values relative to book assets, may use relatively more equity financing in order to maintain financial flexibility. Answering quantitative questions requires a market timing measure that is not so closely tied to other determinants of financing policy.

A research question that has recently received considerable attention is the long-term impact of market timing on capital structure. The importance of the issue cannot be overstated. If true, high persistence of market timing effects would imply very loose leverage targets, suggesting a minimal role for traditional determinants of capital structure. In their influential study, Baker and Wurgler (2002) raise the persistence question and offer a striking answer. Identifying market timers as those firms that have a history of raising capital at high market-to-book ratios, Baker and Wurgler find persistent timing effects on leverage that extend beyond ten years. However, their market timing measure is subject to the same criticism that applies to previous studies. A history of concurrent increases in external funding needs and the market-to-book ratio is likely to proxy for underlying firm characteristics, most notably the long-term growth traits, that dictate low optimal leverage ratios. To the extent that contemporaneous control variables are noisy proxies for these characteristics, history may spuriously seem to matter for capital structure. The need to isolate market timing is especially important in analyzing its long-term effects on leverage.

In this paper, I focus on a single financing event, the initial public offering, in an attempt to capture market timing and its impact on capital structure. The IPO market constitutes a natural laboratory to analyze market timing for a number of reasons. First, going public is arguably the single most important financing event in the life of a public firm. Therefore the payoff from

[1] See Section I for a detailed review of prior evidence on market timing.

correctly timing the IPO, whether real or as perceived by the issuer, is potentially quite high. Second, investors face more uncertainty and a higher degree of asymmetric information in valuing IPO firms than they do in the case of mature public companies. Hence IPOs offer more room for misvaluation, which is at the root of timing considerations. Third, and most importantly, timing attempts are nowhere more apparent than in the IPO market. Perhaps as a result of the first two reasons suggested above, cycles in IPO volume are much more pronounced and pervasive than cycles for other types of financing activity.[2] Hence, the IPO sample is likely to be highly revealing of pure market timing motives that are distinct from long-range financing policy requirements.

My measure of market timing is direct and very simple: whether the IPO takes place in a hot issue market, characterized by high IPO volume in terms of the number of issuers, or a cold one. If issuers regard hot markets as windows of opportunity with temporarily low cost of equity capital, they should react by issuing more equity than they would otherwise. Conversely, cold-market IPOs are likely to keep their equity issues to a necessary minimum, as the market conditions are less favorable than average. Hence I attempt to capture market timing behavior by linking the amount of equity an IPO firm issues to whether the market is hot or cold at the time of its offering. Quantifying market timing attempts this way has the advantage of not picking up firm-level characteristics; the timing measure is instead a function of market conditions. If it exists, a significant hot-market effect on equity issues is likely to depress the leverage ratio in the short-run. The main question of interest is whether the impact persists, i.e., whether hot-market firms continue to have low leverage ratios in years subsequent to their IPOs.

I find a substantial hot-market effect on the amount of equity issued by IPO firms. The average cold-market firm's IPO proceeds amount to about 54% of its pre-IPO asset value. The same ratio for the average hot-market firm is 76%, a 40% increase over cold markets. More importantly, the hot-market effect is almost completely orthogonal to other factors that are known to affect equity issues. The difference in the equity issue amounts of hot- and cold-market firms remains virtually the same in size and statistical significance after controlling for industry effects and various firm characteristics that previous studies identified to be important determinants of financing policy. Thus focusing directly on market conditions proves to be highly effective in isolating the timing

[2]Ibbotson and Jaffe (1975), Ritter (1984), and Ibbotson, Sindelar, and Ritter (1988, 1994) document the sharp hot-cold market cycle in IPOs. Helwege and Liang (2004) show that hot markets attract firms from a variety of industries with different characteristics.

behavior.

Further findings support this view. Hot- and cold-market firms do not differ in their pre-IPO leverage levels, so avoiding financial distress is not the likely cause of issuing more equity in hot markets. Differences in growth characteristics do not explain the hot-market effect either: if anything, hot-market firms invest less than their cold-market counterparts in the IPO year, and they invest in similar ways in subsequent years. The additional equity hot-market firms issue mainly adds to their cash balances. This is consistent with the idea that market timers issue more equity than their capital needs dictate. Finally, hot- and cold-market firms differ substantially in the dividends they pay in the IPO year. As one would expect, IPO firms have no or very low dividend payout for several years after going public; and the same is true for most cold-market issuers in the IPO year as well. The exception is a sizeable fraction of hot-market firms, which pay their pre-IPO shareholders large special dividends financed out of IPO proceeds. The finding reflects issuers' perception of hot markets as windows of opportunity that allow their shareholders to liquidate their positions relatively easily.

After establishing the hot-cold market classification as a timing measure, I turn to the capital structure implications of market timing. Not surprisingly, market timing depresses leverage in the very short-run. While leverage ratios decline substantially at the IPO in both hot and cold markets, the decline is significantly larger for hot-market firms. After controlling for firm and industry characteristics, hot-market firms appear to be about 3.7 percentage points more underleveraged than cold-market firms are as of the end of the IPO year.

The negative impact of market timing on leverage has very low persistence. One year after the IPO, only about one half of the effect remains. Two years after the IPO, the hot-market effect is completely reversed. Hence market timing appears to have only a short-term impact on capital structure. An analysis of financing activity in these two years reveals that hot-market firms follow an active policy of reversing the timing effect on leverage. Cold-market issuers are content with the leverage ratios they attain at the IPO; they do not significantly change leverage thereafter. In contrast, hot-market firms increase leverage substantially in the two years following their IPOs. Both debt and equity issues account for this reversal; hot-market firms issue significantly more debt and less equity relative to their cold-market counterparts. At the end of the second year after the IPO, hot- and cold-market firms become indistinguishable in their leverage ratios.

Accordingly, differences in equity and debt issue activity disappear from that point on.

Overall, the results are consistent with a modified version of the traditional trade-off view on capital structure, one that also includes market timing as a short-term factor. Market timing plays a very important role in shaping financing activity and as a result leads to short-term deviations from leverage targets. But these deviations quickly reverse, suggesting that the trade-offs underlying the targets have non-negligible effects on firm value. The results do not support the view in Baker and Wurgler (2002) that capital structure is largely the cumulative outcome of past attempts to time the equity market.

The remainder of the paper is organized as follows. Section I provides an overview of prior research on market timing. Section II describes the data. The empirical analyses of market timing and its impact on capital structure are presented in Section III. Section IV concludes.

I. Measures of Market Timing

Evidence for market timing comes from a variety of different sources. Starting with Taggart (1977), several studies have demonstrated the tendency of firms to issue equity when their market valuations are high relative to book values or past market values.[3] This line of research utilizes forward-looking market timing measures. As discussed above, however, proper interpretation of the findings is made difficult by the confounding effects of other determinants of financing policy. An alternative approach to detecting overvalued equity sales is to analyze the subsequent stock return performance of issuers. Ritter (1991) and Loughran and Ritter (1995) document that IPOs and seasoned equity issues underperform their benchmarks in the long-run. Underperformance is more pronounced for hot-market IPOs (Ritter (1991)) and the IPOs of firms for which analysts initially forecast high growth (Rajan and Servaes (1997)). These findings provide further justification for focusing on hot-cold market differences to capture timing effects.[4] Finally, survey evidence in Graham and Harvey (2001) reveals market timing to be a primary concern of

[3]Market timing is detected based on past stock returns in the earlier studies of Taggart (1977), Marsh (1982), Jalilvand and Harris (1984), and Asquith and Mullins (1986). More recent studies such as Rajan and Zingales (1995), Jung, Kim, and Stulz (1996), Pagano, Panetta, and Zingales (1998), and Hovakimian, Opler, and Titman (2001) focus on the market-to-book ratio to capture timing attempts.

[4]It should be emphasized, however, that the current analysis does not make use of any post-issue information in identifying market timers. It may as well be the case that a positive payoff to timing exists only in the perception of issuers. Therefore my focus is on the identification, not the success, of market timing attempts.

corporate executives. CFOs admit that timing considerations play a very important role in their financing decisions.

Given their emphasis on the persistence of timing effects, Baker and Wurgler (2002) attempt to capture market timing by focusing on the historical market-to-book series. Specifically, their timing measure is a weighted average of the firm's past market-to-book ratios, where the weights are the past amounts of external capital raised by the firm. The idea is to identify as market timers those firms that raised most of their capital at high market valuations. Baker and Wurgler show that their historical timing variable predicts current and future leverage ratios. To prevent a spurious link due to correlation between the timing measure and investment opportunities, Baker and Wurgler detect this predictive power in regressions that control for the market-to-book ratio at the time leverage is observed. However, this control is likely to be very noisy. In addition to growth prospects, market-to-book ratio is affected by a number of other factors, such as the current state of the economy, or capital intensiveness of the firm's technology. As a result two firms with identical market-to-book ratios may differ substantially in their growth potential. If one of these firms has a repeat history of raising capital at high market-to-book ratios, it is more likely to be a growth firm, as the past financing activity is consistent with a growth trend. Even if the current investment prospects are dim, such a firm may keep the leverage ratio low in order to maintain financial flexibility for the future.

In recent work, Kayhan and Titman (2004) also make the point that the significance of the historical market-to-book series in leverage regressions may be due to noise in the current market-to-book ratio. They propose market-to-book-based timing measures that are in the spirit of Baker and Wurgler's and show that the persistence results may not be robust to these alternative specifications. Similarly, Leary and Roberts (2004) argue against history effects by providing evidence that firms attempt to rebalance leverage to stay within an optimal range. Developing a different line of criticism, Hennessy and Whited (2004) question the interpretation, rather than the robustness, of history effects on capital structure. Hennessy and Whited (2004) show that a dynamic trade-off model with no market timing opportunities is able to replicate the empirically observed link between the historical market-to-book series and current leverage. In their model, a high market-to-book firm finances growth with equity to avoid financial distress. Once profitable, such a firm finds a leverage increase unattractive for personal tax reasons, as

issuing debt necessitates increasing payout to equity holders.

By identifying hot-market IPO firms as market timers, this paper attempts to avoid the concerns surrounding the use of the market-to-book ratio. There are two versions of the market timing hypothesis that appear in previous studies. The idea that hot markets reflect timing attempts is consistent with both of them. The first version of the hypothesis obtains under time-varying mispricing in the equity market. Whether real or perceived to be present only by the issuer, the opportunity to sell overvalued stock induces firms to use more equity capital than usual. Under this interpretation, hot markets are periods of high market valuations relative to fundamentals, at least from the viewpoint of the firms, and this leads to a clustering of equity issues. The second version of market timing is based on the adverse selection problem of Myers and Majluf (1984) extended to a dynamic framework. Lucas and McDonald (1990) and Korajczyk, Lucas, and McDonald (1992) examine the timing of equity issues when adverse selection costs vary across firms and in time. In these analyses, investors and managers are rational, but nevertheless timing opportunities arise as the degree of asymmetric information changes. Under this interpretation, hot markets correspond to periods of low adverse selection costs.[5]

Potentially, measuring market timing through hot-market clustering is subject to concerns similar to those that arise for measures based on market valuations, though possibly to a lesser extent. For example, hot-market firms may have high growth potential that is not fully reflected by widely-used control variables for target leverage. Prior evidence shows that this is not likely to be a concern; there are few differences in the operating characteristics of hot- versus cold-market firms (Helwege and Liang (2004)). Nevertheless, the analysis below evaluates alternative hypotheses in this regard and provides comparative results for the hot-market-based and the market-to-book-based identifications of market timers.

[5]Loughran and Ritter (1995) compare these two explanations for market timing and favor the one based on mispricing. They argue that there is too little time variation in adverse selection costs to induce the observed timing behavior.

II. Data

A. Sample Construction and Summary Statistics

The initial sample consists of all IPOs between January 1, 1971 and December 31, 1999 reported by the Securities Data Company (SDC). I restrict the sample to exclude spin-offs, unit offers, financial firms with SIC codes between 6000 and 6999, and firms with book values of assets below $10 million in 1999 dollars at the end of the IPO year. I further restrict the sample to those firms for which COMPUSTAT data is available for the last fiscal year before the IPO. Firms are included in the sample until the first year they exit COMPUSTAT. The data ends with fiscal year 2002. Firm-year observations that are outliers with regard to various firm characteristics are dropped. These restrictions are described below.

Variable definitions are as follows. *Book debt D* is defined as total liabilities (COMPUSTAT Annual Item 181) and preferred stock (Item 10, replaced by the redemption value of preferred stock (Item 56) when missing) minus deferred taxes (Item 35) and convertible debt (Item 79). *Book Equity E* is total assets (Item 6) minus book debt. *Book leverage D/A* is then defined as book debt divided by total assets. Firm-year observations where book leverage exceeds 100% are dropped. Market-to-book ratio M/B is book debt plus market equity (common shares outstanding (Item 25) times share price (Item 199)) divided by total assets. As in Baker & Wurgler (2002), I drop observations where M/B exceeds 10.0.

Net debt issues d/A is the change in book debt. Net equity issues e/A is the change in book equity minus the change in retained earnings (Item 36). Newly retained earnings $\Delta RE/A$ is the change in retained earnings. Profitability is measured by *EBITDA*, which is earnings before interest, taxes, and depreciation (Item 13). *SIZE* is the logarithm of net sales (Item 12) in millions of 1999 dollars. Asset tangibility *PPE* is defined as net plant, property, and equipment (Item 8). *R&D* is research and development expense (Item 46, replaced by zero when missing). In regression analyses below, a dummy variable *RDD* takes the value of one when Item 46 is missing. *INV* denotes capital expenditures (Item 128). *DIV* is common dividends (Item 21) divided by year-end book equity. *CASH* is defined as cash and short-term investments (Item 1). The variables d/A, e/A, $\Delta RE/A$, *EBITDA*, *PPE*, *R&D*, *INV*, and *CASH* are normalized by fiscal-year-end total assets. I drop firm-year observations where d/A, e/A, $\Delta RE/A$, *EBITDA*, *INV*, or *DIV* exceed

100% in absolute value.

Table I summarizes firm characteristics and financing decisions. All variables except *M/B* and *SIZE* are expressed in percentage terms. The analysis is conducted in IPO time. I define the IPO year as the fiscal year in which the IPO takes place. Year IPO+k is then the k'th fiscal year after the IPO. The patterns displayed in Table I are consistent with findings in previous studies. Book leverage declines substantially in the IPO year, and slightly increases thereafter. Size increases with age, whereas the investment rate and the market-to-book ratio decrease. As documented by Jain and Kini (1994) and Mikkelson et al. (1997), there is a significant reduction in profitability around the IPO year. Cash balances double with the infusion of new capital in the IPO year, and steadily decline in the subsequent years.

B. Definition of Hot and Cold Markets

I define hot and cold markets based on the monthly IPO volume. Specifically, I use the SDC sample before the imposition of COMPUSTAT data requirements to determine the number of IPOs for each month between January 1971 and December 1999. To smooth out seasonal variation, I take a three-month centered moving average of the number of IPOs for each month. Since the economy grew by about 3% per annum over the 29-year period, I de-trend the monthly moving average IPO volume at a rate of 0.25% per month. *Hot months* are then defined as those that are above the median in the distribution of the de-trended monthly moving average IPO volume across all the months in the sample. *Cold months* are those that are below the median. For each IPO in the sample described in Section II.A, a dummy variable *HOT* takes the value of one if the firm goes public in a hot month, and zero otherwise. The variable *HOT* is the main focus of this study in measuring market timing attempts of firms.

Figure 1 plots the de-trended monthly moving average IPO volume from 1971 to 1999. The horizontal line is the median at 9.37. As the figure illustrates, hot and cold months differ substantially in terms of number of IPOs. In the main sample of 2,200 IPOs, 1,891 occur in hot months (86% of the sample). 309 IPOs, or 14% of the sample, take place in cold months.

III. Market Timing and Its Impact on Capital Structure

A. Do Hot Markets Reflect Timing Attempts?

In the IPO context, market timing has two related implications. First, firms are more likely to go public when entrepreneurs perceive the market conditions to be favorable. Second, firms that go public when the market is favorable are likely to sell more equity than they would had they gone public when the market conditions were unfavorable. The market timing measure of the current analysis, the variable *HOT*, is constructed based on the first implication. This section presents evidence on the second implication by examining the effect of market timing on the amount of equity issued at the IPO.

I measure the amount of equity issued at the IPO using two different variables. The first one is $Proceeds^P/A_t$, defined as the IPO proceeds from the sale of primary shares divided by IPO-year-end total assets. This variable captures the amount of new equity capital the firm raises by going public. The second variable is $Proceeds^T/A_t$, defined as the total IPO proceeds divided by IPO-year-end total assets. Since some of the shares sold at the IPO are secondary shares held by insiders, total proceeds typically exceed the proceeds from the sale of primary shares. By including insiders' sales, $Proceeds^T/A_t$ captures an aspect of market timing that $Proceeds^P/A_t$ may not reflect.

Panel A of Table II reports the mean values of $Proceeds^P/A_t$ and $Proceeds^T/A_t$ for hot- versus cold-market firms. Both measures indicate that hot-market firms sell substantially more equity than cold-market firms do. For example, proceeds from the sale of primary shares are on average about 29% of IPO-year-end total assets for cold-market firms. The same ratio for hot-market firms is 38.53%, an increase of 33% relative to cold markets. Total IPO proceeds of hot- versus cold-market firms exhibit a similar difference. In both cases the differences are highly significant. Furthermore, even these estimates are likely to be conservative. The additional equity issued by a hot-market firm mainly adds to assets. Therefore normalizing proceeds by the IPO-year-end assets dampens the hot-market effect. The third column of Table II reports the mean values for $Proceeds^P/A_{t-1}$, defined as the proceeds from the sale of primary shares divided by total assets at the beginning of the IPO year.[6] As expected, the market timing effect when measured relative

[6] As before, observations where total assets are below \$10 million in 1999 dollars are dropped to eliminate outliers.

to pre-IPO assets is even larger. Proceeds from primary shares of the average cold-market firm are about 54% of its pre-IPO assets. In contrast, the proceeds of the average hot-market firm are 75.61% of its assets, a 40% increase relative to cold-market issuers. The timing effect is statistically highly significant.

The hot-market effect on the amount of equity issued can potentially be due to differing characteristics of hot- versus cold-market firms. To address this concern, I run the following regression that controls for various determinants of equity issues:

$$\begin{aligned} Y_t &= c_0 + c_1 HOT + c_2 M/B_t + c_3 EBITDA_{t-1} + c_4 SIZE_{t-1} + c_5 PPE_{t-1} \\ &\quad + c_6 R\&D_{t-1} + c_7 RDD_{t-1} + c_8 \left(\frac{D}{A}\right)_{t-1} + \varepsilon_t, \end{aligned} \tag{1}$$

where t is the IPO year, and the regression is run in the cross-section of IPOs. Above, the dependent variable Y_t is $Proceeds^T/A_t$, $Proceeds^P/A_t$, or $Proceeds^P/A_{t-1}$. The dummy variable HOT captures the market timing effect. The control variables include market-to-book, profitability, size, tangibility of assets, research and development expense, and lagged book leverage. Previous research has identified these factors as the main determinants of financing policy (Titman and Wessels (1988), Rajan and Zingales (1995)). The dummy variable RDD takes the value of one when $R\&D$ is missing in COMPUSTAT. All firm characteristics are lagged one year, with the exception of market-to-book ratio which is observed in the IPO year for the first time. To further control for heterogeneity in industry characteristics, this and all subsequent regressions include industry fixed effects defined by three-digit SIC codes.

The first three columns in Panel B of Table II report the results. The results confirm that the tendency of hot-market firms to issue more equity is a genuine timing effect. Various firm characteristics are highly significant determinants of equity issue activity; furthermore, industry-level variation is already accounted for. Nevertheless, the hot-market effect retains both its size and significance. In all three columns, the coefficient of HOT in (1) is almost identical to the difference in means displayed in Panel A. The significance of the timing effect in fact increases after introducing the controls.

The positive hot-market effect on the amount of equity issued may reflect higher prices (relative to the book value of assets) obtained in hot markets, larger ownership fractions offered for sale,

or both. The price effect is consistent with market timing, but it could also obtain if intangible assets play a relatively more important role in the valuation of hot-market firms. The quantity effect captures market timing attempts more directly. To examine these two effects separately, I decompose the primary proceeds measure $Proceeds^P/A_t$ into its quantity and price components:

$$\frac{Primary\ Proceeds}{Total\ Assets} = \frac{Primary\ Shares\ Issued}{Number\ of\ Shares\ Outstanding} \times \frac{Offer\ Price}{Per\ Share\ Book\ Value\ of\ Assets}. \quad (2)$$

The first term on the right-hand side of (2) measures the fraction of firm ownership sold via the issuance of primary shares. The second term is the offer price as a multiple of book value of assets. Columns four and five in Table II report the mean values and regression results for these two variables. The hot-market effect is significantly positive in both cases: hot-market issuers sell more shares at the IPO, and do so at higher prices relative to book value of assets, compared to their cold-market counterparts.[7]

The last column in Table II reports the net debt issues of hot- and cold-market firms in the IPO year. While the mean values are small for both groups, the hot-market effect is significantly negative. This is consistent with the idea that hot-market firms find the equity market conditions more favorable than the debt market conditions in the IPO year.

Hot-market firms could issue more equity than their cold-market counterparts for reasons other than market timing. First, hot-market firms may be severely over-leveraged before going public, and may attempt to adjust back to their leverage targets at the IPO. Although the regression specification (1) controls for pre-IPO book leverage, it is instructive to see whether hot-market firms have higher leverage prior to the IPO. The first column in Panel A of Table III reports the mean book leverage for hot- and cold-market firms at the beginning of the IPO year. The two groups of firms are very similar in their leverage ratios prior to the IPO. In Panel B, book leverage at the beginning of the IPO year is regressed on the hot-market dummy and the same control variables as in (1) except the market-to-book ratio. The coefficient of the hot-market dummy is negative and not significant, indicating that hot-market firms do not deviate from their leverage

[7]The hot-market price effect in column five is a conservative estimate of the actual price effect. This is because the regression specification controls for the IPO-year-end market-to-book ratio, which is highly correlated with the dependent variable offer price/book value ratio. When the same regression is estimated without the market-to-book ratio, the coefficient on the hot market dummy increases to 0.29 (with a t-statistic of 5.28; not reported in the table).

targets any more than cold-market firms do prior to the IPO.

Another potential explanation for the equity issue activity of hot-market firms is that they grow faster. If hot-market firms invest at higher rates, or expect to do so in the near future, then they are likely to finance part of this growth by raising equity capital. The second column in Table III characterizes the investment behavior of firms in the IPO year. Contrary to the financing needs explanation, the mean investment rate is in fact lower for hot-market firms. The difference in investment rates is statistically significant after controlling for firm and industry characteristics. The next two columns replicate the analysis for investment rates in the two years subsequent to the IPO. There is no evidence that hot-market firms invest more after the IPO year either. Therefore the tendency of hot-market firms to issue more equity does not seem to be related to their real investment behavior.[8]

The investment regressions also point to an important drawback of using market-to-book ratio as a measure of market timing. Firms that have higher market-to-book ratios invest significantly more. Thus the relationship between the market-to-book ratio and equity issues is likely to obtain due to growth firms' tendency to use more equity financing. Focusing instead on market conditions around equity issues seems to do a better job of isolating the market timing effects, as hot- and cold-market firms do not differ in their future investment activity.

Columns five to eight in Table III report the profitability of hot- versus cold-market firms at the time they go public and in the subsequent years. Favorable market conditions may trigger IPOs of less profitable firms if these firms find it difficult to go public when the IPO market is less active. Supporting this view, Table III shows that the hot-market IPO firms are less profitable than their cold-market counterparts. The low profitability of the hot-market firms persists well beyond the IPO year.

Further evidence of market timing comes from the dividends hot-market firms pay in the IPO year. The last column in Table III shows that the average IPO-year dividend payout of hot-market firms is 3.12% of IPO-year-end book equity, a surprisingly high ratio for young firms. Table IV provides a closer look at the IPO-year dividend payout. As one would expect, the majority of the firms in the sample do not pay any dividends in the IPO year. However the fraction of payers,

[8]Unreported results show that using alternative investment measures (defining investment more broadly as growth in assets, or normalizing investment relative to net PPE instead of total assets) does not change the main conclusion: hot- and cold-market firms do not differ in their real investment rates.

about 22%, is quite large. Therefore the high dividend payout of hot-market firms is not due to a few outliers. Panel B of Table IV shows that the positive payout ratios represent special rather than regular dividends in most cases.[9] Furthermore, the frequency of special dividends is substantially higher among hot-market issuers. An examination of IPO filings reveals that such special dividends are typically financed out of the IPO proceeds.[10,11] The fact that firms tend to follow this policy predominantly in hot markets is consistent with the market timing hypothesis: issuers view hot markets as windows of opportunity for selling equity relatively easily, and hence feel confident to proceed with an offering whose proceeds will largely finance a special dividend. Convincing IPO investors to such a transaction appears to be more difficult in a cold market.

Prior literature has interpreted the positive relationship between the market-to-book ratio and equity issues as evidence of market timing. How does the hot-market effect compare to the market-to-book ratio in explaining IPO firms' equity issues? From Table II, the coefficient of M/B in the $Proceeds^P/A_t$ regression is 1.82. The standard deviation of M/B in the IPO cross-section is 1.45 (Table I). Hence a one standard deviation increase in market-to-book ratio is associated with a 2.64 percentage point increase in IPO proceeds. Clearly, market timing does not account for all of the cross-sectional variation in market-to-book. In particular, growth prospects of firms directly affect their market-to-book ratios. Furthermore, variation in market-to-book that is not due to market timing is likely to relate to factors that affect equity issues (e.g., high growth firms may issue more equity to maintain financial flexibility). The market timing measure of the current analysis is the hot-market dummy, which has a positive effect of 8.66 percentage points on $Proceeds^P/A_t$ (Table II). As the findings of this section demonstrate, the hot-market effect does not relate to firms' growth prospects or other characteristics, and hence is not subject to the concerns that cloud the interpretation of market-to-book results. It appears that the hot-cold market classification characterizes the market timing phenomenon in a stronger and more robust way than market-to-book ratio does.

[9] Regular dividend payers are identified as those firms that pay at least two dividends within twelve months after going public.

[10] IPO filings are available at the SEC website at http://www.sec.gov/edgar.shtml.

[11] Most of the special dividend payers are S-corporations prior to the IPO. An S-corporation is a pass-through entity with no corporate taxation. Its shareholders pay personal taxes on the firm's income in the year it is earned, regardless of whether the income is distributed or retained. Therefore many S-corporations have accumulated undistributed income on their books at the time of their IPOs. Since receiving this sum is a tax-free event, whereas selling shares (at the IPO or in the future) is subject to capital gains taxation, S-corporation shareholders have a tax incentive to liquidate through special dividends at the IPO.

To summarize, IPO market volume is a highly significant indicator of market timing attempts of individual firms. Firms that go public in hot markets issue a lot more equity than those that go public in cold markets. This hot-market effect does not stem from any differences in leverage prior to the IPO, or external financing needs subsequent to the IPO. The prevalence of large special dividends among hot market issuers provides further evidence that market timing, as opposed to financing or investment needs, drives the hot-market effect on equity issues.[12]

B. The Short-Term Impact of Market Timing on Capital Structure

The findings above show that market timing affects not only the total IPO proceeds (which includes insiders' sales), but also the amount of new equity capital raised by the firm. Therefore the impact of market timing on leverage in the IPO year is likely to be negative. This section quantifies this negative effect, and analyzes how it relates to other changes in the balance sheet of the firm.

I start with the change in book leverage in the IPO year. The first column of Panel A in Table V reports the mean change in book leverage for hot- and cold-market firms. Not surprisingly, book leverage declines substantially in both cases. Hot-market firms, however, reduce leverage by about 3.5 percentage points more than cold-market firms do. To better evaluate the hot-market effect, I next run the following regression that controls for other determinants of leverage changes:

$$\begin{aligned}\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} &= c_0 + c_1 HOT + c_2 M/B_t + c_3 EBITDA_{t-1} + c_4 SIZE_{t-1} + c_5 PPE_{t-1} \\ &\quad + c_6 R\&D_{t-1} + c_7 RDD_{t-1} + c_8 \left(\frac{D}{A}\right)_{t-1} + \varepsilon_t. \end{aligned} \tag{3}$$

Panel B of Table V reports the coefficient estimates. After controlling for the firm and the industry characteristics, the hot-market effect on the change in book leverage in the IPO year is a highly significant -3.57 percentage points.

[12] There is one possibility not considered in this section that can potentially explain why hot-market firms differ in their equity issue activity from cold-market firms. If recapitalization is costly, firms are likely to set their leverage ratios considering not only a snapshot of their operating characteristics, but also the anticipated changes in these characteristics. Then, to the extent that hot- versus cold-market firms differ in their expectations about the future, they may pick different leverage ratios and hence issue differing amounts of equity. Since this hypothesis closely relates to capital structure dynamics, it is considered in greater detail below in Section III.D, where the persistence of market timing effects on capital structure is examined.

The change in leverage can be decomposed as follows:

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = -\left(\frac{e}{A}\right)_t + \left(\frac{E}{A}\right)_{t-1} \times \left(\frac{\Delta Cash + \Delta Other\ Assets}{A}\right)_t - \left(\frac{\Delta RE}{A}\right)_t. \quad (4)$$

The first term on the right-hand side of (4) is the negative of the net equity issues in year t.[13] If all of the new equity capital is used to pay down the debt, then the change in leverage resulting from equity issues equals the negative of the amount issued. But to the extent that the new equity capital adds to total assets, the reduction in leverage is less than one-for-one. The second term captures this effect through the growth in assets. It is further decomposed into the change in cash and the change in other assets. If market timers raise more equity capital than needed, then the proceeds are more likely to add in the short-run to cash and short-term investments than to other, longer-term assets. The final term in (4) is the change in retained earnings. Newly retained earnings add to the equity capital and hence reduce leverage.

The second to fifth columns in Table V report the mean values and the regression analyses for the terms on the right-hand side of (4).[14] In line with the results of Section III.A, the IPO-year net equity issues $(e/A)_t$ is substantially higher for the hot-market IPOs. The additional equity hot-market firms issue largely adds to their cash balances. The hot-market effect on the change in cash is 2.42 percentage points, and is highly significant. The change in long-term assets, on the other hand, is not affected by whether the firm goes public in a hot or a cold market. The lower profitability of hot-market issuers results in a negative hot-market effect on the IPO-year retained earnings.

The overall picture that emerges from the results discussed so far is as follows. Hot-market firms issue significantly more equity and less debt in the IPO year than cold-market firms do. As a result, the drop in the book leverage ratio is larger for hot-market firms. Part of this hot-market effect on leverage is masked by the higher retained earnings cold-market firms generate. Hot- and cold-market firms do not differ in the way they convert the new equity capital into illiquid assets. The additional equity hot-market firms issue primarily affects the cash and other liquid assets

[13] Notice that $(e/A)_t$ is not the same as the $Proceeds^P/A_t$ measure in Section III.A, as $(e/A)_t$ is calculated based on the total change in book equity in the IPO year and hence it includes other forms of equity issuance (e.g., through mergers and employee stock options).

[14] In columns three and four, the dependent variables $(\Delta Cash/A)_t$ and $(\Delta Other\ Assets/A)_t$ are not multiplied by $(E/A)_{t-1}$, unlike as they appear in equation (4).

balances. This is consistent with the view that market timers tap the equity market more than their capital needs dictate.

I conclude this section by examining the levels of leverage at the end of the IPO year. The last column in Panel A of Table V shows that the hot-market issuers start their first fiscal year as a public firm with significantly less leverage than the cold-market issuers do. Perhaps more important is how much firms deviate from their leverage targets at this point. To answer this question, I estimate the following regression in the cross-section of firms as of the IPO year-end:

$$\left(\frac{D}{A}\right)_t = c_0 + c_1 HOT + c_2 M/B_t + c_3 EBITDA_{t-1} + c_4 SIZE_{t-1} + c_5 PPE_{t-1} + c_6 R\&D_{t-1} + c_7 RDD_{t-1} + \varepsilon_t. \quad (5)$$

The control variables utilized in earlier regressions appear in (5) as determinants of target leverage. If hot- and cold-market firms do not differ in terms of how far away they are from their targets, then the coefficient of the hot-market dummy should be zero. The last column in Panel B of Table V shows that this is not the case. Similar to leverage change regressions, the hot-market effect on the level of leverage is negative and significant. Thus the leverage ratios of hot-market firms immediately after their IPOs are too low to be explained by standard determinants of capital structure.

C. Persistence of the Impact of Market Timing on Capital Structure

The previous section presents evidence that market timing shapes the capital structures of firms in the short-run. Now I turn to the central question: How persistent are these effects? Recall the three major facts from the above analysis: i) hot- and cold-market firms have similar leverage ratios prior to their IPOs; but, ii) hot-market firms reduce leverage to a greater extent in the IPO year; and hence, iii) they have lower leverage ratios at the end of the IPO year than cold-market firms do. Whether this hot-market effect is reversed in the years subsequent to the IPO is the main question of interest in this section.

To analyze the persistence question, I first examine the cumulative change in leverage:

$$\begin{aligned}\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{PRE-IPO} &= c_0 + c_1 HOT + c_2 M/B_{t-1} + c_3 EBITDA_{t-1} \\ &\quad + c_4 SIZE_{t-1} + c_5 PPE_{t-1} + c_6 R\&D_{t-1} + c_7 RDD_{t-1} \\ &\quad + c_8 \left(\frac{D}{A}\right)_{PRE-IPO} + \varepsilon_t. \end{aligned} \tag{6}$$

If market timing has a permanent effect on leverage, then the cumulative change in leverage from its pre-IPO level should continue to reflect the hot-market effect in years t that are subsequent to the IPO.[15] Table VI reports the results of this regression. As the first two columns show, there is very little persistence in the hot-market effect. One year after the IPO, the hot-market dummy coefficient is -1.46. Recall that the hot-market effect on the change in leverage in the IPO year was -3.53 percentage points. Therefore about half of this effect is reversed in the first fiscal year following the IPO. By the second year after the IPO, the hot-market effect is completely gone. The point estimate of the hot-market dummy is positive in year IPO+2, and not significant. Unreported regressions show that the results in years following IPO+2 are very similar: the hot-market effect is permanently dead as of two years after the IPO.

One potential concern is the likely interaction between the hot-market dummy and the market-to-book ratio in the IPO year. It may be the case that both variables capture the market timing effect in the IPO year, but market-to-book does a better job of reflecting the persistence of this effect. Then, since both variables are included in (6), the hot-market dummy may turn out to be insignificant in years subsequent to the IPO even though the market timing effect is not reversed.[16] To address this concern, I re-estimate the persistence regression (6) without the market-to-book ratio. The results, reported in columns three and four of Table VI, are similar to those in the first two columns. The IPO-year hot-market effect is reduced to -1.95 in IPO+1, pointing to the reversal. The reversal continues, and by the end of the year IPO+2 the hot-market effect completely vanishes.

The last four columns in Table VI replicate the analysis in the first four columns for levels of leverage. The regression specification is similar to (5). The reversal results for leverage levels

[15] As in Baker and Wurgler (2002), the control variables in (6) reflect up-to-date information as of the end of year $t-1$.

[16] To be more specific, for year IPO+1, M/B_{t-1} is the same as the market-to-book ratio in the IPO year. For IPO+2, M/B_{t-1} is different from the IPO-year market-to-book.

are the same as those for cumulative changes. The short-term effect of market timing on capital structure starts to reverse immediately after the IPO. At the end of year IPO+1, there is still some significantly negative effect. The hot-market effect continues to reverse, and by the end of the second year the reversal is complete.

The exclusion of firms with negative book equity values in years subsequent to the IPO could bias the persistence results above. To the extent that the excluded firms tend to be cold-market issuers, the average leverage ratio of the cold-market firms would be understated in Table VI. The book equity screen causes 23 firms in IPO+1 and 44 firms in IPO+2 to drop out of the sample. These numbers are quite small, mainly due to the fact that the total assets and the market-to-book screens already exclude very small firms that are more likely to experience big losses and negative book equity values. Unreported results show that lifting the book equity screen does not lead to any significant changes in Table VI.

D. Reversal

How does the reversal take place? The first possibility is that hot-market firms increase leverage in years subsequent to their IPOs in order to catch up with their leverage targets. This is consistent with the idea that market timers become underleveraged in the short-run but quickly rebalance. The second possibility is that firm characteristics, rather than the leverage itself, change in such a way as to bring the leverage target back into line with the actual leverage ratio. One plausible story for why this could happen is based on the existence of recapitalization costs. If recapitalization is costly, dynamically optimizing firms will not continuously recapitalize by issuing (or retiring) securities. Recapitalization will be infrequent and lumpy. When firms do make active changes to leverage by issuing securities, the new leverage ratio will reflect not only a snapshot of the firm characteristics at that moment, but also the direction in which these characteristics are anticipated to move in the future. This is because a leverage ratio that is optimal given current firm characteristics is not necessarily optimal when future recapitalization costs are considered (see Fischer, Heinkel, and Zechner (1989) and Titman and Tsyplakov (2003) for models of dynamically optimal capital structure with recapitalization costs). In the current context, it may as well be the case that hot- and cold-market firms systematically differ in their expectations about the future (e.g., anticipated changes in growth opportunities), and hence issue differing amounts of equity

when they go public. Although hot-market firms may appear under-leveraged in the IPO year given a set of control variables proxying for their then-current characteristics, the low leverage ratio may in fact be optimal from a dynamic perspective. In time, the realization of the anticipated changes will then bring the leverage ratio back into line (on average) with the underlying firm characteristics, although it is the characteristics, rather than the leverage itself, that move. If supported by the data, this costly recapitalization hypothesis would not only explain the reversal results above, but also undermine the market timing findings of the previous sections, as then the IPO-year hot-market effect may simply be a reflection of dynamic optimization by firms.

As a first look at the two competing hypotheses above, I examine the annual leverage changes in the two years following the IPO. If hot-market firms set low leverage ratios in the IPO year as an optimal response given their expectations about the future, then they should not systematically increase leverage immediately afterwards. They may continue to reduce it, or at best, there may be no further hot-market effect in leverage changes. The first two columns in Panel A of Table VII show that this is not the case. Hot-market firms increase leverage substantially in the two years following the IPO: by an average of 3.85 percentage points in year IPO+1 and 2.17 points in year IPO+2. Both numbers are statistically significant. Cold-market firms, on the other hand, appear to be content with their IPO-year leverage ratios: in both IPO+1 and IPO+2, their leverage changes are small and not significantly different from zero. Unreported results show that this stark difference in the leverage changes of hot- and cold-market firms disappears from year IPO+3 on. Recall that the reversal of the hot-market effect is complete as of IPO+2. Thus, the reversal appears to be mainly due to the increase in the leverage ratios of hot-market firms.

To better evaluate the market timing versus the costly recapitalization hypotheses, I next run the following leverage change regression for each of the two years after the IPO:

$$\begin{aligned}\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} &= c_0 + c_1 HOT + c_2 Market_t + c_3 M/B_{t-1} + c_4 EBITDA_{t-1} \\ &\quad + c_5 SIZE_{t-1} + c_6 PPE_{t-1} + c_7 R\&D_{t-1} + c_8 RDD_{t-1} \\ &\quad + c_9 d_{high\text{-}lev} + c_{10} d_{low\text{-}lev} + \varepsilon_t,\end{aligned} \tag{7}$$

where t=IPO+1 or IPO+2. In (7), the dummy variable $d_{high\text{-}lev}$ ($d_{low\text{-}lev}$) takes the value of one if

lagged book leverage is above 80% (below 10%), and zero otherwise.[17] The regression specification also controls for market conditions in year t. Financing decisions in years IPO+1 and IPO+2 possibly depend on then-current market conditions as well. Since every hot market is by definition followed by a cold market, the post-IPO leverage increase of hot-market firms may potentially arise from a change in market conditions.[18] The control variable $Market_t$ is intended to capture any such effects on financing activity.[19]

The change in leverage in year t should be affected by three different sets of factors. First, current firm characteristics dictate changes in leverage. The control variables in (7), measured as of the beginning of year t, proxy for these characteristics. Second, firms are likely to have expectations about future changes to these characteristics. If recapitalization is costly, these expectations will affect financing decisions in year t. The explanatory variables in (7) do not control for such unobserved information; hence, changes in leverage due to these factors should appear in the error term. The third determinant of leverage changes is the financing history, which is the focus of the current analysis. Under the costly recapitalization hypothesis, firms set their leverage ratios in the IPO year given their expectations about future characteristics. To the extent that realized values of these characteristics differ from prior expectations, firms may find themselves over- or under-leveraged in year t, and attempt to reverse their IPO-year leverage decisions. However, there is no reason to expect that hot-market firms systematically find themselves more under-leveraged than cold-market firms do. Those firms that reduced leverage at the IPO more than necessary (given ex-post information) should increase leverage, but the same argument applies to hot- and cold-market firms alike. In contrast, the market timing hypothesis posits that hot-market firms are under-leveraged *as of the IPO year*. Thus, to the extent that hot-market firms attempt to catch up with their targets in the subsequent years, the coefficient

[17] Notice that lagged book leverage is not directly included in (7). This is because regardless of the source of deviation from the target, over- or under-leveraged firms are likely to revert back to the target. Therefore including lagged leverage in the regression would subsume the effect of market timing by construction. Instead, I use the leverage dummies in (7) to account for firms with extremely high or low leverage ratios.

[18] This is more likely to be true if market conditions change quickly. Conversely, high persistence in hot and cold markets would imply that most issuers will continue to face similar market conditions in the first few years following their IPOs.

[19] $Market_t$ is a dummy variable that takes the value of one if the IPO volume in fiscal year t exceeds the median IPO volume across all of the fiscal years in the sample. I use the IPO rather than the SEO volume in measuring market conditions, because recent IPO firms are more likely to be subject to those factors that affect the new issuers than to those that affect the more mature firms of the SEO market. This view is supported by the data, as $Market_t$ is significant in explaining the equity issues of the sample firms in years IPO+1 and IPO+2 (see the last two columns in Table VII).

of HOT in (7) should be positive.

The first two columns in Panel B of Table VII report the results. The hot-market dummy is significantly positive in both IPO+1 and IPO+2. Thus the hot-market effect in the IPO year and its subsequent reversal do not seem to be artifacts of optimal capital structure choices under costly recapitalization. Rather, the findings support the hypothesis that firms that become under-leveraged due to market timing rebalance quickly by increasing their leverage ratios.

Leverage ratio changes as a result of external financing activity and internal growth in assets. The former reflects the active implementation of capital structure policy, whereas the latter leads to partly passive changes in leverage, especially in the short-run (e.g., when managers do not have enough time to respond to earnings shocks by issuing securities). The last four columns in Table VII report the financing activity in years IPO+1 and IPO+2. Hot-market firms issue significantly more debt than their cold-market counterparts in both years (only the IPO+2 result holds up in the regression analysis). In addition, hot-market firms issue significantly less equity in IPO+1. This is in sharp contrast to the financing activity just one year earlier, i.e., the IPO year, where the hot-market effect on equity issues was strongly positive (Table II). Unreported results show that the differences in the financing activities of hot- and cold-market firms disappear from year IPO+3 on. Overall, the results indicate that hot-market firms actively pursue a policy of reversing the past market timing effect on leverage by substituting more debt in the financing mix. The reversal starts immediately after the IPO and takes about two years to complete.

E. Robustness Checks

Table VIII presents several robustness tests. For each test, the table reports the coefficients of the hot-market dummy in the IPO proceeds from primary shares regression (1) and the cumulative leverage change regression (6) for years IPO, IPO+1, and IPO+2. The IPO year results illustrate the market timing effect on the amount of equity issued and the short-term impact of market timing on capital structure, whereas the results for IPO+1 and IPO+2 capture the reversal. The results are similar for leverage level regressions and are not reported.

The first test concerns the robustness of the results to firm size. Market timing and its capital structure implications may potentially be very different for small versus large firms. The first two panels in Table VIII replicate the analysis for small and large firm samples separately. Large

firms are defined as those whose pre-IPO sales exceed $50 million in 1999 dollars. The results are similar to those in the main analysis. The hot-market effect on the IPO proceeds is very strong for both sub-samples. The immediate timing effect on the leverage ratio is significantly negative in both cases as well. As before, the hot-market effect on leverage quickly reverses. One year after the IPO, the hot-market effect loses its significance for both small and large firms.

The next robustness issue relates to the high persistence of market conditions. Most of the late 1990s are hot years, whereas most of the 1970s are cold. Therefore the hot-market dummy may proxy for differing characteristics of the new- and the old-economy firms that are not captured by the control variables. The inclusion of industry fixed effects throughout the analysis alleviates this concern. To address the issue more directly, I split the sample at the October 1987 stock market crash, and analyze the two sub-samples separately. The choice of 1987 as the sample split point is dictated by the fact that the last major cold market before 1999 starts with the 1987 crash. Panels three and four in Table VIII report the results. The hot-market effects on the IPO proceeds and the leverage change in the IPO year are significant for both sub-samples. Once again, the hot-market effect reverses in IPO+1 and IPO+2. There seems to be relatively more persistence in the post-1987 sample; however the hot-market dummy turns statistically insignificant in IPO+1 in both cases.

The third test concerns the definition of the book leverage ratio. Baker and Wurgler (2002) include non-interest-bearing liabilities in calculating book leverage, and the analysis so far follows their definition in order to facilitate comparison. When alternatively defined based on short- and long-term debt only, book leverage levels both before and after the IPO are substantially lower (unreported). Panel five in Table VIII shows that the main conclusions from the analysis remain the same with this alternative measure of leverage.

The final robustness check replicates the analysis with all of the outliers included. The results, reported in panel six in Table VIII, continue to point to the hot-market effect in the IPO year and its subsequent reversal.

IV. Conclusion

This paper analyzes the capital structure implications of equity market timing. Previous studies have found convincing evidence of timing attempts by firms. But quantifying the extent to which timing considerations affect financing activity has proved more problematic. Commonly used measures of market timing typically correlate with other determinants of financing policy. This is especially troubling when studying the link between timing attempts and capital structure dynamics.

In this paper, I propose initial public offerings as a natural place to look for more robust measures of market timing. The pronounced cycle in the IPO volume, and the fact that the peaks of this cycle attract firms from a wide spectrum of industries, make the IPO market an excellent laboratory in which to detect market timing effects. The empirical analysis confirms this view. Market timers identified as the firms that go public when the market is hot issue substantially more equity than cold-market firms do. The hot-market effect is remarkably robust; it has almost no relationship to firm- and industry-level characteristics. Further tests regarding issuers' starting leverage, investment and dividend policies, and cash balances are all consistent with the idea that the hot-market effect on equity issues is indeed driven by market timing.

Not surprisingly, the short-term impact of these timing attempts on capital structure is negative. Hot-market firms experience a bigger decline in their leverage ratios in the IPO year. Also, their leverage levels are too low to be explained by the underlying firm characteristics. The negative impact quickly reverses, however. Immediately following their IPOs, hot-market firms start issuing significantly more debt and less equity than cold-market firms do. As a result of this active reversal policy the leverage ratios of hot-market firms increase significantly in the two years following the IPO. In contrast, cold-market firms appear to be content with the leverage ratios they attain at the IPO. By the end of the second year, the hot-market effect on leverage completely vanishes. Overall, the results show that market timing is an important determinant of financing activity in the short-run, but its long-run effects are limited. Firms' capital structure policies in the long-term appear to be largely consistent with the existence of leverage targets.

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Table I
Summary Statistics of Firm Characteristics and Financing Decisions

The table reports the means and the standard deviations of several firm characteristics in IPO time. All variables except *M/B* and *SIZE* are in percentage terms. *Book Leverage D/A* is the ratio of book debt to total assets. *Market-to-book ratio M/B* is defined as book debt plus market value of equity divided by total assets. *Net Debt Issues d/A* is the change in book debt. *Net Equity Issues e/A* is the change in book equity minus the change in retained earnings. *Newly retained earnings ΔRE/A* is the change in retained earnings. *Profitability* is measured by *EBITDA*, which is earnings before interest, taxes, and depreciation. *SIZE* is the logarithm of net sales in millions of 1999 dollars. *Asset tangibility PPE* is defined as net plant, property, and equipment. *R&D* is the research and development expense. *INV* is capital expenditures. *DIV* is common dividends divided by year-end book equity. *CASH* is defined as cash and short-term investments. The variables *d/A, e/A, ΔRE/A, EBITDA, PPE, R&D, INV,* and *CASH* are normalized by fiscal-year-end total assets. The sample excludes financial firms, spin-offs, unit offers, and firms that have less than $10 million (in 1999 dollars) in assets at the end of the IPO year. Firm-year observations that constitute outliers with respect to book leverage, market-to-book ratio, net debt and net equity issues, newly retained earnings, profitability, investment, and dividends are also dropped from the sample.

	N	*Book Leverage D/A*	*M/B*	*d/A*	*e/A*	*ΔRE/A*	*EBITDA*	*SIZE*	*PPE*	*R&D*	*INV*	*DIV*	*CASH*
Pre-IPO	2,200	66.54	-	-	-	-	20.19	3.91	29.04	5.16	10.82	3.95	11.41
		(20.87)	-	-	-	-	(17.06)	(1.41)	(22.45)	(10.21)	(11.53)	(12.83)	(15.90)
IPO	2,200	38.74	2.38	0.18	39.80	3.72	15.69	4.27	25.95	3.01	10.57	2.85	22.97
		(19.88)	(1.45)	(19.49)	(22.84)	(9.93)	(11.65)	(1.31)	(21.55)	(5.47)	(11.58)	(9.47)	(23.12)
IPO+1	2,138	41.05	2.02	11.07	6.89	2.45	11.10	4.44	28.15	4.11	10.79	0.34	18.47
		(21.45)	(1.38)	(16.28)	(13.55)	(13.45)	(16.56)	(1.43)	(21.98)	(7.81)	(10.42)	(1.30)	(21.34)
IPO+2	1,921	42.03	1.86	7.00	5.81	0.13	10.12	4.63	28.84	4.23	8.78	0.37	16.69
		(21.80)	(1.33)	(15.37)	(13.18)	(15.51)	(16.29)	(1.40)	(22.29)	(8.06)	(8.59)	(1.53)	(20.28)
IPO+3	1,662	43.17	1.75	5.22	4.44	0.01	10.41	4.78	29.44	4.35	7.99	0.42	14.91
		(21.64)	(1.31)	(15.36)	(11.54)	(15.18)	(15.28)	(1.39)	(22.06)	(8.33)	(8.09)	(2.08)	(18.29)
IPO+5	1,158	42.90	1.62	3.48	3.62	-0.17	11.39	4.95	29.88	4.37	7.56	0.59	15.11
		(21.78)	(1.12)	(14.10)	(11.89)	(14.70)	(13.62)	(1.40)	(21.66)	(8.01)	(7.61)	(3.01)	(18.49)
IPO+7	802	43.44	1.55	2.92	2.24	0.96	12.14	5.05	29.99	4.13	7.21	0.75	14.59
		(21.44)	(1.13)	(14.16)	(9.19)	(12.84)	(12.54)	(1.43)	(21.43)	(7.65)	(7.31)	(3.23)	(17.65)

Table II
Market Timing Effects on Issue Activity

For each variable Y_t, Panel A reports the mean value among hot- and cold-market firms, and the t-value of their difference. The time subscript t denotes the IPO year. Panel B reports the coefficients of regressions of the form

$$Y_t = c_0 + c_1 HOT + c_2 M/B_t + c_3 EBITDA_{t-1} + c_4 SIZE_{t-1} + c_5 PPE_{t-1} + c_6 R\&D_{t-1} + c_7 RDD_{t-1} + c_8 \left(\frac{D}{A}\right)_{t-1} + \varepsilon_t .$$

All regressions are estimated with industry fixed effects. The constant term and the coefficient of lagged leverage $(D/A)_{t-1}$ are not reported. Robust t-statistics are in parentheses. The dummy variable *RDD* takes the value of one when research and development expense information is missing in COMPUSTAT. The dependent variable Y_t is the total IPO proceeds divided by year-end assets, the proceeds from primary shares divided by year-end assets, the proceeds from primary shares divided by beginning-of-the-year assets, primary shares issued as a percentage of total outstanding shares, offer price/per-share book value ratio, and the IPO-year net debt issues divided by year-end assets in columns one to six, respectively.

	$Proceeds^T/A_t$	$Proceeds^P/A_t$	$Proceeds^P/A_{t-1}$	*% Issued*	*Offer/Book*	$(d/A)_t$
Panel A: Mean values						
Hot	47.95	38.53	75.61	23.96	1.77	-0.03
Cold	37.87	28.95	53.76	21.76	1.53	1.48
t-value (difference)	(6.21)	(6.45)	(4.44)	(3.02)	(3.68)	(1.25)
Panel B: Regression analysis						
HOT	10.16	8.66	22.16	2.58	0.23	-2.24
	(8.61)	(9.03)	(7.05)	(4.34)	(5.64)	(1.95)
M/B_t	3.68	1.82	15.16	-2.59	0.39	0.02
	(7.58)	(4.78)	(8.07)	(15.97)	(17.56)	(0.06)
$EBITDA_{t-1}$	0.29	0.08	-0.26	-0.01	0.01	-0.05
	(7.75)	(2.54)	(1.12)	(0.41)	(4.11)	(1.64)
$SIZE_{t-1}$	-6.54	-6.98	-20.31	-2.97	-0.09	-1.69
	(16.23)	(19.64)	(12.92)	(14.21)	(6.98)	(4.71)
PPE_{t-1}	-0.10	-0.09	-0.42	-0.05	0.00	-0.06
	(3.38)	(3.58)	(4.44)	(3.32)	(0.91)	(1.94)
$R\&D_{t-1}$	0.37	0.30	1.39	-0.02	0.01	-0.10
	(4.13)	(4.10)	(3.98)	(0.72)	(4.23)	(2.23)
RDD_{t-1}	-0.52	0.45	1.193	2.30	-0.08	0.84
	(0.37)	(0.40)	(0.51)	(3.55)	(2.03)	(0.65)
R^2	0.37	0.36	0.37	0.30	0.58	0.11
N	2,157	2,156	1,814	1,963	2,157	2,103

Table III
Comparison of Hot- and Cold-Market Firms

For each variable Y_t, Panel A reports the mean value among hot- and cold-market firms, and the t-value of their difference. Panel B reports the coefficients of regressions of the form

$$Y_t = c_0 + c_1 HOT + c_2 M/B_{IPO} + c_3 M/B_{t-1} + c_4 EBITDA_{t-1} + c_5 SIZE_{t-1} + c_6 PPE_{t-1} + c_7 R\&D_{t-1} + c_8 RDD_{t-1} + \varepsilon_t .$$

All regressions are estimated with industry fixed effects. The constant term is not reported. Robust t-statistics are in parentheses. The dependent variable Y_t is the pre-IPO book leverage, the investment rates for years IPO, IPO+1, and IPO+2, profitability for years IPO, IPO+1, IPO+2, and IPO+4, and the IPO-year dividend payout ratio in columns one to nine, respectively.

	$D/A_{PRE\text{-}IPO}$	INV			$EBITDA$				DIV_{IPO}
t		IPO	$IPO+1$	$IPO+2$	IPO	$IPO+1$	$IPO+2$	$IPO+4$	
Panel A: Mean values									
Hot	66.74	10.51	10.72	8.80	15.37	10.93	9.91	10.00	3.12
Cold	65.83	10.98	11.22	8.67	17.68	12.14	11.36	12.03	1.19
t-value (difference)	(0.71)	(0.66)	(0.75)	(0.22)	(3.23)	(1.17)	(1.36)	(1.89)	(3.33)
Panel B: Regression analysis									
HOT	-0.43	-1.15	-0.43	0.29	-2.29	-0.59	-0.71	-2.18	1.73
	(0.34)	(2.00)	(0.82)	(0.56)	(3.63)	(0.66)	(0.77)	(2.33)	(3.83)
M/B_{IPO}	-	0.13	0.91	0.15	2.18	2.42	-1.20	-0.10	0.97
	-	(0.90)	(6.37)	(1.47)	(9.77)	(8.87)	(4.49)	(0.26)	(5.35)
M/B_{t-1}	-	-	-	0.71	-	-	3.76	2.67	-
	-	-	-	(4.44)	-	-	(10.97)	(6.40)	-
$EBITDA_{t-1}$	-0.22	0.05	0.07	0.06	-	-	-	-	0.05
	(6.79)	(3.82)	(2.84)	(4.93)	-	-	-	-	(3.41)
$SIZE_{t-1}$	2.21	-1.05	-1.46	-0.44	2.26	3.26	3.57	2.64	0.63
	(5.53)	(5.72)	(7.37)	(3.15)	(11.20)	(10.96)	(10.22)	(7.34)	(4.15)
PPE_{t-1}	-0.01	0.24	0.26	0.21	0.06	0.13	0.14	0.14	-0.01
	(0.26)	(14.43)	(15.56)	(14.12)	(4.29)	(6.52)	(6.05)	(5.27)	(0.80)
$R\&D_{t-1}$	-0.29	-0.06	-0.11	-0.03	-0.21	-0.28	-0.40	-0.51	-0.01
	(4.24)	(2.50)	(2.90)	(1.54)	(5.57)	(2.21)	(3.91)	(4.90)	(0.59)
RDD_{t-1}	1.86	0.94	-1.14	-0.20	0.10	0.81	-0.87	-1.90	0.41
	(1.57)	(1.69)	(2.17)	(0.41)	(0.15)	(0.87)	(0.91)	(2.01)	(0.69)
R^2	0.15	0.46	0.47	0.42	0.27	0.19	0.27	0.28	0.11
N	2,157	2,132	1,998	1,841	2,162	2,023	1,863	1,358	2,155

Table IV
Dividend Payout in the IPO Year

The sample is the hot-market IPOs in column one, the cold-market IPOs in column two, and all IPOs in column three. Panel A reports the fraction of each sample in various dividend payout brackets. Panel B reports the fractions of special and regular dividend payers among the firms with positive IPO-year dividend payout. Regular dividend payers are defined as those firms that pay at least two dividends within twelve months after going public.

	% Hot markets	% Cold markets	% All
Panel A: IPO year payout ratio			
0%:	77.63	78.96	77.82
0% - 10%:	13.17	17.48	13.77
10% - 25%:	4.18	2.27	3.91
25% and above:	5.02	1.29	4.50
Panel B: Special versus regular dividends			
Special only:	75.65	52.31	72.54
Regular:	24.35	47.69	27.46

Table V
Short-Term Impact of Market Timing on Capital Structure

For each variable Y_t, Panel A reports the mean value among hot- and cold-market firms, and the t-value of their difference. The time subscript t denotes the IPO year. Panel B reports the coefficients of regressions of the form

$$Y_t = c_0 + c_1 HOT + c_2 M/B_t + c_3 EBITDA_{t-1} + c_4 SIZE_{t-1} + c_5 PPE_{t-1} + c_6 R\&D_{t-1} + c_7 RDD_{t-1} + c_8 \left(\frac{D}{A}\right)_{t-1} + \varepsilon_t .$$

All regressions are estimated with industry fixed effects. The constant term and the coefficient of lagged leverage $(D/A)_{t-1}$ are not reported. Robust t-statistics are in parentheses. The dependent variable Y_t is the change in book leverage, net equity issues, the change in cash, the change in other assets, and the change in retained earnings in columns one to five, respectively. In column six, the dependent variable is the level of book leverage, and the lagged book leverage is excluded from the regression.

	$(D/A)_t - (D/A)_{t-1}$	$(e/A)_t$	$(\Delta Cash/A)_t$	$(\Delta Other\ Assets/A)_t$	$(\Delta RE/A)_t$	$(D/A)_t$
Panel A: Mean values						
Hot	-28.28	40.83	18.09	26.06	3.24	38.42
Cold	-24.88	33.59	15.82	25.74	6.63	40.70
t-value (difference)	(2.75)	(5.40)	(1.77)	(0.26)	(5.56)	(1.87)
Panel B: Regression analysis						
HOT	-3.57	6.74	2.42	-0.28	-2.63	-3.69
	(3.88)	(6.41)	(2.46)	(0.24)	(4.74)	(3.67)
M/B_t	-2.61	3.54	3.34	0.39	0.22	-2.67
	(10.04)	(11.31)	(9.95)	(1.20)	(1.21)	(9.94)
$EBITDA_{t-1}$	-0.16	-0.01	0.08	0.08	0.22	-0.23
	(7.07)	(0.53)	(2.53)	(2.63)	(13.16)	(9.71)
$SIZE_{t-1}$	3.60	-6.28	-4.51	-3.35	0.14	4.28
	(11.93)	(17.71)	(14.65)	(9.65)	(0.79)	(12.87)
PPE_{t-1}	0.02	-0.08	-0.06	-0.08	0.00	0.02
	(1.03)	(2.89)	(2.41)	(2.88)	(0.30)	(0.87)
$R\&D_{t-1}$	-0.23	0.35	0.55	-0.28	0.02	-0.31
	(5.69)	(7.05)	(8.73)	(4.65)	(0.60)	(7.45)
RDD_{t-1}	-0.40	1.90	-0.72	2.21	-0.65	0.19
	(0.41)	(1.65)	(0.73)	(1.79)	(1.09)	(0.18)
R^2	0.51	0.42	0.49	0.15	0.22	0.41
N	2,157	2,103	2,157	2,157	2,103	2,157

Table VI
Persistence of the Impact of Market Timing on Capital Structure

For each variable Y_t, Panel A reports the mean value among hot- and cold-market firms, and the t-value of their difference. Panel B reports the coefficients of regressions of the form

$$Y_t = c_0 + c_1 HOT + c_2 M/B_{t-1} + c_3 EBITDA_{t-1} + c_4 SIZE_{t-1} + c_5 PPE_{t-1} + c_6 R\&D_{t-1} + c_7 RDD_{t-1} + c_8 \left(\frac{D}{A}\right)_{PRE-IPO} + \varepsilon_t .$$

All regressions are estimated with industry fixed effects. The constant term and the coefficient of pre-IPO book leverage $(D/A)_{PRE\text{-}IPO}$ are not reported. Robust t-statistics are in parentheses. The dependent variable Y_t is the cumulative change in book leverage from the pre-IPO year to years IPO+1 and IPO+2 in the first four columns. In the last four columns the dependent variable is the level of book leverage, and the regression excludes the pre-IPO book leverage.

	$(D/A)_t - (D/A)_{PRE\text{-}IPO}$				Book Leverage $(D/A)_t$			
t	*IPO+1*	*IPO+2*	*IPO+1*	*IPO+2*	*IPO+1*	*IPO+2*	*IPO+1*	*IPO+2*
				Panel A: Mean values				
Hot	-24.96	-22.93	-	-	41.14	42.37	-	-
Cold	-24.27	-23.80	-	-	40.53	39.98	-	-
t-value (difference)	(0.50)	(1.45)	-	-	(0.46)	(1.67)	-	-
				Panel B: Regression analysis				
HOT	-1.46	0.51	-1.95	0.42	-1.48	0.52	-1.98	0.43
	(1.47)	(0.44)	(1.88)	(0.36)	(1.35)	(0.42)	(1.75)	(0.35)
M/B_{t-1}	-3.12	-2.65	-	-	-3.20	-2.78	-	-
	(10.70)	(7.66)	-	-	(10.67)	(7.74)	-	-
$EBITDA_{t-1}$	-0.32	-0.33	-0.43	-0.41	-0.39	-0.37	-0.50	-0.46
	(7.63)	(7.93)	(10.45)	(10.07)	(8.74)	(8.39)	(11.39)	(10.51)
$SIZE_{t-1}$	3.17	3.57	3.38	3.59	4.09	4.49	4.32	4.52
	(9.33)	(9.10)	(9.53)	(8.97)	(10.84)	(10.91)	(10.96)	(10.76)
PPE_{t-1}	0.16	0.20	0.20	0.23	0.17	0.21	0.22	0.24
	(5.83)	(6.79)	(7.32)	(7.10)	(5.76)	(5.59)	(7.16)	(7.50)
$R\&D_{t-1}$	-0.22	-0.20	-0.34	-0.28	-0.34	-0.26	-0.46	-0.35
	(2.38)	(2.25)	(3.75)	(3.11)	(3.53)	(2.94)	(4.82)	(3.79)
RDD_{t-1}	0.07	0.08	0.13	0.23	0.93	1.34	1.01	1.51
	(0.06)	(0.06)	(0.11)	(0.17)	(0.77)	(0.97)	(0.80)	(1.07)
R^2	0.49	0.46	0.46	0.44	0.40	0.36	0.36	0.33
N	2,027	1,873	2,027	1,873	2,027	1,873	2,027	1,873

Table VII
Reversal of the Market Timing Effect on Capital Structure

For each variable Y_t, Panel A reports the mean value among hot- and cold-market firms, and the t-value of their difference. Panel B reports the coefficients of regressions of the form

$$Y_t = c_0 + c_1 HOT + c_2 Market_t + c_3 M/B_{t-1} + c_4 EBITDA_{t-1} + c_5 SIZE_{t-1} + c_6 PPE_{t-1} + c_7 R\&D_{t-1} + c_8 RDD_{t-1} + c_9 d_{high-lev} + c_{10} d_{low-lev} + \varepsilon_t .$$

All regressions are estimated with industry fixed effects. The dummy variable $d_{high\text{-}lev}$ takes the value of one if lagged book leverage exceeds 80%, and zero otherwise. The dummy variable $d_{low\text{-}lev}$ is defined similarly for firms with lagged book leverage below 10%. The constant term and the coefficients of the leverage dummies are not reported. Robust t-statistics are in parentheses. The dependent variable Y_t is the annual change in book leverage in years IPO+1 and IPO+2, net debt issues in IPO+1 and IPO+2, and net equity issues in IPO+1 and IPO+2 in columns one to six, respectively.

	Change in Book Leverage $(D/A)_t - (D/A)_{t-1}$		*Net Debt Issues d/A*		*Net Equity Issues e/A*	
t	*IPO+1*	*IPO+2*	*IPO+1*	*IPO+2*	*IPO+1*	*IPO+2*
Panel A: Mean values						
Hot	3.85	2.17	11.42	7.30	6.67	5.81
Cold	0.86	0.73	8.92	5.22	8.24	5.87
t-value (difference)	(3.77)	(1.93)	(2.40)	(2.05)	(1.80)	(0.07)
Panel B: Regression analysis						
HOT	2.06	1.38	1.39	2.11	-2.62	-0.08
	(2.62)	(1.82)	(1.35)	(2.01)	(2.85)	(0.09)
$Market_t$	-1.42	-0.51	-0.60	-0.39	2.86	1.33
	(2.07)	(0.84)	(0.67)	(0.46)	(4.60)	(2.02)
M/B_{t-1}	-0.27	-0.29	0.20	0.69	2.35	2.91
	(1.27)	(1.15)	(0.78)	(2.27)	(7.64)	(7.86)
$EBITDA_{t-1}$	-0.15	-0.05	-0.03	0.11	-0.15	-0.08
	(4.85)	(1.22)	(0.75)	(2.31)	(3.87)	(2.50)
$SIZE_{t-1}$	-1.39	-0.52	-0.91	-0.04	-0.09	-0.49
	(5.05)	(1.69)	(2.51)	(0.09)	(0.30)	(1.65)
PPE_{t-1}	0.00	0.02	0.07	0.05	0.02	0.01
	(0.07)	(0.73)	(2.58)	(1.80)	(0.73)	(0.44)
$R\&D_{t-1}$	-0.10	-0.09	-0.03	-0.05	0.27	0.13
	(1.54)	(1.05)	(0.36)	(0.70)	(2.64)	(1.32)
RDD_{t-1}	-0.28	-0.79	1.13	-0.61	1.30	1.67
	(0.34)	(0.87)	(0.95)	(0.49)	(1.63)	(1.75)
R^2	0.07	0.01	0.08	0.03	0.12	0.08
N	2,027	1,873	2,026	1,873	2,026	1,873

Table VIII
Robustness Tests

The table reports the coefficient of the variable *HOT* in regressions of the form

$$Y_t = c_0 + c_1 HOT + c_2 M/B_{t-1} + c_3 EBITDA_{t-1} + c_4 SIZE_{t-1} + c_5 PPE_{t-1} + c_6 R\&D_{t-1} + c_7 RDD_{t-1} + c_8 \left(\frac{D}{A}\right)_{PRE\text{-}IPO} + \varepsilon_t.$$

All regressions are estimated with industry fixed effects. Robust t-statistics are in parentheses. The dependent variable Y_t is the total IPO proceeds divided by year-end assets and the cumulate change in leverage from the pre-IPO year to years IPO, IPO+1, and IPO+2 in columns one to four, respectively. The first four panels report the results for the size (pre-IPO sales below or above $50 million in 1999 dollars) and calendar time (before and after 10/87) sub-samples. In the fifth panel, book leverage ratio is alternatively defined as the sum of short-term and long-term debt divided by total assets. The sixth panel contains the results when outliers are included in the sample.

		$Proceeds^P/A_t$	$(D/A)_t - (D/A)_{PRE\text{-}IPO}$		
			IPO	*IPO+1*	*IPO+2*
Pre-IPO sales < $50 million	*HOT*	8.61	-3.91	-1.22	0.77
	t-statistic	(5.55)	(2.71)	(0.71)	(0.43)
	R^2	0.24	0.56	0.49	0.49
	N	986	986	904	790
Pre-IPO sales > $50 million	*HOT*	8.41	-3.70	-1.92	-0.41
	t-statistic	(6.09)	(3.13)	(1.49)	(0.25)
	R^2	0.19	0.48	0.52	0.47
	N	1,170	1,171	1,123	1,083
Sub-sample 1/71-9/87	*HOT*	5.96	-2.93	0.17	1.33
	t-statistic	(3.75)	(1.80)	(0.10)	(0.67)
	R^2	0.47	0.49	0.43	0.40
	N	774	774	728	676
Sub-sample 11/87-12/99	*HOT*	8.40	-3.23	-2.14	-0.07
	t-statistic	(6.60)	(2.58)	(1.57)	(0.04)
	R^2	0.35	0.54	0.54	0.51
	N	1,376	1,377	1,293	1,192
Alternative leverage definition	*HOT*	-	-2.33	-1.04	0.78
	t-statistic	-	(2.39)	(0.95)	(0.63)
	R^2	-	0.34	0.31	0.32
	N	-	2,154	2,024	1,871
Outliers included	*HOT*	6.92	-2.89	-2.38	-0.48
	t-statistic	(4.34)	(2.93)	(1.93)	(0.34)
	R^2	0.31	0.53	0.48	0.43
	N	3,670	2,958	2,859	2,587

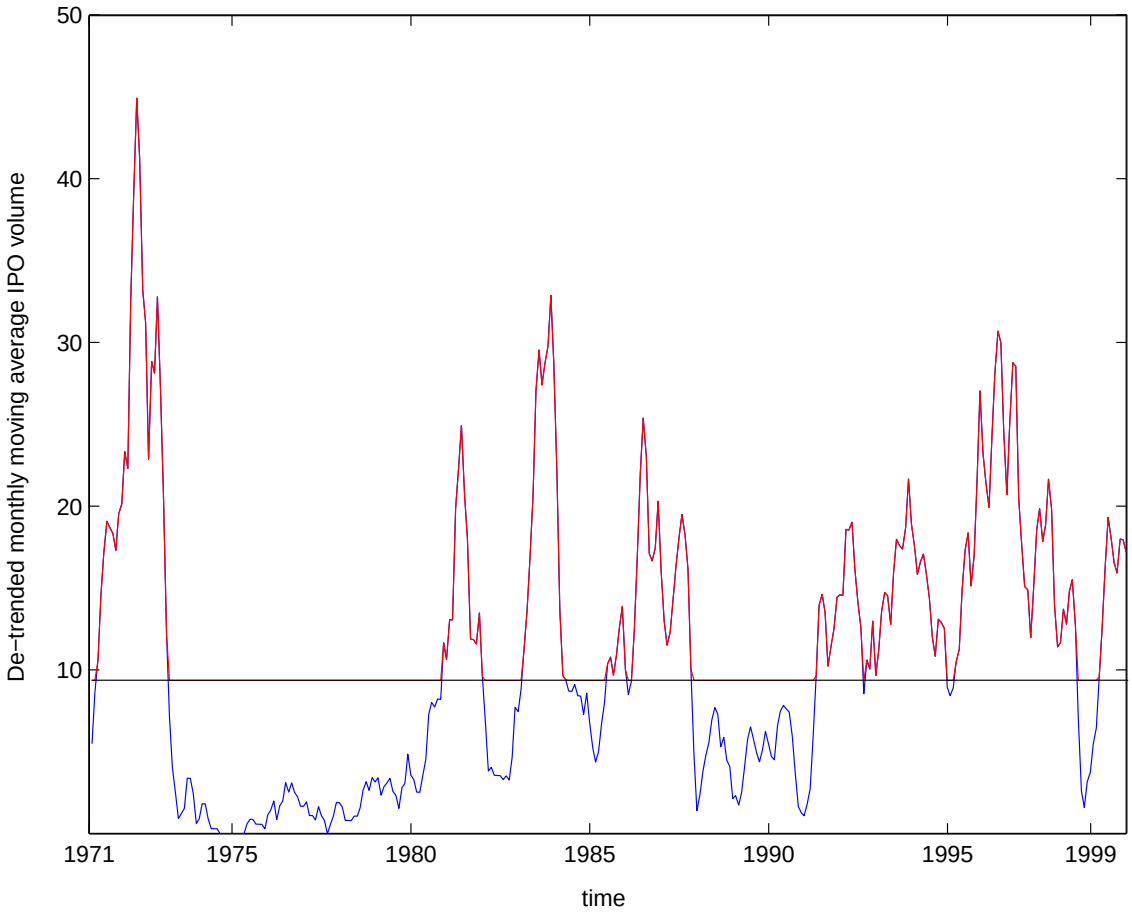

Figure 1. Time series of de-trended monthly moving average IPO volume.