

Long-run Performance of Market-timing Initial Public Offerings

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Abstract

In this paper we examine the long-term performance of firms that conduct their IPO in periods of high investor sentiment. We use different measures of returns and conclude that the value-weighted risk-adjusted buy-and-hold return is the most appropriate measure to use. We find that there is significant underperformance of the so called market-timing firms. There is also evidence supporting that market-timing firms are more short-term oriented than firms conducting their IPO in other periods. Our results are robust after controlling for explanatory variables and after controlling for alternative measures of return. We also discuss the possible implications of our research within the framework of financial and economic theory.

I. INTRODUCTION

The cyclical nature of the Initial Public Offering (IPO) market is an irrefutable fact. Early research on the topic (Ibbotson and Jaffe, 1975; Ibbotson, Sindelar and Ritter, 1988; 1994; Ritter, 1984) sparked a large academic and public interest in this seemingly strange phenomenon. What has come to be called “hot issue markets” is the observed spike in IPO activity following periods of high returns in both the stock market and in other new issues. Several different theories have been proposed in response to as why this occurs. The most common one, springing from fact that IPO activity seems to follow rising markets, is the business condition hypothesis. This school of thought argues that firms, in order to receive acceptable valuations for their equity, want to time their IPO with favorable market conditions. By timing the IPO with market factors such as optimistic expected returns and high expected aggregate profitability, the issuing companies can benefit as the valuation of their offering increases (Pástor and Veronesi, 2005).

Another common explanation, with similarities to the business condition hypothesis, emphasizes the important role of investors’ sentiment. During some periods (often coinciding with periods of favorable market conditions), investors become irrationally excited about new investment opportunities. This irrational exuberance causes mispricing in the equity market and a higher demand for new equity issues with ensuing high initial returns (Loughran and Ritter, 1995). The cost of financing the company by equity decreases until it eventually is cheaper than debt financing. At this point the IPO activity will escalate into a hot issue market. The classic explanation for why companies go public states that they need new funds in order to finance investments and future growth. While this certainly is true, there are undoubtedly other factors in play in regards to determining the timing of the IPO. Some research has pointed towards the use of IPOs as a tool for an eventual sale of the company by the initial owners (Rydqvist and Högholm, 1995; Zingales, 1995).

The purpose of our paper is to look at performance differences between periods of high and low-to-medium investor sentiment. This is interesting as it might help to bridge gaps between the research areas of market-timing, financing decision and long-term performance of IPOs. Our hypothesis suggests that issuing firms that time the markets with their IPO have short-term motives for using equity financing. Consequently, these firms should have worse subsequent long-term performance compared to non-market-timers. The hypothesis is based on the argument stating that if owners use IPOs as an instrument for liquidating their investment, and thus putting private needs foremost, the mere existence of hot issue markets

indicates that there are certain beneficial aspects for owners in going public during those periods. One of these aspects is most likely the fact that there is a higher possibility to receive the most money for the shares in periods of high investor sentiment. This implies that the firms going public in other periods of investor sentiment have different motives for doing so; otherwise they too would have waited for more favorable conditions. There are other apparent ulterior motives for going public in hot issue markets, such as personal wealth-maximization, that can be characterized as short-term behavior as it does nothing to ensure improved performance of the firm in the foreseeable future.

We test our hypothesis by regressing risk-adjusted return at a four-year horizon on a dummy variable for high investor sentiment peaks (the top quintile of the investor sentiment index). The results show a significant larger underperformance by market-timers. The initial results are robust after controlling for other contributing factors to the additional underperformance. Furthermore, the results also indicate a positive relationship between R&D intensity and long-term performance. As expected, improvements in profitability, in our case measured as return on equity, have a strong positive relationship with the performance. Despite the strong control variables, market-timing appears to be a strong determinant for explaining the underperformance of IPOs. We go on to test our results with both buy-and-hold and cumulative return measures, calculated respectively with value-weighted and equal-weighted market returns. In total we test ten different return measures. The results show that the market-timing firms contribute negatively to the four-year performance for all return measures. In the robustness test, nine out of ten return measures are significant at a 5% significance level.

The results indicate that firms that conduct IPOs in hot issue markets periods with high investor sentiment have less long-term incentives in comparison to firms conducting their IPO in other periods.

II. PREVIOUS RESEARCH

A. Market Timing

The market for IPOs shows a highly cyclical behavior. Research by Ibbotson and Jaffe (1975), Ibbotson, Sindelar and Ritter (1988, 1994), and Ritter (1984) marked the beginning of a large academic and public interest in the subject of hot issue markets. These hot issue markets are characterized by periods of rising stock markets and high initial returns of IPOs

followed by a spike in the number of IPOs, clustered in relatively few months. Several theories have emerged in order try to explain why there is cyclical in the IPO market.

The business condition hypothesis argues that number of equity issuances reflect the prevailing economic conditions and would thus be positively correlated with measurements of business activity. In favorable market conditions, firms are able to issue equity to more attractive prices. In the context of IPOs, Pástor and Veronesi (2005) introduced a narrowed down definition of business condition. It includes the time-varying expected market returns, the expected aggregate profitability and the prior uncertainty about average post-IPO profitability. Their model predicts that firms go public when equity prices are high, expected aggregate profitability is high and prior uncertainty is high. According to their findings, many firms choose to wait for market conditions to improve so that their decision for going public can be justified by a high price for their equity. These statistical results are supported by a qualitative study made by Brau and Fawcett (2006), who interviewed 336 CFOs who had been involved in planning IPOs. According to the majority of the CFOs, they based the timing of the IPOs on the overall market conditions.

An alternate explanation for the IPO cyclical in the investor sentiment theory. During some periods, investors become abnormally excited about new investment opportunities. The demand for new equity issues rises and the marginal cost of obtaining new funds decreases (Loughran, Ritter and Rydqvist, 1994; Lerner, 1994; Loughran and Ritter, 1995). Consequently, by taking advantage of the so called “window of opportunity”, firms’ previously unattractive projects suddenly become lucrative as the investor optimism intensifies (Ritter, 1991).

Another explanation is one depending on the costs associated with adverse selection. In periods when asymmetric information is high, investors require larger price discounts on new equity issues. For example, during bad macroeconomic conditions it is often difficult for an investor to identify the risks associated with a specific company. Due to uncertainty of current and future asset values the demand for larger price discount in new issues increases (Choe, Masulis and Nanda, 1993).

These differing theories provide different explanations of the underlying reasons for the cyclical in IPO activity. Ivanov and Lewis (2008) explore the impact of these three explanations. They find that the most significant determinants of the IPO cycle is business condition and investor sentiment, while adverse selection costs have no significant effect on IPO activity. Lowry (2003) found similar results with the addition of firms’ demand for capital as another important determinant. Even though the previously mentioned theories have

different approaches, they expectedly lead to similar conclusions. The consequence from all of the aforementioned theories is the clustering of IPOs around the period of a rising stock market. When the stock market is rising we find favorable business conditions, high investor sentiment and a relatively low uncertainty regarding the condition of issuing firms. Drawing upon these conclusions, Colak and Günay (2011) developed a model for strategic waiting in the IPO market. In their study they find evidence that firms, which are about to go public, benefits from delaying the IPO process in order to obtain more information about the current economic condition. The existence of a sharp decline in IPO activity during unfavorable market conditions supports this theory. It indicates that firms do not solely base the decision to go public on their own fundamentals, but rather on the aggregate state of the economy.

Going public during an economic slowdown is costlier since the real or supposed risk of a failed IPO is higher. This is why the extra information from recent IPOs is of great value: to maximize the probability of a successful IPO (or minimize the probability of a failure). The market participants cannot know the exact result of an IPO at any given time; instead they rely on information gathered through other IPOs. This free-riding nature of information gathering may cause extended periods of inactivity even as the economy starts to recover. It also implies a quick increase in activity when a couple of successful IPOs have led the way (Lowry and Schwert, 2002; Alti, 2005).

B. Reasons for Going Public

The classic explanation for going public is the company's demand for new capital in order to finance future growth and investments. Several papers challenge this view. It would also be odd that there is a rise in IPO activity during economic expansions, when in fact it is during periods of bad economic conditions that companies are financially constrained and would need additional funds to continue expanding. Rydqvist and Högholm (1995) provide an alternate explanation as to why companies go public. They find that companies are taken public mainly due to the owners' desire to liquidate their investments. With this explanation, it makes perfect sense for IPOs to cluster around market peaks since that is when the proceeds to the initial owners are the greatest. This strategy is supported by Zingales (1995) who argues that the choice whether or not to go public is made in order to maximize the proceeds from an eventual sale by the initial owners. Further evidence of personal wealth-maximization can be found in a study conducted by Ang and Brau (2003). They find evidence of two different concealment strategies consistent with personal wealth-maximization. Insiders tend to

underreport the number of personally owned shares in the original prospectus, and later correcting the numbers in obscure amendments. The number of secondary shares offered is also being increased in later amendments as to avoid sending any obvious negative signals regarding the IPO. On a related note are the findings by Teoh, Welch and Wong (1998), explaining that IPO firms report higher earnings in comparison to their cash flow around the date of the IPO compared to non-issuers. Such behavior indicates a short-term focus. The earnings are inflated in unsustainable ways due to an over-emphasis on maximizing the short-term gains from the IPO.

According to the previously mentioned strategic waiting model (Colak and Günay, 2011), every firm benefits by delaying their IPO. If that is the case, why would there be any IPOs at all? It resembles a game of chicken, where all firms delay their IPO until the point where some firms desperately need the new funds provided by an equity offering. According to the reasoning in the strategic waiting model, these should be the firms conducting the IPO relatively early in the IPO cycle. Also, these firms assumedly conduct the IPO solely to finance their growing business and future investments. In contrast, when conducting an IPO during a hot issue market, we would expect that at least some firms do not desperately need new funds but instead justify their IPO by the prevailing high equity valuations. Since firms going public during a cold market cycle do it for the sake of funding their future expansion it is also safe to assume that there is a thorough investment plan for the usage of the new capital. The amount of equity that is raised is also on average lower, further increasing the efficiency of the equity employed. Although supposedly not all firms that go public during the expanding phase of the IPO cycle do so for the sake of receiving a larger amount of cash, some will. Consequently, these latter firms raise money with a less carefully planned usage of the new capital. The reported equity would also be larger at higher valuations, causing even lower equity returns. As a result, we would expect to see worse long-run performance of firms going public in the hot IPO markets. Consistent with these claims are the findings of Chemmanur and He (2011), who provide empirical evidence that firms going public later in the IPO cycle have lower productivity and profitability but larger cash holdings compared to those who perform the IPO earlier in the cycle. There is further supporting evidence from Yung, Colak and Wang (2008) concluding that due to opportunistic issuance of low quality firms during hot market conditions, the cross-sectional return variance is greater and there is a higher incidence of delisting for firms going public during this stage of the cycle. On the other hand, the model developed by Colak and Günay (2011) predicts that there is a higher probability of low-quality firms being among the first to go public.

C. Long-run Underperformance of IPOs

Over a period of one to five years, newly issued stocks have been found to underperform compared to non-issuing firms. Loughran and Ritter (1995) found an average yearly underperformance of 7 percent compared to non-issuing firms with approximately the same market capitalization. Ritter (1991) showed a mean underperformance over three years of 27 percent (median of 55 percent) for new issues relative to stocks matched on size and industry.

Certain accounting policies and measures have been proven to influence the long-term performance of IPOs. Accounting policies stated in the GAAP (Generally Accepted Accounting Principles) give companies some discretion over how to report earnings. As a result, companies can choose to report earnings that are far higher than the actual cash flow. Teoh, Welch and Wong (1998) reports that companies that are aggressively reporting earnings in excess of cash flow underperform by 20 percent compared to companies with more conservative policies. Another aspect that has been under scrutiny is the expenditures for research and development (R&D). Guo, Lev and Shi (2006) found a positive relationship between R&D intensity (both R&D as a fraction of sales and as a fraction of expected market value after the IPO) and long-term performance. Jain and Kini (2008) found no consistent relationship between R&D expenditures and changes in operating performance. They did however find that managerial commitment to R&D and developing new product lines improves the IPO firms' chances of remaining viable for longer periods of time.

III. DATA AND METHODOLOGY

In this section we explain how we have composed our data, which variables we have created, and the methodology we have adapted when conducting our tests.

A. Sample Selection

Our data is based on the Field-Ritter dataset, which consists of an initial sample of 8 860 American companies that conducted an initial public offering between 1st of January 1975 and 31st of December 2009. The dataset excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on Nasdaq or the NYSE. The dataset is available for download on Jay R. Ritter's webpage (Ritter, 2014) It is originally combined with data from Field and Karpoff (2002) and Loughran and Ritter (2004). This set of initial data, which contains only the security identifier, name and founding year of the companies, is

joined by monthly stock data from CRSP, as well as quarterly company data from CRSP/COMPUSTAT Merged. All observations that only contain CRSP data in less than one year are dropped. Due to the mismatch between the monthly and quarterly data, we compose more values for the company data. These are taken from the closest future quarterly report, not going further than two months away. The variable for R&D expenditures have missing data for many of the observations, and consequently we have assumed these R&D values to be zero as is done in prior research. Chauvin and Hirschey (1993) empirically test the suitability of this assumption and conclude that it is generally appropriate to set missing R&D expenditure values to zero. After this, we drop all observations that have missing CRSP or CRSP/COMPUSTAT Merged data. This creates a final sample of 7156 IPOs. The final dataset appears to be unbiased in regards to years. As seen in Table I in the results section, the dropped observations are more or less equally spread out over the entire range of years. There could however be a slight quality bias. It is not clear whether the firms with missing data in CRSP or CRSP/COMPUSTAT Merged are of lower quality than those with complete data.

B. Variables for Investor Sentiment

The variable we use to measure investor sentiment is created by Baker and Wurgler (2006) and is available from Wurgler's webpage (Wurgler, 2011). This variable is a composite index of the common variation of six underlying proxies for sentiment. These six proxies are the closed-end fund discount, NYSE share turnover, the number and average first-day returns on IPOs, the equity share in new issues, and the dividend premium. The composite index is also constructed in such a way that it excludes all business cycle specific variation.

Our paper will focus on a comparison between firms who choose to go public in different periods in the IPO cycle. In line with the investor sentiment hypothesis and the strategic waiting hypothesis, we define a hot issue market as when the investor sentiment is in the highest quintile. We construct a dummy variable for investor sentiment that is one if the company went public during a month when investor sentiment was in the highest quintile, and zero otherwise.

C. Return Variables

We use several different measures of returns in order to adjust for risk and control for the robustness of our results. For all of our return variables we calculate the buy-and-hold return as well as the cumulative return. By using both methods, we can account for large early

changes in stock price, which would otherwise get an un-proportional influence over longer-term returns. In order to correct for the usual abnormal initial returns of IPOs, we skip one month before calculating the returns.

In addition to using basic raw returns, we construct a market-adjusted return variable. This variable is simply the return of a stock in a specific month less the return of the market portfolio for that specific month. To adjust for certain risk characteristics we use a method where we match the IPO firms with non-issuing firms of similar risk character. We use data provided by Kenneth R. French on his webpage (French, 2014). The firms are divided into two portfolios based on size, and three portfolios based on book-to-market ratios. In total, when intersecting the different portfolios, we get six portfolios, which is consistent with the division of Fama and French (1993). The monthly returns of the firms are matched by the corresponding monthly returns of their portfolio, the monthly risk-free rate and the monthly market risk premium. To further control for robustness in our regressions we construct the market-adjusted and the risk-adjusted returns based on both value-weighted and equal-weighted returns.

Finally we calculate the event-time returns based on the previously calculated monthly returns. These returns are relative to the IPO event with, as previously mentioned, one-month lag. Thus, what we describe as the five-year return is the return from approximately one month to 61 months after going public (depending on when during the month the IPO happened).

D. Control Variables

In order to check our main regression for robustness we use several other variables to control for alternative causes of variation. These alternative variations could come from stock characteristics, accounting performance, or both. To control for stock characteristics, we construct two variables that have been extensively used for this purpose: market capitalization and the book-to-market ratio, which is based on the market value and book equity at the time of the IPO. We also include the age of the company when it goes public. In addition to controlling for certain stock characteristics we include two accounting measures that have been found to influence the long-term performance of IPOs. The first such variable is change in profitability, which we measure as the difference in logarithmic return on equity plus one between the end-date of the event-time horizon and date of the IPO. This variable is constructed in a similar fashion as the construction by Pástor, Taylor and Veronesi (2009).

The second accounting variable measure is R&D and is defined as R&D expenditures at the time of the IPO divided by book asset value at the time of the IPO. This ratio has been shown to influence the performance of IPOs by Jain and Kini (2008). In aggregate, these control variables should explain some of the variance not related to market timing.

E. Methodology

We begin by determining a suitable event-time horizon where it is possible to see significant differences in returns between periods of different levels of investor sentiment. This is done by simple linear regressions of different measures of return on our dummy variable indicating high levels of investor sentiment at the time of the IPO. The regression is run using different horizons from the day the company went public, ranging from one year to five years.

In the next step we check the robustness in our results by including additional variables that have been found to influence the returns of IPOs. By adding the new variables in multiple stages, and by including a correlation matrix, we hope to convince the readers of the lack of multicollinearity.

Finally, we run the same regression as above but with different measures of return. This way we can assess whether or not our results are dependent on the choice of return measurement. In all of our regression we cluster the standard errors by month of IPO. We choose 5 percent as the lowest acceptable significance level.

IV. RESULTS

The objective of the paper is to examine whether there are any differences in long-term returns between firms that are timing their IPO with high sentiment periods and firms that are conducting their IPO in periods of lower sentiment. In order to do this, we need appropriate measures to study the long-term performance for the two groups. Thus, we use raw return, market-adjusted returns, and risk-adjusted returns for every year up to five years after the IPO. In addition to our computed buy-and-hold returns, and in alignment with critique from Fama (1998), we also compute cumulative returns. For each of the return measurements (except for the raw return), we adjust by both value-weighted market return and equal-weighted market return. In most of our cross-sectional regressions we only use the value-weighted buy-and-hold return since it is the most relevant for investors. All of our tests show that the market-timing firms have negative long-term performances.

A. Descriptive Statistics

i. Descriptive statistics on sample

Table I provides descriptive statistics for our sample of 7156 IPOs for each and every year from 1975 to 2009. As our sample contains only one observation per firm, the numbers of observations in our samples equals the number of IPOs. Panel A in Table I shows the number of observations for both the initial and the final sample, the number of observations dropped from the initial sample, and the percentage of the initial sample that have been dropped. The largest fraction dropped per year is in the beginning of our data sample period. The reason for this is simply that the number of observations during this period is proportionally smaller than the rest of the data. The frequency of the IPOs are concentrated around the years from 1983 to 1987 and then again, in an even larger degree, around the mid-nineties. The count of sentiment dummies is also concentrated around the eighties, but not as much in the mid-nineties. These findings are consistent with the facts provided by Baker and Wurgler (2006), stating that the years between the late seventies up till the mid-eighties generally represented high sentiment in comparison to other years.

The mean market capitalization values are not consistently moving together with the frequency of IPOs throughout the years. Surprisingly, the mean market capitalization is remarkably low in the mid-eighties in comparison to other years. However, as the frequency of IPOs is at its height in the nineties, the mean market capitalization shows a tendency of rising year by year until 2001, after which the mean market capitalization values decline. The IPO activity, however, begins to decrease after year 2000. In 2008, the mean market capitalization value is \$1805 million, and is the largest in our sample. This value is difficult to explain with certainty, but most likely, it is a result of a smaller number of IPOs with comparably larger offerings.

As explained in the data section, we have divided all companies into two groups using our sentiment dummy: one group that contains firms that conducted their IPO during sentiment peaks, and another group that contains firms that conducted their IPO in other periods. As we use this distinction generously in our research, we provide statistics for the two groups accordingly. Panel B contains financial statement statistics and firm age statistics from our sample of 7156 observations divided into different periods using the sentiment dummy (high investor sentiment periods and all other periods). Interestingly, the mean of the R&D to assets ratio is higher during periods of lower investor sentiment. Considering that R&D investments are unlikely to be harvested in a short time-span, one can argue that the

Table I
Descriptive Statistics on Sample Characteristics and Financial Characteristics

The sample consists of 7156 US firms that have conducted an Initial Public Offering between the years 1975 and 2009. The sample excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on NASDAQ or the NYSE. The numbers provided under Final Sample in Panel A are the observations per year in the dataset from which other variables in the table have been computed. The sentiment index variable in the table is a market specific variable and is therefore not based on the final sample. Since the sentiment dummy is derived from the sentiment index, the count statistics for this variable is counts of the top sentiment quintile for the entire US market. The mean statistics for the variables Offering age, MV (Market Value), BV/MV (Book Value/Market Value), RD/TA (R&D expenses divided by Total Assets) are based on the data from the monthly reports at the end of the month at which the firms have conducted their IPO. The Market Value is in millions of dollars in both Panel A and Panel B. The equation for $\Delta\log(1+ROE)$ is defined as follows:

$$\Delta\log(1 + roe)_{i,t} = \log\left(\frac{1+roe_{i,t}}{1+roe_{i,0}}\right) \quad (\text{Equation 1})$$

Where $\Delta\log(1+ROE)$ is the change in firm i 's logarithmic ratio of net income to stockholder's equity plus one between month t (in our case, t equals 48) and the month of the IPO. The statistics in Panel B are based on the final sample of 7156 cross-sectional observations. TA is the total assets and TL is the total liabilities, both variables in millions of dollars and based on the monthly reports at the time of the IPO. ROE is the monthly return on equity in percent and Age is the age of the firm when it went public. In panel B, the statistics are shown for firms that conducted their IPO during sentiment peak as well as for firms that conducted their IPO during other periods.

Panel A: Sample Characteristics

	Initial Sample	Final Sample	Observations Dropped		Offering age	MV (\$m)	BV/MV	$\Delta\log(1+ROE)$	RD/TA	Sentiment	SentDummy
Years	N	N	N	% of Initial Sample	Mean	Mean	Mean	Mean	Mean (%)	Mean	Count
1975	11	4	7	64	58	327	1.39	-0.039	0	-1.6	-
1976	28	6	22	79	19	40	0.50	-0.017	0	-2.3	-
1977	20	2	18	90	8	66	0.62	0.011	0	-1.8	-
1978	23	3	20	87	31	63	0.47	-0.049	0	-1.2	-
1979	48	5	43	90	22	243	0.50	-0.024	0	-0.2	-
1980	71	11	60	85	10	235	0.30	-0.120	0	0.6	2
1981	189	38	151	80	13	56	0.39	-0.034	0	1.5	6
1982	86	55	31	36	10	81	0.28	-0.095	0	1.5	11
1983	558	390	168	30	12	96	0.32	-0.032	0	1.1	9
1984	240	158	82	34	12	51	0.40	-0.091	0	1.7	9
1985	275	182	93	34	16	73	0.42	0.024	0	0.8	11

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1986	563	397	166	29	16	98	0.39	-0.070	0	0.4	11
1987	419	316	103	25	15	109	0.43	-0.014	0	0.4	7
1988	174	127	47	27	15	142	0.47	0.020	0.11	0.0	6
1989	169	149	20	12	12	109	0.44	-0.049	1.09	-0.2	7
1990	151	132	19	13	14	116	0.45	0.007	1.73	-0.4	4
1991	344	300	44	13	17	167	0.41	-0.047	1.22	-0.4	6
1992	463	418	45	10	19	167	0.38	-0.032	1.20	-0.1	2
1993	591	515	76	13	14	217	0.38	-0.067	1.06	-0.2	2
1994	479	427	52	11	12	121	0.41	-0.028	1.36	-0.1	1
1995	518	469	49	9	11	208	0.33	-0.022	1.83	-0.2	1
1996	689	623	66	10	13	247	0.40	-0.051	1.66	0.2	3
1997	478	418	60	13	17	221	0.40	-0.002	1.33	0.4	1
1998	295	257	38	13	15	291	0.47	-0.064	1.13	0.0	2
1999	465	429	36	8	10	1199	0.30	0.024	1.87	0.0	3
2000	370	346	24	6	11	1354	0.28	-0.037	2.45	1.0	-
2001	88	73	15	17	23	1579	0.48	0.006	1.33	1.7	3
2002	71	61	10	14	23	755	0.56	0.008	0.95	0.2	4
2003	70	61	9	13	22	541	0.48	-0.084	1.35	-0.6	3
2004	185	168	17	9	17	611	0.45	-0.048	2.00	-0.1	3
2005	188	171	17	9	28	505	0.50	-0.039	1.26	-0.1	4
2006	203	181	22	11	21	718	0.54	0.020	1.64	0.0	-
2007	245	193	52	21	14	690	0.54	-	1.94	0.2	2
2008	30	26	4	13	22	1805	0.59	-	0.57	0.2	4
2009	63	45	18	29	21	817	0.79	-	0.89	-0.3	1
Total	8860	7156									

Panel B: Financial Characteristics and Firm Age Statistics									
	TA (\$m)	TL (\$m)	BV (\$m)	MV (\$m)	BV/MV	RD/TA (%)	ROE (%)	$\Delta \log(1+ROE)$	Age
Sentiment Peak									
Mean	736.42	592.89	141.85	427.35	0.35	0.78	4.41	-0.032	13
Median	37.98	9.71	22.09	75.25	0.29	0	2.08	-0.014	7
Other Periods									
Mean	485.89	353.22	132.65	345.82	0.41	1.27	-0.80	-0.033	15
Median	56.38	14.31	35.23	112.58	0.32	0	1.51	-0.012	8
N	7156								

firms going public in colder issue markets have a more long-term perspective in comparison to the firms that conducted their IPO during the sentiment peaks. As the R&D expenditures are assumed to be zero when the values are missing, it is not surprising that the median for the R&D to assets ratio in both periods is zero. Furthermore, from the financial statistics and offering statistics in Panel B we find that the mean for age of the firm when conducting the IPO is lower for the market timing firms.

ii. Descriptive statistics on returns

Table II contains descriptive statistics on both buy-and-hold and cumulative returns based on raw return as well as market- and risk-adjusted return for year one to five. There are two important relationships in, and between, the three tables. First, in all three of the tables the market timing firms have a mean return considerably worse in comparison to the mean returns of the firms that conducted their IPOs in other periods. This effect is, as expected, most significantly present among the raw returns, and is to a lesser extent present among the market-adjusted returns and the risk-adjusted return. In alignment with theory, one needs to control for several market and firm specific conditions before being able to extract valuable information from the returns. As the raw returns are not adjusted in any way, different conditions tend to skew the returns and make them present themselves differently from the market- and risk adjusted returns, as can be recognized when comparing the three tables.

The second relationship represents itself in the volatility of the buy-and-hold returns. Interestingly, though in accordance with expectancy and the reasoning above, the raw buy-and-hold return is the most volatile of the three types of returns followed by the market-adjusted return and the risk-adjusted return as the least volatile buy-and-hold return. This behavior is consistent through all years and in both groups respectively. Since the market-adjusted returns are only adjusted by the value-weighted market return, and not for any other market- and firm-specific conditions, it is more volatile than the risk-adjusted return. Furthermore, the proportionally high volatility of raw buy-and-hold returns is also present in the raw cumulative returns, where the mean value shifts from -16.55% in the first year, to 55.04% in the fifth year for the market-timing group. This is a significant change in the cumulative return when compared to the other types of returns, where the cumulative value in fact also decreases instead of increases.

Table II
Descriptive Statistics on Value Weighted Buy & Hold and Cumulative Returns at All Horizons

The sample consists of 7156 US firms that have conducted an Initial Public Offering between the years 1975 and 2009. The sample excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on NASDAQ or the NYSE. In Panel A, B, and C statistics are shown for firms that conducted their IPO during sentiment peaks and for firms that conducted their IPO during other periods. Panel A, Panel B and Panel C show descriptive statistics on raw returns, market-adjusted returns and risk-adjusted returns respectively. Both the market-adjusted return and the risk-adjusted return have been adjusted by the value-weighted market return. To estimate the risk-adjusted returns, the firms are divided into six different portfolios in accordance with the division of Fama and French (1993). In each of the panels, buy-and-hold returns as well as cumulative returns for all horizons are provided. Buy-and-hold returns and Cumulative returns are defined as follows:

$$R_{i,t} = \frac{P_{i,t+1} - P_{i,1}}{P_{i,1}} \quad (\text{Equation 2})$$

$$R_{i,t} = \sum_{n=1}^{t+1} R_{i,n} \quad (\text{Equation 3})$$

In equation 2, $R_{i,t}$ is the buy-and-hold return for firm i at month t , $P_{i,t+1}$ is the share price for firm i at month t plus one month (thereby taking the one-month lag into account), and $P_{i,1}$ is the price of firm i at the month after the IPO (month of the IPO plus the one-month lag). In equation 3, $R_{i,t}$ is the cumulative return for firm i at month t , and $R_{i,n}$ is the return of firm i in a series of n observations. Mean statistics, median statistics and standard deviation statistics is provided at all horizons, for each of the measurements.

Panel A: Descriptive statistics on Raw returns										
	Buy-and-Hold (%)					Cumulative (%)				
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
Sentiment Peak										
Mean	-15.54	-21.22	-15.47	-20.84	-18.39	-16.55	-6.53	27.65	44.89	55.04
Median	-28.00	-37.82	-39.08	-45.34	-45.45	-10.26	-4.07	19.65	30.11	44.46
St. dev.	61.95	74.52	85.78	78.88	87.29	79.80	120.23	143.51	162.36	172.62
Other periods										
Mean	1.65	3.21	2.39	8.96	7.55	5.95	16.17	34.93	68.30	91.75
Median	-10.14	-20.51	-25.80	-26.97	-26.50	6.71	17.46	31.23	55.04	75.72
St. dev.	68.57	97.26	103.10	120.66	117.46	71.70	94.09	119.56	163.65	165.60
N	7156									

Panel B: Descriptive statistics on Market-Adjusted Returns

	Buy-and-Hold (%)					Cumulative (%)				
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
Sentiment Peak										
Mean	-21.93	-34.57	-36.69	-43.65	-44.9	-23.65	-26.47	-9.01	-3.85	-0.98
Median	-31.83	-49.15	-55.67	-62.12	-65.52	-19.47	-27.94	-22.78	-20.49	-17.81
St. dev.	52.56	60.88	66.96	62.23	62.93	72.74	119.05	150.12	172.26	182.06
Other periods										
Mean	-10.15	-18.25	-26.51	-30.97	-37.28	-7.97	-9.85	-2.63	15.98	27.27
Median	-19.69	-35.93	-46.57	-53.7	-59.2	-6.41	-8.76	-7.3	1.96	9.39
St. dev.	59.45	76.78	75.29	79.42	73.55	69.87	93.17	120.08	165.5	170.69
N	7156									

Panel C: Descriptive statistics on Risk-Adjusted Returns

	Buy-and-Hold (%)					Cumulative (%)				
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
Sentiment Peak										
Mean	-33.94	-50.28	-57	-67.97	-72.05	-42.49	-58.28	-55.91	-68.05	-76.83
Median	-42.9	-64.86	-74.04	-81.32	-85.31	-38.06	-63.27	-75.31	-87.12	-100.14
St. dev.	45.96	51.43	55.4	41.52	37.22	74.06	123.36	157.66	177.94	187.31
Other periods										
Mean	-20.99	-36.63	-48.93	-57.81	-66.32	-21.65	-38.03	-42.73	-38.46	-42.53
Median	-30.86	-52.8	-66.62	-74.76	-81.34	-20.3	-37.63	-49.65	-54.24	-62.02
St. dev.	55.21	66.87	60.5	56.9	48.01	71.58	97.18	125.34	170.63	178.66
N	7156									

B. Cross-sectional Regressions over Different event-time Horizons

In order to examine whether going public during a peak in investor sentiment have any significant effect on the future returns, we regress the buy-and-hold returns of different time horizons on our sentiment dummy variable (see Panel A, B and C in Table III). We find a relatively large negative sentiment dummy coefficient when regressing on the raw returns. This is to be expected since the investor sentiment peaks usually corresponds to stock market peaks. When the market soon reverts back towards the mean, the raw returns would be considerably lower for the IPOs conducted close to this event.

Of more interest are the results from the regressions on market-adjusted return and risk-adjusted return. All of the sentiment dummy coefficients are negative with varying levels of significance. This result is consistent with our hypothesis stating that companies trying to exploit market mispricing in aggregate have more short-term reasons for going public, which translates into lower returns over a longer time period. It should also be noted that all intercepts are significantly negative, meaning that all IPOs on average underperform relative to the benchmark.

When examining the risk-adjusted returns in Panel C, it is apparent that the IPOs during hot issue markets (market-timers) underperform compared to IPOs during colder issue markets. The underperformance of these issues, compared to the already underperforming total IPO market (in parentheses) is 13% (21%) in one year, 13.7% (36.6%) in two years, 8.08% (48.9%) in three years, 10.2% (57.8%) in four years, and 5.74% (66.3%) in five years.

These results are however not complete and needs to be checked for other contributing factors. Instead, these results are used as a basis to determine over which time period there is a significant difference in return between high sentiment IPOs and IPOs during colder periods. As seen in Table III, there is a lower significance in both the market- and risk-adjusted five-year return. In order to ensure that potential short-termism will be reflected in the stock price, we choose to focus the following parts of the paper on the longest possible horizon with overwhelmingly significant results. Considering the lower significance over the five-year horizon combined with Ibbotson's (1975) findings of no underperformance in the fifth year after going public, we decide that a four-year horizon is the most adequate horizon for further research (see Panel D in Table III).

Table III
Cross-Sectional Regression at Five Horizons for Raw, Market-
and Risk Adjusted Return

The sample consists of 7156 US firms that have conducted an Initial Public Offering between the years 1975 and 2009. The sample excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on NASDAQ or the NYSE. The simple regression model is constructed as follows:

$$R_{i,t} = a_{i,t} + b_1 \text{SentDummy}_i + u_{i,t} \quad (\text{Regression model 1})$$

Where $R_{i,t}$ is the value-weighted (or raw) buy-and-hold return for firm i and month t , $a_{i,t}$ is the intercept, b_1 is the coefficient for the group of firms that conducted their IPO during the sentiment peaks. The sentiment dummy is one if firm i conducted their IPO during sentiment peaks, and zero otherwise. Finally, $u_{i,t}$ is the unknown other factors that contribute in explaining the performance of the different return measures. Panel A shows the horizons of the raw returns, Panel B shows the horizons of the market-adjusted returns, and Panel C shows the horizons of the risk-adjusted returns. To estimate the risk-adjusted returns, the firms are divided into six different portfolios in accordance with the division of Fama and French (1993). The market-adjusted returns are simply the monthly raw returns subtracted by the monthly value-weighted market returns. Panel D contains the four-year return from Panel A, Panel B and Panel C.

Panel A: Raw Return at Different Horizons

	Year 1	Year 2	Year 3	Year 4	Year 5
SentDummy	-0.172** [-3.29]	-0.244*** [-4.95]	-0.179*** [-3.56]	-0.298*** [-6.67]	-0.259*** [-5.27]
Constant	0.0165 [0.84]	0.0321 [1.25]	0.0239 [0.93]	0.0896** [3.04]	0.0755** [2.62]
N	7156	6448	5651	4793	4116
adj. R-sq	0.011	0.012	0.006	0.012	0.010

t statistics in brackets

* p<0.05 ** p<0.01 *** p<0.001

Panel B: Market-Adjusted Return at Different Horizons

	Year 1	Year 2	Year 3	Year 4	Year 5
SentDummy	-0.118*** [-3.54]	-0.163*** [-5.67]	-0.102*** [-3.47]	-0.127*** [-3.80]	-0.0764* [-2.16]
Constant	-0.101*** [-7.11]	-0.182*** [-10.79]	-0.265*** [-16.03]	-0.309*** [-18.29]	-0.373*** [-19.73]
Observations	7156	6448	5651	4793	4116
Adjusted R-squared	0.007	0.009	0.003	0.005	0.002

t statistics in brackets

* p<0.05 ** p<0.01 *** p<0.001

Panel C: Risk-Adjusted Return at Different Horizons

	Year 1	Year 2	Year 3	Year 4	Year 5
SentDummy	-0.130*** [-4.36]	-0.137*** [-4.94]	-0.0808* [-2.51]	-0.102*** [-3.51]	-0.0574* [-2.19]
Constant	-0.210*** [-14.08]	-0.366*** [-20.10]	-0.489*** [-28.39]	-0.578*** [-35.38]	-0.663*** [-40.32]
Observations	7156	6448	5651	4793	4116
Adjusted R-squared	0.010	0.008	0.003	0.006	0.003

t statistics in brackets

* p<0.05 ** p<0.01 *** p<0.001

Panel D: Raw, Market-Adjusted and Risk-Adjusted Return at a Four-Year Horizon

	Raw	Market-Adjusted	Risk-Adjusted
SentDummy	-0.298*** [-6.67]	-0.127*** [-3.80]	-0.102*** [-3.51]
Constant	0.0896** [3.04]	-0.309*** [-18.29]	-0.578*** [-35.38]
Observations	4793	4793	4793
Adjusted R-squared	0.012	0.005	0.006

t statistics in brackets

* p<0.05 ** p<0.01 *** p<0.001

C. Cross-sectional regressions over a four-year event-time horizon with controlling variables

As seen in the previous section, there is a significant underperformance by companies going public during hot issue markets, when sentiment is high, compared to companies that go public during colder issue markets. It is difficult to ascertain whether this proportionally higher underperformance is only due to the timing of the hot issue market, or if there are other factors better explaining the increased underperformance. In order to test this we add the additional control variables to our regression.

The result from the robustness test is found in Table IV. The underperformance contributable to market timing is still significantly negative. Over a four-year period, starting when going public, the market-timers underperform relative to the risk-adjusted benchmark by 8.95%. This is a slightly lower underperformance than before we added the control variables, which were 10.2% (see Panel D in Table III). The control variables thus explains 1.25% of the underperformance that earlier only was contributed by the sentiment dummy. Still, the underperformance of market-timers is large and appears to be an important determinant in explaining some of the variation in the long-term returns of IPOs.

The coefficient for the book-to-market variable is positive and significant. This relationship was expected considering that high book-to-market stocks, also called value stocks, have historically outperformed stocks with lower book-to-market ratio (growth stocks). Our results show that companies with a higher book-to-market ratio at the time of the IPO tend to perform better in the following four years. Quite surprisingly, the market capitalization coefficient is positive. It is the opposite of what is known as the small firm effect, which is based on the historical findings stating that smaller firms tend to outperform larger ones. Our results present a different relationship in the context of IPOs. We propose some possible explanations in accordance with our results: (i) Larger firms are less risky, with subsequent lower volatility. Since the IPO market is characterized by declining trends, the underperformance should be lower for larger firms. On the other hand, if the IPO market would theoretically outperform the benchmark, we would expect lower positive returns for large firms, and thus, a negative coefficient. (ii) Larger firms attract more analyst coverage. The increased coverage contributes to pricing the new issue more fairly. Future returns would be less volatile and the coefficient for market capitalization would be positive.

Table IV
Robustness Check 1: Cross-Sectional Regression on Risk-Adjusted Return at Year 4 with Control Variables

The sample consists of 7156 US firms that have conducted an Initial Public Offering between the years 1975 and 2009. The sample excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on NASDAQ or the NYSE. The control variable regression model is constructed as follows:

$$R_{i,t} = a_{i,t} + b_1 \text{SentimentDummy}_{i,0} + b_2 \log\left(\frac{BV}{MV}\right)_{i,0} + b_3 MV_{i,0} + b_6 \text{Age}_{i,0} + b_4 \Delta \log(1 + roe)_{i,t} + b_5 \left(\frac{R\&D}{TA}\right)_{i,0} + u_{i,t} \quad (\text{Regression model 2})$$

Where $R_{i,t}$ is the value-weighted risk-adjusted buy and hold return for firm i month t , $a_{i,t}$ is the intercept, b_1 is the coefficient for the group of firms that conducted their IPO during the sentiment peaks. The sentiment dummy is one if firm i conducted their IPO during sentiment peaks, and zero otherwise. The variable $\log\left(\frac{BV}{MV}\right)_{i,0}$ is the logarithmic book-to-market ratio for firm i when $t=0$, $MV_{i,0}$ is the market capitalization for firm i when $t=0$, $\text{Age}_{i,0}$ is the age of firm i when it went public. Moreover, $\Delta \log(1 + roe)_{i,t}$ is the change in firm i 's logarithmic ratio of net income to stockholder's equity plus one between month t (in our case, t equals 48) and the month of the IPO. The $\left(\frac{R\&D}{TA}\right)_{i,0}$ variable is firm i 's R&D expenditures divided by the firm's total assets when $t=0$. Finally, $u_{i,t}$ is the unknown other factors that contribute in explaining the performance of the different return measures. The regression is conducted in three steps. In the first step, only stock characteristics are included. In the second step, only accounting variables are included, and in the third and final step, all control variables are included. To estimate the risk-adjusted returns, the firms are divided into six different portfolios in accordance with the division of Fama and French (1993).

Table IV: Robustness Check of Risk-Adjusted
Return at Year 4

	(1)	(2)	(3)
SentDummy	-0.0926*** [-3.34]	-0.102*** [-3.53]	-0.0895** [-3.26]
log(BV/MV)	0.0773*** [6.61]		0.0790*** [6.66]
MV	0.0314*** [4.54]		0.0300*** [4.38]
Age	0.00103** [2.72]		0.00107** [2.76]
$\Delta \log(1+ROE)$		0.133*** [5.47]	0.125*** [5.26]
RD/TA		0.338 [0.96]	0.917* [2.39]
Constant	-0.516*** [-21.60]	-0.572*** [-32.07]	-0.516*** [-20.60]
Observations	4793	4626	4626
Adjusted R-squared	0.025	0.013	0.031

t statistics in brackets

* p<0.05 ** p<0.01 *** p<0.001

The accounting measures all contribute in the expected direction. Increases in return on equity for the length of the period contribute positively to the performance. Furthermore, the measure for R&D activity is also positively correlated with performance. Firms with one percent higher R&D activity experience an average increase in their four-year return by 0.917%. Due to the fact that R&D is an investment that is unlikely to be capitalized in a short timespan, combined with the findings by Jain and Kini (2008), we view a lower R&D activity as a proxy for short-termism. The expected contribution from higher R&D activity would thus be higher future returns, which is consistent with our findings and the findings of Guo, Lev and Shi (2006). When only controlling for the variables $\Delta\log(1+ROE)$ and RD/TA , the R&D activity measure is insignificant at the 5% significance level. However, this may be due to the size aspect in the ratio cancelling out the benefit from R&D. When the firm gets larger, the R&D activity ratio gets lower. It is a plausible explanation considering the fact that the R&D activity variable indeed becomes significant when including the market capitalization variable.

The age of the company also impacts the four-year return in a positive direction. A company that is one year older has on average a 0.107% higher four-year return. As seen in the correlation matrix in Table V, the variable for age is somewhat correlated with the market capitalization (0.12) and the logarithmic book-to-market variable (0.215). This indicates that the older companies tend to be larger companies and have value stock characteristics. We do, however, feel that this correlation is within acceptable limits.

Table V
Correlation Matrix between Risk-Adjusted Returns and Regression Variables

The sample consists of 7156 US firms that have conducted an Initial Public Offering between the years 1975 and 2009. The sample excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on NASDAQ or the NYSE. Table IV shows the correlation between the risk-adjusted returns, the sentiment dummy, $\log(BV/MV)$ (the logarithmic book-to-market ratio), MV (the market capitalization), $\Delta\log(1+ROE)$ (the change in firms' logarithmic ratio of net income to stockholder's equity plus one between month 48 (year four) and the month of the IPO), RD/TA (R&D expenditures divided by total assets) and Age (age of firm when it went public). All risk-adjusted returns in this table are value-weighted buy-and-hold returns. To estimate the risk-adjusted returns, the firms are divided into six different portfolios in accordance with the division of Fama and French (1993).

Table V: Correlation between Risk-Adjusted Returns and Regression Variables

		Risk-Adjusted Returns					SentDummy	$\log(BV/MV)$	MV	$\Delta\log(1+ROE)$	RD/TA	Age
		Year 1	Year 2	Year 3	Year 4	Year 5						
Risk-Adjusted Returns	Year 1	1.000										
	Year 2	0.610	1.000									
	Year 3	0.396	0.683	1.000								
	Year 4	0.324	0.552	0.780	1.000							
	Year 5	0.305	0.498	0.661	0.832	1.000						
	SentDummy	-0.096	-0.088	-0.039	-0.070	-0.054	1.000					
	$\log(BV/MV)$	0.095	0.119	0.113	0.101	0.107	-0.071	1.000				
	MV	-0.018	-0.010	0.036	0.047	0.064	0.047	-0.163	1.000			
	$\Delta\log(1+ROE)$	0.024	0.050	0.066	0.096	0.091	-0.007	0.058	0.011	1.000		
	RD/TA	0.000	0.032	0.030	0.026	0.028	-0.086	-0.198	0.019	0.004	1.000	
	Age	0.067	0.062	0.063	0.069	0.097	-0.049	0.215	0.120	0.018	-0.142	1.000

D. Cross-sectional regression over a four-year event-time horizon controlling for alternative measurements of return

As can be seen in Table VI, the risk-adjusted performance is still significantly negative for all measure of return except for the cumulative value-weighted market-adjusted return. The most widely accepted measure of return, the value-weighted buy-and-hold return, shows the lowest risk-adjusted underperformance of market-timers (8.93%). The corresponding equal-weighted buy-and-hold underperformance is 10.5%. When controlling for possible skewness in the returns by using a cumulative measure of return, the risk-adjusted underperformance of market-timers using value-weighted and equal-weighted adjustments is 25.9% and 23.1% respectively. Although many of the control variables lose their significance when using alternative measures of return, the investor sentiment dummy variable shows significant explanatory power for all measures except the value-weighted market-adjusted cumulative return.

Table VI

Robustness Check 2: Cross-Sectional Regression on Alternative Return Measurements at Year 4 with Control Variables

The sample consists of 7156 US firms that have conducted an Initial Public Offering between the years 1975 and 2009. The sample excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on NASDAQ or the NYSE. The control variable regression model is constructed as follows:

$$R_{i,t} = a_{i,t} + b_1 \text{SentimentDummy}_{i,0} + b_2 \log\left(\frac{BV}{MV}\right)_{i,0} + b_3 MV_{i,0} + b_6 \text{Age}_{i,0} + b_4 \Delta \log(1 + roe)_{i,t} + b_5 \left(\frac{R\&D}{TA}\right)_{i,0} + u_{i,t} \quad (\text{Regression model 2})$$

Where $R_{i,t}$ is the return for firm i and month t , $a_{i,t}$ is the intercept, b_1 is the coefficient for the group of firms that conducted their IPO during the sentiment peaks. The sentiment dummy is one if firm i conducted their IPO during sentiment peaks, and zero otherwise. The variable $\log\left(\frac{BV}{MV}\right)_{i,0}$ is the logarithmic book-to-market ratio for firm i when $t=0$, $MV_{i,0}$ is the market capitalization for firm i when $t=0$, $\text{Age}_{i,0}$ is the age of firm i when it went public. Moreover, $\Delta \log(1 + roe)_{i,t}$ is the change in firm i 's logarithmic ratio of net income to stockholder's equity plus one between month 48 (year 4) and the month of the IPO. The $\left(\frac{R\&D}{TA}\right)_{i,0}$ variable is firm i 's R&D expenditures divided by the firm's total assets when $t=0$. Finally, $u_{i,t}$ is the unknown other factors that contribute in explaining the performance of the different return measures. Panel A shows the robustness regression on all buy-and-hold returns, and Panel B shows the robustness regression on all cumulative returns. The panels contain both equal-weighted and value-weighted adjustments on the market-adjusted return as well as the risk-adjusted return. To estimate the risk-adjusted returns, the firms are divided into six different portfolios in accordance with the division of Fama and French (1993). Buy-and-hold returns and Cumulative returns are defined as follows:

Buy & Hold Returns

$$R_{i,t} = \frac{P_{i,t+1} - P_{i,1}}{P_{i,1}} \quad (\text{Equation 2})$$

Cumulative Returns

$$R_{i,t} = \sum_{n=1}^{t+1} R_{i,n} \quad (\text{Equation 3})$$

In equation 2, $R_{i,t}$ is the buy-and-hold return for firm i at month t , $P_{i,t+1}$ is the share price for firm i at month t plus one month (thereby taking the one-month lag into account), and $P_{i,1}$ is the price of firm i at the month after the IPO (month of the IPO plus the one-month lag). In equation 3, $R_{i,t}$ is the cumulative return for firm i at month t , and $R_{i,n}$ is the return of firm i in a series of n observations.

Panel A: Robustness Check on Buy-and-Hold Returns at Year 4

	Value Weighted			Equal Weighted	
	Raw	Market-adjusted	Risk-adjusted	Market-adjusted	Risk-adjusted
SentDummy	-0.258*** [-6.29]	-0.103** [-3.24]	-0.0893** [-3.25]	-0.116*** [-4.22]	-0.105*** [-5.07]
log(BV/MV)	0.204*** [7.67]	0.129*** [7.60]	0.0790*** [6.67]	0.114*** [6.91]	0.0563*** [5.64]

Long-run Performance of market-timing IPOs

MV	-0.00632 [-0.67]	0.0222** [2.86]	0.0300*** [4.38]	-0.0087 [-1.55]	0.0018 [0.46]
Age	0.000451 [0.56]	0.000963 [1.79]	0.00107** [2.77]	0.000149 [0.29]	0.000416 [1.19]
$\Delta\log(1+ROE)$	0.287*** [5.74]	0.203*** [5.65]	0.125*** [5.26]	0.192*** [5.56]	0.109*** [5.14]
RD/TA	2.191* [2.22]	1.709** [2.66]	0.919* [2.39]	1.27 [1.77]	0.363 [0.98]
Constant	0.313*** [7.25]	-0.190*** [-6.42]	-0.516*** [-20.61]	-0.158*** [-5.77]	-0.537*** [-24.70]
N	4626	4626	4626	4626	4626
adj. R-sq	0.039	0.032	0.031	0.025	0.022

t statistics in brackets

* p<0.05 ** p<0.01 *** p<0.001

Panel B: Robustness Check on Cumulative Returns at Year 4

	Value Weighted			Equal Weighted	
	Raw	Market-adjusted	Risk-adjusted	Market-adjusted	Risk-adjusted
SentDummy	-0.189* [-2.46]	-0.158 [-1.56]	-0.259* [-2.20]	-0.140* [-2.00]	-0.231** [-2.95]
$\log(BV/MV)$	-0.0318 [-0.86]	-0.0535 [-1.38]	-0.0582 [-1.41]	-0.0276 [-0.77]	-0.0224 [-0.61]
MV	0.0392 [0.85]	0.0931* [1.98]	0.133** [2.78]	0.0339 [0.73]	0.0538 [1.16]
Age	-0.00479*** [-5.03]	-0.00394*** [-4.02]	-0.00312** [-3.00]	-0.00446*** [-4.62]	-0.00353*** [-3.44]
$\Delta\log(1+ROE)$	0.161 [1.35]	0.148 [1.05]	0.146 [0.96]	0.132 [1.00]	0.128 [0.91]
RD/TA	10.07*** [4.64]	10.78*** [4.54]	11.07*** [4.50]	9.054*** [4.37]	8.732*** [4.21]
Constant	0.590*** [11.79]	0.000489 [0.01]	-0.579*** [-8.62]	0.0859 [1.76]	-0.546*** [-9.26]
N	4626	4626	4626	4626	4626
adj. R-sq	0.039	0.032	0.031	0.025	0.022

t statistics in brackets

* p<0.05 ** p<0.01 *** p<0.001

V. Conclusion

In this paper we examine whether firms that conduct their IPO during investor sentiment peaks underperform in the long run. We study different horizons of raw, market-adjusted and risk-adjusted returns and conclude that the four-year risk-adjusted return is the most appropriate measure to use in our tests. We find that there are significant results for long-term underperformance among firms that issue their IPO during sentiment peaks. This result is robust after controlling for several explanatory variables proven in previous research to have a significant influence on IPO performance. Furthermore, we find that the market-timing firms have a considerably lower mean value of R&D expenditures relative to assets compared to other firms. When testing our regression with this variable in our robustness check, we find that it is positive for regressions including all control variables and significant at a 5% significance level. In alignment with this relationship, together with the findings of negative correlation between the market timing group and the R&D-asset ratio, we identify an indication insinuating that the market-timing firms' are more short-term oriented than other firms.

Our research ties together three different areas of previous research: one being the research that challenges the view of long-term incentives as the reason for going public, another one being the research finding a tendency among firms to delay the time of the IPO to times with more favorable market conditions, and finally, the third one being the research on long-term performance of IPOs. Our findings should have implications on investors' decisions since the market-timing firms have long-term underperformance and seem to care more about the instant cash flow rather than the sustained well-being of the firm. As the market intensifies along with the investor sentiment, there should be a point in time where it is no longer lucrative for investors to participate in IPOs. This point in time should be before the sentiment reaches its' peak, and in a window where investors maximizes the profit of their investment. This reasoning raises several interesting questions. If investors were able to identify and time this window, how would this affect the market-timing of IPOs? Would the different periods of investor sentiment be characterized by a more evenly spaced distribution of IPOs? As this "investor window of opportunity" to a large degree would impact on financial and economic theory, we suggest for future research in this area to try to identify this window. As an alternative it would be interesting, considering our findings, to find out where in the market cycle there is IPO activity initiated by long-term incentives. Finally, we suggest additional research supporting our theory on market-timing short-term firms.

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APPENDIX

A. Equations

Formula for ROE control variable

$$\Delta \log(1 + roe)_{i,t} = \log\left(\frac{1+roe_{i,t}}{1+roe_{i,0}}\right) \quad (\text{Equation 1})$$

Where $\Delta \log(1 + roe)_{i,t}$ is the change in firm i 's logarithmic ratio of net income to stockholder's equity plus one between month t (in this equation, t equals 48) and the month of the IPO.

Buy & Hold returns

$$R_{i,t} = \frac{P_{i,t+1} - P_{i,1}}{P_{i,1}} \quad (\text{Equation 2})$$

Where $R_{i,t}$ is the buy-and-hold return for firm i at month t , $P_{i,t+1}$ is the share price for firm i at month t plus one month (thereby taking the one-month lag into account), and $P_{i,1}$ is the share price of firm i at the month after the IPO (month of the IPO plus the one-month lag).

Cumulative returns

$$R_{i,t} = \sum_{n=1}^{t+1} R_{i,n} \quad (\text{Equation 3})$$

Where $R_{i,t}$ is the cumulative return for firm i at month t , and $R_{i,n}$ is the return of firm i in a series of n observations.

Market-adjusted return

$$AR_{i,t} = R_{i,t} - R_{mkt,t} \quad (\text{Equation 4})$$

Where $AR_{i,t}$ is the monthly market-adjusted return for firm i at month t , $R_{i,t}$ is the raw return for firm i at month t , and $R_{mkt,t}$ is either the value-weighted or the equal-weighted market return at month t .

Risk-adjusted return

$$FFR_{i,t} = R_{i,t} - R_{mkt,t} - portfolio_{i,t} \quad (\text{Equation 5})$$

Where $FFR_{i,t}$ is the monthly risk-adjusted return for firm i at month t , $R_{i,t}$ is the raw return for firm i at month t , $R_{mkt,t}$ is either the value-weighted or the equal-weighted market return at month t , and $portfolio_{i,t}$ is the return at month t of the portfolio in which firm i has been divided into. The firms are divided into six different portfolios in accordance with the division of Fama French (1993).

B. Regression models

Simple regression model

$$R_{i,t} = a_{i,t} + b_1 \text{SentimentDummy}_{i,t} + u_{i,t} \quad (\text{Regression model 1})$$

Where $R_{i,t}$ is the value-weighted buy-and-hold return for firm i and month t , $a_{i,t}$ is the intercept, b_1 is the coefficient for the group of firms that conducted their IPO during the sentiment peaks. The sentiment dummy is one if firm i conducted their IPO during sentiment peaks, and zero otherwise. Finally, $u_{i,t}$ is the unknown other factors that contribute in explaining the performance of the different return measures.

Control variable regression model

$$R_{i,t} = a_{i,t} + b_1 \text{SentimentDummy}_{i,0} + b_2 \log\left(\frac{BV}{MV}\right)_{i,0} + b_3 MV_{i,0} + b_4 \Delta \log(1 + roe)_{i,t} + b_5 \left(\frac{R\&D}{TA}\right)_{i,0} + b_6 Age_{i,0} + u_{i,t} \quad (\text{Regression model 2})$$

Where $R_{i,t}$ is the return for firm i and month t , $a_{i,t}$ is the intercept, b_1 is the coefficient for the group of firms that conducted their IPO during the sentiment peaks. The sentiment dummy is one if firm i conducted their IPO during sentiment peaks, and zero otherwise. The variable $\log\left(\frac{BV}{MV}\right)_{i,0}$ is the logarithmic book-to-market ratio for firm i when $t=0$, $MV_{i,0}$ is the market capitalization for firm i when $t=0$, $Age_{i,0}$ is the age of firm i when it went public. Moreover, $\Delta \log(1 + roe)_{i,t}$ is the change in firm i 's logarithmic ratio of net income to stockholder's equity plus one between month t (in our case, t equals 48) and the month of the IPO ($t=0$). The $\left(\frac{R\&D}{TA}\right)_{i,0}$ variable is firm i 's R&D expenditures divided by the firm's total assets when

$t=0$. Finally, $u_{i,t}$ is the unknown other factors that contribute in explaining the performance of the different return measures

Appendix Table Testing the R&D Expenditures Variable

The sample consists of 7156 US firms that have conducted an Initial Public Offering between the years 1975 and 2009. The sample excludes ADRs, natural resource limited partnerships and trusts, closed-end funds, REITs, SPACs, banks and S&Ls, unit offers, penny stocks (offer price of less than \$5 per share), and stocks not listed on NASDAQ or the NYSE. As pointed out in our results when commenting Table IV, the RD/TA ratio (R&D expenditures divided by the total assets) is insignificant in the second step of the regression. We reasoned that it was the size aspect in the RD/TA ratio that was cancelling out the benefit from the R&D expenditures. Therefore, we provide with this Appendix Table where we switch out the RD/TA ratio in the regression from Table IV and put in the R&D expenditures variable. This table only shows the second step of the regression in Table IV. The second step model is constructed as follows:

$$R_{i,t} = a_{i,t} + b_1 \text{SentimentDummy}_{i,0} + b_2 \Delta \log(1 + roe)_{i,t} + b_3 R\&D_{i,0} + u_{i,t}$$

(Regression model 3)

Where $R_{i,t}$ is the value-weighted risk-adjusted buy-and-hold return for firm i at month t , $a_{i,t}$ is the intercept, b_1 is the coefficient for the group of firms that conducted their IPO during the sentiment peaks. The sentiment dummy is one if firm i conducted their IPO during sentiment peaks, and zero otherwise. Moreover, $\Delta \log(1 + roe)_{i,t}$ is the change in firm i 's logarithmic ratio of net income to stockholder's equity plus one between month 48 (year 4) and the month of the IPO. The $R\&D_{i,0}$ variable is firm i 's R&D expenditures when $t=0$. Finally, $u_{i,t}$ is the unknown other factors that contribute in explaining the performance. To estimate the risk-adjusted returns, the firms are divided into six different portfolios in accordance with the division of Fama and French (1993)

Testing of the R&D Control Variable	
Risk-adjusted Year 4 Return	
SentDummy	-0.106*** [-3.76]
$\Delta \log(1+ROE)$	0.132*** [5.49]
RD	0.00251** [2.71]
Constant	-0.570*** [-33.78]
N	4626
adj. R-sq	0.015
t statistics in brackets	
* p<0.05 ** p<0.01 *** p<0.001	

As can be seen in the Appendix Table, the R&D expenditures variable is positive and significant at a 5% significance level. This result helps to support our reasoning of the firm's size as a cancelling effect of the R&D expenditures benefits.