“The long-run impact of IPO market timing on capital structure”

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The long-run impact of IPO market timing on capital structure

Abstract

This paper examines the capital structure implications of the timing of Initial Public Offerings (i.e. IPOs). The author identifies market timers as firms that issue equity in "Hot" issue markets. Using several different measures for "Hot" markets, the author finds that "Hot" market IPO firms issue substantially more equity than "Cold" market firms do. While the leverage ratios of all issuers decline just after the offering, the decline is significantly larger for "Hot" market issuers. My capital structure tests indicate that, immediately after the offering, both "Hot" and "Cold" market firms start increasing their leverage, although "Hot" market firms increase their leverage more compared to "Cold" market firms. This reversal is in line with Alti's (2006) findings. However, extending the analysis beyond the second year reveals that this reversal continues for at least three more years. Interestingly, three years after the issue, "Cold" market firms start reducing their leverage once again while "Hot" market firms still continue to increase their leverage. As a result, "Hot" market firms have significantly higher leverage ratios compared to "Cold" market firms in the long run (i.e. 3 to 5 years). These results imply that firms that do an initial public offering when market conditions are favorable tend to follow an active policy of increasing their leverage for at least five years after the offering.

Keywords: Initial Public Offerings, market timing, "Hot" markets, leverage, capital structure.
JEL Classification: G30, G32.

Introduction

In this paper, I focus on an important financing event, the Initial Public Offering, in an attempt to capture equity market timing and its long-run impact on the issuing firm's capital structure. I attempt to answer these two questions: (1) Is there evidence of market timing by companies in the IPO market? (2) If so, does this timing have a persistent impact on issuing firms' capital structures?

The earlier studies like Taggart (1977), Marsh (1982), Jalilvand and Harris (1984), Asquith and Mullins (1986), Rajan and Zingales (1995), Pagano, Panetta, and Zingales (1998), Hovakimian, Opler and Titman (2001), Korajczyk, Lucas, and McDonald (1991), Choe, Masulis and Nanda (1993), and Bayless and Chaplinsky (1996) test for the timing behavior of firms in the IPO and SEO markets, but they do not extend their research into the capital structure area.

In their influential study, Baker and Wurgler (2002) examine the link between equity market timing and capital structure, and name their theory as "The market timing theory of capital structure". Baker and Wurgler (2002) suggest that firms issue securities depending on the relative costs; if cost of equity is low relative to the cost of other forms of capital, they are more likely to issue equity. In other words, their theory suggests that firms are more likely to issue equity when their market values (or share prices) are high, relative to book and past market values, and to repurchase equity when their market values (or share prices) are low. This also implies that, for external financing decisions, firms prefer external equity when the cost of equity is low, and prefer debt otherwise. "The market timing theory of capital structure" also states that the timing of equity issuances has long-lasting effects on issuing firms' capital structures.

Baker and Wurgler (2002) empirically show that firms try to time the equity markets by offering IPOs and SEOs when their market valuations are high compared to their recent historical values. They also show that low leverage firms are those that raised funds when their market valuations were high, as measured by the market-to-book ratio, while high leverage firms are those that raised funds when their market valuations were low. This finding implies that a firm's timing behavior in the equity markets has a persistent impact on its capital structure (or leverage). In other words, firms can permanently lower their leverage by timing the equity markets (i.e. by issuing equity when their market valuations are high relative to their recent historical values).

On the other hand, more recent studies like Korajczyk and Levy (2002), Alti (2006), Flannery and Rangan (2004), Hovakimian (2004), Kayhan and Titman (2007), Huang and Ritter (2009), Elliott, Koeter-Kant and Warr (2008), and O'Brien, Klein and Hilliard (2007) only partially support Baker and Wurgler (2002) findings. Managers seem to issue equity when market valuations of their firms are high and issue debt otherwise. On the other hand, as opposed to Baker and Wurgler (2002), these studies find that, within a period of two years, the effect of market timing on a firm's capital structure disappears.

Alti (2006) contends that certain months are more advantageous for IPO offerings. In other words, there are "windows of opportunities" for firms that want to go public. Alti (2006) classifies the months in his sample period as "Hot", "Neutral", and "Cold" depending on the number of IPO issuers in each month; and then, he shows that the "Hot" market firms issue more equity than do the "Cold" market firms. He contends that, when market conditions are favorable, to lower their cost of capital, more companies issue equity and each of them issue more equity.

Alti (2006) also tests for the impact of IPO market timing on issuing firms' capital structure. He finds that, market timing depresses leverage in the short-run. In other words, while the leverage ratios of both "Hot" market and "Cold" market issuers decline just after the IPO, the decline is significantly larger for "Hot" market issuers. When Alti (2006) tests for the long-run impact of IPO market timing on leverage, he finds that the negative impact of market timing on leverage has very low persistence. He finds that, just one year after the IPO, the "Hot" market effect loses its significance; and two years after the IPO, the "Hot" market effect is reversed (i.e. the effect is positive and significant). So, he contends that his results support the earlier findings of a short-run impact of market timing on leverage rather than a persistent impact.

Alti (2006) has an important limitation: It only covers the two-year period after the IPO. We really do not know if "Hot" market issuers' active reversal policy continues in the long run or not. In other words, we do not know if market timing has a persistent impact on leverage.

In this study, using a methodology similar to Alti's (2006) methodology, I first test for market timing in the IPO market, and then examine the impact of timing (if any) on the issuing firms' leverage ratios. I use several different measures to define active (i.e. "Hot") months. So, my first contribution is creating different measures to define "Hot" markets rather than using Alti (2006) classification where he drops approximately a quarter of his observations.

All of the previous studies use annual financial data in their empirical tests. However, since managers use the most recent data available to them when making decisions, we need to use more frequent data (i.e. data from quarterly statements) in order to capture managers' timing behavior. In this study, my second contribution is using quarterly financial data rather than annual data in my empirical tests.

As mentioned above, the impact of equity market timing on capital structure is still not clear. While Baker and Wurgler (2002) find that equity market timing has a persistent impact on capital structure, subsequent studies find only a short-run (i.e. two or three years) impact. In this study, my third contribution is to examine the long-run (i.e. five-year) impact of IPO market timing on the issuing firms' capital structure. An evidence of a negative long-run impact would support Baker and Wurgler (2002), while a short-run impact would be in line with the more recent studies. To the best of my knowledge, this is the first study after Baker and Wurgler (2002) that extends the analysis beyond the third year. While Baker and Wurgler (2002) use historical weighted-average market-to-book ratio as their market timing measure, here I use the "Hot" market dummy.

The remainder of the paper is organized as follows. Section 1 describes the hypotheses. Section 2 explains the sample construction. Section 3 describes the methodology in detail. The empirical results are presented in Section 4. The final section concludes the paper.

1. Hypotheses

Considering Alti's (2006) findings, I expect to find a "Hot" market effect for my IPO sample. In other words, I expect "Hot" market IPO firms to issue more equity compared to "Cold" market IPO firms.

My first hypothesis of interest is:

Hypothesis 1: "Hot" market IPO firms issue more equity than "Cold" market IPO firms do.

In this study, the analysis for the long-run impact of equity market timing is extended by using the "Hot" dummy variable for IPOs for a period of up to 5 years after the issue.

The hypothesis of interest here is:

Hypothesis 2: Firms that have issued an IPO when equity markets were "Hot", have lower leverage ratios in the long run compared to the other firms.

2. Sample construction

The initial sample consists of all IPOs that occurred between January 1, 1981 and December 31, 2004 reported by the Securities Data Company (SDC).

Like most of the previous studies, I examine only the security issuances. I am limited to the security issuances because SDC database includes only the issuances, not the repurchases. Firms may in fact time the markets by repurchasing the previously issued securities. In this study, I do not test for market timing in security repurchases.

I restrict the sample to exclude unit offers, financial firms with SIC codes between 6000 and 6999, and firms with book values of assets below $10 million in 2004 dollars at the end of the last issue quarter. Following the previous literature, and to minimize the influence of outliers, observations with a market-to-book ratio greater than 10, book leverage (D/A) greater than 1, and earnings before interest, taxes, and depreciation scaled by assets ($EBITDA/A$) greater than 1 are dropped. Since financing choices of subsidiary companies may be motivated by the parent companies' own needs, all subsidiary companies are dropped from the sample. In my final sample, I have 1,758 IPOs. Table 1 shows the summary statistics for my IPO sample.

Table 1. Summary statistics for IPOs

Variable	Median	Mean	St. deviation
Size	2.45	2.52	1.46
Tangibility	0.19	0.28	0.23
Profitability	0.40	0.40	0.24
$(M/B)_t$	2.13	2.63	1.82
Leverage	0.33	0.35	0.27
$EquityProceeds/A_t$	0.53	0.56	0.32
$EquityProceeds/A_{t-1}$	0.77	1.13	1.07
Observations	1,758	1,758	1,758

Notes: The sample covers all initial public offerings from January 1984 through December 2004. *Size* is the natural logarithm of sales (Item 2). *Tangibility* is measured as (net property, plant, and equipment (Item 42)/total assets (Item 44)). *Profitability* is (EBITDA (Item 21)/total assets (Item 44)). The market-to-book ratio is the ((total assets – book value of equity + market value of equity)/total assets). *Leverage* is ((long-term debt (Item 51) + short-term debt (Item 45))/total assets). $(EquityProceeds/A_t)$ is the total equity proceeds scaled by end-of-quarter total assets. $(EquityProceeds/A_{t-1})$ is the total equity proceeds scaled by beginning-of-quarter total assets. The "total equity proceeds" is defined as the money received from the investors when a company sells equity to the investors. Except for $(M/B)_t$ and $(EquityProceeds/A_t)$, all variables are measured at the end of the previous quarter (*t*-1).

Table 2 shows the summary statistics for issue and firms characteristics for my final sample. The median value of "Net proceeds less fees" is \$30.10 million, while the median value of "Net proceeds less fees and expenses" is \$29.69 million. The median value of "Gross spread", which is the fees that the underwriters receive, is \$0.84 million. The median of "Gross spread (%)" is 7.00% meaning that the IPO firms paid 7% of the principal amount as underwriter fees. The median values of "Assets", "Current liabilities", and "Long-term debt" are \$56.81 million, \$0.64 million, and \$2.38 million, respectively. The median value of "Sales" for my sample firms is \$12.73 million.

Table 2. Issue and firm characteristics (all in million \$ except for "Gross spread %")

	Mean	Median	St. dev.
Net proceeds less fees	51.89	30.10	142.64
Net proceeds less fees & expenses	51.52	29.69	141.44
Gross spread	0.86	0.84	0.27
Gross spread (%)	7.06	7.00	0.78
Assets	182.43	56.81	830.36
Current liabilities	5.32	0.64	22.24
Long-term debt	54.83	2.38	308.84
Sales	41.50	12.73	202.73

3. Methodology

3.1. IPO market timing. In order to test for market timing behavior in equity markets, first, I define "Hot" and "Cold" equity markets, and then use this dummy variable to measure IPO market timing attempts. Alti (2006) first finds the number of IPOs in each month for his sample period, then he finds the 3-month moving averages, and then he detrends these averages. He classifies the months where the detrended number of IPOs falls into the top 25 percent of the months in his sample as "Hot" and the months where this number falls into the bottom half of the months in his sample as "Cold". He eliminates the other months from his sample. Finally, he finds that this "Hot" dummy variable explains the amount of proceeds from the IPOs scaled by the asset sizes of the issuing companies.

I follow Alti's (2006) procedure and create a "Hot" dummy for equity issuers by assigning the top 25% of the months in terms of detrended number of equity issuers into the "Hot" category and the bottom half into the "Cold" category.

After doing exactly what Alti (2006) does for "Hot"/ "Cold" classification, I do a second classification in which no observation is eliminated: The top 25% of the months is classified as "Hot" and the bottom 75% is classified as "Cold".

My model for equity market timing is:

$$Y_t = c_0 + c_1(Hot)_{t-1} + c_2(M/B)_t + \\ + c_3(EBITDA/A)_{t-1} + c_4 \log(s)_{t-1} + \\ + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \varepsilon_t, \quad (1)$$

where the dependent variable Y_t is $Proceeds^T/A_t$ (i.e. the total equity proceeds divided by quarter-end assets), $Proceeds^T/A_{t-1}$ (total equity proceeds divided by beginning-of-the-quarter assets), or $Proceeds^P/A_t$ (i.e. the total primary equity proceeds divided by quarter-end assets). "The total equity proceeds" is the total dollar amount a company gets by selling equity to the investors.

The "Hot" dummy is my equity market timing variable. The control variables are those used in the previous literature: market-to-book ratio, earnings before interest, taxes and depreciation scaled by assets (profitability), natural logarithm of net sales (size), property, plant and equipment (tangibility of assets), and book leverage. All firm characteristics are lagged one quarter. Since $(M/B)_{t-1}$ data are unavailable for IPOs, $(M/B)_t$ data are used instead.

Alti (2006) finds that the "Hot" dummy explains the amount of proceeds from the IPOs scaled by the asset sizes of the issuing companies. He concludes that "Hot" market firms tend to issue more equity. Here, I expect a positive and significant relationship between the "Hot" dummy and my dependent variables. I expect the regression coefficients for market-to-book ratio and profitability to be positive and the coefficients for the other control variables to be negative.

Here, in some regressions, instead of the "Hot" market dummy, I use the detrended number of monthly issues along with monthly dummies to see if a continuous variable rather than a "Hot"/"Cold" categorical variable explains the proceeds. Therefore, in some of my regressions, I replace the "Hot" market dummy variable with the "Monthly Issues" variable and the monthly dummies. As we will see, in Tables 3 and 4, the first three columns use the "Hot" market dummy, and the last three columns use the "Monthly Issues" variable along with the monthly dummies.

For additional robustness checks, instead of the "Hot"/"Cold" classification which measures the market activity, I use the variable "Δ*Issues*" as my main variable. This is similar to the "Hot"/"Cold" classification, but instead of creating a dummy variable as in the "Hot"/"Cold" classification, here I create a continuous variable that measures the change in the number of IPO firms coming to the market over a period (i.e. over the previous 1-, 2-, …, 12-month period). In other words, "Δ*Issues*" is a lagged variable that measures the change in the number of detrended, standardized number of issuers over the previous 1, 2, …, 12 months. I use a detrending constant of 0.25% per month since the average growth rate in the U.S. over my sample period was approximately 3% per year. This is the number that Alti (2006) and others use for detrending. For the dependent variable, I use $Proceeds^T/A_t$ (i.e. the total equity proceeds divided by quarter-end assets), or $Proceeds^T/A_{t-1}$ (total equity proceeds divided by beginning-of-the-quarter assets), or $Proceeds^P/A_t$ (i.e. the total primary equity proceeds divided by quarter-end assets).

My model here is:

$$Y_t = c_0 + c_1(\Delta Issues)_t + c_2(M/B)_t + c_3(EBITDA/A)_{t-1} + c_4 \log(s)_{t-1} + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \sum_{i=2}^{12} d_i m_{i,t} + \varepsilon_t, \quad (2)$$

where the dependent variable Y_t is $Proceeds^T/A_t$ (i.e. the total equity proceeds divided by quarter-end assets), $Proceeds^T/A_{t-1}$ (total equity proceeds divided by beginning-of-the-quarter assets), or $Proceeds^P/A_t$ (i.e. the total primary equity proceeds divided by quarter-end assets). The independent variable, "Δ*Issues*", is a detrended, standardized count of the change in all issuers over the previous 1, 2, …, 12 months. $M_{i,t}$ represents the 11 monthly dummies starting from February. All other variables are as explained above.

3.2. The persistence of the impact of IPO market timing. To test for the long-run impact of IPO market timing, I follow Alti's (2006) methodology. The following model is used:

$$Y_t = c_0 + c_1(Hot)_{t-1} + c_2(M/B)_t + c_3(EBITDA/A)_{t-1} + c_4 \log(s)_{t-1} + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \varepsilon_t, \quad (3)$$

where the dependent variable Y_t is the change in the book leverage (i.e. *D*/*A*) of the IPO firms over the next 8, 12, 16, and 20 quarters. All explanatory variables are as explained in the previous sections. Later, I replace the "Hot" variable with "Δ*Issues*" to check the robustness of the results.

4. Empirical results

4.1. IPO market timing. As mentioned above, to test for equity market timing, Alti's (2006) "Hot"/"Cold" market classification is used. Besides Alti's (2006) "Hot"/"Cold" market classification, a second classification is also employed where no observation is dropped.

To test for equity market timing, I regress the proceeds from each equity issue (scaled by assets) against five firm-specific control variables (i.e. size, market-to-book ratio, tangibility, profitability, and pre-issue leverage), and the "Hot" market dummy variable that I have created for the equity markets. Here, I am trying to see if "Hot" market firms issue more equity (in dollar terms) than "Cold" market firms do. This is the procedure followed by Alti (2006).

Table 3 shows the results for IPO market timing where all months are included. The results here can be directly compared to Alti's (2006) results. The first three columns show the results where the "Hot" market dummy is used, and the last three columns show the results where the "Monthly Issues" variable is used (i.e. the detrended number of monthly issues). Here, in the first three columns, the top 25% of the months in market activity is classified as "Hot" months and the remaining months are classified as "Cold" months.

For all three dependent variables, I find a positive and significant "Hot" market effect. The regression coefficient for the "Hot" market dummy is 0.063 (t-statistics = 4.41) for $Proceeds^T/A_t$, 0.088 (t-statistics = 2.06) for $Proceeds^T/A_{t-1}$, and 0.044 (t-statistics = 3.86) for $Proceeds^P/At$. These results are consistent with Alti's (2006) findings of a "Hot" market effect. It confirms that the tendency of "Hot" market firms to issue more equity is a genuine timing effect. In other words, equity market volume is a highly significant indicator of market timing attempts of IPO firms. Firms that go public in "Hot" markets issue significantly more equity than those that go public in "Cold" markets.

Table 3. IPO market timing (all months)

For each variable Y_t, columns 2 through 4 report the coefficients of regressions of the form

$$Y_t = c_0 + c_1(Hot)_{t-1} + c_2(M/B)_t + c_3(EBITDA/A)_{t-1} + c_4 \log(s)_{t-1} + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \varepsilon_t$$

The results are for Initial Public Offerings only. The table shows the results for all months in my sample period where I classify the top half of my sample months in terms of detrended issue volume as "Hot" months and the other months as "Cold" months. The time subscript *t* denotes the issue quarter. Robust *t*-statistics are in parentheses. The dependent variable Y_t is either $Proceeds^T/A_t$ (i.e. the total equity proceeds divided by quarter-end assets), $Proceeds^T/A_{t-1}$ (total equity proceeds divided by beginning-of-the-quarter assets), or $Proceeds^P/A_t$ (i.e. the total primary equity proceeds divided by quarter-end assets).

Regression analysis						
	$Proceeds^T/A_t$	$Proceeds^T/A_{t-1}$	$Proceeds^P/A_t$	$Proceeds^T/A_t$	$Proceeds^T/A_{t-1}$	$Proceeds^P/A_t$
Intercept	0.427 (15.09)	1.106 (13.06)	0.397 (17.70)	0.452 (10.50)	1.056 (8.17)	0.410 (11.71)
Hot	0.063 (4.41)	0.088 (2.06)	0.044 (3.86)	- -	- -	- -
Monthly issues	- -	- -	- -	0.045 (5.29)	0.112 (4.36)	0.032 (4.58)
$(M/B)_t$	0.056 (12.28)	0.230 (16.92)	0.050 (13.77)	0.055 (12.29)	0.231 (17.10)	0.049 (13.75)
$(EBITDA/A)_{t-1}$	0.360 (10.43)	0.648 (6.26)	0.224 (8.08)	0.363 (10.60)	0.647 (6.28)	0.227 (8.21)
$\text{Log}(S)_{t-1}$	-0.066 (-11.33)	-0.275 (-15.84)	-0.075 (-15.84)	-0.065 (-11.31)	-0.275 (-15.86)	-0.075 (-15.79)
$(PPE/A)_{t-1}$	-0.078 (-2.25)	-0.019 (-0.18)	-0.082 (-2.98)	-0.067 (-1.96)	-0.003 (-0.03)	-0.077 (-2.80)
$(D/A)_{t-1}$	0.003 (0.11)	-0.479 (-5.15)	0.120 (4.78)	-0.003 (-0.10)	-0.479 (-5.15)	0.119 (4.70)
Adj. R^2	0.2973	0.4433	0.3366	0.3134	0.4518	0.3428
N	1439	1439	1407	1439	1439	1407

For *Proceeds/A$_t$*, the results for various firm characteristics like market-to-book ratio, profitability, tangibility, firm size, and leverage ratio are consistent with Alti's (2006) findings. Market-to-book ratio and profitability each has a positive and significant impact on proceeds scaled by end-of-issue-quarter assets. While firm size and tangibility each has a negative and significant impact on proceeds scaled by end-of-issue-quarter assets, leverage has an insignificant impact on proceeds scaled by end-of-issue-quarter assets.

The last three columns in Table 3 show the results where "*Monthly issues*" variable is used instead of the "*Hot*" market dummy. I also control for the monthly dummies here to take care of seasonality, but the results for the monthly dummies are not shown due to space limitations. The results are similar to the first three columns where the "*Hot*" market dummy is used. For all three dependent variables, the coefficient for "*Monthly issues*" is positive and significant. When there are more firms in the market, each firm issue more equity.

In Table 4, I do what Alti (2006) has done: I only include the top 25% and the bottom half of the months in terms of market activity. I take the top 25% of the months in market activity as "Hot" months and the bottom half as the "Cold" months, meaning that I actually eliminate approximately a quarter of my sample. Here, the results are similar to the Table 3 results. For all three dependent variables, I find a positive and significant "*Hot*" market effect. Also, the coefficients for the "*Monthly Issues*" are positive and significant.

Looking at Table 4, I conclude that the results with the second classification where I drop 25% of the sample are similar to the results with the first classification where I do not drop any observation from the sample. This shows that, at least for my specific IPO sample, eliminating the equity issuances in the "Neutral" months does not make any difference. In other words, besides Alti's (2006) classification, a more simple classification, where the top 25% of the months in terms of detrended number of IPOs plus SEOs is classified as "Hot" and the bottom 75% is classified as "Cold", also explains the market timing behavior of IPO firms. The general conclusion for IPO market timing is the same with both classifications: Companies seem to wait for "windows of opportunities" in the IPO markets and tend to issue more stock during these periods.

Table 4. IPO market timing (all months minus 2nd quartile)

Regression analysis						
	$Proceeds^T/A_t$	$Proceeds^T/A_{t-1}$	$Proceeds^P/A_t$	$Proceeds^T/A_t$	$Proceeds^T/A_{t-1}$	$Proceeds^P/A_t$
Hot	0.068 (3.67)	0.124 (2.40)	0.053 (3.51)	- -	- -	- -

Table 4 (cont.). IPO market timing (all months minus 2nd quartile)

Regression analysis						
	$Proceeds^T/A_t$	$Proceeds^T/A_{t-1}$	$Proceeds^P/A_t$	$Proceeds^T/A_t$	$Proceeds^T/A_{t-1}$	$Proceeds^P/A_t$
Monthly issues	- -	- -	- -	0.041 (4.20)	0.114 (4.20)	0.029 (3.61)
$(M/B)_t$	0.067 (11.59)	0.253 (15.69)	0.058 (12.19)	0.067 (11.60)	0.250 (15.49)	0.058 (12.23)
$(EBITDA/A)_{t-1}$	0.324 (7.66)	0.601 (5.09)	0.209 (5.93)	0.325 (7.73)	0.610 (5.20)	0.212 (6.05)
$\text{Log}(S)_{t-1}$	-0.063 (-8.83)	-0.262 (-13.17)	-0.074 (-12.10)	-0.064 (-8.94)	-0.264 (-13.26)	-0.075 (-12.32)
$(PPE/A)_{t-1}$	-0.058 (-1.42)	0.018 (0.16)	-0.055 (-1.62)	-0.047 (-1.14)	0.032 (0.28)	-0.049 (-1.44)
$(D/A)_{t-1}$	-0.006 (-0.15)	-0.425 (-4.09)	0.124 (3.97)	-0.007 (-0.18)	-0.414 (-3.98)	0.129 (4.13)
Adj. R^2	0.3154	0.4711	0.3328	0.3298	0.4800	0.3437
N	1023	1023	997	1023	1023	997

Table 5 shows the results of the robustness tests on IPO market timing (equation (2)). Due to space limitations, only the regression coefficients for the lagged "Δ*Issues*" variable are shown in the table (i.e. the coefficients for the eleven monthly dummies and the control variables are not reported). My results mostly confirm my previous findings. As we can see from the table, the coefficients of almost all of the lagged variables are significant at 1% level for $Proceeds^T/A_t$ and $Proceeds^T/A_{t-1}$. The results are weaker for $Proceeds^P/A_t$. Some of the coefficients here in this last panel are insignificant at 10% level. Therefore, I conclude that my robustness tests (especially for total proceeds) generally confirm my earlier finding of a significant market timing effect. Using different classifications for market activity does not make any difference. Whether the variations of the "Hot"/ "Cold" market classification or the lagged change in the number of issues are used, the results do not change.

4.2. The persistence of the impact of IPO market timing. In this section, the long-run impact of market timing on capital structure is examined. In other words, I attempt to see if IPO market timing has a persistent impact on the leverage ratios of the issuing firms. If our equity market timing variable (i.e. the "*Hot*" market dummy) still has a significant impact on the leverage ratios of the equity issuing firms after five years, I will conclude that equity market timing has a persistent impact on capital structure. Table 6 shows the results of the tests for the long-run impact of IPO market timing on the issuing firms' leverage.

To examine the long-run impact of IPO market timing on the cumulative change in leverage, I regress the cumulative changes in the leverage ratios of the IPO issuing firms (over the next two, three, four, and five years after the issue) against the five firm-specific variables (size, M/B, profitability, tangibility, and pre-issue leverage) and the "*Hot*" market dummy. As in Alti (2006), I expect to find a reversal over the next two or three years after the issue. However, the more important test here will be the change in leverage over the five year period after the issue, not two or three years (i.e. we know from previous research that there is a reversal in IPO firms leverage over the two or three year period after the issue).

Table 5. IPO market timing (robustness tests)

Columns 3-14 report the coefficients of regressions of the form:

$$Y_t = c_0 + c_1(\Delta Issues)_t + c_2(M/B)_t + c_3(EBITDA/A)_{t-1} + c_4\log(s)_{t-1} + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \sum_{i=2}^{12} d_i m_{i,t} + \varepsilon_t.$$

All months in my sample period are included in the analysis. The dependent variable Y_t is either $Proceeds^T/A_t$ (i.e. the total equity proceeds divided by quarter-end assets), $Proceeds^T/A_{t-1}$ (total equity proceeds divided by beginning-of-the-quarter assets), or $Proceeds^P/A_t$ (i.e. the total primary equity proceeds divided by quarter-end assets). The independent variable, "Δ*Issues*", is a detrended, standardized count of the change in all IPOs issued during a given month. It is lagged 12 times. $M_{i,t}$ represent the 11 monthly dummies starting from February. All other variables are as explained above. Regression coefficients of only the lagged "Δ*Issues*" variable are shown in the table. The time subscript *t* denotes the issue quarter. Robust *t*-statistics are in parentheses.

Market timing effects on IPO activity													
		Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8	Lag9	Lag10	Lag11	Lag12
$Proceeds^T/A_t$	Coef.	0.021	0.022	0.022	0.023	0.029	0.021	0.020	0.018	0.014	0.013	0.019	0.022
	t-stat.	(2.48)	(2.25)	(2.34)	(2.72)	(3.42)	(2.43)	(2.30)	(2.07)	(1.62)	(1.44)	(2.14)	(2.65)
	Adj. R^2	0.303	0.302	0.303	0.304	0.306	0.303	0.303	0.302	0.301	0.301	0.302	0.303
	N	1439											

Table 5 (cont.). IPO market timing (robustness tests)

Market timing effects on IPO activity													
		Lag1	Lag2	Lag3	Lag4	Lag5	Lag6	Lag7	Lag8	Lag9	Lag10	Lag11	Lag12
$Proceeds^T/A_{t-1}$	Coef.	0.064	0.090	0.079	0.093	0.102	0.105	0.108	0.108	0.104	0.095	0.095	0.081
	t-stat.	(2.50)	(3.00)	(2.86)	(3.75)	(4.05)	(4.07)	(4.23)	(4.19)	(4.10)	(3.51)	(3.57)	(3.29)
	Adj. R^2	0.447	0.448	0.448	0.450	0.451	0.451	0.451	0.451	0.451	0.449	0.449	0.449
	N	1439											
$Proceeds^P/A_t$	Coef.	0.014	0.012	0.008	0.009	0.012	0.014	0.008	0.012	0.011	0.015	0.014	0.014
	t-stat.	(2.10)	(1.50)	(1.02)	(1.40)	(1.79)	(2.02)	(1.21)	(1.77)	(1.58)	(2.12)	(1.95)	(2.09)
	Adj. R^2	0.335	0.334	0.333	0.334	0.334	0.335	0.334	0.334	0.334	0.335	0.335	0.335
	N	1439											

Table 6. Persistence of the impact of IPO market timing on capital structure

Columns 2-6 report the coefficients of regressions of the form:

$$Y_t = c_0 + c_1(Hot)_{t-1} + c_2(M/B)_t + c_3(EBITDA/A)_{t-1} + c_4 \log(s)_{t-1} + c_5(PPE/A)_{t-1} + c_6(D/A)_{t-1} + \varepsilon_t.$$

The dependent variable is the cumulative change in book leverage from the last day of the pre-issue quarter through the end of quarters Issue+8, Issue+12, Issue+16, and Issue+20. In other words, the impact of an initial public offering on the issuing firm's book leverage over the next 2, 3, 4, and 5 years are estimated. All explanatory variables are as explained in the previous sections. Since $(M/B)_{t-1}$ data are unavailable for IPOs, $(M/B)_t$ data are used instead. The last four columns report the results using the detrended number of monthly issues and monthly dummies, instead of the "*Hot*" market dummy. The results for the monthly dummies are not shown in the table.

Dependent variable: $(D/A)_z$-$(D/A)_{t-1}$								
z	Issue+8	Issue+12	Issue+16	Issue+20	Issue+8	Issue+12	Issue+16	Issue+20
Hot	0.036 (2.27)	0.047 (2.69)	0.064 (2.58)	0.074 (2.15)	- -	- -	- -	- -
Monthly issues	- -	- -	- -	- -	0.011 (1.51)	0.023 (2.83)	0.041 (3.50)	0.043 (2.71)
$(M/B)_t$	-0.023 (-4.48)	-0.028 (-4.64)	-0.027 (-3.13)	-0.043 (-3.57)	-0.025 (-5.26)	-0.028 (-5.33)	-0.031 (-4.04)	-0.043 (-4.04)
$(EBITDA/A)_{t-1}$	-0.134 (-3.74)	-0.167 (-4.16)	-0.064 (-1.12)	-0.060 (-0.75)	-0.145 (-4.44)	-0.159 (-4.53)	-0.073 (-1.46)	-0.100 (-1.47)
$Log(S)_{t-1}$	0.014 (2.35)	0.012 (1.82)	0.003 (0.28)	-0.009 (-0.67)	0.009 (1.79)	0.008 (1.46)	0.004 (0.45)	-0.011 (-0.96)
$(PPE/A)_{t-1}$	0.094 (2.76)	0.082 (2.15)	0.054 (1.00)	0.038 (0.51)	0.086 (2.77)	0.061 (1.83)	0.050 (1.07)	0.029 (0.45)
$(D/A)_{t-1}$	-0.542 (-17.50)	-0.532 (-15.37)	-0.502 (-10.07)	-0.471 (-6.77)	-0.542 (-19.26)	-0.523 (-17.26)	-0.516 (-11.93)	-0.484 (-8.10)
Adj. R^2	0.2770	0.2583	0.1449	0.0832	0.2743	0.2626	0.1589	0.0938
N	814	718	628	568	1053	926	817	731

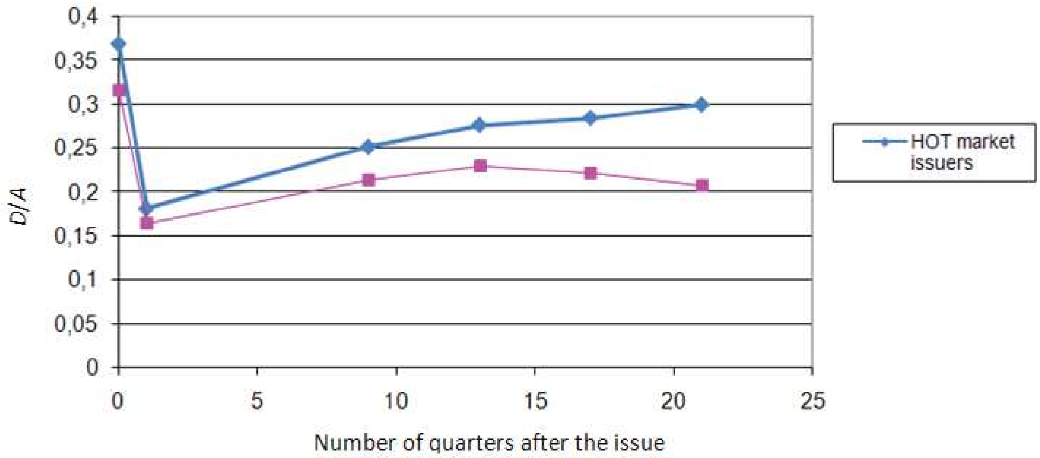
The first four columns show the results for 8, 12, 16, and 20 quarters after the IPO using the "*Hot*" market dummy, and the last four columns show the corresponding results using the detrended number of monthly issues (and monthly dummies), rather than the "*Hot*" market dummy.

When we look at the first four columns, we see that the regression coefficients for the "*Hot*" market dummy are positive and significant for the 8, 12, 16, and 20 quarter period after the IPO. The coefficients are 0.036 (*t*-statistic = 2.27), 0.047 (*t*-statistic = 2.69), 0.064 (*t*-statistic = 2.58), and 0.074 (*t*-statistic = 2.15), respectively. Therefore, I conclude that the firms that do an IPO in "*Hot*" markets tend to have significantly larger changes in their leverage ratios in the long run compared to the "Cold" market issuers. Even just two years after their offering, they have significantly larger changes in their leverage ratios compared to the "Cold" market issuers.

When we look at the last four columns, we see similar results. The coefficients for the detrended number of monthly issues are positive and significant for the 8, 12, 16, and 20 quarter period after the IPO (Issue+8 is marginally significant). These results confirm that firms that do an IPO in active (or "Hot") months tend to have significantly larger changes in their leverage ratios in the long run (i.e. starting from the second or the third year) compared to the "Cold" market issuers.

Figure 1 plots the leverage ratios of "Hot" and "Cold" market IPO firms over time. As we can see from the figure, the "Hot" market issuers have much higher leverage ratios compared to the "Cold" market issuers two, three, four, and five years after the offering. Interestingly, the difference in the two groups' leverage ratios gets larger each year. In fact, three years after the issue, "Cold" market firms start reducing their leverage once again while "Hot" market firms still continue to increase their leverage; therefore, we are seeing much larger differences in years four and five.

One important conclusion here is the following: Our results show that the traditional trade-off theory seems to work only for market timers (i.e. "Hot" market issuers). They return to their original levels five years after the issue, while the "Cold" market issuers are at much lower levels even five years after the issue. I contend that the "Hot" market issuers (i.e. successful timers) are rewarded by the market by more favorable financing conditions (i.e. better interest rates) after the offering, therefore they are able to return to their original levels. On the other hand, the "Cold" market issuers are penalized by less favorable financing conditions, and in the end, they are forced to have permanently lower leverage levels compared to their original levels.



	Pre-issue	Issue qtr	Issue+8	Issue+12	Issue+16	Issue+20
All IPOs	0.349	0.175	0.244	0.263	0.271	0.280
"Hot" market firms	0.369	0.182	0.252	0.277	0.285	0.300
"Cold" market firms	0.316	0.164	0.213	0.229	0.222	0.207

Fig. 1. Leverage ratios of "Hot" and "Cold" market IPO firms over time

Conclusion

This study contributes to the literature by answering these two main questions: (1) Is there evidence of IPO market timing? (2) Does IPO market timing have a persistent impact on issuing firms' capital structures in the long run (i.e. up to five years after the issue)?

The previous studies show the existence of market timing attempts in equity markets. In this paper, in order to measure equity market timing, I classify each month as a "Hot", "Neutral", or "Cold" month depending on the number of equity issuers in each month. I create two different classifications: One that drops the "Neutral" months, and only compares the "Hot" and "Cold" months, and one that takes each "Neutral" month as a "Cold" month. I use both of these classifications to explain the IPO firms' proceeds scaled by assets. For robustness, I also looked at the impact of the lagged change in the number of IPO firms coming to the market over the previous 1, 2, .., 12 months on the proceeds scaled by assets.

My empirical results confirm the existence of IPO market timing. Both of my "Hot" market classify-cations capture the companies' timing attempts in the IPO market. Firms seem to wait for "windows of opportunities" in the equity markets and they tend to issue more equity during these periods. This implies that managers are taking advantage of the market conditions to lower their companies' costs of capital. My robustness tests also confirm this.

Although previous research shows convincing evidence of timing attempts by firms, there is no consensus on the long-run impact of timing on leverage. While Baker and Wurgler (2002) find that equity market timing has a persistent impact on capital structure, subsequent studies find only a short-run (i.e. two or three years) impact.

My capital structure tests show that, immediately after the offering, both "Hot" and "Cold" market firms start increasing their leverage ratios, although "Hot" market firms increase their leverage ratios more compared to "Cold" market firms. This increase in leverage continues for three years for all issuers. Interestingly enough, after the third year, "Cold" market firms stop increasing their leverage ratios (i.e. they even reduce their leverage a little bit) while "Hot" market firms still continue to increase their leverage. Therefore, after the third year, the difference between the two groups' leverage ratios starts to widen. My results show that the "Hot" market firms have significantly higher leverage ratios compared to "Cold" market firms in the long run (i.e. 3 to 5 years).

My results shed a new light on the trade-off theory of capital structure. The traditional trade-off theory seems to work only for market timers (i.e. "Hot" market issuers). Firms that issue equity when market conditions are favorable (i.e. market timers) follow an active policy of increasing their leverage for five years after the issue until their leverage ratios reach their pre-issue levels. So, the reversal in these firms' leverage continues until they reach their original levels. Other firms (i.e. "Cold" market issuers), on the other hand, stop increasing their leverage after the third year, and their leverage ratios never reach their original pre-issue levels. This difference in the policies of the two groups may be due to the more favorable future financing offers extended to the successful issuers in recognition of their improved financial statements.

Overall, market timing seems to have a persistent impact on capital structure and it appears to determine the debt level of the issuing firm in the long run. While the market timers return to their pre-issue level by issuing more debt and less equity over time, the other firms have permanently lower debt ratios after the issue.

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