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Master Thesis

Long-Run IPO Underperformance on the Swedish Equity Market

-Making a distinction between Private Equity Issuers and Non-private Equity Issuers

Abstract:

This thesis examines the long-run underperformance of IPOs on the Swedish equity market during 1992-2005 and hence includes the post IT-era. We also investigate whether there is a difference in long-run performance between IPOs that are backed by professional private equity investors and those that are not. We use a sample of in total 271 IPOs of which 89 are private equity backed. In order to investigate the abnormal performance we use two different approaches; the event-time approach as well as the calendar-time approach. Under each of the approaches we use different measuring techniques as well as weighting methods, and control for size and book-to-market ratios. Our main contribution is that we introduce the Fama-French three factor model in determining long-run IPO underperformance on the Swedish equity market.

Our findings suggest that Swedish IPOs do underperform during this time period when returns are equally weighted. However this performance disappears when returns are value weighted. A deeper analysis point to the fact that especially small IPO firms performed relatively poorly in the post IT period. We also find signs that private equity backed IPOs outperform non private equity backed IPOs when returns are value weighted but not when returns are equally weighted. These results are more evident when long-run IPO returns are measured over a five year period, rather than a three year period.

Tutor: Prof. Clas Bergström
Authors: Gustav Björcke 19982
Michael Menzel 20357
Discussant: Bogdan Onaca 19024

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1 INTRODUCTION

1.1 Background

In the early 90's, severe long-run underperformance of recent IPOs were documented in studies buy Ritter (1991) and Loughran and Ritter (1995). Their findings suggested that investors systematically overestimate the prospects of firms issuing equity for the first time. The above mentioned documents show that nominal five-year, buy-and-hold returns are 50% lower for recent IPOs than they are for comparable size-matched firms (16% versus 66% respectively). These studies were first conducted on American stock exchanges but subsequent research has shown that underperformance extends to other countries as well as to SEO's.

The findings by Ritter and Loughran and Ritter encouraged an extensive amount of research in the field of IPO underperformance over the coming years. Spiess and Affleck-Graves (1995) also found that the long-run performance of newly issued stocks underperformed their peers, both in terms of initial offerings and seasoned offerings. However, doubts have risen regarding the underperformance as academics such as Brav and Gompers (1997), Fama (1998), Brav, Gezcy and Gompers (2000) and Gompers and Lerner (2000) show that the underperformance may not be an IPO related phenomena but is rather attributed to firms with a certain characteristic. Brav and Gompers matched the performance of recent IPO firms to size and book-to-market matched portfolios that excluded the IPO firms and showed that IPO's do not under perform. Underperformance is rather a characteristic of small, low book-to-market firms regardless of whether they are IPO firms or not. The above mentioned studies also utilize time-series factor models such as Fama-French's three factor model to test underperformance. The results show that the low average return on equity issuer stock is not a distinct anomaly.

Brav and Gompers (1997) divide the IPO firms in their study into two subgroups including venture capital backed IPOs and non-venture capital backed IPOs. The aim is to determine whether venture capitalists are able to affect the long-run post-IPO performance of their firms. They find that venture-backed firms do indeed outperform non-venture capital backed firms over a five-year period, but only when returns are weighted equally. When tested using the Fama-French model described above none of the two subgroups show statistically significant abnormal intercepts. The relatively worse performance of non-venture capital firms is driven by small, low book-to-market firms.

Acknowledgements:
We would like to take the opportunity to thank our tutor Prof. Clas Bergström for valuable insights and feedback. Also we would like to express our appreciation to the staff at Kungliga Biblioteket in Stockholm for providing us with numerous listing prospectuses, as well as the staff at OMX for providing us with complementary data material.

1.2 Purpose

The purpose of this paper is to take on where others left of and investigate the long-run underperformance of recent Swedish IPOs, using a sample of 271 IPOs listed in the A-, O- and OTC list. The period we aim to study is 1992-2005, which has not yet been covered in financial literature. We also aim to explore whether or not there is a systematic difference in performance between IPOs that are backed by professional private equity investors as opposed to those that are not. The study will be performed using a range of measuring techniques in order to reach a high level of accuracy. One of these techniques is the Fama-French three factor regression which, to our knowledge, has not yet been used measuring Swedish IPO performance. Finally we also mean to discuss our findings in light of previous similar studies to see in what way, if any, our results differ from theirs.

1.3 Clarification of concepts

Private equity can be defined as providing equity capital to enterprises not quoted on a stock market[1]. Private equity can be used to develop new products and technologies, to expand working capital, to make acquisitions, or to strengthen a company's balance sheet. It can also resolve ownership and management issues - a succession in family-owned companies, or the buyout or buy-in of a business by experienced managers may be achieved using private equity.

As can be seen in figure 1.1 below, there are a number of different areas with in the concept of private equity. Buy-out groups specialize in raising funds on behalf of their investors and then use the capital to by strong, developed, often market leading companies. This can be done using a substantial amount of leverage in a Leveraged Buyout ("LBO") or in conjunction with sitting management buying a significant stake in the company in a Management Buyout ("MBO"). Other examples are when external management buys a significant stake of a company's share together with the buyout group in a Management Buy-in ("MBI") or when institutional investors take part in buying the company from its current shareholders in an Institutional Buyout ("IBO"). Venture Capitalists on the other hand are known to invest in "younger" developing companies that might have an interesting new technology or product, or in companies that have reached a threshold in their development and need a fresh capital injection to expand their business.

[1] All definitions in this section are taken from the homepage of the European Private Equity & Venture Capital Association, www.evca.com

Figure 1.1 **Common Features of Private Equity**

Private Equity

Venture Capitalists
- Early Stage/Start-Ups
- Expansion Stage

Buyout Groups
- LBO
- MBO
- MBI
- IBO

Even though there is a clear difference between the different disciplines of private equity we will not make any distinction between venture capitalists and buyout groups in this thesis. One reason for this is that we do not consider the Swedish IPO market large enough to do our kind of study on either one of them alone. The other reason is that we believe that the theoretical IPO consequences, presented in section 2.2, of the two private equity investor types are largely the same in the sense that they are both professional institutional investors in non-public equity. Thus, a private equity backed IPO in this thesis refers to a company of which a significant stake of equity is owned by a professional private equity investor before the listing on a public exchange.

1.4 Previous research on Swedish equity market

Among previous studies on the Swedish equity market we have found two theses' that are of particular interest to mention. Besser, Carlman & Mossberg (2001) studied the long-run underperformance of IPOs between 1980 and 2000 by calculating monthly abnormal returns on IPO portfolios where the benchmark portfolios were formed based on book-to-market ratios and size. Besser et. al. found no clear evidence of long-run abnormal performance. Frick & Jonsson–Melander (2001) studied the long-run underperformance of IPOs on the Swedish equity market between 1992 and 2000 by calculating monthly abnormal returns when IPO portfolios were compared to Affärsväldens equity index, AFGX. They also made the distinction between private equity backed IPOs and non-private equity backed IPOs and found that the former outperforms the latter when returns are equally weighted.

This thesis distinguishes from the two above firstly by measuring a different time period and hence, also incorporating the "post IT-crisis" period, which is still relatively untouched by financial academic literature. We also control for book-to-market ratios and size in our comparison between private equity backed IPOs and non-private equity backed IPO, something that was not covered in Frick & Jonsson-Melander. Finally we also use Fama-French's three-factor model when testing for long-run underperformance of IPOs and when distinguishing between our two sub-groups.

1.5 Disposition

The thesis will be presented as follows: In section 2 we will describe the long-run IPO underperformance phenomenon and give explanations to why this phenomenon may or may not occur. We also take a deeper look into two groups of issuers; private equity and non-private equity issuers and discuss whether the difference in issuer type could theoretically have any impact on future stock returns. We continue in section 3 by describing the different methods we will use to perform our study. Section 4 gives a detailed overview of what data we have used and how we have manipulated it to fit our needs. In section 5 we present the different results of our study and in section 6 we conclude our findings and compare them to findings in previous studies. The thesis ends in section 7 by giving some interesting suggestions to how one can research this area further.

2 THEORETICAL FRAMEWORK

The theoretical section of this thesis is not thought to give the reader a thorough run-through of all theories surrounding the IPO topic in general or the private equity backed version of IPOs. The reason for this is that these issues are no new findings and have been debated back and forth a number of times before. Also since we are mostly applying a different methodology to test for the same phenomena we have been focusing on the technical aspects of the thesis. However, we will take the reader through a quick overview of the different theories in order to put our research into a theoretical context.

2.1 Long-Run Underperformance

As discussed in the introduction to this thesis we can conclude that the phenomena of long-run IPO underperformance have been heavily debated in academic studies, mainly with focus on the American stock exchanges. When trying to explain post-IPO pattern such as presented by Ritter and Loughran (1995) many authors turn to the world of behavioral finance and hold investor sentiment responsible for the underperformance. Others, such as Fama and French (1996) defend their efficient market hypothesis by claiming the recent academics use the wrong method to test for underperformance.

2.1.1 Behavioral Finance

Individuals are demonstrated by behavioral economists to violate Bayes' Rule[2] and rational choice theories when they are making decisions under uncertainty in experimental settings (Kahneman and Tversky 1982). In a study by Miller (1977) he assumes that investors have a diverse set of expectations regarding the proper valuation of any given firm. So when a firm is issuing its shares for the first time the most optimistic investors are the ones buying the shares. Subsequently as the variation in these sets of expectation decreases as a result of more public information, the marginal investor will turn his/her opinion towards the "average" valuation and hence, prices will fall. This reaction in share price is the same as the one that occurs for stocks that have been subject to lock-up periods and are subsequently released (Bradley et al (2001)).

Brav and Gompers (1997) provide some further interpretation and state that if investor sentiment is in the underperformance of IPO's, then small firms (which are typically IPO firms) are likely to be more affected. The reason for this is that these stocks are more likely to be held by individuals as opposed to institutions and that these individuals are, in turn, more likely to suffer from asymmetric information regarding the true value of the stock (Lee, Scheifer, and Thaler (1991)). Many institutions like pension funds or

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[2] Bayes' rule is derived form economics statistics and tells how you should change your existing beliefs in the light of new evidence.

insurance companies are reluctant to hold shares in minor companies as it easily makes them a large block-holder. Also there are often trading restrictions in place for institutions to hold more than a certain percentage of a company.

Another explanation is presented by Schultz (2001). Here it is argued that a large group of IPO's often follow successful IPO's. Firms that are thinking about going public are more prone to issue their shares when they see that a lot of other firms are successfully issuing their shares. This happens especially when markets are peaking. As a result, the group of "lagging" IPO does underperforms partly because markets go down after the peak and also because some of the firms that "jumped on the train" were perhaps not ready for IPO but got tempted by attractive prices. As the latter group constitutes a relatively large fraction of the sample, the average IPO is underperforming. This explanation coincides with the general behavioral finance theory that investors weight recent events too heavily or extrapolate recent trends too much.

One theory for post-IPO's underperformance that holds managers responsible through "optimistic" accounting is presented in a paper by Teoh, Welch and Wong (1998). They state that firms are eager to look good when conducting the IPO and therefore "improve" their accounting the time immediately before the issue. As the market has problems to see carefully hidden warning signals it is optimistic about future prospects and attributes a high value to the company. Subsequently as the true performance reveals, prices adjust and these firms under perform.

2.1.2 Rational Asset Pricing Explanations

As an answer to behavioral economists, advocates of rational asset pricing models claim that their models can potentially explain many pricing anomalies found in recent financial economic literature. Fama and French (1996) claim that the anomalous performance found in these articles is explained by not completely controlling for risk factors. When using their three factor model, and thereby adjusting for size and growth (book-to-market ratios), many of the anomalies disappear.

Also Barber and Lyon (1997) and Kothari and Warner (1997) find that previous long-horizon test statistics are misspecified. They indicate that the direction and magnitude of bias in long horizon studies can be sensitive to sample characteristics such as the book-to-market ratio, size, exchange listing, and the time period studied.

Our tests of long-run underperformance are not meant to give one of the two just mentioned approaches right or wrong. Rather we will use these different views as theoretical reference when performing our tests and try to relate back to them when discussing our findings in section 6.

2.2 Private Equity and presumed impact on future returns

In this section we will shortly describe the market for private equity exits through IPO and discuss what impact private equity ownership may have on subsequent stock performance. This discussion will be performed while referring to academic findings in the topic.

2.2.1 Private Equity exits through IPOs

The market for private equity has been booming during the last couple of years as the big players, mainly American and European, have been raising enormous funds to invest in attractive unquoted capital across Europe. As a direct effect from the increased investment activity from these investors, the number of exits through various channels also increases. According to the European Private Equity and Venture Capital Association, private equity exits reached its all-time high at €29.8 billion in 2005; representing a 52% increase on 2004's total of €19.6 billion. The same source tells us that about 5% of these exits were done through IPOs in 2005. Naturally, just like with IPOs in general, this percentage depend on the strength of the stock markets and its ability to absorb new shares. For instance the number IPOs in the late 90's was far higher than the number of IPOs in the last couple of years. Figure 4.1 gives the reader an overview of how the number of IPOs and also number of private equity backed IPOs in our sample has evolved over our measurement period.[3]

2.2.2 Private Equity's impact on future stock returns

The topic of reputation and its effect to attract capital in the financial markets has constituted a large part of corporate finance literature in recent years. Amongst others, Diamond (1989) has shown that reputation may very well be an important factor in assessing future debt or equity markets. Intuitively, one might think of a company that is looking to raise capital in a new market. If the company is completely unknown to the lending or underwriting banks that operate in that market it might be hard to attract capital on attractive terms, whereas if the owner or if someone on the board of directors has established contacts in the market the availability of capital may increase.

A part of the literature discussed above has more specifically researched the effect private equity or venture capital ownership may have on the development of future listed companies. Barry, Mucarella, Peavy and Vetsuypens (1990), Megginson and Weiss (1991) and Lerner (1994) all document the important role that institutional owners like venture capitalists play in bringing companies public. The first two papers show evidence that venture backed firms go public earlier than non-venture backed firms since the venture capitalist can certify the quality of the offering. Also, since all private equity investors repeatedly bring companies to the stock markets, they can credibly commit not to overprice the issue. This can be understood quite simply by imagining the following situation: private equity company X brings company Y to the stock market and heavily overprices the issue. Subsequently company Y's share price plummets and investors quickly loose a large part of their investment. A few months later when private equity company X wants to exit from its position in company Z through an IPO, there are no willing investors to absorb the shares.

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[3] www.evca.com

The theory presented above indicates that private-equity backed IPO's should be overpriced to a lesser extent than non-private equity backed IPO's. This could mean that the former performs better in the longer run. However, if markets are efficient, this difference should be erased in the first days of trading and then the two subclasses of IPO's should trade on equal terms in the future.

Another factor that diversifies the two classes of IPO's is that representatives from the private equity company often stays on the board of directors for a while after the IPO and may, as reasoned in the first paragraph above, continue to give the company access to capital, a luxury that the non-private equity backed firms may not have (Brav and Gompers (1997)). Also, in their hunt for large IRR's[4], private equity firms are likely to have improved operating activities of their portfolio companies and put managerial structures in place that makes the company more fit for better performance in the long-run.

Intuitively, the fact that private equity ownership in some sense guarantees fair listing prices, give access to capital in the future and have optimized operating performance, tells us that this class of IPO's are in position to outperform their non-private equity peers in the long-run. But, as stated in Brav and Gompers (1997), "if venture-backed companies are better on average than non-venture backed companies, the market should incorporate these expectations into the price of the offering and long-run stock performance should be similar for the two groups."

[4] Internal Rate of Return

3 METHOD

We do not seek to present the ultimate method on how to measure long-run abnormal returns in this thesis, rather we want to as objectively as possible evaluate long-run IPO performance on the Swedish equity market between 1992-2005 with the distinction between private equity backed issuers and non-private equity backed issuers. In order to achieve this objectivity, we believe it is necessary to use different methodologies as there is not a sole methodology that has evolved as the optimal for measuring long-run performance. As Barber and Lyon (1999) pointed out, no winner has emerged as the optimal methodology in terms of statistical properties, and the analysis of long-run abnormal returns is "treacherous". To base our study on one single method with this in mind does not seem very wise. Having said this, we will still discuss the pros and cons with each methodology.

In order to perform a thorough analysis of long-run IPO performance on the Swedish equity market we will build our conclusions based on two different approaches. We distinguish between the event-time approach and the calendar-time approach and use different methodologies within each approach.

Within the event-time approach we look for abnormal performance by using the cumulative abnormal return (CAR) measure as well as the buy-and-hold abnormal return (BHAR) measure. In the calendar-time approach we examine the mean cumulative abnormal return as well as the alphas from Fama-French three factor model as an indicator of underperformance. To give further depth in the analysis both the equally weighting and value weighting schemes will be used.

Initially, our ambition was to perform statistical tests on the measured abnormal performance from the BHAR and CAR calculations in event-time and the CAR calculations in calendar-time. However, as we explored the different methodologies and got acquainted within the area of measuring long-run returns we realized the test statistics we would employ too heavily depended on extreme simplifications of reality. An example is the assumption of cross-sectional independence of returns. This seems to be particularly unrealistic in light of the turbulent years around the IT-bubble where a large number of similar firms went public within a very short time period after which their returns tended to follow very similar patterns. Finally, the result from this paper is to illustrate past IPO performance and thus not intended for any future predictions. Loughram and Ritter (1994) have presented similar lines of argument.

We have chosen to look at two different time horizons when measuring long-run underperformance, three and five years respectively. Hence, we consider a firm as an IPO firm during the 36/60 months after it has made its issuance. However, we have chosen to exclude the return in the issuance month in order to not incorporate the underpricing effect in the return series.

An integral part of our method is the construction of reference portfolios (i.e. portfolios to which we compare the IPO returns). Therefore we will start by describing the construction of those before we move on to explanations of the different methodologies used.

3.1 Reference Portfolios

To be able to assess relative long-run performance in terms of abnormal returns, one needs to decide upon what normal long-run performance is. Previous studies emphasize the importance of comparing returns of similar firms with respect to risk characteristic (eg. Fama and French (1993), Brav and Gompers (1997)). In this thesis we have chosen to focus on the size and book-to-market ratio to control for those risk characteristics.

The prime reference portfolio is a size and book-to-market ratio (S/BtM) based portfolio. In order to construct the S/BtM portfolio, all stocks in our sample are assigned a size rank between one and two and a book-to-market rank between one and three based on its size and book-to-market ratio. This gives a total of six portfolios with varying degree of firm characteristic risk, with respect to size and book-to-market value. The S/BtM based reference portfolios are formed by excluding all firms that are considered as IPO firms. The exclusion is done in order to not compare returns of IPO firms with returns that are made up in part by IPO firms.

The breakpoints for the size and book-to-market ratios are recalculated every month adjusting for firms entering and leaving the market as well as for changing market capitalizations. Hence the benchmark portfolios are also rebalanced on a monthly basis as they are determined by the size and book-to-market breakpoints.

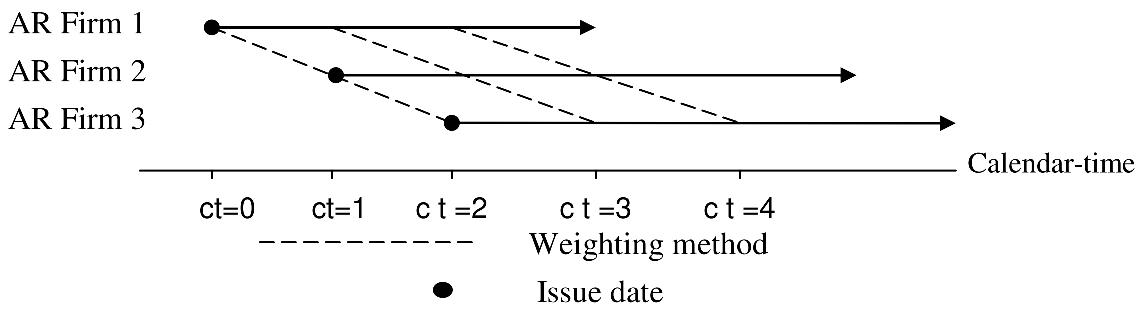
When we calculate abnormal performance, each IPO firm is matched to a size and book-to-market portfolio with similar size and book-to-market characteristic as the IPO firm has.

To further relate our findings we use an “adjusted” market portfolio as an additional benchmark. The portfolio consists of all our sample firms (i.e. firms traded on our selected lists) given a specific calendar month where the IPO firms are excluded in line with the reasoning above. Value weighted returns are used for both reference portfolios.

3.2 Event-time approach

An event-time return is a return computed as of a given event month following an event, in our case the IPO issuance. In the event-time approach the calendar-time month is irrelevant except that the event occurs within our sample period (1992-2005) as well as the event window; 36/60 months, are within the end of the sample period.

Figure 3.1 **Illustration of an Event-time measurement**



The figure can be interpreted as follows: Firms 1 goes public at point ct=0. Lets for simplicity assume that this point is the first of May, any given year. In line with this reasoning, firm two and three go public on the first of June and July, respectively. The first month that each of these firms are traded publicly is here called event month 0. Event month 0 for firm 1 is hence May, for firm two it is June and for firm 3 is July etcetera. Since we do not include the issuing month (event month 0) in our calculation, we start computing the abnormal performance for each of these firms, in their respective event month 1 (for firm 1 between ct=1 and ct=2). This is calculated by comparing the performance of each firm to the performance of a benchmark during the same month. The three resulting abnormal performances for the three firms are then bundled together as IPO abnormal performance in event month 1. The same method is applied for event month 2, 3,…, 36/60.

Formally, the monthly raw returns for the event months are calculated as:

$$r_{i,t} = (\mathrm{P}_{i,t} - P_{i,t-1}) / P_{i,t-1}$$

where $r_{i,t}$ is raw return for company *i* in the event month *t* following listing, $P_{i,t}$ is the last traded total return index of the company in event month *t* and $P_{i,t-1}$ is the last traded total return index in event month $t - 1$.

3.2.1 Cumulated Abnormal Return (CAR)

The Cumulated Abnormal Return (CAR) measure is useful if a researcher is interested in analyzing if the sample firms systematically earn abnormal returns compared to its benchmark. The CAR measure is often claimed to be superior to BHAR in the context of statistical inference as distributional properties and test statistics for cumulative abnormal returns are better understood (Fama (1998), Mitchell & Stafford (1998)). The same authors state that abnormal CARs and time-series regressions at the monthly frequency, for example, are less likely to yield spurious rejections of market efficiency relative to methodologies that calculate buy-and-hold returns by compounding single period returns. A drawback however, is that the measure does not accurately reflect investor return as it does not take into account the compounding of returns.

The cumulated abnormal return following the issuance month (t=0) to event month *T is* calculated by cumulating the mean benchmark-adjusted returns, AR_t over various intervals during the *T* month aftermarket period as follows:

$$CAR_{1\,\text{to}\,\text{T}} = \sum_{\text{t}=1}^{T} AR_t \;\text{ where }\; AR_t = \sum_{i=1}^{N} w_i ar_{i,t} \quad \begin{cases} w_{\text{i}} = \text{MV}_{\text{i}} / \sum \text{MV}_{\text{i}} & \text{(value weigthing)} \\ w_{\text{i}} = 1/N & \text{(equally weigthing)} \end{cases}$$

As we examine both three year returns and five year returns T = 36 and T = 60, respectively. The mean benchmark-adjusted return on a portfolio of *N* stocks for event month *t*, AR_t, is the equally weighted or value weighted arithmetic mean of the benchmark-adjusted returns, $ar_{i,t}$.

The benchmark adjusted return, $ar_{i,t}$ is the return of firm *i* event month *t* minus the return in benchmark portfolio in event month *t*. As described in section 3.1 we use two different benchmark portfolios, the size and book-to-market portfolio as well as the adjusted market portfolio. MV_i is firm *i*'s stock value, expressed in 1992 SEK to adjust for inflation, in the end of the first month.

3.2.2 Buy-and-Hold Abnormal Return (BHAR)

As mentioned above, a drawback with the CAR measure is that it does not accurately reflect investor return as it does not take into account the compounding of returns. This is accounted for in the buy-and-hold abnormal return (BHAR) measure.

The BHAR for company *i* is defined as the geometrically compounded return on the stock following issuance month to selling time *T* minus the geometrically compounded return for its benchmark. As with the CAR method we have *T* = 36 months and *T* = 60 months.

$$BHAR_{i,1\,\text{to}\,\text{T}} = \prod_{\text{t}=1}^{T} (1+\text{r}_{\text{i,t}}) - \prod_{\text{t}=1}^{T} (1+\text{r}_{\text{b,t}})$$

The mean buy-and-hold abnormal return for period *T* is then defined as follows:

$$\overline{BHAR}_{1\,\text{to}\,\text{T}} = \sum_{i=1}^{N} w_i BHAR_{i,1\,\text{to}\,\text{T}} \quad \begin{cases} w_{\text{i}} = \text{MV}_{\text{i}} / \sum \text{MV}_{\text{i}} & \text{(value weigthing)} \\ w_{\text{i}} = 1/N & \text{(equally weigthing)} \end{cases}$$

When equally weighing the returns the mean buy-and-hold abnormal return can intuitively be seen as the impact of an investor's wealth if the same amount of money is invested passively in each IPO after issuance month to the end of the pre-specified holding period (*T*) compared to if it was invested in the benchmark. When value weighting the returns each company's BHAR is weighted in proportion to its market capitalization in relation to all event firms market capitalizations (inflation adjusted).

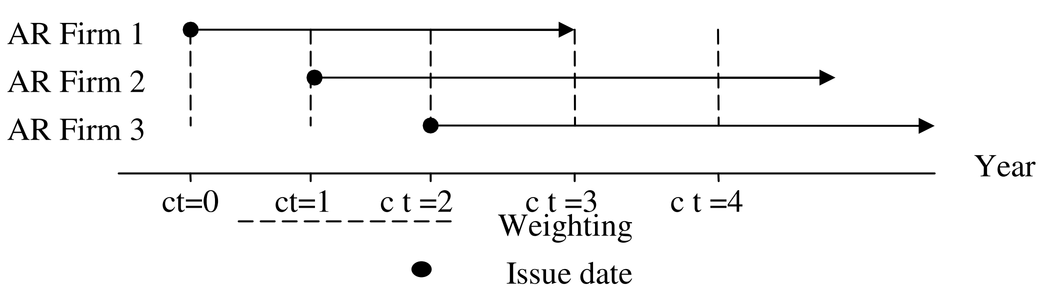
One problem with the method is however that as it measures returns over a single period, (T) which often is quite long, returns tends to be quite skewed. This is easily understood when considering that BHAR for a single company can newer be less than -100 % but it can in be a much larger number than 100% considering the time horizon.

3.3 Calendar-Time Approach

According to Mitchell and Stafford (2000), using the event-time method to calculate abnormal returns may overstate the statistical significance of these returns due to the presence of cross-sectional dependence of observations. Also, as touched upon before, Schultz (2001) show in a study performed on American data, even though ex-ante expected returns of equity issuers may be zero, when IPOs cluster at peaks, ex-post underperformance for IPOs can be found significantly negative using the event-time approach. However, this problem can be solved using the calendar-time approach. Please turn to section 3.4 for an example.

Thus, along side the event-time method, we will also use the calendar-time approach to measure abnormal returns. The calendar-time approach bundles together returns of the IPOs in calendar-time, independently of age. The only condition is that the firm is considered an IPO firm, i.e. that an issue has been made within the previous three or five years (depending on the time period chosen). Figure 3.2 illustrates how the return from three different firms with different issuing dates is bundled together.

Figure 3.2 **Illustration of a Calendar-time measurement**



The figure can be interpreted as follows: at the first measuring occasion ct=0, only firm 1 is weighted into the portfolio of IPOs. On the second measuring occasion, firm 1, who has now already been traded publicly for "one period", is weighted into the portfolio together with firm 2, who just recently issued. On the third occasion we have three firms in the portfolio since firm 3 recently issued etcetera. Finally, at ct=4, firm 1 is no longer in the IPO portfolio since it, given the assumptions, is not considered an IPO firm any more.

Intuitively, the calendar-time method can be seem as a situation that simulates an investment strategy that can be implemented by a portfolio manager, in our case only investing in IPOs that are up to 3 or 5 years old depending on preferences.

We have decided to measure the returns of the portfolio on a monthly basis, i.e. the tick marks on the time-line in figure 3.2, e.g. ct=0 – ct=1, in our case constitute one month. Fama (1998) discusses various reasons for constructing monthly portfolios when measuring abnormal performance in the calendar-time approach; firstly, the risk of facing the "bad model problem"[5] is less. Secondly, when constructing monthly portfolios, the cross-correlation between the IPO firms in the sample is taken into account. Thirdly, monthly portfolio returns allow superior statistical inferences.

We will now describe the two different methods for measuring abnormal return under the calendar-time method. As in Besser, Carlman & Mossberg (2001), we have chosen to use the cumulative abnormal return analysis and not the buy-and hold analysis under the calendar-time approach. These, since we want to present our findings in light of earlier findings. In addition, as mentioned, we introduce the Fama-French three factor regression method.

3.3.1 Cumulative Abnormal Returns (CAR)

The first method of measuring abnormal return under the calendar-time approach is calculating value- and equally weighted cumulative abnormal returns. We will now go through the technicalities for this approach.

As already mentioned, we calculate return on constructed monthly portfolios. At the end of every calendar month of our time period we calculate abnormal returns as the difference between each firm's return, $r_{i,t}$, and the benchmark return, $r_{b,t}$. We get:

$$CTAR_{i,t} = r_{i,t} - r_{b,t} .$$

This calendar-time abnormal return, $CTAR_{i,t}$, for each firm is then used to calculate a mean $CTAR_{i,t}$, denoted $\overline{CTAR_t}$, according to:

$$\overline{CTAR_t} = \sum_{i=1}^{n} w_{i,t} CTAR_{i,t} \quad \begin{cases} w_{\text{i}} = MV_{i,t} / \sum_{t=1}^{n} MV_{i,t} & \text{(value weigthing)} \\ w_{\text{i}} = 1/N & \text{(equally weigthing)} \end{cases}$$

Where n is the number of firms in calendar month t and MV refers to the market capitalisation of any given firm, i, in the measured month, t.

Finally, we calculate yearly calendar-time abnormal returns, *YCTAR's,* for each full calendar-time year in our time period, 1992-2005. The formula can be stated as follows:

$$YCTAR_Y = \sum_{t=y}^{y+11} \overline{CTAR_t}$$

[5] According to Fama (1998), all asset pricing model show problems in describing average returns of securities such as equities. Consequently, before one can deal with anomalies to the Efficient Market Hypothesis, financial economists must first develop a better model.

where, y, represents the first calendar month in year Y. The results of these measurements will be presented in section 5.2.

We will now move on to describing the Fama-French three factor model and thoroughly go through how we have used this model to test for abnormal IPO performance.

3.3.2 Fama-French Three Factor Regression Analysis

In order to give further insight in the long-run underperformance analysis on the Swedish market we will use the Fama-French three factor model to test for long-run underperformance of IPOs on the Swedish Stock Exchange.

Fama and French (1993) showed that a three factor model may explain the cross section of stock returns. The three factors in their model are: RMRF, which is the excess return on the value weighted market portfolio; SMB, the return on a zero investment portfolio formed by subtracting the return on large firm portfolio from the return on a small firm portfolio and HML, the return on a zero investment portfolio calculated as the return on a portfolio of high book-to-market stock minus the return on a portfolio of low book-to-market stocks. If IPOs under perform on a risk-adjusted basis, portfolios of IPOs should consistently underperform relative to an explicit asset pricing model (Brav and Gompers (1997)).

The motivation for the use of this model is that it is a risk-adjusted model as is the case with CAPM and it also controls for firm size and type of firm (growth stock or value stock). Controlling for these factors in a model is considered to be vital according to the discussion in section 2.1.2, and thus we consider ourselves being in good company when using the Fama-French set-up to seek for long-run IPO underperformance. We will also use the model to see if there is any difference in the long-run performance between private equity backed IPOs vs. non-private equity backed IPOs.

The Fama-French three factor model has the following normal form:

$$r_p - r_f = \alpha + \beta_1(RMRF) + \beta_2 SMB + \beta_3 HML + \varepsilon$$

where SMB is calculated as:

SMB = (S/L + S/M+ S/H)/3 − (B/L + B/M+ B/H)/3,

and HML is calculated as:

HML = (S/H + B/H)/2 − (S/L + B/L)/2.

In order to apply the model we need to calculate monthly returns on several portfolios including the market portfolio (for the *RMRF* factor), a large firm portfolio (*B* in the SMB calculation), a small firm portfolio (*S* in the SMB calculation), a high book-to-market-portfolio (*H* in the HML calculation), a low book-to-market portfolio (*L* in the

HML calculation) as well as a middle book-to-market portfolio (*M* in the SMB calculation). In addition to these we need to calculate return for the different IPO portfolios. As a proxy for the risk free interest we use Swedish one-month t-bills.

As mentioned before, our market portfolio consists of all firms that were listed at either A, O or OTC-list at the Stockholm Stock Exchange for a given month during the period 1992 – 2005, filtered for all firms in the IPO portfolio. The reason for excluding these is that, as indicated by figure 4.1 in next section, they constitute a large part of the market portfolio and we want to prevent measuring the IPO returns against themselves.

The large firm portfolio is based on all firms that are in the highest tercile with respect to market value. The small firm portfolio is based on the firms that reside in the lowest tercile for a given month. The breakpoints are re-estimated each month allowing for firms to switch between the groups. Similarly, the high book-to-market firm portfolio is based on all firms that are in the highest deciles with respect to their book-to-market ratio and the small book-to-market firm portfolio is based on all firms that are in the lowest tercile.

Portfolios of IPOs are formed by including all issues for a given month that were done within the previous three or five years. Two sub portfolios of those IPO portfolios are also formed; one consisting of all private equity backed IPOs and one consisting of all non private equity backed IPOs.

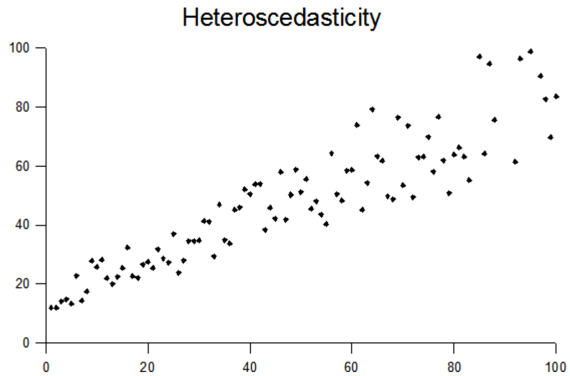
Monthly equally weighted returns as well as value weighted returns for each of the portfolios are calculated to serve as input to the regressions.

Our null hypothesis, when testing for long-run IPO underperformance, is that there is no long-run underperformance of IPOs. This means that the intercept, $\alpha >= 0$. Our alternative hypothesis is accordingly $\alpha < 0$. If α is significantly below zero we must reject our hypothesis (of no long-run underperformance) accordingly. We then perform the same test for the sub-portfolios; private equity backed or non-private equity backed.

3.3.3 Controlling for Heteroscedasticity and Autocorrelation

When using different regression techniques, such as the ordinary least squares (OLS) regression, a number of assumptions are typically made. One of these is that the error term has a constant variance. This will be true if the observations of the error term are assumed to be drawn from identical distributions. Heteroscedasticity is a violation of this assumption. For example, the error term could vary or increase with each observation, something that is often the case with time series measurements such as ours.

Figure 3.3 **Graph showing a typical view of heteroscedasticity**



Another assumption that is often made with OLS regressions is that there is no auto correlation in the residuals. In regression analysis using time series, autocorrelation of the residuals is a problem, and leads to an upward bias in estimates of the statistical significance of coefficient estimates, such as the T-statistics or p-values. In simple words, autocorrelation means that today's observation is affected by yesterday's observation. Intuitively one could argue that autocorrelation in the return of any given stock could occur in so called "hot" or "cold" markets when there is a lot of momentum in the market.

We will control for these problems in our regressions by running the regressions with Newey-West standard errors. By doing this we get standard errors of OLS estimators that are corrected for autocorrelation. Since the Newey-West method is an extension of White's heteroscedasticity-consistent standard error method, this method correct for these errors as well. If the standard errors from the Newey-West regression do not largely differ from the standard errors in our OLS regressions, then we can interpret this as an indication of no heteroscedasticity or autocorrelation[6]. The outcome is presented in appendix 2.

3.4 Event-Time vs. Calendar-Time, an Example

Table 3.1 shows a simple example of how the two approaches treats a scenario of clustered IPOs when stock prices are peaking. One might think of a period such as 1998-2003, though very simplified. Before, t=2, stock prices are going up each period (all IPO movements are +/- 10% and all market movement is +/- 2%) and new firms is entering. Prices peak in t=2, were a lot of new firms enter. As the recession hits in prices start to fall. When using the calendar-time approach, each period gives us an equally weighted yearly calendar-time abnormal return (YCTAR). The average of these is presented as 1.6%, in this case indicating a small yearly underperformance. However, when using the event-time approach we get a significant underperformance of -16% (since this figure is a three year return we have to multiply the calendar-time performance with three to make them more comparable, which gives us an underperformance of -5.4%). According to the

[6] Gujarati, D.N., 2003, "Basic Econometrics", 4th ed, McGrawHill, 475-485

reasoning in Schultz (2001) the event-time result is biased from what he calls pseudo market timing, a bias that we do not have in the calendar-time case.

Table 3.1 A comparing example using the Calendar-Time and Event-Time approaches

	t=0	t=1	t=2	t=3	t=4	t=5
Firm I	100,0	110,0	121,0	108,9		
Firm II		100,0	110,0	99,0	89,1	
Firm III			100	90,0	81,0	72,9
Firm IV			100	90,0	81,0	72,9
Firm V			100	90,0	81,0	72,9
Firm VI			100	90,0	81,0	72,9
Market	100,0	102,0	104,0	102,0	99,9	97,9
Abnormal Return, Firm I		8,0%	8,0%	-8,0%		
Abnormal Return, Firm II			8,0%	-8,0%	-8,0%	
Abnormal Return, Firm III				-8,0%	-8,0%	-8,0%
Abnormal Return, Firm IV				-8,0%	-8,0%	-8,0%
Abnormal Return, Firm V				-8,0%	-8,0%	-8,0%
Abnormal Return, Firm VI				-8,0%	-8,0%	-8,0%
YCTAR		8,0%	8,0%	-8,0%	-8,0%	-8,0%
Calendar-time, average YTCAR						-1,6%
Event-time, three year						-16,0%

4 DATA

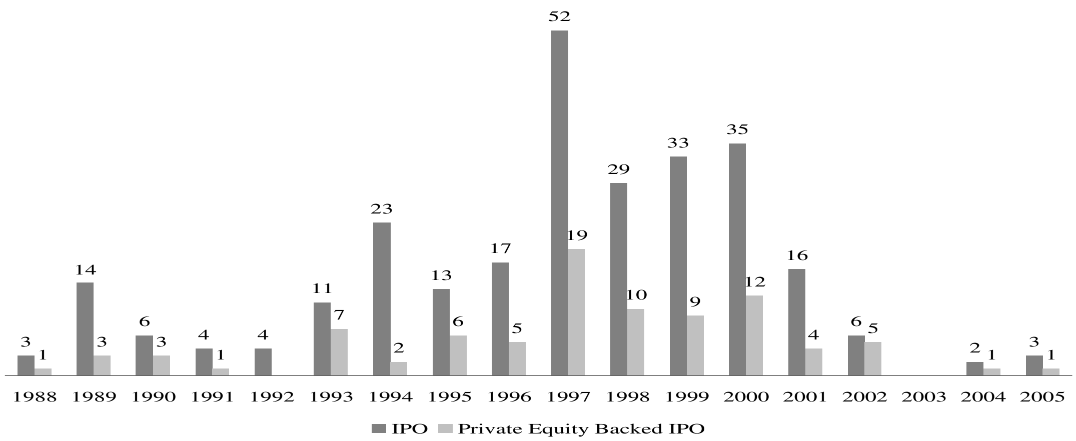
Due to the nature of our report there was extensive data collection work to be done. This section elaborates on what data we have collected to perform our task, how we have chosen the data and also on some of the problems we have encountered in our work.

4.1 Selection of companies

Our first task was to determine which companies to include in our tests. As the title of our thesis indicates the relevant companies are IPO firms listed on the Swedish stock exchanges. We have chosen to limit ourselves to companies traded on the A-, O- and OTC-list on the Stockholm Stock Exchange. The reason for choosing these lists is that they are the most liquid ones on the exchange and thereby, arguably, give the most efficient prices. However, we have even included firms that are first listed on minor stock exchanges such as the New Market or the SBI-list and then subsequently change to one of our selected lists. The IPO date of these firms is set at the date of their first listing and hence not at the time of the list change. The reasoning behind this is that if we had started to calculate the IPO-period as of the date of the list change, then these firms would have been treated as an IPO firm for a longer time compared to the firms that directly list on one of our selected lists. Many companies are first listed on for example the SBI-list and then within one or a couple of months change to e.g. the O-list. We do not feel that there is a big difference between these companies and the ones that immediately list on say the O-list, which is why we have chosen to include them.

The second task was to determine what time period to study. As already mentioned we have chosen the period 1992-2005. This has been done with the motivation that that the private equity industry relatively was immature before this time period. Since part of our purpose is to compare private equity backed IPOs with non-private equity backed IPOs this is considered to be the best period to study. Figure 4.1 display all the IPOs in our sample. For the interested reader, appendix 1 lists all of the IPO-firms by name and date.

Figure 4.1 **IPOs in Sample**



In addition to IPO firms we also collected data for all other firms listed on our selected lists during the chosen time period. The reason for this is obviously to create benchmark portfolios to compare the IPO firms to and also to create the market portfolio in our regression analysis.

To select the companies to include in our study we used a number of different methods. Because of our chosen portfolio approach we needed IPOs going back three and five years from the start of our test period, i.e. we needed to collect data from 1987. To find out what companies were listed during 1987 and 2000 we have partly analyzed earlier articles investigating IPOs on the Swedish markets, partly analyzed official monthly quote lists provided to us by the OM Group and partly used the webpage for listings and list changes hosted by the OM Group (available from 1997)[7]. For the period 2000 to 2005 we used the information sent to us by the OM Group and from the web page just referred to.

Finally, to discover which companies were already traded on the A-, O-, and OTC-lists before our chosen time frame we used the stock quoting in a copy of Svenska Dagbladet form 1991 provided by Stockholm's Stadsbibliotek. All data was then downloaded using DataStream Advance

4.2 Selection of company data

Given the choice of method to perform our study there are is number of different data types required for each company in the tests. Firstly, we have chosen to work with total return figures for all the companies included as opposed to just price data. These figures also encompass dividends reinvested and are therefore more suitable when determining a given company's performance from an investor's perspective. The figures are downloaded as a monthly index starting at 100 when the company was listed. We then

[7] http://domino.omgroup.com/www/xsse-statistik.nsf/(listandringar)

calculate the change in the index to get the monthly change in total returns which we want to use in our tests.

To be able to create our size and book-to-market portfolios and also the Fama-French SMB and HML factors, we needed market capitalization and book-to-market figures for each company in the study. We were able to find yearly market capitalization figures in DataStream which we used to sort the companies by size. DataStream also provides price-to-book ratios which we inverted to be able to use to sort companies according to book-to-market ratios.

4.4 Private Equity backed vs. Non-Private Equity backed

In order to determine which IPO companies were private equity backed we needed to go through a great deal of listing prospectuses. Fortunately, the thesis by Jonsson & Frick-Melander had already done the work for us for most of the IPOs during the period 1992 – 2000. However, we still needed to analyze the IPOs from 1987-1992 and 2000-2005. This was done by studying share and ownership structure in listing prospectuses that were partly provided to us by Kungliga Biblioteket in Stockholm and partly found on the Internet.

Figure 4.2 below display the evolution of number of firms included in the various portfolios during our chosen time period (this is only done for the five-year portfolios in order to prevent redundancy of figures). The data is presented as total number of firms as well as number of general IPO firms and private equity backed IPO firms. For instance if we look at the black area that reflects the private equity backed IPO portfolio, we can see that in January 1998 there were about 30-40 companies in this portfolio. The lines in the graph represent share of total number of firms for the various groups of IPOs so if we look at the same point in time, the dotted line indicates that the number of companies in the private equity backed IPO portfolio constituted about 20% of the number of firms in the total sample.

Figure 4.2 **Number of firms in the total sample, IPO sample and PE backed IPO sample**

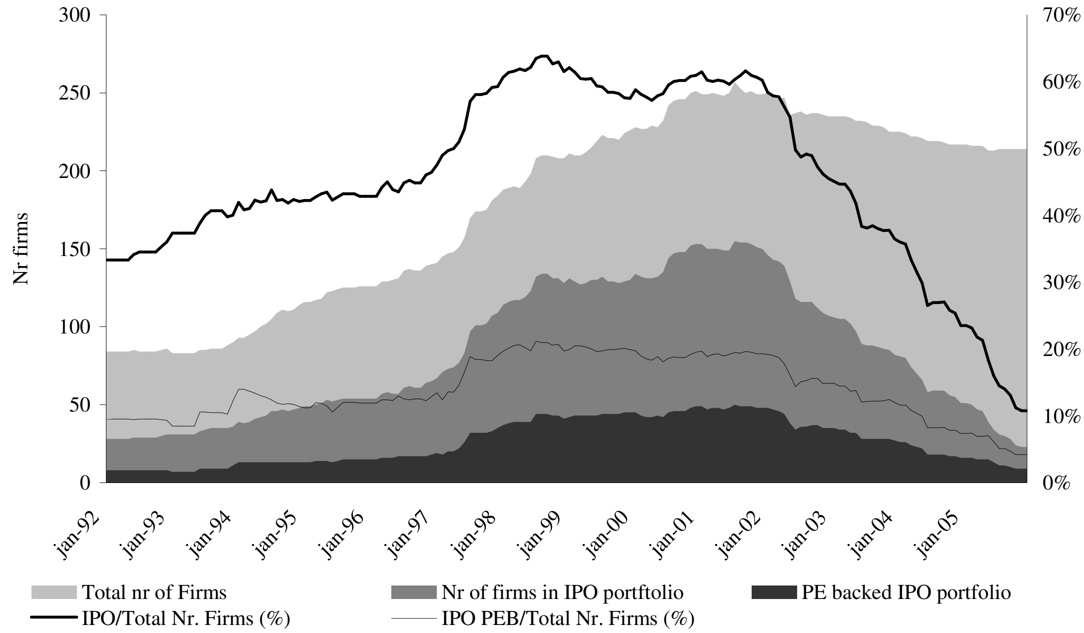
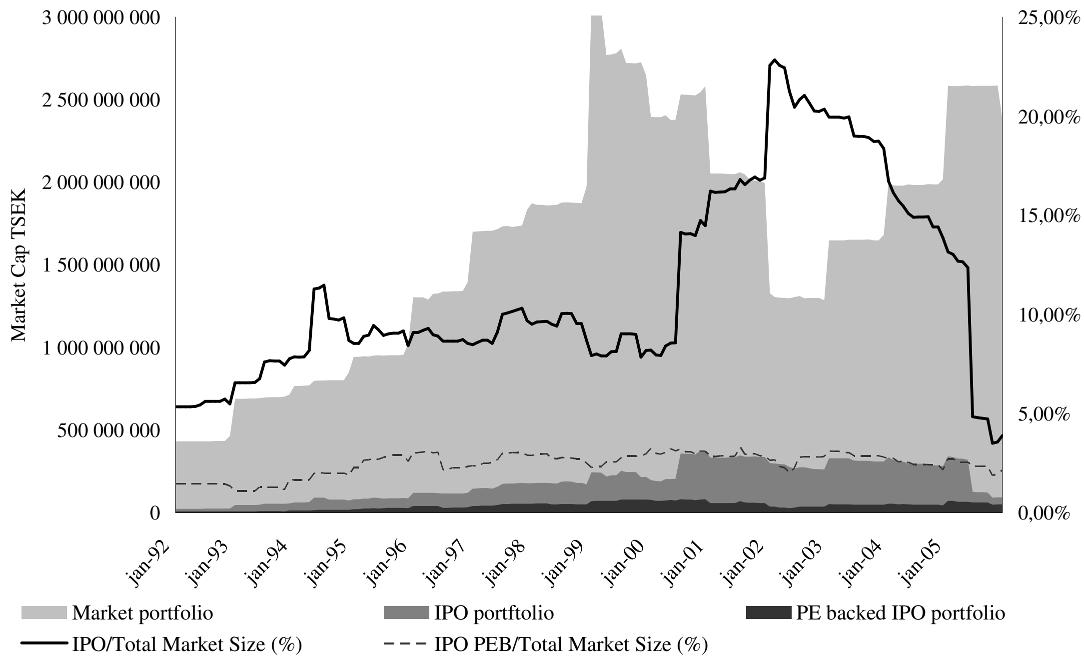


Figure 4.3 show the distribution of market capitalization for the different categories of firms included in the tests. Even though, as we saw in figure 4.2 the total numbers of IPOs at some points constitutes a large part of the total number of firms, in terms of market capitalization the IPO firms take up a very small part of the total sample. The lines in the graph represent share of total market capitalization for the various groups of IPOs. Again to give some examples; if we this time look at the light grey area that represent the total market capitalization of the market portfolio, we see that after the first half of 1999, this figure peaked at about 3,000,000,000 TSEK. At the same time the private equity backed IPO firms, indicated by the dotted line, only constituted about 2-3% of this figure.

Figure 4.3 **Distribution of Market Capitalization**



4.4 Obstacles and Simplifications

In some instances DatasStream failed to provide us with price-to-book or market capitalization figures for the full period that the company was listed on the stock exchange. In those instances we have assumed that these company variables remain the same as they were before/after the period for which the data was missing. To give an example; if company X was listed in October 1992 and DataStream only give us market capitalization figures for the full year 1993, we have assumed that company X had the same market capitalization is the last three months of 1992 as they subsequently had in 1993 etc.

When a company has dual class shares listed on the exchange, which is often prevalent in Sweden, we have chosen the B-share if the to classes were listed simultaneously. The reasoning for this is in line with the choice of list; because this is where liquidity is often at highest. However, when a company's A-share has been listed for some time before the company decides to list B-shares on the same list, we choose to stay with the A-share if this is already included in the study. To use both types of shares in the study would not give adequate results since this would imply that company's market capitalization would be included twice in the study and thereby give it too high weighting in the value weighted scenario.

Regarding the determination of private equity backed or non-private equity backed IPO firms, naturally there were some instances when a listing prospectus could not be found on the internet or by Kungliga Biblioteket. In those instances we tried to contact the companies via E-mail. If we still were not able to determine which group of issuers the company belonged to we labeled them as non-private equity backed.

Finally, even though we consider DataStream as a very solid and ambitious database, it does in some instances fail to give us the information we needed to be able to use a company in our study. These companies for which we lack crucial information have been excluded from our study.

5 RESULTS

In this section of the thesis we will present the results from the various studies we have conducted. We start by presenting the results from the event-time studies. This section ends by presenting the results from the calendar-time study. For each of the sub-sections we round of by summarizing the main findings.

5.1 Event-time results

This sub-section presents the result from the CAR- and BHAR-calculations within the event-time approach.

5.1.1 Cumulative Abnormal Return (CAR)

Table 5.1 displays the results from the cumulative abnormal return calculation for the three-year portfolios as well as the five-year portfolios. For both time periods we can see that the IPO portfolio clearly underperforms both benchmark portfolios with both weighting methods. What is quite surprising to see is that that the IPO portfolio performs worse to the size and book-to-market controlled benchmark compared to the market portfolio (except for the three years equally weighted returns).

Table 5.1 Cumulative Abnormal Returns, three- and five-year portfolios

3 Year Abnormal Return	Value Weighted			Equally Weighted		
Benchmark	IPO	PE backed	Non-PE backed	IPO	PE backed	Non-PE backed
S/BtM	-51,24%	-17,97%	-60,75%	-17,84%	-12,28%	-20,38%
Market	-36,08%	-17,89%	-41,28%	-25,28%	-10,23%	-32,16%
5 Year Abnormal Return	Value Weighted			Equally Weighted		
Benchmark	IPO	PE backed	Non-PE backed	IPO	PE backed	Non-PE backed
S/BtM	-59,87%	5,98%	-73,60%	-40,73%	-26,72%	-46,79%
Market	-47,62%	11,72%	-60,00%	-39,44%	-9,23%	-52,49%

Looking at the three-year portfolios we see that underperformance is most severe in the non-private equity backed IPO portfolio regardless of weighting method. The portfolio experiences the largest cumulative abnormal performance when returns are value weighted (-61% and -41 % when compared to the Size- and Book-to-Market (S/BtM) based benchmark and the Market portfolio, respectively).

For the five-year portfolios there is an even larger discrepancy between the two subgroups where the private equity-backed IPO portfolio is even indicating some abnormal positive performance compared to benchmarks when returns are value weighted (6 % and 12 % compared to the S/BtM and market benchmark, respectively) compared to an underperformance of -74 % and -60% for the non-private equity backed IPO portfolio as measured by CAR.

5.1.2 Buy-and-Hold Abnormal Return (BHAR)

Table 5.2 displays the results of the calculation for the three and five year mean buy-and-hold abnormal returns in event-time for the respective IPO portfolio. Even here we can see that the IPO portfolio underperforms both benchmark portfolios with both weighting methods. What differs from the CAR result is that the most severe underperformance is attributed to the private equity backed IPO portfolio.

Table 5.2 Buy and Hold Abnormal Returns, three- and five-year portfolios

3 Year Abnormal Return	Value Weighted			Equally Weighted		
Benchmark	IPO	PE backed	Non-PE backed	IPO	PE backed	Non-PE backed
S/BtM	-32,72%	-45,02%	-27,24%	-26,08%	-49,39%	-15,42%
Market	-32,86%	-46,33%	-26,85%	-33,28%	-28,58%	-35,42%
5 Year Abnormal Return	Value Weighted			Equally Weighted		
Benchmark	IPO	PE backed	Non-PE backed	IPO	PE backed	Non-PE backed
S/BtM	-81,33%	-99,60%	-75,22%	-126,55%	-207,08%	-91,76%
Market	-94,32%	-93,73%	-94,51%	-107,66%	-109,35%	-106,93%

For three year portfolios the underperformance for the IPO portfolio is -33% compared to both benchmarks when value weighting the returns and -26 % and -33% compared to S/BtM and market portfolio, respectively when equally weighting the returns. The private equity backed IPO portfolio performs worse than the non-private equity backed portfolio against both benchmarks and independently of weighting method except when compared to the market benchmark and when equally weighting the returns.

Turning to the five year portfolio the pattern largely remains. The IPO portfolio's mean buy-and-hold abnormal return is -81% and -94% compared to S/BtM and market respectively, when value weighting returns. When equally weighting the returns the IPO portfolio's mean buy-and-hold abnormal return is -127% and -108% compared to the respective benchmark portfolio. The private equity backed IPO portfolio underperforms about the same as the non-private equity backed IPO portfolio when returns are value weighted but underperforms significantly more when returns are equally weighted and matched to S/BtM portfolio (-207 %).

To relate these figures we have calculated some mean *buy-and-hold* returns for the different IPO portfolios. The value weighted three year mean buy-and-hold returns for the IPO portfolio, private equity backed IPO and non-private equity backed portfolio were 45.13 %, 26.58 % and 53.4 % respectively. The equally weighted three year mean buy-and-hold return were 67.60 %, 75.63 % and 63.93 % for the same portfolios. Intuitively, in line with the mean buy-and-hold *abnormal* return interpretation in section 3.1.2, the mean buy-and-hold return can be seen as the return to an investor when investing an equal amount in each firm in the respective IPO portfolios at the IPO date and selling it after three year. To give an example; the return from investing an equal amount in each private equity backed IPO during the period and holding it for three years would have given a return of 75.63 % while investing an equal amount in each non-private equity backed IPO during the period would have given a return of 63.93 %. Looking at the two portfolios mean buy-and-hold *abnormal* returns, in table 5.2, we see that it is -49.39 % for the private equity backed when matched to the S/BtM portfolio and only -15.42 % for the non-private equity backed IPO portfolio when matched to the S/BtM portfolio. From this we can determine that the private equity backed IPO's benchmark performed superior (125.02 %) compared to the non-private equity backed IPO's benchmark (79.35 %).

This illustrates the simple fact that the abnormal return measure does not say anything about the absolute performance of the different portfolios. This is even the case if we use the same benchmark, for example the market portfolio, unless the events (IPOs) occur simultaneously in the two portfolios.

The more severe underperformance for the private equity backed IPO portfolio could possibly be explained by the fact that a relatively larger amount of private equity backed IPOs were performed before the years of the millennium (1997-2000) compared to the amount of non-private equity backed IPOs seen over the whole period (see table 4.1). This implies that even if the two subgroups of IPOs hypothetically performed equally bad during this period the compounding and weighting of the returns means that the private equity backed group would suffer more when BHAR measure is used.

It is also important to recall that within the event-time approach only companies that have been listed 36/50 months prior to the end of the measurement period are incorporated in the calculation. Hence companies that is listed in 2003 and forward is not included in the three year portfolio and companies listed in 2001 and forward is not included in the five year portfolio.

The findings are consistent with the arguments of Fama (1998), Mitchell and Stafford (2000) and Gompers and Lerner (2003) that the buy-and-hold return method can magnify under/overperformance.

We conclude our findings from the event-time approach by stating that we have found severe IPO underperformance using both the CAR method and the BHAR method. Besser, Carlman & Mossberg (2001) also found abnormal negative IPO underperformance when calculating value weighted three-year CAR and BHAR, but not of the magnitude observed here. It is although important to notice that Besser et. al. performed their study over the time period 1980-2000 and hence, did not include the IT-bubble. In light of the findings in Schultz (2001) discussed earlier in this thesis we have to be aware of that our findings may be biased by the relatively high frequency of issuances in the late 90's.

We can not conclude that there is a systematic difference between private equity backed IPOs and non-private equity backed IPOs as the different measuring techniques present different results.

5.2 Calendar-time results

As already stated in section 3, the calendar-time approach bundle together returns of the IPOs in calendar-time, independently of age. The only condition is that the firm is considered an IPO firm within a portfolio. We start by looking at the CARs from comparing our IPO portfolio and our two sub-portfolios to a size- and book-to-market-matched benchmark (S/BtM) and a market benchmark containing no IPO firms. After that we turn to the results from the Fama-French three factor regression.

5.2.1 Cumulative Abnormal Returns (CAR)

Table 5.3-4 below display yearly abnormal returns for the different IPO portfolios, calculated according to the CAR method. In table 5.3, a firm is considered an IPO if it was listed within the previous three years of the measuring date. In contrast, table 5.4 considers a company an IPO if it has been listed with in the last five years. One needs to be aware of the fact that since the number of firms in our study is quite limited, significant outliers may very well affect the outcome. Because of this fact we have chosen also to display median values.

Table 5.3 Yearly Cumulative Abnormal Returns, three-year portfolios

	Value Weighted						Equally Weighted						Firms in portfolio		
Year	IPO - S/BtM	IPO - Market	PEIPO - S/BtM	PEIPO - Market	NPEIPO - S/BtM	NPEIPO - Market	IPO - S/BtM	IPO - Market	PEIPO - S/BtM	PEIPO - Market	NPEIPO - S/BtM	NPEIPO - Market	IPO	PEIPO	NPEIPO
1992	18,6%	0,2%	2,6%	3,2%	26,0%	-2,6%	11,8%	-31,1%	4,5%	-38,3%	13,7%	-29,2%	19	5	14
1993	0,6%	0,3%	5,1%	-1,3%	-2,1%	1,3%	-0,2%	-1,2%	12,6%	2,5%	-4,9%	-2,3%	16	5	11
1994	6,1%	10,9%	-1,6%	13,0%	8,3%	9,8%	-3,3%	7,1%	-2,1%	20,0%	-2,2%	0,7%	28	9	19
1995	-1,9%	-5,8%	-4,7%	-0,1%	-0,8%	-7,8%	4,1%	-10,9%	-14,5%	-22,8%	11,4%	-6,2%	44	12	32
1996	7,6%	13,5%	15,1%	22,9%	5,0%	10,4%	-5,1%	14,0%	9,8%	29,8%	-10,2%	8,4%	50	14	36
1997	-2,5%	0,8%	-0,3%	4,6%	-2,9%	-1,2%	-15,0%	-14,0%	-3,3%	6,3%	-21,8%	-24,3%	64	20	44
1998	6,6%	5,1%	8,8%	13,8%	4,9%	-0,2%	-7,7%	-12,5%	-8,4%	-6,2%	-7,4%	-16,2%	88	32	56
1999	51,8%	53,7%	57,5%	60,0%	49,0%	51,1%	9,9%	1,1%	13,7%	11,1%	8,1%	-4,1%	100	35	65
2000	-5,7%	-8,9%	65,3%	54,0%	-26,4%	-28,9%	-9,7%	-20,3%	12,2%	1,8%	-19,5%	-30,3%	97	30	67
2001	-13,2%	-0,1%	-20,9%	-24,9%	-12,5%	3,2%	-22,3%	-25,1%	-30,7%	-35,9%	-18,1%	-19,9%	86	27	59
2002	-14,3%	5,4%	-20,7%	-11,8%	-11,3%	9,4%	-13,0%	-16,6%	-30,2%	-34,8%	-5,7%	-8,6%	67	20	47
2003	9,5%	4,6%	-3,9%	-10,1%	30,3%	26,2%	-7,8%	-2,1%	-11,5%	-15,9%	-5,4%	6,8%	36	14	23
2004	-7,4%	-7,0%	-6,8%	-9,4%	-5,9%	1,2%	14,7%	12,9%	-14,3%	-15,8%	41,3%	40,8%	14	6	8
2005	-2,1%	1,0%	25,3%	25,9%	27,8%	42,1%	13,0%	20,9%	29,7%	30,8%	29,7%	46,5%	5	3	2
Average	3,84%	5,27%	8,64%	9,98%	6,38%	8,15%	-2,18%	-5,55%	-2,31%	-4,81%	0,62%	-2,70%	51	17	34
Median	-0,65%	0,92%	1,15%	3,91%	2,06%	2,26%	-4,22%	-6,50%	-2,70%	-2,18%	-5,15%	-5,12%	47	14	34

Looking at the three-year data we can see that there are large differences between value weighted and equally weighted returns, but not that large differences between the comparisons with the S/BtM portfolio and the Market portfolio. If we start to analyze the findings from the value weighted general IPO portfolio we see that the average value is positive (3.84%) while the median value is actually negative (-0.65%). We, however do not think that the latter is a sign of underperformance, but rather is an unfortunate outcome due to a very small number of firms in the IPO portfolio for 2005.

The abnormal returns arising from the comparison against the market portfolio seem to be on average higher than the ones arising from the comparison with the S/BtM portfolio. This seems quite logical since the IPO portfolios and the S/BtM portfolio are more closely matched in terms of risk.

We can see that there are big differences between the average values and the median values especially from the S/BtM-abnormal returns for some of the IPO portfolios. This has probably to do with the large positive abnormal returns arrived in the first and last couple of years when there are few companies in the portfolios. Also there are a few really high abnormal returns in the time of the IT- bubble. As expected, the abnormal returns are much better, on average, before 2000 than after. Since IPO firms are generally smaller firms they tend to be more volatile and would hence be assumed show relatively high returns in booms and relatively low returns in recessions.

Moving on to the equally weighted returns we can instead see a trend towards IPO underperformance for both mean and median values. Even though the non-private equity backed IPO portfolio is on average creating positive abnormal returns (most likely due to outlier in 2004 of 41.3%), the general trend for the median values is negative. These findings point to the fact that small IPO companies have performed relatively bad during our time period, which is now reflected as their returns get a higher weight.

From the results arising from both of the weighting methods, it is quite hard to see any clear performance differences between the two sub-portfolios, private equity backed and non-private equity backed. When returns are value weighted the former outperforms the latter when looking at average values. When results are equally weighted the non-private equity backed IPO portfolio seems to be the strongest when looking at average values but not when looking at median values, etcetera. We will return to this discussion after having view some further findings.

Table 5.4 Yearly Cumulative Abnormal Returns, five-year portfolios

	Value Weighted						Equally Weighted						Firms in portfolio		
Year	IPO - BM	IPO - Market	PEIPO - BM	PEIPO - Market	NPEIPO - BM	NPEIPO - Market	IPO - BM	IPO - Market	PEIPO - BM	PEIPO - Market	NPEIPO - BM	NPEIPO - Market	IPO	PEIPO	NPEIPO
1992	11,2%	-9,8%	2,4%	1,1%	13,8%	-13,9%	5,8%	-33,9%	12,5%	-31,4%	2,7%	-35,3%	29	8	21
1993	-5,2%	0,2%	3,1%	-2,7%	-7,0%	0,8%	-7,1%	-5,7%	-4,2%	-7,4%	-7,5%	-4,7%	34	9	25
1994	1,4%	5,9%	-7,7%	10,8%	3,6%	4,4%	-11,1%	6,9%	-3,8%	21,8%	-14,2%	0,2%	44	13	31
1995	-0,2%	-4,1%	1,3%	7,2%	-0,9%	-9,2%	0,8%	-13,7%	-14,6%	-23,5%	6,6%	-10,1%	52	14	38
1996	6,6%	12,1%	9,6%	18,0%	5,2%	10,1%	-10,0%	11,8%	-7,1%	20,2%	-10,9%	8,7%	59	17	43
1997	-3,3%	-3,4%	-6,3%	-0,1%	-2,1%	-5,0%	-21,4%	-14,8%	-12,4%	1,7%	-25,6%	-22,3%	89	27	62
1998	-4,7%	-6,8%	-5,5%	1,5%	-4,6%	-10,4%	-25,0%	-19,9%	-25,0%	-9,2%	-25,1%	-25,2%	125	41	84
1999	37,1%	38,2%	33,1%	28,3%	39,8%	43,7%	11,9%	-3,5%	10,6%	0,6%	12,7%	-5,3%	129	44	86
2000	7,7%	3,5%	53,8%	44,2%	-9,9%	-13,4%	-6,1%	-11,7%	11,8%	5,5%	-14,5%	-19,9%	141	45	96
2001	-7,4%	2,7%	-4,2%	-8,3%	-7,7%	5,4%	-21,5%	-23,1%	-20,5%	-21,9%	-21,9%	-23,6%	152	48	103
2002	-7,0%	11,0%	-20,1%	-10,6%	-4,3%	14,8%	-5,6%	-8,0%	-26,7%	-30,6%	4,1%	2,3%	124	39	85
2003	-0,1%	-2,7%	20,2%	16,7%	-3,8%	-6,2%	2,7%	13,2%	18,4%	25,0%	-4,8%	7,7%	93	30	63
2004	-9,0%	-15,1%	-8,8%	-9,1%	-9,0%	-16,2%	-2,0%	0,5%	-12,4%	-10,3%	2,8%	5,6%	64	20	44
2005	11,5%	9,7%	26,3%	25,4%	1,5%	0,4%	11,1%	16,7%	13,3%	16,7%	10,5%	17,3%	36	12	23
Average	2,76%	2,96%	6,95%	8,73%	1,04%	0,39%	-5,54%	-6,08%	-4,28%	-3,06%	-6,07%	-7,47%	84	26	57
Median	-0,19%	1,43%	1,86%	4,35%	-2,96%	-2,25%	-5,81%	-6,87%	-5,67%	-3,40%	-6,15%	-4,98%	76	24	53

Table 5.4 gives us the results from the five-year portfolios. It is quite clear that adding two years to the period measured for IPOs, alters the results significantly in some aspects. Starting again with the value weighted returns the general IPO portfolio show the same signs as with the three-year portfolios. However, rather than being a result of biased results in the last year, it seems to be the non-private equity backed portfolio that is driving the negative median. Again, this is no clear sign of underperformance.

What is interesting to see compared to the results from the three-year portfolios is that adding two years to the measuring period seem to have a positive effect for the private equity backed portfolio but at negative effect for the non-private equity portfolio. This is especially obvious in the value weighted case but we can see the same pattern in the equally weighted case where we now see a clearer underperformance for the latter.

The results from the calendar-time CARs seem to be generally that we see IPO underperformance in the equally weighted cases, but not in the value weighted cases. These findings are much like those of Brav and Gompers (1997). What is perhaps more interesting is that when returns are value weighted, some of the results rather point towards positive abnormal returns for IPOs.

We will now leave this section to have a look at the results from the Fama-French regression results. However, we will naturally return to the discussion initiated in this section again in section 6.

5.2.2 Fama-French Three Factor Regression Results

Having interpreted the results from the book-to-market and size matched benchmark returns; we now turn to the results from the Fama-French three factor regression analysis. As the Newey-West regressions did not show us any large differences in standard errors compared to the ones we got using the OLS regression, we base our analysis on the latter. We start by commenting on the outcome from the regressions made up by portfolios of companies listed within the last three years and then proceed with the five-year portfolios[8].

5.2.2.1 3-year returns

Looking at the figures in the first column of table 5.5 from the left we see the outcome from the regression of the value weighted returns for the general IPO portfolio. As we can see the outcome for the intercept is clearly insignificant (p-value of 0.97). This means that we can not state it as being different from zero and hence, we can not see any patterns of IPO underperformance. Moving downwards in the column we find a clearly significant coefficient for the market-factor (coefficient: 0.96, p-value: 0.00). This coefficient can be interpreted similarly to the beta in the CAPM-model and, hence implies that the general IPO portfolio is slightly less volatile than the market portfolio.

[8] All discussion about significance in this section and the next refers to the 5% level unless otherwise stated

The coefficient for the SMB factor, which usually tends to be positive in previous academic studies (e.g. Brav & Gompers (1997)), is in our case insignificantly negative. This means that we can not see that the IPO portfolio has any significant co variation with small or large firms (the interested reader may turn to appendix 3 for a table displaying yearly SMB and HML factor premiums). The HML factor has a significantly negative coefficient, indicating that the IPO portfolio's return covaries with the return of companies with low book-to-market ratios i.e. "growth" firms. Finally, if we look at the adjusted R^2-value at the bottom of the column we see that the "fit" of the model is quite low (0.54) compared to other Fama-French studies (see Brav & Gompers), indicating that there is indeed room for other explaining factors in this model.

Table 5.5 Fama-French Three Factor Regressions on IPOs, three-year portfolios

	Value Weighted			Equally Weighted		
	IPO Portfolio	PE backed Portfolio	Non-PE backed Portfolios	IPO Portfolio	PE backed Portfolio	Non-PE backed Portfolios
Intercept	-0,0002	-0,0009	0,0045	-0,0071	-0,0121	-0,0020
(p-value)	(0,97)	(0,90)	(0,53)	(0,08)	(0,04)	(0,71)
Market_Rf	0,8927	0,6918	0,9775	1,0389	1,0712	1,0182
(p-value)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)
SMB	-0,0650	-0,0998	-0,0622	-0,2125	-0,3765	-0,1359
(p-value)	(0,50)	(0,39)	(0,63)	(0,01)	(0,00)	(0,19)
HML	-0,2170	-0,4391	-0,1148	-0,1889	-0,2439	-0,1484
(p-value)	(0,01)	(0,00)	(0,29)	(0,00)	(0,00)	(0,06)
Adjusted R^2	0,5427	0,4202	0,4184	0,7292	0,5798	0,6037

If we move to column two from the left we have the outcome from the regression on the private equity backed IPO portfolio. As one can see the results are similar to the ones for the general IPO portfolio. This means that these outcomes do not give us any signs of a difference in returns solely because of the fact that a private equity player is backing the IPO. However, looking at the coefficients for the market factor we can see that the private equity backed IPO portfolio seem to be less volatile than the general IPOs (coefficient of 0.069 vs. 0.89). Also, quite interestingly we see that private equity backed IPOs seem to covary more with "growth" firms than the average IPO does, indicated by having a more negative HML loading.

Moving on to the non-private equity backed IPOs, the major differences from the previous results are twofold. First, the HML coefficient discussed above is no longer significant which indicates that there is no observed covariantion with the returns of either "growth" firms or "value" firms. Second, the market coefficient of 1.05 points to the fact that the non-private equity backed portfolios is more volatile than the market portfolio.

Now looking at the equally weighted results to the right in table 5.5, one can see that giving small firms equal weight in the model alters the results considerably. Interpreting the coefficients from the top down, we now find that the private equity backed IPO portfolio is in fact, significantly underperforming. The coefficient of -0.012 means that the private equity backed IPOs are, on average, generating 1.2% less return per month. Also the general IPO portfolio is close to being a significant underperformer (coefficient: -0.007, p.value: 0.08). Having discussed the results for the value weighted regressions, this gives us the interpretation that small private equity backed firms have been performing relatively poorly during our measurement period. The coefficients for the market factors show increased volatility than before for all portfolios which is quite expected due to the increased impact of small firms.

A quite contradictive finding is that the SMB coefficients are significantly negative for the general IPO portfolio as well as the private equity backed portfolio which means that their return covaries with larger companies. At the same time the HML coefficients are significantly negative for the same portfolios, indicating that returns covary with those of "growth" stocks as opposed to "value" stocks. Normally one would expect that companies whose return is correlated to with growth stocks would also be correlated to small stocks. Finally, as expected when returns are equally weighted, we can see that the R^2-values are quite high.

5.2.2.2 5-year returns

Table 5.6 below display the regression results for the IPO portfolios made up by companies that have been listed within the last five years of every measured month within our time period. Starting with the intercepts, we can see that we have significant IPO underperformance again when returns are equally weighted. However, this time the poor performance seems to be driven by the non-private equity backed IPOs, who has a negative intercept of 68 basis point. These findings indicate that extending period for which we measure the long-run underperformance with two years takes away the significance in the underperformance for the private equity backed IPOs but introduces significance in the underperformance of non-private equity backed IPOs.

The coefficients for the market factor show the same patterns now as for the three-year portfolios. When using the value-weighted returns the betas are lower than one, but when using equally weighted returns they are all significantly above one. Again, this is argued to be the effect of giving smaller firms more power in the calculations.

Table 5.6 Fama-French Three Factor Regressions on IPOs, five-year portfolios

	Value Weighted			Equally Weighted		
	IPO Portfolio	PE backed Portfolio	Non-PE backed Portfolios	IPO Portfolio	PE backed Portfolio	Non-PE backed Portfolios
Intercept	0,0001	0,0066	-0,0029	-0,0065	-0,0058	-0,0068
(p-value)	(0,98)	(0,20)	(0,58)	(0,03)	(0,20)	(0,03)
Market_Rf	0,8344	0,6795	0,8966	1,0061	1,0694	0,9764
(p-value)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)	(0,00)
SMB	0,0487	0,0942	0,0157	0,1748	-0,0153	0,2320
(p-value)	(0,54)	(0,31)	(0,87)	(0,00)	(-0,32)	(0,00)
HML	-0,2144	-0,2410	-0,2068	-0,2972	-0,2593	-0,3025
(p-value)	(0,00)	(0,00)	(0,01)	(0,00)	(0,00)	(0,00)
Adjusted R^2	0,6287	0,4938	0,5762	0,8695	0,7155	0,8606

The coefficients for the SMB factors look slightly different in the outcome for the five-year portfolios than they did for the three-year portfolios. Starting to look at the value weighted results they are still insignificant, but we can see that the signs have now turned towards being positive indicating covariance with small firm returns. If we look at the equally weighted results we can see that the SMB coefficients are significantly positive for the IPO portfolio and for the non private equity backed IPO portfolio. The more negative intercept for the non-private equity backed IPO portfolio demonstrate higher covariance.

HML coefficients are significantly negative for all of the IPO portfolios. There is a difference in that when returns are weighted by value, the private equity backed IPOs get the highest covariance with growth firms, whereas when returns are weighted equally, the non-private equity backed IPOs have the higher coefficient.

Finally, as can be seen on the last row of table 5.6, adjusted R^2-values are significantly higher for the five-year portfolios than for the three-year portfolios. This fact is given the explanation that there are more companies in the IPO portfolios at any given point in time.

5.2.2.3 Sub-period results

When we obtained our regression results for the full time period, we felt that it would be interesting to have a look if there are any differences in the results before and after the IT-crisis. Thus, we have also chosen to run our regressions for the sub periods 1992-1999 and 1999-2005 to shed some further light on the findings. The full output from these regressions is presented in appendix 4 and may be thoroughly analyzed by the interested reader. However, we will give a short presentation of the differences below.

There are a few diverging findings in the sub-period output. Starting with the value weighted returns in the three-year portfolios, the private equity backed IPO portfolio is actually showing a positive abnormal result (coefficient: 0.016, p-value: 0.047) in the earlier sub-period. This point to the fact that there seems to be a difference in performance for private equity backed IPOs before and after the crisis (since we rather found signs of underperformance for the full time period). The regression on the latter sub-period returns (1999-2005) shows no abnormal returns for any of the portfolios. These findings are in line with the ones for the full time period.

Moving on to the equally weighted returns, the most interesting finding is that we severe underperformance for the private equity backed IPO portfolio of almost 2% per month in the latter sub-period. The general IPO portfolio show next-to-significant underperformance for the same period (coefficient: -0.012, p-value: 0.059). This again, points to the fact that especially the performance of private equity backed IPOs changed dramatically over the full measurement period.

Having a look at the results for the value weighted results for the 5-year portfolios, 1992-1998, we again find that we have a significant positive abnormal performance for the private equity backed IPO portfolio (coefficient: 0.018, p-value: 0,013), and no abnormal performance for the general IPO portfolio or the non-private equity backed IPO portfolio.

Looking at the equally weighted results we again find significant (or almost significant) abnormal positive returns (coefficient: 0,010, p-value: 0,054) for the private equity backed portfolio, 1992-1998, but no abnormal returns for the other IPO portfolios. For the second sub period, 1999-2005, we have significant underperformance for the general

IPO portfolio (coefficient: -0.009, p-value: 0.021) and almost significant underperformance in the private equity backed IPO portfolio (coefficient: -0.011, p-value: 0.065). So, apparently, mixing the private equity backed IPO portfolio with more mature IPO firms reduces the level of underperformance in the after-crisis period.

The calendar-time methodology gives us a set of different results than the ones we got from the event-time study. Using the CAR method we see signs of underperformance when returns are weighted equally, however this disappears when returns are weighted by the companies' market capitalization. These findings are conflicting with the ones of Besser, Carlman and Mossberg (2001) who, using the same method found some IPO underperformance when returns were value weighted but not when they were equally weighted.

The CAR results also show indications that private equity backed IPOs are outperforming non-private equity backed IPOs, at least when returns are value weighted. Results are a bit more dubious when returns are equally weighted. The fact that private equity backed IPOs is, at least, performing as good as non-private equity backed IPOs, is line with the findings of Frick and Jonsson-Melander (2001).

The first findings are supported by the Fama-French three factor regression outcome that also suggests long-run IPO underperformance in the equally weighted case but not the value weighted. There are no previous studies to compare this to. The second finding regarding type of issuer does not give us any significant outcome for the full period.

6 CONCLUSION

In the event that the numerous types of measuring techniques may have confused the reader, we now attempt to bring some clarity as to our findings. In this section we conclude the thesis in two steps. We start by addressing the issue of long-run IPO underperformance. We end the section by summarize our findings regarding the differences between private equity backed IPOs and non-private equity IPOs.

To put our findings in the proper context we will tie them back to the theoretical aspects presented in section 2 and also put them in comparison to earlier findings on the Swedish as well as the American market.

6.1 Long-Run IPO Underperformance

In section 5.1 we found signs of surprisingly strong long-run underperformance for Swedish IPOs, under the event-time approach. The size of the abnormal returns, especially the ones we found using the buy-and-hold method, is larger than what we have seen in earlier studies.

Schultz (2001) pointed out that in times when IPOs cluster around specific time periods, such as market peaks, the event-time approach creates biased results. Since this is very much the case in our time-period, due to the IT-bubble, we do not believe that saying that IPOs underperform on a general basis is appropriate, based on these results alone. In line with the reasoning presented by Schultz, we choose to put more weight into the findings using the calendar-time approach.

Section 5.2 presents the calendar-time results. Generally, we can say that the findings here are more in line with earlier findings in that we do not find any clear signs of IPO underperformance. We find underperformance when results are equally weighted but not when they are value weighted. These results are the same using both the CAR method and the Fama-French three factor regression. The findings from the latter analysis are similar to those of Brav and Gompers (1997) and others for the value weighted case but not the equally weighted case.

Based on our findings we can say that especially small IPO firms have been performing relatively badly, seen over the whole time period. The signs of the intercepts in the sub-period findings suggest that small IPOs firms were hurt more than other IPOs in the later half of the time-period. Brav, Geczy and Gompers (2000) found similarly that the relatively worst IPO performers on the American stock market were small firms (with low book-to-market ratios), despite controlling for size and book-to-market ratios.

In an attempt to analyze why small IPO firms have been underperforming even though they are matched to similar companies in terms of size and book-to-market, we reason that there might be some kind of survivorship bias behind these results. Small firms are generally more unknown to the public than larger firms, hence implying a larger uncertainty. Small firms that have been listed for a while have proven that they can survive for a long period as a publicly listed company, while there is more uncertainty around newly issued small firms. If this is the case, the latter group of companies would be more volatile than the former group and hence show more negative returns when markets go down (as they did in the post-IT era).

Behavioral economists would probably describe our findings (regarding underperformance of small IPO firms) with their theory of investor sentiment. If there is more uncertainty around smaller IPO firms then investors could reasonably differ in their valuations about the firms. But does this necessarily mean that the advocates of efficient markets are wrong? One could argue that if there is more risk in a newly issued small firm than a small firm that has been traded for a couple of years, then this risk should be controlled for before we could draw any conclusions about abnormal returns. This invites to the fact that additional control variables need to be accounted for to fully capture the risk of these firms.

6.2 Private Equity vs. Non-Private Equity

Previous studies (e.g. Frick and Jonsson & Melander (2001), Brav & Gompers (1997)) that do the distinction between the two types of issuer have found that the private equity backed IPOs have been the best performers if any difference occurred at all. In the event-time study, private-equity backed IPOs are performing relatively well using the CAR method. This is the case for both weighting methods and both measuring periods (three-year and five-year). However using the buy-and-hold technique gives us the opposite results. Again we must stress the fact that given the clustering of especially private equity backed IPOs in the late 90's, the event-time approach gives us significantly reduced performance seen over the full time-period, especially from the buy-and-hold measurement.

Under the calendar-time approach, the CAR indicate that private equity backed IPOs outperform the non-private equity backed IPOs, at least when returns are value weighted. As stated before, the Fama-French regression for the full time-period does not provide us with any significant results in this matter. When regressing equally weighted three year return, the private equity backed portfolio show significant underperformance while the same result for the non-private equity backed IPO portfolio is insignificant. The opposite occur when regressing five-year return.

The sub-period regression results provide some further light to our findings. Here we find indications that the private equity backed IPO portfolio outperforms the non-private equity backed IPO portfolio in the period before the IT-bubble, again when value weighting the returns (indicated by positive abnormal returns). However when returns are equally weighted we find significant negative abnormal performance in the period after the IT-bubble. This indicates that the overall private equity backed IPO performance suffer from the relatively poor performance of small firms in this time period.

Relating back to the theoretical overview in section two, it seems like the theories describing why private equity backed IPOs should have superior post-IPO performance are more applicable on larger private equity backed IPOs than on smaller.

As, not the least, the advocates of efficient markets have pointed out one can not understate the importance of using the right method when measuring IPO underperformance, especially in such turbulent times as investigated in this thesis . We adopted the method presented by Fama-French (1993) and numerous economists were one control for crucial risk factors by matching returns to the right benchmark in terms of size and book-to-market ratios and still we found some signs of underperformance especially when returns are equally weighted. Is this a sign that behavioral economists are correct in their theories about investor sentiment or are there other risk factor that we need to control for in order to do a fair comparison? The next section leaves some room for this question in further studies.

7 FURTHER RESEARCH

As we started to think about different aspects of the methodology for our analysis we thought about the validity of the Fama-French Three Factor model on Swedish data. We have not found any other study that uses the regression model on Swedish data. However, during our search for similar studies, we found several thesis's from countries such as Australia and Singapore that focuses solely on trying the models validity on those market, implementing a range of statistical tests etcetera. We think that such a study is motivated on the Swedish market as well.

As we pointed out in section 2 of this thesis, there are a lot of different disciplines of private equity. We have chosen to treat them all as one group in this paper since we thought that our choice of method was not able to pursue with a narrower distinction. However, it would be interesting to compare IPO returns for venture capitalist backed companies to IPO returns of buy-out backed companies, especially since our findings indicate that small private equity backed IPO firms perform relatively bad. Since one might generally assume that venture capitalists rather invest in small firms, whereas the opposite is true for buy-out groups, this invites to the conclusion that post-IPO performance would be better for the latter, at least in our time-period. Whether this will be done in the future when there is more data available, using a different methodological approach or even on a different market is up to a future author to decide.

Finally, while going through the huge amount of theory that has been written about long-run IPO underperformance, we have come across diverging opinions about how to accurately control for the risk aspect of an IPO firm. In this thesis we have looked at size and book-to-market ratios, but authors such as Eckbo and Norli (2000) discuss factors such as liquidity and leverage as being crucial when creating a suitable benchmark. An IPO firm is thought to have a lower degree of leverage and a higher degree of liquidity than the typical public firm and is thereby exposed to less systematic risk than the latter. It can therefore be argued that IPOs are matched against riskier firms, creating a perceived underperformance. Developing a model with factors incorporating these aspects is also warranted on the Swedish market, we believe.

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Appendix 1 – IPO Companies in the Survey

Company	IPO date	PE Backed
24H POKER	jan-97	no
ACADEMEDIA	jun-98	no
ACANDO	jun-95	yes
A-COM	nov-99	no
ADDNODE	jun-99	no
ADDTECH	sep-01	no
AFFARSSTRATEGERNA	jun-98	yes
ALFA LAVAL	maj-02	yes
ALFASKOP	mar-97	no
ALLGON	nov-88	yes
ALTHIN MEDICAL	apr-95	no
ANOTO GROUP	mar-00	no
ARETE	dec-97	no
ARJO	nov-93	yes
ARTIMPLANT	nov-97	yes
ASCS	maj-98	no
ASG	jun-90	no
ASPIRO	maj-00	no
ASSA ABLOY	nov-94	no
ASSIDOMAN	apr-94	no
ASTICUS	apr-98	no
ATLE	dec-93	no
AUDIODEV	sep-00	no
AU-SYSTEM	jun-00	yes
AUTOFILL	dec-98	no
AVANZA	nov-92	no
AXFOOD	jun-97	no
AXIS	jun-00	yes
BALDER	jun-98	no
BALLINGSLOV	jun-02	yes
BEIJER ELECTRONICS	jun-00	no
BETSSON	mar-96	no
BIACORE INTERNATIONAL	dec-96	no
BILLERUD	nov-01	no
BIOGAJA	maj-98	no
BIOINVENT	jun-01	yes
BIOPHAUSIA	jun-96	no
BIORA	feb-97	yes
BIOTAGE	jun-00	yes
BOLIDEN	maj-99	no
BONGS LJUNGDAHL	maj-89	no
BOSS MEDIA	jun-99	yes
BROSTROM	jun-98	yes
BT INDUSTRIES	nov-95	yes
BTS GROUP	jun-01	no
BURE EQUITY	okt-93	no
CAPIO	okt-00	yes
CARAN	maj-95	no
CARDO	feb-95	yes
CASHGUARD	maj-00	no
CASTELLUM	maj-97	no
CELSIUS	jun-93	no
CELTICA FASTIGHETS	apr-90	yes
CLAS OHLSON	okt-99	no
CLOETTA FAZER	jun-94	no
CONNECTA	aug-02	yes
CONSILIUM	maj-94	no
CTT SYSTEMS	nov-97	yes
CUSTOS	nov-00	yes
CYBERCOM	dec-99	no
D CARNEGIE & CO	jun-01	yes
DAHL INTL	jun-96	yes
DIAL NXT GROUP	jul-98	no
DIAMYD MEDICAL	jan-97	no
DIFFCHAMB	jul-96	no
DIGITAL VISION	apr-99	yes
DIMENSION	feb-01	yes
DIN BOSTAD	jul-00	yes
DIOS ANDERS	sep-89	no
DORO	okt-93	yes
DUROC	okt-96	no

Company	IPO date	PE Backed
ELANDERS	mar-89	no
ELEKTA	mar-94	no
ELVERKET VALLENTUNA	mar-02	no
EMPIRE	jul-00	no
ENATOR	jun-96	no
ENEA	dec-89	no
ENIRO	okt-00	no
ENTRA DATA	feb-97	yes
EPSILON	jun-01	no
FAGERHULT	maj-97	yes
FAGERLID	mar-95	no
FAST PARTNER	feb-94	no
FASTIGHETS BALDER /ENLIGHT INTERACTIVE	okt-99	yes
FB INDUSTRI	dec-97	yes
FEELGOOD SVENSKA	maj-97	yes
FINGERPRINT CARDS	jun-98	yes
FLY ME EUROPÉ (tidigare Array)	feb-96	yes
FORCENERGY	maj-90	no
FRANGO	apr-99	no
FRILUFTSBOLAGET	nov-99	no
GETINGE	maj-93	yes
GIBECK	dec-97	yes
GLOCALNET	mar-00	no
GRANINGE	dec-99	no
GUIDE KONSULT	jan-98	yes
GUNNEBO INDUSTRIER	jun-05	no
HANDSKMAKARN	okt-97	yes
HAVSFRUN	feb-94	no
HEBA	jun-94	no
HEMTEX	okt-05	yes
HIQ INTERNATIONAL	apr-99	no
HL DISPLAY	dec-93	yes
HOGANAS	apr-94	no
HOIST INTERNATIONAL	feb-96	no
HOME PROPERTIES	mar-99	no
HQ BANK	jul-00	no
HQ FONDER	maj-01	no
HUMAN CARE	jul-00	no
IAR SYSTEMS	jun-00	no
ICB SHIPPING	maj-92	no
IMS INTEL. MICRO SYST	dec-94	no
IND & FIN SYSTEMS	jun-97	no
INTENTIA	nov-96	yes
INTRUM JUSTITIA	jun-02	yes
IRO	jul-95	yes
ITAB	mar-89	yes
JC	maj-00	no
JEEVES	maj-99	no
JLT MOBILE COMPUTERS	jan-98	no
JOBLINE	okt-00	yes
KALMAR INDUSTRIES	jul-94	no
KARLSHAMNS	jun-97	yes
KARO BIO	apr-98	yes
KAROLIN	apr-98	yes
KIPLING HOLDING	jun-98	yes
KJESSLER & MANNERSTRÅLE	nov-94	no
KLIPPAN	nov-94	no
KLÖVERN	dec-88	no
KNOW IT	nov-97	no
KUNGSLEDEN	apr-99	no
LABS2GROUP	dec-97	no
LAGERCRANTZ	sep-01	no
LB ICON	jun-98	yes
LBI INTERNATIONAL	jun-99	no
LEDSTIERNA	apr-95	no
LGP ALLGON HOLDING (ARKIVATOR)	jun-97	yes
LIFCO	maj-98	no
LILJEHOLMEN	okt-97	no
LINDEX	apr-95	yes
LINJEBUSS	okt-92	no
LJUNGBERGSGRUPPEN	jul-94	no

Company	IPO date	PE Backed
LUNDIN PETROLEUM	sep-01	no
M2S SVERIGE	dec-99	no
MALMBERG	mar-99	no
MANDAMUS	jun-98	no
MANDATOR	jan-97	no
MATTEUS	maj-94	yes
MEDA	jun-95	no
MEDICOVER (ORESA VENTURES)	jul-97	no
MEDIVIR	feb-96	no
MEKONOMEN	maj-00	no
METRO	aug-00	no
MICRONIC LASER SYSTEMS	mar-00	yes
MIDWAY HOLDING	okt-89	no
MIND	jun-00	yes
MODUL1	okt-96	no
MOGUL1	jul-97	no
MONARK STIGA	okt-94	no
MSC KONSULT	maj-98	no
MTG	sep-97	no
MULTIQ INTERNATIONAL	feb-98	yes
MUNTERS	okt-97	no
MÅLDATA	jun-89	yes
NAECKEBRO	jun-96	no
NAN RESOURCES	jun-97	no
NEFAB	maj-96	yes
NEONET	okt-00	no
NET INSIGHT	jun-99	yes
NETONNET	jun-00	no
NETWISE	sep-00	yes
NEW WAVE GROUP	dec-97	no
NIBE INDUSTRIES	jun-97	yes
NILÖRN GRUPPEN	apr-98	no
NOBEL BIOCARE	mar-94	no
NOBIA	jun-02	yes
NOCOM	jan-99	yes
NORDIFAGRUPPEN	aug-94	no
NORDNET	dec-99	no
NORRPORTEN	jun-94	no
NOVESTRA	apr-00	no
NOVOTEK	jun-99	no
OPCON	dec-98	yes
OPTIMAIL	jul-98	no
ORC SOFTWARE	okt-00	no
ORIFLAME	mar-04	yes
ORTIVUS	okt-95	no
PANDOX	jun-97	no
PARTNERTECH	jun-97	yes
PERBIO SCIENCE	okt-99	no
PERGO	jun-01	no
PHONERA	maj-00	no
POOLIA	jun-99	no
PRECISE BIOMETRICS	dec-99	no
PREVAS	maj-98	no
PRICER	apr-95	no
PRIFAST	maj-91	no
PROACT IT	okt-97	no
PROBI	dec-98	no
PROFFICE	okt-99	no
PROFILGRUPPEN	jun-97	no
PRONYX	apr-97	no
PROSOLVIA	jun-97	no
PROTECT DATA	jun-97	yes
Q-MED	dec-99	yes
READSOFT	jun-99	yes
REALIA	feb-89	no

Company	IPO date	PE Backed
REDERI AB TRANSATLANTIC	jun-91	no
RESCO	okt-96	no
RIDDARHYTTAN	jun-97	no
RKS	maj-99	no
RND RETAIL&BRANDS	jun-01	no
ROTTNEROS	okt-91	no
RÖRVIK TIMBER	jun-97	no
SAAB	jun-98	no
SALUS ANSVAR	jan-97	no
SAPA	maj-97	no
SARDUS	apr-97	yes
SCAN MINING	jan-97	no
SCANDIACONSULT	aug-89	no
SCANDIC HOTELS	dec-96	yes
SCANDINAVIA ONLINE	jun-00	no
SCRIBONA	dec-92	no
SECO TOOLS	aug-89	no
SECTRA	mar-99	no
SECURITAS	jul-91	yes
SEGERSTRÖM & SVENSSON	mar-95	yes
SEMCON	maj-97	yes
SENEA	aug-94	no
SENSYS TRAFFIC	jan-01	no
SINTERCAST	maj-93	yes
SKISTAR	jul-94	no
SOFTRONIC	dec-98	no
SOLITAIR KAPITAL	maj-90	yes
SONG NETWORKS	mar-00	no
SPCS	jun-97	yes
SSAB	aug-89	no
STENA LINE	nov-88	no
STUDSVIK	maj-01	yes
SWECO	sep-98	no
SVEDALA INDUSTRIER	jul-90	no
SVEDBERGS	okt-97	no
SVENSKA ORIENT	okt-97	no
SWITCHCORE	mar-99	no
SVOLDER	jul-93	no
SÄK I	maj-97	yes
TECHNOLOGY NEXUS	jun-98	no
TELELOGIC	mar-99	yes
TELIASONERA	jun-00	no
TELIGENT	apr-99	yes
TERRA MINING	nov-93	yes
THALAMUS	jul-00	yes
TICKET	apr-97	yes
TRACTION	jul-97	no
TRANSCOM WWD.	sep-01	no
TRIO INFO SYSTEMS	jun-96	no
TRYGG-HANSA	dec-89	no
TV 4	apr-94	yes
UNIBET	jun-04	no
UNITED TANKERS	jun-90	yes
UTFORS	apr-00	yes
VBB	nov-90	no
VBG	maj-89	yes
WEDINS SKOR	jul-97	no
VERIMATION	jul-94	no
WESTERGYLLEN	aug-89	no
WHILBORGS	maj-05	no
WISE GROUP	jun-00	no
VISION PARK	sep-97	no
VITROLIFE	jun-01	no
XPONCARD	dec-93	yes
ZODIAK TELEVISION	apr-97	no

Appendix 2 – Fama-French Regression Output

Table A2.3 Regression results value weighted returns, OLS & Newey-West Std. Errors, 3 years

```
.
.
. regress IPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   67.06
       Model |  .735082578     3  .245027526           Prob > F      =  0.0000
    Residual |  .599216281   164  .003653758           R-squared     =  0.5509
-------------+------------------------------           Adj R-squared =  0.5427
       Total |  1.33429886   167  .007989814           Root MSE      =  .06045

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |    .892694    .071586    12.47   0.000     .7513451    1.034043
         smb |  -.0650153   .0962707    -0.68   0.500    -.2551052    .1250746
         hml |  -.2169824   .0822424    -2.64   0.009    -.3793728   -.0545919
       _cons |  -.0002179   .0053903    -0.04   0.968    -.0108613    .0104255
------------------------------------------------------------------------------

. regress PEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   41.34
       Model |  .655369962     3  .218456654           Prob > F      =  0.0000
    Residual |  .866591508   164  .005284095           R-squared     =  0.4306
-------------+------------------------------           Adj R-squared =  0.4202
       Total |  1.52196147   167  .009113542           Root MSE      =  .07269

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .6917792   .0860881     8.04   0.000     .5217952    .8617632
         smb |  -.0998259   .1157736    -0.86   0.390    -.3284249    .1287732
         hml |  -.4390534   .0989034    -4.44   0.000    -.6343416   -.2437652
       _cons |  -.0008565   .0064823    -0.13   0.895     -.013656    .0119431
------------------------------------------------------------------------------

. regress NPEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   41.05
       Model |  .790811225     3  .263603742           Prob > F      =  0.0000
    Residual |  1.05309367   164  .006421303           R-squared     =  0.4289
-------------+------------------------------           Adj R-squared =  0.4184
       Total |  1.84390489   167  .011041347           Root MSE      =  .08013

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |    .977451   .0949007    10.30   0.000     .7900662    1.164836
         smb |  -.0621599    .127625    -0.49   0.627      -.31416    .1898401
         hml |  -.1148216   .1090279    -1.05   0.294    -.3301009    .1004577
       _cons |   .0045206   .0071459     0.63   0.528    -.0095892    .0186304
------------------------------------------------------------------------------
```

```
.
.
.
. newey IPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     33.94
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |    .892694   .0953402     9.36   0.000     .7044414    1.080947
         smb |  -.0650153   .1552326    -0.42   0.676    -.3715274    .2414969
         hml |  -.2169824   .1519835    -1.43   0.155    -.5170791    .0831144
       _cons |  -.0002179   .0057471    -0.04   0.970    -.0115657    .0111299
------------------------------------------------------------------------------

.
. newey PEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     15.56
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .6917792   .1225841     5.64   0.000     .4497327    .9338258
         smb |  -.0998259   .2099932    -0.48   0.635    -.5144647     .314813
         hml |  -.4390534   .1627633    -2.70   0.008    -.7604351   -.1176716
       _cons |  -.0008565   .0060564    -0.14   0.888    -.0128149     .011102
------------------------------------------------------------------------------

.
. newey NPEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     24.89
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |    .977451   .1424954     6.86   0.000     .6960889    1.258813
         smb |  -.0621599   .1738635    -0.36   0.721    -.4054594    .2811395
         hml |  -.1148216   .1625402    -0.71   0.481    -.4357628    .2061196
       _cons |   .0045206    .007113     0.64   0.526    -.0095242    .0185654
------------------------------------------------------------------------------

.
```

Table A2.4 Regression results equally weighted returns, OLS & Newey-West Std. Errors, 3 years

```
. regress IPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =  150.87
       Model |  .937582497     3  .312527499           Prob > F      =  0.0000
    Residual |  .339717778   164   .00207145           R-squared     =  0.7340
-------------+------------------------------           Adj R-squared =  0.7292
       Total |  1.27730028   167  .007648505           Root MSE      =  .04551

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.038916   .0566521    18.34   0.000     .9270549    1.150778
         smb |  -.2124867   .0780466    -2.72   0.007    -.3665924    -.058381
         hml |  -.1889121   .0604202    -3.13   0.002    -.3082139   -.0696104
       _cons |  -.0071097   .0040956    -1.74   0.084    -.0151965    .0009771
------------------------------------------------------------------------------

. regress PEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   77.82
       Model |  .934664545     3  .311554848           Prob > F      =  0.0000
    Residual |  .656539952   164  .004003292           R-squared     =  0.5874
-------------+------------------------------           Adj R-squared =  0.5798
       Total |   1.5912045   167  .009528171           Root MSE      =  .06327

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.071218   .0787566    13.60   0.000     .9157104    1.226726
         smb |  -.3764623   .1084989    -3.47   0.001    -.5906972   -.1622274
         hml |  -.2438828    .083995    -2.90   0.004    -.4097338   -.0780317
       _cons |  -.0120932   .0056936    -2.12   0.035    -.0233354   -.0008511
------------------------------------------------------------------------------

. regress NPEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   85.80
       Model |  .922202972     3  .307400991           Prob > F      =  0.0000
    Residual |  .587582787   164  .003582822           R-squared     =  0.6108
-------------+------------------------------           Adj R-squared =  0.6037
       Total |  1.50978576   167  .009040633           Root MSE      =  .05986

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.018171    .074506    13.67   0.000     .8710562    1.165285
         smb |  -.1359273    .102643    -1.32   0.187    -.3385994    .0667449
         hml |  -.1484222   .0794616    -1.87   0.064    -.3053219    .0084776
       _cons |  -.0020119   .0053863    -0.37   0.709    -.0126472    .0086235
------------------------------------------------------------------------------
```

```
.
.
. newey IPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =    122.44
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.038916   .0556524    18.67   0.000     .9290287    1.148804
         smb |  -.2124867   .1568087    -1.36   0.177    -.5221108    .0971375
         hml |  -.1889121   .1160934    -1.63   0.106    -.4181425    .0403182
       _cons |  -.0071097   .0043533    -1.63   0.104    -.0157054    .0014861
------------------------------------------------------------------------------

.
. newey PEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     68.16
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.071218   .0780896    13.72   0.000     .9170275    1.225409
         smb |  -.3764623    .231737    -1.62   0.106    -.8340351    .0811106
         hml |  -.2438828   .1399347    -1.74   0.083    -.5201886     .032423
       _cons |  -.0120932   .0053737    -2.25   0.026    -.0227038   -.0014826
------------------------------------------------------------------------------

.
. newey NPEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     89.34
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.018171    .063792    15.96   0.000     .8922112     1.14413
         smb |  -.1359273     .14071    -0.97   0.335     -.413764    .1419094
         hml |  -.1484222   .1225059    -1.21   0.227    -.3903144    .0934701
       _cons |  -.0020119   .0056233    -0.36   0.721    -.0131152    .0090915
------------------------------------------------------------------------------
```

Table A2.1 Regression results value weighted returns, OLS & Newey-West Std. Errors, 5 years

```
.
.
. regress IPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   95.27
       Model |  .708770092     3  .236256697           Prob > F      =  0.0000
    Residual |  .406694743   164  .002479846           R-squared     =  0.6354
-------------+------------------------------           Adj R-squared =  0.6287
       Total |  1.11546483   167   .00667943           Root MSE      =   .0498

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .8343884   .0581946    14.34   0.000     .7194811    .9492957
         smb |   .0487149   .0793229     0.61   0.540    -.1079109    .2053407
         hml |  -.2144103   .0677368    -3.17   0.002     -.348159   -.0806617
       _cons |     .00011   .0044391     0.02   0.980    -.0086552    .0088751
------------------------------------------------------------------------------

. regress PEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   55.31
       Model |   .54960717     3   .18320239           Prob > F      =  0.0000
    Residual |   .54325437   164  .003312527           R-squared     =  0.5029
-------------+------------------------------           Adj R-squared =  0.4938
       Total |  1.09286154   167  .006544081           Root MSE      =  .05755

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .6795125    .067259    10.10   0.000     .5467074    .8123176
         smb |    .094175   .0916782     1.03   0.306    -.0868467    .2751967
         hml |  -.2409955   .0782874    -3.08   0.002    -.3955767   -.0864142
       _cons |   .0065825   .0051305     1.28   0.201    -.0035479    .0167129
------------------------------------------------------------------------------

. regress NPEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =   76.68
       Model |  .779145784     3  .259715261           Prob > F      =  0.0000
    Residual |  .555486119   164   .00338711           R-squared     =  0.5838
-------------+------------------------------           Adj R-squared =  0.5762
       Total |   1.3346319   167  .007991808           Root MSE      =   .0582

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |      .8966   .0680119    13.18   0.000     .7623081    1.030892
         smb |   .0157079   .0927045     0.17   0.866    -.1673404    .1987561
         hml |    -.20679   .0791639    -2.61   0.010    -.3631018   -.0504782
       _cons |  -.0029116    .005188    -0.56   0.575    -.0131554    .0073322
------------------------------------------------------------------------------
```

```
.
.
. newey IPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     61.31
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .8343884   .0795377    10.49   0.000     .6773384    .9914383
         smb |   .0487149   .1106635     0.44   0.660     -.169794    .2672237
         hml |  -.2144103   .1179112    -1.82   0.071    -.4472301    .0184094
       _cons |     .00011   .0046475     0.02   0.981    -.0090667    .0092866
------------------------------------------------------------------------------

.
. newey PEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     22.06
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .6795125    .102887     6.60   0.000     .4763585    .8826664
         smb |    .094175   .1633797     0.58   0.565    -.2284238    .4167739
         hml |  -.2409955   .1243085    -1.94   0.054    -.4864468    .0044559
       _cons |   .0065825   .0049377     1.33   0.184    -.0031671    .0163321
------------------------------------------------------------------------------

.
. newey NPEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     47.12
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |      .8966   .1074262     8.35   0.000     .6844833    1.108717
         smb |   .0157079   .1340209     0.12   0.907    -.2489211    .2803368
         hml |    -.20679   .1337186    -1.55   0.124     -.470822     .057242
       _cons |  -.0029116   .0053698    -0.54   0.588    -.0135145    .0076913
------------------------------------------------------------------------------
```

Table A2.2 Regression results equally weighted returns, OLS & Newey-West Std. Errors, 5 years

```
.
. regress IPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =  372.05
       Model |   1.1641019     3  .388033968           Prob > F      =  0.0000
    Residual |  .171047344   164  .001042972           R-squared     =  0.8719
-------------+------------------------------           Adj R-squared =  0.8695
       Total |  1.33514925   167  .007994906           Root MSE      =   .0323

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.006114   .0406564    24.75   0.000     .9258365    1.086391
         smb |   .1747733    .053886     3.24   0.001     .0683734    .2811731
         hml |  -.2972101   .0427401    -6.95   0.000    -.3816019   -.2128184
       _cons |  -.0064864   .0029163    -2.22   0.028    -.0122447    -.000728
------------------------------------------------------------------------------

. regress PEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =  141.02
       Model |  1.04323548     3   .34774516           Prob > F      =  0.0000
    Residual |  .404404614   164  .002465882           R-squared     =  0.7206
-------------+------------------------------           Adj R-squared =  0.7155
       Total |   1.4476401   167  .008668504           Root MSE      =  .04966

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.069411   .0625142    17.11   0.000     .9459748    1.192848
         smb |  -.0152734   .0828564    -0.18   0.854    -.1788762    .1483295
         hml |  -.2592714   .0657181    -3.95   0.000    -.3890341   -.1295087
       _cons |  -.0057601   .0044842    -1.28   0.201    -.0146143    .0030941
------------------------------------------------------------------------------

. regress NPEIPO_rf NOIPO_rf smb hml

      Source |       SS       df       MS              Number of obs =     168
-------------+------------------------------           F(  3,   164) =  344.81
       Model |  1.18499183     3  .394997277           Prob > F      =  0.0000
    Residual |  .187872998   164  .001145567           R-squared     =  0.8632
-------------+------------------------------           Adj R-squared =  0.8606
       Total |  1.37286483   167  .008220747           Root MSE      =  .03385

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .9764312   .0426091    22.92   0.000      .892298    1.060564
         smb |   .2319758   .0564742     4.11   0.000     .1204655    .3434862
         hml |  -.3025137   .0447929    -6.75   0.000    -.3909589   -.2140686
       _cons |  -.0067935   .0030564    -2.22   0.028    -.0128284   -.0007585
------------------------------------------------------------------------------
```

```
.
.
. newey IPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =    191.90
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .9983938   .0465179    21.46   0.000     .9065426    1.090245
         smb |    .178986   .0760819     2.35   0.020     .0287596    .3292124
         hml |  -.2966614   .0693901    -4.28   0.000    -.4336747   -.1596482
       _cons |  -.0063517   .0030894    -2.06   0.041    -.0124518   -.0002516
------------------------------------------------------------------------------

.
. newey PEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =     89.41
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |    1.03822   .0706514    14.69   0.000     .8987166    1.177724
         smb |   .0022668    .175225     0.01   0.990     -.343721    .3482546
         hml |  -.2541588   .1054919    -2.41   0.017    -.4624563   -.0458613
       _cons |  -.0043727   .0040517    -1.08   0.282    -.0123729    .0036276
------------------------------------------------------------------------------

.
. newey NPEIPO_rf NOIPO_rf smb hml, lag(0)

Regression with Newey-West standard errors          Number of obs  =       168
maximum lag: 0                                      F(  3,   164)  =    147.32
                                                    Prob > F       =    0.0000

------------------------------------------------------------------------------
             |             Newey-West
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .9487608    .054923    17.27   0.000     .8403134    1.057208
         smb |   .2492523    .078246     3.19   0.002     .0947529    .4037518
         hml |  -.2957638   .0765504    -3.86   0.000    -.4469152   -.1446125
       _cons |   -.005375     .00353    -1.52   0.130    -.0123451     .001595
------------------------------------------------------------------------------
```

Appendix 3 – Evolution of SMB and HML premiums

Figure A3.1 Yearly SMB and HML Factor Premiums, 1992-2005

Evolution of Average SMB and HML Factor Premiums		
Year	SMB	HML
1992	-1,15%	-2,50%
1993	7,83%	-5,70%
1994	1,40%	-3,46%
1995	-0,76%	-3,04%
1996	0,98%	-1,85%
1997	-1,48%	-2,08%
1998	0,20%	-5,49%
1999	-1,00%	-6,80%
2000	-4,15%	-2,70%
2001	-2,26%	-1,95%
2002	-2,10%	-1,80%
2003	-0,07%	-3,13%
2004	-0,16%	-1,17%
2005	-0,40%	-1,56%
Average	-0,22%	-3,09%
Median	-0,58%	-2,60%

Appendix 4 – Fama-French regression output, sub-periods

Table A4.1 Regression results value weighted returns, 1992-1998, 3 years

```
.
.
. regress   IPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   36.34
       Model |  .293684862     3  .097894954           Prob > F      =  0.0000
    Residual |  .215485401    80  .002693568           R-squared     =  0.5768
-------------+------------------------------           Adj R-squared =  0.5609
       Total |  .509170263    83  .006134581           Root MSE      =   .0519

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .9744907   .0942806    10.34   0.000     .7868663    1.162115
         smb |   .1706198   .1228049     1.39   0.169    -.0737698    .4150094
         hml |   .1326321   .1160237     1.14   0.256    -.0982624    .3635265
       _cons |   .0069282   .0066428     1.04   0.300    -.0062914    .0201479
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =    9.05
       Model |   .10074375     3   .03358125           Prob > F      =  0.0000
    Residual |  .297003217    80   .00371254           R-squared     =  0.2533
-------------+------------------------------           Adj R-squared =  0.2253
       Total |  .397746967    83  .004792132           Root MSE      =  .06093

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |    .483428   .1106864     4.37   0.000     .2631551    .7037009
         smb |   .3232334   .1441742     2.24   0.028     .0363177    .6101491
         hml |   .1141537   .1362129     0.84   0.404    -.1569185     .385226
       _cons |   .0157073   .0077988     2.01   0.047     .0001873    .0312273
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   39.78
       Model |  .459903665     3  .153301222           Prob > F      =  0.0000
    Residual |  .308285445    80  .003853568           R-squared     =  0.5987
-------------+------------------------------           Adj R-squared =  0.5836
       Total |  .768189111    83   .00925529           Root MSE      =  .06208

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.230902   .1127691    10.92   0.000     1.006484     1.45532
         smb |    .103946    .146887     0.71   0.481    -.1883685    .3962605
         hml |   .1573587   .1387759     1.13   0.260    -.1188142    .4335316
       _cons |   .0029434   .0079455     0.37   0.712    -.0128686    .0187555
------------------------------------------------------------------------------
```

Table A4.2 Regression results value weighted returns, 1999-2005, 3 years

```
.
.
.
. regress   IPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   38.66
       Model |  .490096157     3  .163365386           Prob > F      =  0.0000
    Residual |    .3338456    79  .004225894           R-squared     =  0.5948
-------------+------------------------------           Adj R-squared =  0.5794
       Total |  .823941757    82   .01004807           Root MSE      =  .06501

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .7538889   .1064876     7.08   0.000     .5419307    .9658472
         smb |  -.0637448   .1662179    -0.38   0.702    -.3945932    .2671037
         hml |  -.4615507   .1151925    -4.01   0.000    -.6908357   -.2322658
       _cons |  -.0037955   .0085583    -0.44   0.659    -.0208304    .0132394
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   40.23
       Model |  .679367781     3  .226455927           Prob > F      =  0.0000
    Residual |  .444638315    79  .005628333           R-squared     =  0.6044
-------------+------------------------------           Adj R-squared =  0.5894
       Total |   1.1240061    82  .013707391           Root MSE      =  .07502

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .7584271   .1228937     6.17   0.000     .5138134    1.003041
         smb |  -.2246243   .1918264    -1.17   0.245    -.6064452    .1571966
         hml |  -.7357348   .1329397    -5.53   0.000    -1.000345   -.4711249
       _cons |    -.00933   .0098769    -0.94   0.348    -.0289894    .0103295
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   15.62
       Model |  .399369177     3  .133123059           Prob > F      =  0.0000
    Residual |  .673082444    79  .008520031           R-squared     =  0.3724
-------------+------------------------------           Adj R-squared =  0.3486
       Total |  1.07245162    82  .013078678           Root MSE      =   .0923

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .7109496   .1512029     4.70   0.000     .4099877    1.011912
         smb |   .0354894   .2360147     0.15   0.881    -.4342861    .5052649
         hml |   -.343557   .1635632    -2.10   0.039    -.6691214   -.0179926
       _cons |   .0080683   .0121521     0.66   0.509    -.0161198    .0322564
------------------------------------------------------------------------------
```

Table A4.2 Regression results equally weighted returns, 1992-1998, 3 years

```
. regress   IPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   84.42
       Model |  .365181537     3  .121727179           Prob > F      =  0.0000
    Residual |  .115348885    80  .001441861           R-squared     =  0.7600
-------------+------------------------------           Adj R-squared =  0.7510
       Total |  .480530423    83  .005789523           Root MSE      =  .03797

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .9098383   .0618358    14.71   0.000      .7867811    1.032895
         smb |  -.0512605   .0969458    -0.53   0.598     -.2441889    .1416679
         hml |   .0950986   .0848298     1.12   0.266     -.0737182    .2639154
       _cons |   .0051647   .0048247     1.07   0.288     -.0044368    .0147661
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   28.61
       Model |  .290185032     3  .096728344           Prob > F      =  0.0000
    Residual |  .270455984    80    .0033807           R-squared     =  0.5176
-------------+------------------------------           Adj R-squared =  0.4995
       Total |  .560641017    83  .006754711           Root MSE      =  .05814

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |    .855671   .0946851     9.04   0.000      .6672417      1.0441
         smb |  -.2254264   .1484468    -1.52   0.133     -.5208449    .0699921
         hml |   .0876553   .1298944     0.67   0.502     -.1708428    .3461533
       _cons |   .0062035   .0073877     0.84   0.404     -.0084986    .0209056
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   97.25
       Model |  .393557062     3  .131185687           Prob > F      =  0.0000
    Residual |  .107914837    80  .001348935           R-squared     =  0.7848
-------------+------------------------------           Adj R-squared =  0.7767
       Total |  .501471898    83   .00604183           Root MSE      =  .03673

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .9219275     .05981    15.41   0.000      .8029018    1.040953
         smb |   .0043028   .0937698     0.05   0.964     -.1823051    .1909107
         hml |   .0904829   .0820508     1.10   0.273     -.0728033    .2537691
       _cons |   .0037794   .0046666     0.81   0.420     -.0055075    .0130663
------------------------------------------------------------------------------
```

Table A4.4 Regression results equally weighted returns, 1999-2005, 3 years

```
.
. regress   IPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   98.44
       Model |  .626085369     3  .208695123           Prob > F      =  0.0000
    Residual |  .167481714    79  .002120022           R-squared     =  0.7890
-------------+------------------------------           Adj R-squared =  0.7809
       Total |  .793567083    82  .009677647           Root MSE      =  .04604

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.086916   .0964723    11.27   0.000      .8948928    1.278939
         smb |  -.0861098   .1340776    -0.64   0.523     -.3529846     .180765
         hml |   -.347507   .0793044    -4.38   0.000     -.5053585   -.1896555
       _cons |  -.0119629   .0062336    -1.92   0.059     -.0243705    .0004448
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   77.53
       Model |  .766995787     3  .255665262           Prob > F      =  0.0000
    Residual |  .260521586    79  .003297742           R-squared     =  0.7465
-------------+------------------------------           Adj R-squared =  0.7368
       Total |  1.02751737    82    .0125307           Root MSE      =  .05743

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.202595   .1203208     9.99   0.000      .9631026    1.442088
         smb |  -.1588641   .1672224    -0.95   0.345     -.4917119    .1739837
         hml |  -.4217758   .0989089    -4.26   0.000     -.6186491   -.2249024
       _cons |  -.0198477   .0077746    -2.55   0.013     -.0353227   -.0043728
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   33.81
       Model |  .564915402     3  .188305134           Prob > F      =  0.0000
    Residual |  .439984898    79  .005569429           R-squared     =  0.5622
-------------+------------------------------           Adj R-squared =  0.5455
       Total |   1.0049003    82  .012254882           Root MSE      =  .07463

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.022548   .1563644     6.54   0.000      .7113122    1.333783
         smb |   .0230099   .2173159     0.11   0.916     -.4095465    .4555663
         hml |   -.278439   .1285383    -2.17   0.033     -.5342881   -.0225899
       _cons |  -.0005195   .0101036    -0.05   0.959     -.0206302    .0195911
------------------------------------------------------------------------------
```

Table A4.5 Regression results value weighted returns, 1992-1998, 5 years

```
.
. regress   IPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   71.15
       Model |  .345462186     3  .115154062           Prob > F      =  0.0000
    Residual |  .129477936    80  .001618474           R-squared     =  0.7274
-------------+------------------------------           Adj R-squared =  0.7172
       Total |  .474940122    83   .00572217           Root MSE      =  .04023

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.015503   .0732364    13.87   0.000     .8697582    1.161248
         smb |   .2990239   .0952472     3.14   0.002     .1094759    .4885719
         hml |   .0793227   .0899666     0.88   0.381    -.0997165     .258362
       _cons |   .0010228    .005151     0.20   0.843     -.009228    .0112736
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   16.94
       Model |  .148194755     3  .049398252           Prob > F      =  0.0000
    Residual |  .233316884    80  .002916461           R-squared     =  0.3884
-------------+------------------------------           Adj R-squared =  0.3655
       Total |  .381511639    83  .004596526           Root MSE      =    .054

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .5558822    .098311     5.65   0.000     .3602371    .7515274
         smb |   .5022086   .1278578     3.93   0.000     .2477633    .7566538
         hml |   .2332444   .1207693     1.93   0.057    -.0070942     .473583
       _cons |   .0175713   .0069146     2.54   0.013     .0038108    .0313318
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   63.74
       Model |  .436307123     3  .145435708           Prob > F      =  0.0000
    Residual |  .182547539    80  .002281844           R-squared     =  0.7050
-------------+------------------------------           Adj R-squared =  0.6940
       Total |  .618854662    83   .00745608           Root MSE      =  .04777

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.165366   .0869595    13.40   0.000     .9923108    1.338421
         smb |   .2242777   .1130947     1.98   0.051    -.0007879    .4493434
         hml |   .0457265   .1068247     0.43   0.670    -.1668613    .2583144
       _cons |  -.0042394   .0061162    -0.69   0.490     -.016411    .0079322
------------------------------------------------------------------------------
```

Table A4.6 Regression results value weighted returns, 1999-2005, 5 years

```
.
. regress   IPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   46.14
       Model |  .406621531     3   .13554051           Prob > F      =  0.0000
    Residual |  .232047411    79  .002937309           R-squared     =  0.6367
-------------+------------------------------           Adj R-squared =  0.6229
       Total |  .638668941    82  .007788646           Root MSE      =   .0542

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .6640427    .086751     7.65   0.000     .4913692    .8367161
         smb |  -.0256235   .1386036    -0.18   0.854     -.301507      .25026
         hml |  -.4209261    .095856    -4.39   0.000    -.6117227   -.2301295
       _cons |  -.0009924   .0071334    -0.14   0.890    -.0151911    .0132064
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   55.41
       Model |  .480769735     3  .160256578           Prob > F      =  0.0000
    Residual |  .228470103    79  .002892027           R-squared     =  0.6779
-------------+------------------------------           Adj R-squared =  0.6656
       Total |  .709239838    82  .008649266           Root MSE      =  .05378

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .7129462   .0860797     8.28   0.000     .5416089    .8842835
         smb |  -.0963523   .1375311    -0.70   0.486     -.370101    .1773964
         hml |  -.4927309   .0951143    -5.18   0.000    -.6820511   -.3034107
       _cons |  -.0001386   .0070782    -0.02   0.984    -.0142275    .0139502
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =   33.48
       Model |  .399902349     3  .133300783           Prob > F      =  0.0000
    Residual |  .314547251    79  .003981611           R-squared     =  0.5597
-------------+------------------------------           Adj R-squared =  0.5430
       Total |    .7144496    82    .0087128           Root MSE      =   .0631

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .6645429   .1010017     6.58   0.000     .4635039    .8655818
         smb |  -.0210909   .1613723    -0.13   0.896    -.3422945    .3001126
         hml |  -.4084147   .1116025    -3.66   0.000     -.630554   -.1862755
       _cons |  -.0027601   .0083053    -0.33   0.741    -.0192914    .0137711
------------------------------------------------------------------------------
```

Table 4.7 Regression results equally weighted returns, 1992-1998, 5 years

```
.
. regress   IPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =  204.36
       Model |  .51939547     3  .173131823           Prob > F      =  0.0000
    Residual | .067775996    80    .0008472           R-squared     =  0.8846
-------------+------------------------------           Adj R-squared =  0.8802
       Total | .587171466    83  .007074355           Root MSE      =  .02911

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .8736325   .0462823    18.88   0.000     .7815278    .9657371
         smb |   .3834387   .0718676     5.34   0.000     .2404176    .5264597
         hml |  -.0266535   .0650855    -0.41   0.683    -.1561778    .1028709
       _cons |   .0008216   .0037054     0.22   0.825    -.0065523    .0081955
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =   69.91
       Model | .356584573     3  .118861524           Prob > F      =  0.0000
    Residual | .136010758    80  .001700134           R-squared     =  0.7239
-------------+------------------------------           Adj R-squared =  0.7135
       Total | .492595331    83  .005934884           Root MSE      =  .04123

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .8442065   .0655637    12.88   0.000     .7137306    .9746824
         smb |   .2017424   .1018079     1.98   0.051    -.0008619    .4043466
         hml |   .1312662   .0922005     1.42   0.158    -.0522186     .314751
       _cons |   .0102793    .005249     1.96   0.054    -.0001666    .0207252
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 1/84

      Source |       SS       df       MS              Number of obs =      84
-------------+------------------------------           F(  3,    80) =  159.09
       Model | .580071039     3  .193357013           Prob > F      =  0.0000
    Residual | .097231772    80  .001215397           R-squared     =  0.8564
-------------+------------------------------           Adj R-squared =  0.8511
       Total | .677302811    83  .008160275           Root MSE      =  .03486

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   .8783737   .0554346    15.85   0.000     .7680553     .988692
         smb |   .4366056   .0860794     5.07   0.000     .2653021     .607909
         hml |  -.0677394   .0779562    -0.87   0.387    -.2228771    .0873984
       _cons |  -.0026023   .0044381    -0.59   0.559    -.0114344    .0062297
------------------------------------------------------------------------------
```

Table A4.8 Regression results equally weighted returns, 1999-2005, 5 years

```
.
. regress   IPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =  267.24
       Model | .680255094     3  .226751698           Prob > F      =  0.0000
    Residual | .067031805    79  .000848504           R-squared     =  0.9103
-------------+------------------------------           Adj R-squared =  0.9069
       Total |   .7472869    82  .009113255           Root MSE      =  .02913

------------------------------------------------------------------------------
      IPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.114091   .0628273    17.73   0.000     .9890359    1.239145
         smb |   .1666461   .0806341     2.07   0.042     .0061479    .3271442
         hml |  -.4212132   .0493274    -8.54   0.000    -.5193969   -.3230295
       _cons |  -.0091807   .0038973    -2.36   0.021    -.0169382   -.0014232
------------------------------------------------------------------------------

.
. regress   PEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =  130.99
       Model |  .78720755     3  .262402517           Prob > F      =  0.0000
    Residual | .158252835    79    .0020032           R-squared     =  0.8326
-------------+------------------------------           Adj R-squared =  0.8263
       Total | .945460385    82  .011530005           Root MSE      =  .04476

------------------------------------------------------------------------------
    PEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.220396   .0965347    12.64   0.000     1.028249    1.412544
         smb |   .1414336   .1238951     1.14   0.257    -.1051734    .3880405
         hml |  -.4521552    .075792    -5.97   0.000    -.6030154    -.301295
       _cons |  -.0112283   .0059883    -1.88   0.064    -.0231477    .0006911
------------------------------------------------------------------------------

.
. regress   NPEIPO_rf NOIPO_rf smb  hml in 85/167

      Source |       SS       df       MS              Number of obs =      83
-------------+------------------------------           F(  3,    79) =  222.39
       Model | .616578127     3  .205526042           Prob > F      =  0.0000
    Residual | .073008501    79  .000924158           R-squared     =  0.8941
-------------+------------------------------           Adj R-squared =  0.8901
       Total | .689586628    82  .008409593           Root MSE      =   .0304

------------------------------------------------------------------------------
   NPEIPO_rf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    NOIPO_rf |   1.026188   .0655684    15.65   0.000      .895677    1.156698
         smb |   .2187399   .0841521     2.60   0.011     .0512393    .3862404
         hml |  -.4009965   .0514795    -7.79   0.000    -.5034639   -.2985292
       _cons |  -.0061298   .0040674    -1.51   0.136    -.0142257    .0019661
------------------------------------------------------------------------------
```