Competitive effects of initial public offerings in Sweden

A Swedish study of the impact of initial public offerings on competitor stock return and operational performance from 1990 to 2011

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Abstract

In this paper we examine the competitive effects of initial public offerings (IPOs) in the Swedish financial markets and find that Swedish firms indeed show negative reactions to the IPOs of competing firms both in terms of stock returns and operating performance. We also attempt to explain the level of underperformance by employing two previously proven determinants of competitive IPO effects (leverage and non-financial advantages such as research intensity) but find that leverage does not explain the level of underperformance and that research intense firms experience a greater decline in operating income growth which is contrary to previous research. Thus, we prove that there are competitive effects of IPOs in Sweden but we can only partly explain the differences in these effects using models previously proven in the U.S.

Keywords: IPO, IPO underpricing, IPO stock return, IPO operational performance, competitive effects, industry effects

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1. Introduction

Most financial papers and articles analyzing initial public offerings focus on the IPO firm itself and its stock return while we focus on the impact of an IPO on the industry competitors both regarding operational performance and stock return. Despite the scarcity of articles within this particular genre of IPO-related research, there are a few recent and well-written papers on the subject, most notably a 2010 paper published in *The Journal of Finance* by Hung-Chia Hsu, Adam V. Reed and Jörg Rocholl titled *The New Game in Town: Competitive Effects of IPOs*. Due to its recency, high quality and publication in one of the most respected financial journals we have chosen to use the paper as a basis for our thesis, attempting to replicate its results using Swedish data. To the extent that it is available to us, we use the same type of financial data and employ the same methodology in our analyses albeit with some adjustments which we explain below in great detail. Our results show that there are competitive effects of IPOs in Sweden since both stock returns and operating performance decline following an industry IPO.

An industry effect is likely since the issuing company can use the raised funds to expand and be more efficient and thereby increase the competitiveness within the industry. Studying the industry effects of IPOs is important because it affects several players in the market such as investors, issuing firms and competitors, and the results will be useful for when making decisions. Furthermore, IPO companies are only a small percentage of the average investors' total portfolio; which is why it is important to understand the effects on non IPO firms when making portfolio decisions. This is also important for industry competitors who can make strategic decisions adapting to the effects of the IPO. There are no articles covering this subject for Swedish or even Nordic companies. Thus our paper contributes by analyzing this effect for the Swedish equity markets. The differences between what we find in Sweden and what Hsu et al. (2010) find in the U.S. can partly be explained by the adjustments which we discuss below and partly by the difference between the Swedish and U.S. equity markets. Because there are fewer companies in every industry in Sweden we theorize that a competitor's IPO is slightly more impactful. Consider an example where a given industry constitutes 5 firms in Sweden and 100 firms in the U.S. Intuitively, an industry IPO (henceforth IPO event) would have a greater effect on the 4 competitors in Sweden than it would on the 99 competitors in the U.S. Also the fact that the Swedish equity markets are less internationally integrated than the U.S. equity markets affects the level of underperformance.

Indeed, Braun and Larrain (2008) examine IPOs in 22 emerging markets and show that the competitive effects are stronger when the IPO is issued in a market that is less internationally integrated.

The New Game in Town is itself very much based on prior research and most similar is perhaps the 2003 paper by Akhigbe, Borde and Whyte who essentially analyze the same fundamental question of whether IPOs have an impact on rival firms. However, they find no significant valuation effect whereby Hsu et al. (2010) argue that Akhigbe et al. (2003) employ contaminated data given that they examine both large and small IPOs, suggesting that "the measurement of each IPO's effect on its competitors is likely contaminated by other IPOs in the same industry". By examining larger IPOs, Hsu et al. (2010) hope to capture only the most important and impactful competitive IPO effects. Other prominent and noteworthy research has been done by Ibbotson and Jaffe (1975) and Ritter (1991) who find that IPOs are, on average, underpriced; Slovin, Sushka and Polonchek (1992) who analyze share price reactions of rival SEOs and find negative effects on industry rivals within the banking sector; and Lang and Stulz (1992) who analyze the impact of rival firms' bankruptcy announcements and find that, on average, bankruptcy announcements decrease the value of a value-weighted portfolio of competitors by 1%.

Similarly to how Hsu et al. (2010) attempt to reduce contamination of their data by only including larger IPOs, we take this line of reasoning one step further by also narrowing down our data only to industries where these competitive effects would logically exist. The industries we thus exclude are ones where a causal relationship between one firm's access to capital market funding and a rival firm's share price or operational performance seem extremely unlikely. Most of the industries we exclude in order to reduce this type of contamination are less competitive and driven mostly by internal factors. A few examples are Commodities exploration, Mining, Oil and Gas extraction, Drugs, Research & Development.[3] Furthermore, we deviate from the methodology of *The New Game in Town* regarding industry classification. Hsu et al. (2010) use two-digit SIC (Standard Industry Classification) codes (full SIC codes have four digits) when classifying the industries in their data whilst we have chosen to use three-digit SIC codes. We have chosen three-digit SIC codes because we consider two-digit SIC codes to be insufficiently specific for the purposes of any research paper examining competitive IPO effects. For example, using two-digit SIC codes implies

[3] Full list of excluded industries available in section 3

that a Surgical Instruments manufacturer competes with a Watches & Clocks manufacturer or that a firm in the Sawmilling industry competes with a firm in the Mobile Homes industry. We believe that these adjustments will produce more correct and uncontaminated evidence of the competitive effects of IPOs. Another adjustment Hsu et al. (2010) make as compared to Akhigbe et al. (2003) concerns the event window when measuring the short-term stock return of competitors. Akhigbe et al. (2003) have chosen the event date itself as the start of the event window while Hsu et al. (2010) have chosen the event window to start up to 10 days before the event date in order to include early share price reactions. We have chosen to employ Hsu et al.'s method of examining short-term cumulative abnormal returns around IPO announcement and completion dates but have added additional measurement windows.

In the second part of *The New Game in Town* Hsu et al. (2010) try to explain the level of underperformance of industry competitors after an IPO event using three key determinants: leverage, recent certification by financial intermediaries and nonfinancial advantages such as high levels of knowledge capital. They theorize that, since an IPO increases firm equity and thus lowers leverage, a firm which has recently completed an IPO will be able to make more financially strenuous investments than some of its more mature competitors. This sentiment is supported by the work of Judit Chevalier (1995) who finds that highly leveraged supermarkets exit the market more frequently than less leveraged ones, and Gordon Phillips (1995) who finds that output is negatively correlated with leverage within three different industries. Furthermore Hsu et al. (2010) argue that an IPO involves certain levels of scrutiny by financial intermediaries such as investment banks. The completion of an IPO thus implies that the IPO firm has passed this inspection. Of course, the impact of this effect increases with the prestige of the investment bank. A more prestigious investment bank will be offered to complete more IPOs and can thus choose to complete only the most attractive ones. Indeed, Chemmanur and Fulghieri (1994) find that companies recently underwritten by top ranked investment banks have relatively more attractive stocks than other companies. Hsu et al. (2010) finally argue that there are certain nonfinancial advantages which may explain the underperformance of industry competitors. Natuarlly, as suggested by Stoughton, Wong, and Zechner (2001) firms of higher quality are more likely to complete an IPO than lower quality firms. One way of measuring some of the nonfinancial advantages a firm might have over its competitors is to look at the R&D expenditures. Presumably, these expenditures are not wasted but actually provide some value to a firm which cannot be seen in its balance sheet.

Indeed, Cockburn and Griliches (1988) show that R&D creates a competitive advantage through new innovations, patents etc.

Hsu et al. (2010) found all three of their determinants to be related to the performance of the industry competitors. Since we attempt to recreate the results from *The New Game in Town* we are interested in examining whether Hsu et al.'s (2010) determinants explain the level of underperformance also of the Swedish industry competitors in our study, but due to limited data availability, we cannot control for the recent certification of firms by financial intermediaries. However, we consider this determinant to be the least important of the three and would not expect a significant effect seeing as how the Swedish investment banking industry is much smaller and because bank prestige is not nearly as articulated as in the U.S. Our results on this point show that research intensive firms perform worse than non research intensive firms following an IPO event but that leverage does not help explain variation in post IPO event underperformance.

2. Data

The analyses performed in this paper involve comparing operational performance and stock returns of firms before and after an IPO event. The analyses are made from a Swedish viewpoint and include data from listed Swedish firms. The data used can be divided into three separate segments; accounting data for all firms for which comparisons are made, stock price information for all firms for which comparisons are made and IPO data.

The accounting data includes Revenue, EBIT, Net Income, Total Assets, Debt, Equity, Capital Expenditures, Dividends and other key figures which have been obtained from the COMPUSTAT database through the WRDS (Wharton Research Data Services) webpage. The data, encompassing 21 years between 1990 and 2011, is comprised of 550 Swedish firms. The data also includes SIC (Standard Industry Classification) codes for each company as an industry identification variable. Also the stock price data has been obtained from COMPUSTAT in the form of daily closing prices for all listed Swedish firms since 1990 totaling more than 2 million observations. Both the operational performance data and the stock return data include a global company key as an individual firm identification variable.

The IPO data has been obtained from the Zephyr database through the Bureau van Dijk webpage. A total of 376 IPOs have been studied between 1997 and 2011. The data also includes SIC codes for each IPO in order to facilitate a merger of the different datasets.

We have also obtained annual IPO underpricing data from Jay Ritters webpage which we use as a proxy for IPO market hotness in our regression analysis[4].

[4] Data obtained from Jay R. Ritters website: http://bear.warrington.ufl.edu/ritter/ipoisr.htm

3. Methodology

The purpose of this paper is to examine the impact of a competitor's IPO on a firm's operational performance and stock returns. Our principal approach to studying this effect is to compare performance and stock return (long- and short-term) before and after a competitor's IPO. Similar to Hsu et al. (2010) we choose to employ dummy variables to signify an IPO event. The dummy variables track the number of years that have passed since the IPO event. Most of our analyses are performed using a combination of 1-year, 2-years and 3-years dummy variables tracking if the IPO event occurred one year ago, two years ago or three years ago, respectively. We also examine the short-term returns around both IPO announcement dates and completion dates by calculating the cumulative abnormal return for 10 different measurement windows starting up to 10 days before the event and ending up to 20 days after the event.

When measuring the operational performance of our selected firms we have chosen the three main measures which Hsu et al. (2010) also use: Revenue growth, Capital Expenditure growth and Operating Income growth. All growth variables have been computed using logarithms rather than division as advocated by Opler and Titman (1994) and Campello (2003). When measuring stock returns we have simply compounded the daily closing prices to create yearly returns. We have then created an abnormal return variable for each stock by subtracting the return of the OMXSPI index for the corresponding year. When measuring short-term returns we have computed daily abnormal returns for each firm and then summed these for different measurement windows to create cumulative abnormal return variables.

The data obtained from COMPUSTAT and Zephyr contained SIC codes identifying each industry. However, as there are several hundred different four-digit SIC codes, many of them with a high degree of specification, using full four-digit codes would render our analyses ineffective since the number of firms and IPOs within each industry group would be very low. As such, we decided to use only the first three digits of each SIC code so as to obtain slightly wider but substantially larger industry groups. On this point we divert from the methodology of Hsu et al. (2010) which use two-digit SIC codes. We consider this a key adjustment compared to *The New Game in Town* which we hope will produce more correct and uncontaminated results. The reason for this adjustment is that we simply do not consider two-digit SIC codes to be a sufficiently specified indication of a firm's industry. For example, using two-digit SIC codes implies that a firm in the Sawmilling industry (SIC 2421) competes

with a firm in the Mobile Homes industry (SIC 2451) or that a Pharmaceutical preparations firm (SIC 2834) competes with a Perfumes & Cosmetics firm (SIC 2844) and a Paints & Varnishes firm (SIC 2851)[5]. The notion that any of these firms compete directly with one another and that, for instance, the IPO of a Pharmaceutical preparations firm would affect the operations or share price of a Perfumes & Cosmetics firm seems very farfetched. We realize that this adjustment reduces the number of IPOs and industry competitors within each industry but have nevertheless decided to use three-digit SIC codes due to the risk of contamination mentioned above.

The competitive IPO effects which we are examining are of course most apparent where there is a high level of competition between firms but perhaps most important is that there exists a causal relationship between a firm's operational performance or stock return and a competitor's access to equity capital market funding. This effect is intuitively true for retailers, manufacturers and similar industries but there are a number of industries where this relationship clearly is absent. For instance, the operational performance of a Swedish oil exploration firm with operations in southern Africa is hardly correlated to the equity capital market funding of another Swedish oil exploration firm with operations in Russia. We consider this argument applicable also to the stock return of a firm and have therefore decided to exclude all firms within industries which we consider lacking of this important causal relationship. The excluded industries include: Metals mining, Coal mining, Oil and Gas extraction, Mining and Quarrying of nonmetallic minerals except fuel, Drugs and Research, Development and Testing Services. We have observed that no other research paper with a similar research question accounts for this fact. We consider this another key adjustment (as compared to *The New Game in Town*) and we hope that it will produce more correct and uncontaminated results.

The last and perhaps most crucial adjustment we make to our raw data concerns IPO selection. We found a total of 376 Swedish IPOs between 1990 and 2011 of varying sizes and industries. In order to obtain statistically and economically significant effects we have chosen to focus solely on large IPOs. The main reason for this is that a large IPO is more likely to have a significant competitive effect on its rivals. Furthermore, examining a great number of IPOs, often with overlapping extended event windows presents significant challenges in terms of measuring the hypothesized effects. As such, we have chosen to exclude all IPOs with a

[5] http://www.sec.gov/info/edgar/siccodes.htm

deal value of less than €100 million. This results in a mere 24 IPOs between 1998 and 2009 matched by 111 rival firms to measure the hypothesized competitive effects.

3.1 Univariate methodology

We have chosen to employ both univariate and bivariate methods for analyzing our data. For our univariate analysis we have computed four-year averages for a number of operational measures as well as abnormal stock return. We compare averages for all firms before and after a rival IPO. Furthermore, in order to adjust for a potential survivorship bias we also separate firms into active (listed) and inactive (delisted) firms and compare the pre/post IPO averages within these groups. An active firm is a firm that is currently listed on the Stockholm Stock Exchange whilst an inactive firm is a firm currently not listed but which was listed at the time of the IPO event. This merely serves as a proxy for bankruptcies and we are fully aware of the fact that many of these firms were delisted as a result of private equity investments or similar events which of course indicate good performance and potential rather than poor.

3.2 Multivariate methodology

For our first regression output, in which we examine whether IPO events have a measurable impact on sales growth, capital expenditure growth, operating income growth and abnormal stock return growth, we control for the yearly IPO underpricing as presented by Jay R. Ritter, the industry average market to book ratio, the logarithm of total assets as well as three separate dummy variables tracking whether an IPO event occurred one, two or three years ago. The annual underpricing data serves as a proxy for IPO market hotness. Although comprised only of U.S. annual IPO underpricing data we have decided to consider it a viable proxy also for Swedish IPO market hotness since economic cycles in Sweden follow closely those of the U.S. Contrary to the methodology of Hsu et al. (2010) we have chosen to employ three separate dummy variables instead of a single one tracking whether an IPO event has taken place within three years. The reason for our deviation on this point is that we are interested in examining not only the absolute three-year effect an IPO event has on incumbent firms but also the incremental effect for each additional year. In order to properly replicate the

first regression output of Hsu et al. we would have needed to also control for firm age but due to data limitations we are unable to do this.

$$Performance_{i,t} = \alpha + \beta_1 * 1\_year\_IPO_{i,t} + \beta_2 * 2\_year\_IPO_{i,t} + \beta_2 * 3\_year\_IPO_{i,t} + \gamma * Controls_{i,t} + \varepsilon_{i,t}$$

Our second regression output aims to replicate Hsu et al.'s (2010) second regression output where the explanatory power of three certain determinants are examined (leverage, certification by a financial intermediary such as an investment bank, and nonfinancial advantages such as high research intensity). In this regression output we are no longer employing IPO dummy variables. Instead, the IPO event has been incorporated into the dependent variables by using variables tracking a given firm's average difference in sales growth, capital expenditure growth and operating income growth before and after an IPO event and just like Hsu et al. we now only have one observation per firm. In addition to yearly IPO underpricing, the industry average market to book ratio and the logarithm of total assets, we also control for two of the determinants described in *The New Game in Town*; leverage and research intensity. Leverage is computed as long-term debt divided by total assets and research intensity is computed as research and development expenses divided by total assets. Despite controlling for the two most important determinants and a number of other important factors, Hsu et al. control for a number of factors which we are unable to obtain data for: Bond ranking, VC backing, Underwriter ranking, Herfindahl-Hirschman index, Firm age and Industry underpricing. We are unable to obtain data for the third determinant described in *The New Game in Town*; Underwriter ranking. However, we consider this determinant to be the least important since underwriter prestige is not nearly as pronounced in Sweden as it is in the United States.

$$Pre\ vs.\ Post\ IPO\ diff.in\ performance_i = \alpha + \beta_{1,i} * Leverage_i + \beta_{2,i} * R\&D\ intensity_i + \beta_{n,i} * Controls_{i,t} + \varepsilon_{i,t}$$

3.3 Descriptive statistics

Table I reports descriptive statistics for the data on incumbent firms used for analyses in this study alongside the data used by Hsu et al. (2010) in *The New Game in Town*. As expected, the average firm size is considerably smaller in the Swedish dataset as measured by Total Assets, Sales and Market Capitalization although the difference is not as pronounced when comparing Sales. In fact, median Sales in the Swedish dataset is actually as large or larger than the American data depending on the historical exchange rate used. Most notable among the statistics is the difference in relative IPO size. The American dataset contains IPOs with an average size well above the incumbent average Market Capitalization. This indicates that the average IPO is an important event for incumbent firms. The Swedish dataset contains IPOs with an average size slightly above that of the average incumbent firms' Market Capitalization. Although not as significant compared to incumbents as the American IPOs used by Hsu et al. we consider the Swedish IPO sizes to be significantly large, especially considering the median IPO size which is actually larger in the Swedish dataset. One can infer from the differences in means and medians that the Swedish dataset differs less in size than does the American dataset. This is a result of the careful selection of IPOs and incumbent firms which we hope results in a more accurate presentation of the hypothesized competitive IPO effects.

Unfortunately, the IPO selection criteria described above greatly reduces the number of IPO events available. The original number of 376 IPOs has been decimated to a mere 24 IPOs. Whilst this is a very low number it is important to keep in mind that the statistical significance of any given analysis is not based on the number of IPOs but on the total number of comparisons made for the 24 IPOs. If there are 10 incumbent firms for every IPO, the number of observations would be 240 and not 24 – more than enough for statistical significance.

Table 1: Descriptive statistics

In this table we report descriptive statistics for all firms used in our analyses. We have also added the corresponding statistics for the data used by Hsu et al. (2010) in *The New Game in Town* .

	Swedish incumbent firms (MSEK)		*The New Game in Town* American incumbent firms (MUSD)	
	Mean	Median	Mean	Median
Assets	5,129	743	947	81
Sales	4,144	751	773	73
Market Capitalization	4,535	925	1,001	96
IPO sizes	4,786	1,479	1,745	102
Number of Active firms	67 (60%)		N/A	
Number of Inactive firms	44 (40%)		N/A	
Number of IPOs	24		134	

4. Empirical Results

4.1 Univariate results

By comparing the four-year average performance measures before and after an IPO event we show that the IPO event has a significant performance effect on industry rivals.

The most economically significant competitive IPO effect we observe in Table 2, Panel A is the effect a competitor IPO has on capital expenditure growth. This measure drops from 13.7% to -9.10% accompanied by a t-statistic of 3.79. This is quite a dramatic change and suggests that incumbents are much less inclined to invest after an IPO event. Although large, it is not an unexpected effect since managers are likely to become more cautious after a large competitor goes public. Because Hsu et al. (2010) did not test the average capital expenditure growth before and after an IPO event we are unable to compare our findings on this point.

Despite being just below statistical significance levels, economical significance levels of both ROA1 and ROA2 suggest that firms experience a drop in margins to loss-making levels (ROA1 drops from -1.90% to -7.50% and ROA2 drops from 1.07% to -3.94%). Considering the negative margins and the decline in capital expenditure it is not surprising that also asset growth drops to negative levels, declining from 9.02% before the IPO event to -3.28% after the IPO event. Our results are in line with Hsu et al. (2010) who found an asset growth decline from 18.02% to 9.59%. Contrary to Hsu et al., however, we find that asset growth not only declines but even becomes negative as a result of the IPO event. Unfortunately we do not observe any statistically significant changes in either sales growth, operating income growth, abnormal stock return or leverage ratio. These latter results deviate from those presented by Hsu et al. who found evidence for a decrease in both ROA1 and ROA2, an increase in the leverage ratio and a decrease in sales growth post an IPO event in the industry.

Ultimately we only observe two statistically significant effects, a decline in capital expenditure and asset growth. The decline is certainly economically significant and large enough to suggest that firms do experience negative effects of a rival IPO. The above analyses examine all firms as one single group before the IPO event and one single group after the IPO event and are as such exposed to a potential survivorship bias. A survivorship bias occurs if the results are driven primarily by the surviving firms whose performance measures are likely much higher than those of non-surviving firms. A measurement of only surviving firms

would, of course, not include the effect on firms which went bankrupt as a result of the IPO event – an effect just as important as a reduction of growth for surviving firms.

Next, we adjust for a potential survivorship bias by dividing the data into two groups of listed and delisted firms where we use delistings as a proxy for bankruptcies. We are aware of the limitations of this proxy which we mentioned in section 3. Table 2, Panel B displays listed firms as "active" firms and the delisted firms as "inactive" firms. The active firms show low significance for all performance measures except capital expenditure growth which drops notably from 12.33% to -5.34% with an accompanying t-statistic of 2.38. Inactive firms, however, show both a statistically (t-statistic of 2.75) and an economically significant decrease in ROA1 from -0.17% to -17.4%. The decrease in ROA2 from -0.33% to -12.26% is just below statistical significance levels. The decrease in asset growth is statistically significant (t-statistic of 3.95) and drops from a positive 15.25% to -9.05%. The deterioration in asset growth is according to our results only explained by the performance of non-surviving firms.

Furthermore we can see an even greater decrease in capital expenditure growth compared to the active firms. Capital expenditure decreases from 16.29% to -14.46%. This implies that there seems to be a performance effect even if we take survivorship bias into account when testing for capital expenditure growth. Once more, the effect on capital expenditure growth is substantial but expected. As a large competitor goes public, managers become cautious and employ more austere investment policies.

The result of the four-year average abnormal stock return is insignificant for all test groups and we cannot prove any stock return effect over a four-year period. In total these results imply that a competitor's IPO only affects the profitability of firms that are eventually delisted. Thus it seems that the IPO event strikes hardest at weaker companies which eventually succumb to the increased levels of competition in the industry. Our results indicate that IPOs serves as a force of renewal within the industry, replacing weaker firms with new, more competitive ones.

Although we examine additional variables compared to the ones examined by Hsu et al. (2010), our results differ slightly since *The New Game in Town* manages to prove statistically significant effects for all the variables in both groups and thereby proving that there is a performance effect regardless of survivorship bias or not. Whilst many of our variables are

below statistical significance levels our overall results have similarities with those of Hsu et al. which exhibit an overall decline in performance as a result of an IPO event.

Table 2: Univariate statistics

In this table we report four-year averages before and after an IPO event for a number of important measures. ROA1 is defined as net income divided by total assets. ROA2 is defined as operating income divided by total assets. Leverage Ratio is defined as long-term debt divided by total assets. In order to account for a potential survivorship bias we also report four-year averages before and after an IPO event for active and inactive firms separately.

Period	ROA1	ROA2	Sales Growth	Asset Growth	Capital Expenditure Growth	Operating Income Growth	Abnormal Stock Return	Leverage Ratio
Panel A: Performance measures of all firms								
Four year average before the IPO	-1.90%	1.07%	7.72%	9.02%	13.70%	15.28%	0.86%	11.08%
Four year average after the IPO	-7.50%	-3.94%	3.44%	-3.28%	-9.10%	3.12%	10.46%	11.32%
T-stat	1.74	1.70	1.32	3.82	3.79	0.98	-1.28	-0.16
Panel B: Performance measures divided between active and inactive firms								
Active firms								
Four year average before the IPO	-2.80%	1.80%	5.42%	5.73%	12.33%	11.72%	4.88%	12.10%
Four year average after the IPO	-0.75%	1.79%	2.74%	0.76%	-5.34%	2.58%	7.24%	12.50%
T-stat	-0.60	0.00	0.72	1.41	2.38	0.74	-0.28	-0.20
Inactive firms								
Four year average before the IPO	-0.17%	-0.33%	12.07%	15.25%	16.29%	23.35%	-6.76%	9.28%
Four year average after the IPO	-17.49%	-12.26%	4.46%	-9.05%	-14.46%	4.52%	15.07%	9.64%
T-stat	2.75	1.88	1.26	3.95	2.99	0.61	-1.53	-0.14

4.2 Short-term returns

The primary competitive IPO effects which we are attempting to prove in this thesis are the long-term effects on operating performance measures and stock returns. Whilst these are perhaps the most indicative of the true competitive IPO effects it is also important to examine the very short-term returns of incumbent firms around IPO events.

Table 3 reports mean cumulative abnormal returns (CAR) for a number of measurement windows. We use the exact same measurement windows as Hsu et al. (2010) but have added three windows which start one day before the event and end 1, 5 and 10 days after the event, respectively. The reason for this deviation is that we are interested in examining at which point before the event the hypothesized competitive IPO effects occur. In addition to examining short-term returns around the completion date of IPO events, we have chosen to also examine short-term returns around the announcement date of IPO events. In the absence of insider trading, we would not expect any significant competitive IPO effects prior to the announcement of an IPO event unless the public strongly expects an announcement.

As table 3 shows, we do not observe any significant competitive IPO effects around IPO event announcement dates apart from the event windows starting one day prior to the announcement date and ending 5 and 10 days after the announcement, respectively. These measurement windows display statistically significant mean CAR declines of 3.79% and 3.66% with associated t-statistics of 2.18 and 2.04, respectively. These declines are clearly the result of the extended measurement window after the event date since the measurement window starting one day before and ending one day after the event window shows now statistically significant decline in mean CAR.

Short-term returns around completion dates of rival IPOs are negative and statistically significant for all measurement windows. The strongest effect we observe, -4.51%, is for the measurement window starting 10 days before the completion date and ending 15 days after the completion date. The fact that the mean CAR of the measurement window ending 20 days after the completion date is lower than that of the measurement window ending 15 days after the completion date suggests that the competitive IPO effect diminishes at some point between 15 and 20 days after the completion of an IPO event. The most statistically significant result (t-statistic of -3.36) occurs for the measurement window starting 1 day before the event date and ending 5 days after the event date and shows a mean CAR decline of 3.17%.

Table 3: Cumulative abnormal returns of incumbent firms around announcement dates and completion dates
In this table we report mean cumulative abnormal returns (CAR) of all firms around announcement dates and completion dates of IPO events for 10 different measurement windows

Measurement window		Announcement date		Completion date	
Days before	Days after	Mean CAR	T-stat	Mean CAR	T-stat
10	1	-1.69%	-0.89	-2.48%	-2.27
10	5	-2.94%	-1.55	-2.63%	-2.39
10	7	-3.71%	-1.56	-3.72%	-2.55
10	15	-4.55%	-1.68	-4.51%	-2.31
10	20	-4.30%	-1.66	-3.57%	-2.09
5	1	-1.74%	-0.48	-1.71%	-2.11
5	5	-2.77%	-1.61	-2.42%	-2.39
1	1	-1.61%	-0.46	-1.30%	-2.42
1	5	-3.79%	-2.18	-3.17%	-3.36
1	10	-3.66%	-2.04	-2.74%	-2.59

4.3 Multivariate results

4.3.1 Model 1: Competitive IPO effects

In this regression we test whether IPOs have an effect on sales growth, capital expenditure growth, operating income growth and abnormal stock return one year, two years and three years after an IPO event. To test whether there are other factors than the IPO event itself that explain variation in the selected performance measures and abnormal stock returns we include a number of control variables: annual IPO underpricing as a proxy for IPO market hotness, industry market to book ratio and the logarithm of assets as a proxy for firm size.

We use the model below to test our hypothesis that there are industry performance effects as a consequence of IPO events.

$$Performance_{i,t} = \alpha + \beta_1 * 1\_year\_IPO_{i,t} + \beta_2 * 2\_year\_IPO_{i,t} + \beta_2 * 3\_year\_IPO_{i,t} + \gamma * Controls_{i,t} + \varepsilon_{i,t}$$

The dependent variables we use as measures of performance are sales growth, capital expenditure growth, operating income growth and abnormal stock return. The IPO event

dummy variables (1, 2 and 3) in the model above are equal to one if one, two or three years have passed since the IPO event, respectively. Hsu et al. (2010) employ a single dummy variable tracking whether an IPO event has occurred within three years. Our specification allows for more detailed measurement of a competitive IPO effect since we can observe in which year the effect arises and in which year it is strongest.

When looking at sales growth in table 4, column 1, that is, before we control for IPO events, we find that both IPO market hotness and firm size have significant impacts on sales growth. Firm size has a positive impact on sales growth with a coefficient of 0.2477 and a corresponding t-statistic of 2.33. This implies that, in our sample, larger firms have higher levels of sales growth than smaller firms. Whilst these results might not be perfectly intuitive they are consistent with the findings of Hsu et al. (2010) albeit at lower levels of economic significance. When controlling for IPO events by adding dummy variables (column 2) we get statistically and economically significant results for all measurement windows. The 1-year IPO dummy variable has a positive 9.97% impact on industry competitors' sales growth the first year after an IPO. The 2-year and 3-year dummy variables both return a statistically significant negative coefficient which indicates that an IPO has a negative impact on industry competitors' sales growth in the second and third years. The 2-year IPO dummy has a coefficient of -0.1004 (t-statistic of -2.32) and the 3-year IPO dummy has a coefficient of -0.0951 (t-statistic of -2.11). This implies that incumbent firms experience a 10.0% decrease in sales two years after the IPO event and 9.5% decrease after three years. The positive first year sales growth could be partially be explained by the fact that the IPO dummy only takes into account which year the IPO took place and not which exact date. In reality there could be a few days between the IPO event and the sales report and this could make the result for the first year growth return partially misleading. Despite this it is not surprising that the effect is stronger for the second and third years than for the first year since actual sales numbers will likely take more than one year to show an economically significant decline as a result of the IPO event. After all, the theoretical effect of a rival IPO originates in increased access to capital market funding and as a result increased levels of investments and growth – investments whose end results would surely take more than one year to show in a firm's sales figures.

Columns 3 and 4 report regression coefficients for capital expenditure growth. All three IPO dummy variables show negative and statistically significant coefficients. There is an immediate negative capital expenditure growth effect of -0.2022 (t-statistic of -2.53) in the first year which increases the following years to about -0.25 (t-statistic of -2.51) in year 2 and 0.24 (t-stat of -3.15) in year 3. Our control variables are unfortunately not statistically significant when regressing on capital expenditure growth. Columns 5 and 6 report regression coefficients for operating income growth. The only statistically significant coefficients are those belonging to firm size which are both about -0.07 (t-statistics of about -2.4). The interpretation is that firm size has a negative impact on operating income growth. Again, this result may not be perfectly intuitive but resembles the results reported by Hsu et al. (2010). However, we cannot prove that rival IPOs have an effect operating income growth.

The stock market's reaction to an IPO event is according to our analyses immediate. The 1-year IPO dummy returns a coefficient of -0.1491 (t-statistic of -2.16). Similarly the 2-year IPO dummy returns a coefficient of -0.1706 (t-statistic of -2.46). On the third year after the IPO event we observe an increase in abnormal stock return of 0.5973 (t-statistic of 4.36). The stock market seems to react relatively fast to an IPO event in the industry and reduces the stock values of incumbent firms but this effect diminishes after three years when the stock values are fully recovered.

We can conclude that there is an industry performance effect even when adding our control variables. Sales, capital expenditure and abnormal stock returns are all significantly affected by an IPO event. Noteworthy is that both capital expenditure growth and abnormal stock returns seem to decline immediately after the IPO event whilst sales growth declines only in the second and third years after the IPO event. We note that levels of capital expenditure growth and abnormal stock returns are both factors largely affected by individuals and much more exposed to the psychology behind the IPO of a large competitor. Levels of capital expenditure are, of course, set by the management of a given firm and abnormal stock returns are to a large extent affected by investor sentiment, both more prone to overreaction than sales growth. Thus, we interpret the immediate reductions in abnormal stock returns and capital expenditure growth as an overreaction by investors and firm management teams. However, after three years with no significant reduction in operating income growth, investors become aware of their overreactions and adjust valuation levels back to normal. The expectations of the competitive IPO performance effects are higher than what is later realized.

Table 4: Effects of IPO events on operational measures and stock return

In this table we report estimates from a regression of indumbent firms' sales growth, capital expenditure growth, operating income growth and abnormal stock return on three separate IPO dummy variables and three control variables: Annual underpricing, Industry M/B ratio and Log(Assets). Annual underpricing is the average level of IPO underpricing in the year of the IPO and serves as a proxy for IPO market hotness. Industry M/B ratio is the average market-to-book ratio of a given industry and serves as a proxy for industry valuation levels. Log(Assets) is simply the logarithm of total assets and serves as a proxy for firm size.

	Sales Growth		Capital Expenditure Growth		Operating Income Growth		Abnormal Stock Return	
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy: IPO 1 year ago		0.0997		-0.2022		-0.2811		-0.1491
		(2.21)		-(2.53)		-(1.99)		-(2.16)
Dummy: IPO 2 years ago		-0.1004		-0.2560		-0.3148		-0.1706
		-(2.32)		-(2.51)		-(1.50)		-(2.46)
Dummy: IPO 3 years ago		-0.0951		-0.2427		0.0522		0.5973
		-(2.11)		-(3.15)		(0.30)		(4.36)
Annual underpricing	0.2477	0.2069	0.1577	-0.0731	-0.4826	-0.6296	-0.1560	-0.0835
	(2.33)	(1.91)	(0.73)	-(0.32)	-(1.29)	-(1.58)	-(0.44)	-(0.23)
Industry M/B ratio	-0.0007	-0.0011	0.0023	0.0020	0.0053	0.0025	0.0046	0.0057
	-(0.28)	-(0.45)	(0.67)	(0.57)	(1.11)	(0.57)	(0.77)	(0.92)
Log(Assets)	0.0218	0.0199	0.0089	0.0078	-0.0711	-0.0727	0.0067	0.0140
	(2.74)	(2.50)	(0.62)	(0.55)	-(2.37)	-(2.42)	(0.41)	(0.93)
Intercept	-0.1251	-0.0929	-0.0636	0.0850	0.6917	0.8064	0.0028	-0.1084
	-(1.99)	-(1.36)	-(0.56)	(0.69)	(2.62)	(2.78)	(0.02)	-(0.94)
IPO events fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	333	333	333	333	196	196	333	333
R-squared	0.0403	0.0877	0.0062	0.0458	0.0323	0.0561	0.0094	0.1354

4.3.2 Model 2: The effect of leverage and research intensity

In the previous section we concluded that IPO events have a performance impact on industry incumbent firms. In the following section we want to examine whether research intensity and leverage affect how well firms handle IPO events in their industry. In order to do this we employe the following regression model:

$$Pre\ vs.\ Post\ IPO\ diff.in\ performance_i = \alpha + \beta_{1,i} * Leverage_i + \beta_{2,1} R\&D\ intensity_i + \beta_{n,i} * Controls_{i,t} + \varepsilon_{i,t}$$

As specified in the model above, our dependent variables are no longer the levels of sales, capital expenditure and operating income growth for a given firm but rather a given firm's average difference between sales, capital expenditure and operating income growth, before and after IPO events. As a result, we only have one observation per firm. The regressions displayed in table 5 are our attempts to recreate the second regression output in *The New Game in Town*. Unfortunately we were unable to obtain data for the third competitive IPO determinant as specified by Hsu et al. (2010); *recent certification*. The theoretical foundation of this determinant is based upon the notion that a completed IPO involves significant scrutiny by various financial intermediaries such as investment banks. Hsu et al. therefore theorize that the completion of an IPO implies that the IPO firm has passed the review of the investment banks involved in the IPO – a "stamp of approval" of sorts. Furthermore, the impact of this effect increases with investment bank ranking/prestige since more prestigious investment banks will likely be able to choose to work with more attractive IPO firms. Whilst the existence of this effect seems perfectly intuitive in very mature and highly developed financial markets such as the U.S., it does not seem very likely that the same is true for less saturated financial markets like the Swedish financial market. Underwriter ranking is not as well-defined in Sweden as it is in the U.S. and we are therefore less concerned about omitting this determinant when trying to explain the variation in post IPO event underpreformance.

Column 1 reports the base sales growth regression without the inclusion of any determinants. Both the level of annual IPO underpricing – our proxy for IPO market hotness – and the industry market to book ratio have statistically significant impacts on the degree of sales growth reduction as a result of an industry IPO event with coefficients of -1.3727 (t-statistic of -2.71) and 0.0069 (t-statistic of 2.56), respectively. Whilst the economical significance of

the industry market to book ratio is very low the above results imply that the decline in sales growth as a result of an industry IPO event is substantially lower when IPO markets are hot. This effect may be explained by the fact that there are generally more IPOs when IPO markets are hot and that each individual IPO therefore has a lower effect. Unfortunately neither leverage nor research intensity (columns 2 and 3) significantly impact the pre-/post-IPO difference in sales growth.

Columns 4 to 6 report coefficients for the difference in capital expenditure growth as a result of an industry IPO event. None of the coefficients are statistically significant in columns 4 and 5 whilst only the coefficient for the level of research intensity is statistically significant in column 6 with a coefficient of -0.3386 (t-statistic of -2.07). This result suggests that research intensive firms experience a substantially lower decline in the level of capital expenditure growth as a result of an industry IPO event. This result is intuitive since research intensive firms are often quite dependant on high levels of research and investments and are not likely to substantially decrease research and investment levels as a result of an industry IPO event.

Columns 7 to 9 report coefficients for the difference in operating income growth as a result of an industry IPO event. The output resembles that of capital expenditure growth with only the coefficient for research intensity being statistically significant. The coefficient of 0.5017 (t-statistic of 6.83) implies that research intensive firms experience a greater decline in operating income growth than non research intensive firms as a result of an industry IPO event.

We can conclude that we find evidence for an industry IPO effect regarding research intensity but that we find no evidence for an effect regarding leverage. We cannot prove that Hsu et al.'s leverage determinant explain the variation in individual firm reaction to an industry IPO effect. Hsu et al. find evidence that research intensity has a positive impact on how well a firm handles an industry IPO event which contradicts our findings. We believe that Hsu et al.'s research determinant is misleading since they include the research industry in their analysis where performance is to a greater extent dependant on a firm's own findings and not competitors' performance. Thus, we believe that the inclusion of these research intense industries will produce skewed and misleading results.

Table 5: The effect of leverage and research intensity on post-IPO event underperformance

In this table we report estimates from a regression of incumbent firms' sales growth, capital expenditure growth and operating income growth on two of Hsu et al.'s (2010) proven determinants of post-IPO event underperformance: leverage and research intensity. Leverage is defined as long-term debt divided by total assets and research intensity is defined as research and development expenses divided by total assets. We also control for Annual underpricing, Industry M/B ratio and Log(Assets). Annual underpricing is the average level of IPO underpricing in the year of the IPO and serves as a proxy for IPO market hotness. Industry M/B ratio is the average market-to-book ratio of a given industry and serves as a proxy for industry valuation levels. Log(Assets) is simply the logarithm of total assets and serves as a proxy for firm size.

	Sales Growth			Capital Expenditure Growth			Operating Income Growth		
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Leverage		-0.6663			-1.2374			1.1895	
		-(0.66)			-(0.86)			(0.60)	
Research intensity			0.0681			-0.3386			0.5017
			(1.82)			-(2.07)			(6.83)
Log(Assets)	-0.0314	-0.0089	-0.0905	-0.0569	-0.0089	0.0672	0.0333	0.0183	-0.4978
	-(1.27)	-(0.19)	-(1.49)	-(1.26)	-(0.26)	(0.39)	(0.36)	(0.19)	-(3.80)
Annual underpricing	-1.3727	-1.4155	-0.4417	-0.7820	-0.8615	-0.9106	-3.0399	-3.7583	-1.1267
	-(2.71)	-(2.68)	-(0.72)	-(0.91)	-(0.95)	-(0.77)	-(1.65)	-(1.52)	-(0.82)
Industry M/B ratio	0.0069	0.0070	-0.0005	0.0042	0.0044	-0.0434	-0.0049	0.0040	0.5101
	2.5600	2.8500	-0.0400	0.6100	0.7000	-1.1400	-0.2400	0.2100	9.9100
Intercept	0.3273	0.2456	0.5063	0.3014	0.1498	1.3718	0.2099	0.2040	0.6321
	(1.49)	(0.84)	(1.95)	(0.75)	(0.35)	(1.97)	(0.26)	(0.24)	(1.05)
IPO events fixed effects?	No	No	No	No	No	No	No	No	No
N	42	42	42	42	42	42	21	21	21
R-squared	0.2401	0.2543	0.7657	0.0734	0.0984	0.9496	0.1213	0.1365	0.9834

5. Conclusion

In this thesis, we study what impact an IPO has on its industry competitors. Using stock data and accounting data for Swedish companies between the year of 1990 and 2011 we analyze how IPOs affect stock returns and operational performance for firms within the same industry as the issuing firm. Our results suggest that IPOs do affect firms' performance and that there is a competitive performance effect. We show that sales growth decreases in the second and third year after an IPO suggesting that IPO firms have a competitive advantage which enables them to gain market shares. Capital expenditure growth is decreasing for all our three controlling years as a result of an IPO event; firms are less positive about the future and more austere. We cannot prove that rival IPOs have any impact on operating income growth. Our univariate results show evidence for asset growth and capital expenditure growth declines after an industry IPO. Taking survivorship bias into account we still obtain a significant decline for capital expenditure growth. Furthermore our results show that industry competitors in Sweden experience a negative abnormal stock return both on the announcement date and on the completion date of an IPO event which holds for two years before it recovers. These results suggest that the market expects a negative impact on firm performance as a result of a rival IPO but that this negative view vanishes the third year after the IPO.

When examining whether leverage and research intensity could explain how well a firm manages an IPO in its industry our results for leverage were insignificant but significant for research intensity regarding capital expenditure growth and operating income growth. The level of leverage cannot explain firm performance after an IPO in their industry. Research intensive firms experience a greater decline in operating income growth than non-research intensive firms as a result of an industry IPO event. Research intensive firms experience a substantially lower decline in the level of capital expenditure growth as a result of an industry IPO event. These results are deviating from those presented by Hsu et al. (2010) who showed that lower leverage improved a company's ability to handle an industry IPO event and that more research intensive firms experienced lower negative effects from an industry IPO event. One explanation for the deviation in results regarding research intensity could be that we have excluded the entire research and development industry since there are few logical explanations why research and development firms would be affected by a competitor's IPO. We regard our result as more accurate and fair since the inclusion of research intense industries, in which a relation between firm performance and a competitor's access to equity

capital market funding is not expected to be seen, would produce skewed and misleading results. This issue enables opportunities for future research examining the competitive IPO effects between different industries rather than the average of all industries as a whole.

6. References

Akhigbe, Aigbe, Stephen F. Borde, and AnnM.Whyte, 2003, "Does an industry effect exist for initial public offerings?" *The Financial Review* 38, 531–551.

Braun, Matias, and Borja Larrain, 2009, "Do IPOs affect the prices of other stocks? Evidence from emerging markets", *Review of Financial Studies* 22, 1505–1544.

Campello, Murillo, 2003, "Capital structure and product markets interactions: Evidence from business cycles", *Journal of Financial Economics* 68, 353–378.

Chemmanur, Thomas J., and Paolo Fulghieri, 1994, "Investment bank reputation, information production, and financial intermediation", *Journal of Finance* 49, 57–79.

Chevalier, Judith A., 1995, "Capital structure and product-market competition: Empirical evidence from the supermarket industry", *American Economic Review* 85, 415–435.

Cockburn, Ian, and Zvi Griliches, 1988, "Industry effects and appropriability measures in the stock market's valuation of R&D and patents", *American Economic Review* 78, 419–423.

Hung-Chia Hsu, Adam V. Reed and Jörg Rocholl 2010, "*The New Game in Town: Competitive Effects of IPOs: competitive effects of IPOs", Journal of Finance* 65, 495-528.

Ibbotson, Roger G., and Jeffrey F. Jaffe, 1975, "Hot issue markets", *Journal of Finance* 30, 1027–1042.

Lang, Larry H. P., and Ren´e M. Stulz, 1992, "Contagion and competitive intra industry effects of bankruptcy announcements: An empirical analysis", *Journal of Financial Economics* 32, 45–60.

Opler, Tim C., and Sheridan Titman, 1994, "Financial distress and corporate performance", *Journal of Finance* 49, 1015–1040.

Phillips, Gordon M., 1995, "Increased debt and industry product markets: An empirical analysis",*Journal of Financial Economics* 37, 189–238.

Ritter, Jay R., 1991, “The long-run performance of initial public offerings”, *Journal of Finance* 46, 3–27.

Slovin, Myron B., Marie E. Sushka, and John A. Polonchek, 1992, “Informational externalities of seasoned equity issues: Differences between banks and industrial firms”, *Journal of Financial Economics* 32, 87–101.

Stoughton, Neal, Kit Pong Wong, and Josef Zechner, 2001, “IPOs and product quality”, *Journal of Business* 74, 375–408.