STOCKHOLM SCHOOL OF ECONOMICS
BSc Thesis in Finance
Spring 2011

Secondary Buyouts and Industry Factors

Can Secondary Buyouts across Industries be Explained by Mispricing?

Emma Hou [1]
Ida Kullberg [2]

Abstract

This paper investigates if the market valuation of a target firm's industry affects the private equity firm's choice to conduct a secondary buyout. We argue that industries that are undervalued in the market should experience a greater amount of secondary buyouts than industries that are overvalued. Through an empirical test on 2959 secondary buyouts in Western Europe we find evidence that there is a significant difference in the amount and timing of secondary buyouts across industries. We will also show that this difference is related to how the market is valuing the industry. This relationship is most evident when accounting for the different information structures in industries. This supports our hypothesis that the market's valuation of an industry affects the private equity firm's exit choice.

Keywords: Industry factors, Market timing, Private equity, Secondary buyouts, Soft information

Supervisor: Laurent Bach

[1] 21729@student.hhs.se
[2] 21564@student.hhs.se

Contents

1 Introduction

Private equity has, since its evolution, been the focus of much research. Many have studied this industry, the fastest growing within finance (Sousa, 2010), and tried to explain trends in ownership, industries and exits. However, since it is often difficult to find information about deals made or what actually happens to the target firms, this industry has been subject to more myths and speculation than others.

In the last decade, the growth in the traditional exit strategies such as initial public offerings (IPO) and trade sales has been surpassed by a new exit strategy: Secondary Buyouts (SBO). This is when a Private Equity firm (PE-firm) after the holding period sells the target to another PE-firm. This phenomenon existed prior to year 2000, but was then seen as a signaling of failure for the preceding PE-firm (Anson, 2004). The number of SBOs has increased rapidly since 2000 and become an accepted exit-strategy (Sousa, 2010). In the period of 2002-2007, the absolute number of SBOs worldwide increased by 10 times (Bonini, 2010). There are several previous studies on the topic of SBOs that have tried to pin down the underlying motives for such a transaction. Many of the studies focus on the operating performance of target firms involved in SBOs (Bonini, 2010) and the type of market conditions in which they tend to occur (Wang, 2010). In this paper we will expand on the existing research on SBO by offering additional explanation to the PE-firm's motives for the choice of exit strategy. Specifically, we will show that the market valuation of the industry that the target firm belongs to affects the PE-firrm's decision to conduct an SBO.

In short, PE-firms buy underperforming firms, improve upon them, and then sell the target firms with a profit. Hence, the decision of when to buy, who to buy from, and whom to sell to, is just as important as the strategic effort during the holding period. When a PE-firm is evaluated, success is mainly judged using the measure internal rate of return (IRR) for the entire holding period (Anson, 2004). The IRR depends on the value creation and the difference between selling and buying price. But, the IRR also depends on the length of the holding period. Hence, if there is no additional value creation after 3 years, there is a very high alternative cost in holding the target firm since it decreases the IRR of the investment, and thus the PE-firm will appear less successful. Therefore, some PE-firms are stressed to sell off their target firms in order to raise their IRR. However, the decision to sell off a target in order to sustain a high IRR does

not always coincide with a hot equity market. If the equity market is cold, it is less attractive to sell the firm to the market through an IPO (Wang, 2010). This strategy of determining when it is right to sell or hold an investment based on the state of the market is commonly known as market timing.

An SBO exit gives the PE-firm the possibility to sell a target firm to a fair price even when the equity market is cold. Thus, when the PE-firm has reason to believe that the market will undervalue the firm they wish to sell, they can instead sell it to another PE-firm that will pay a fairer price for the firm. The exiting PE-firm will benefit from a shorter holding period, and the buying PE-firm will benefit from the profit made when the market's valuation later corrects itself and values the target firm to its intrinsic value. We believe that this mechanism lies behind the increased use of SBO as an exit strategy.

The remainder of the paper will be dedicated to test this hypothesis. We will provide evidence for that there is a significant difference in the amount and the timing of SBOs in different industries. Furthermore, we will show that when the valuation of the industry decreases in the market, the share of SBO as chosen exit strategy will increase and PE-firms will prefer to sell the target firm to another PE-firm until the market valuation increases. We will also show that this correlation holds even stronger when controlling for how difficult it is for outside investors to find and evaluate information from an industry.

We will base our study on SBO data from Western Europe in the time period 2000-2010. This leaves us with 2959 observed SBOs. We will divide these SBOs into 14 industries using the classificaion of Fama and French. As a proxy for the market valuation we will use the price-earnings ratio of value-weighted industry portfolios based on the same classifications as the SBO industries.

The study will be organized as follows: We will begin by summarizing previous studies done on the topic, present a theoretical roadmap, formalize our underlying hypothesis and present the data that we will base our study on. We will then continue by developing a method to test our hypothesis and then proceed to report the results from our test. Lastly we will conclude and summarize our findings.

2 Literature

2.1 Secondary Buyouts

Since the phenomenon of SBOs mainly has its origin from the last decade, the research on the area is not yet very extensive, as compared to the various research on first buyouts. There are, however, three recent papers that discuss and try to explain the recent surge in SBOs. A consistent conclusion reached by these papers is the effect of market condition on SBO. Bonini (2010) finds that market conditions in favor of debt (measured as a narrowed debt spread) is an underlying reason for the increase in SBOs, as it allows PE-firms to increase market multiples with cheap financing and then flip the investments between each other. A related essay by Sousa (2010) tries to map out characteristics for portfolio companies that are subject to an SBO and macroeconomic conditions under which SBOs tend to occur the most. He finds that the average holding period when exiting through an SBO is 51.2 months, which is longer than the average holding period when exiting through trade sales, 48.7 months, or an IPO, 41.9 months. Since the number of SBOs increases with the length of holding period and maturity, it indicates that conducting an SBO may be an exit of last resort when considering the IRR-aspect. When looking into macroeconomic conditions, he finds that SBOs, as compared to other exit routes, tend to occur more when the stock market returns are low, when access to the credit market is high and when capital in private equity funds is high. His essay suggests that market condition is the most important, but not the only, determinant in the choice of exit strategy. Also the research by Wang (2010) supports the thesis that the number of SBOs increases when the equity market is cold, and when debt conditions are favorable.

Our essay differs from these previous studies as we will not study market condition or market timing in general, but rather study how it differs across industries and how target firms in those industries are affected. Some industries might experience a boost in the equity market while others do not. This is an aspect that we wish to study. By testing the market-timing hypothesis on an industry level, we believe the result will be more nuanced. Due to the mentioned difference, our essay also differs in how me measure hot equity market. Instead of looking at the number of IPOs in the market as a whole, as done by Wang (2010), we will use a market-based valuation measure: the price-earnings ratio. Further, we will not only study the total amount of SBO in itself, but how the total of SBO is spread among industries. In this way we will sort out the

general market condition effect and focus on the timing issue with respect to the valuation of industries. To our knowledge, the research of SBO on an industry level is still an area without research. However, the industry effect has been examined in previous research regarding first buyouts.

2.2 Literature on Industry effect

There are several articles that discuss Private Equity investments from an industry perspective, with the aim to find an answer to if there is a variation between industries in first buyouts, how it varies and why there is variation. The answer itself varies as well.

Stromberg (2010) in the article "The new demography of Private Equity" finds that the investment of PE-firms differ across industries. Targets in the industries *Software & internet* and *Hotels, Resorts and Cruise Lines* have increased their market share of total private equity deals the most, while private equity activity in *Retail* has shrunk the most. This supports that there are different industry trends. However, he does not go further into what the different industry trends depend on.

An explanation to different trends in leveraged buyout activity is offered by Ambrose and Winters (1992). Using a sample of 263 leveraged buyout (LBO) observations from 1980-1987, they seek to test the industry effect hypothesis, that is, if industry specific factors are the main determinants in the selection of targets. However, they fail to find strong evidence supporting this hypothesis. By first finding which industries have greater-than-expected and lower-than-expected LBO-activity, they further go ahead and test if industries with greater-than-expected amount of LBOs can be explained by three main industry specific factors: the asset growth rate, the free cash flow and the debt capacity. Low asset growth rate, high and stable free cash flow and excess debt capacity were believed to explain the above average LBO activity. Little evidence is found that supports their hypothesis. Instead, they conclude that the target's industry is only a secondary factor, whereas firm-specific factor is a primary factor when selecting targets. However, they use a relatively small sample set with observations dated two decades back, and we cannot be sure that the result applies in today's environment.

A more recent research on the industry effects of PE-firms' investments is that of Mulherin and Boone (2000), who find the existence of industry clustering when looking at acquisitions

and divestures. They use an industry classification of 59 industries, with 1305 observations of LBO transactions in the period 1990-1999. The industries vary heavily in both acquisition activity and divesture activity, with statistically significant results. They test if this variation in acquisition activity is a result of two determinants: federal deregulation and average R&D-ratio. The intuition is that variation in industry structure and technology affects the LBO activity. From the regression, they conclude that the determining factor describing the industry clustering is whether the industry is undergoing a deregulation. The deregulation factor is an industry-specific event that might affect the valuation of one industry while leaving others unaffected. Hence, this will be accounted for in our regressions.

Industry specific factors are also found by Mitchell and Mulherin (1995) who look at takeover activity in the period 1982-1989 across 51 industries. They find significant inter-industry differences among the 51 industries, both with respect to timing as well as frequency. They proceed to find the explanation to this difference in industry shocks. Industry shocks are defined as two types. The first type of shock is broad industry shocks, which alters industry structure (i.e. technological change). The proxy they use for this type of shock is abnormal sales growth during the preceding 5-year period (1977-1981). Their hypothesis is that industries that have undergone the most change in the period before are subject to a larger share of takeover activity in the following period. Abnormal sales growth is defined as the difference between an industry's growth and the average, where the average is the mean of the 51 industries. It can have both positive and negative values, indicating that shocks can be either beneficial or non-beneficial. They find convincing results for that takeover activity is positively related to sales growth.

The second type of shock is specific industry shock. They come up with four industry specific shocks that might alter the ratio of takeover activity: deregulation, energy dependence, foreign competition and financing innovations. Their test showed that industries that were more reorganized due to deregulation, more sensitive to energy prices and more active in financing innovations tend to be subject to more takeover activity in the subsequent period. They also ran this regression with takeover attempts rather than takeover activity and finds nearly identical results.

Due to this extensive research and evidence for differences in acquisition-activity and LBO activity across industries, we wish to study market-timing issues on an SBO level. That is, does

industry shocks lead to a larger share of SBOs in the specific industry? We will define industry shocks as abnormal valuation, which can be either beneficial or non-beneficial. However, our hypothesis differ from the essays above, since we are studying if the market's valuation of a specific industry lead to trends in SBOs, and not on operating characteristics or actual events affecting the industries per se.

2.3 Industry Momentum

The phenomenon of industry mispricing over time is called industry momentum and has been researched by Moskowitz and Grinblatt (1999). They found that one could make an arbitrage profit (loss) if one would invest in an undervalued (overvalued) industry and then sell it after a month up to a year later. This indicates that undervalued (overvalued) firms tend to reverse over time. The effect was so strong that the real momentum effect was left statistically insignificant after controlling for industries.

Researchers have tried to explain the industry momentum, using both rational and irrational investment behavior. Berk, Green and Naik (2000) discuss that the momentum effect might be caused by changes in a firm's growth that has to do with the firm's systematic risk. Since the correlation of industry growth within an industry is larger than correlation of growth between industries, it will be faster incorporated in the prices and valuation of the same industry. Another explanation can be formulated in the lead-lag structure of information dissemination. Information tends to be priced into large firms first and is then further spread to smaller companies in the industry. This indicates that it takes time for information to spread among firms in an industry. Since this lead-lag structure differs among industries due to different structures (i.e. concentration or fragmentation), it might result in an industry momentum. Also, this is a potential explanation to why some industries are more prone to over- or undervaluation than others.

The behavioral finance perspective presents an explanation based on irrational investors. A theory presented by Daniel et al. (1998) is that overconfidence and self-attribution of some investors might occur more in certain industries. Industries where it is difficult to gain new information might be subject to more overconfidence issues, which increase the magnitude of mispricing of that industry.

In contrast, mispricing might also be a result of the opposite effect, the conservatism bias, which states that investors underreact to information (Barberis et al., 1998). This would reflect differently among industries if some industries are more reluctant to take in new information than others, leading to a longer time lag from new information being revealed and to it being incorporated into the price.

Finally, the representative bias as discussed by Barberis et al. (1998) talks about a general overreaction to news, both good and bad, which leads to mispricing since the effect of information is exaggerated. This could explain the industry momentum if the overreaction is applied to the whole industry rather than a specific firm, leading to eventual reversal effects and a momentum profit in the short run.

Since a lot of explanations to the industry momentum effect are based on information related issues, we will include and control for information in our regression. To measure the difference in how easy it is to gain new information from different industries, we use a measure of soft information as defined below.

2.4 Soft Information

In corporate valuation, the amount and reliability of available information is important when valuing a firm. It is easier to value a firm where there is a lot of information available that is easy to interpret. However, for firms in some industries it is harder to transmit information about the firm than in other industries. For example, it is easier to interpret the information given by financial institutions as the underlying operations can be quantified into numbers, such as loans outstanding and received interest payments. If that is the case, it is then said that the firm belongs to an industry with hard information. (Landier, Nair and Wulf, 2009) For these industries, it is easier to communicate the value of the firm to outsiders than for industries without hard information. If it is difficult to transmit information about the firm's operations to outsiders, the industry is said to have soft information. This can be the case for high technology firms, where much of the value can be found in future growth. If the firm is expecting to generate substantial revenue from a product it is developing, it may be difficult to communicate to outside investors how the research is developing and how much revenue can be expected from the new product. For outside investors, it is more difficult to value

firms in industries that contain a lot of soft information, compared to if it would contain hard information.

Landier, Neir and Wulf (2009) studied how the geographic dispersion between the firms' headquarters and their primary lender had changed between the years 1987 and 1998. The belief was that if the firm could communicate through hard information, their primary lender would not have to be close to the firm's headquarter. With the development in information technology (IT) that took place during the time span, lenders to firms in industries with hard information will choose to take advantage of the IT-development and centralize the lending more. This would result in an increase in the average distance between the firm's headquarter and its primary lender. However, if the firm has a lot of soft information that is not easily quantifiable and transmitted to outsiders, it is more difficult for the lenders to use the IT-development to move further away from the firm's headquarter. For these firms, the change in the distance should thus be smaller.

The degree of soft information in an industry is interesting for our study as it indicates how difficult it is for outside investors in the market to value a firm in a given industry. The more soft information there is in an industry, the more difficult it is for the market to value the firm. One can expect that the magnitude of mispricing, and hence the share of SBO, will be larger for industries with soft information.

2.5 Mispricing and Acquisition Activity

As described in the introduction, we believe the magnitude and change in mispricing is a factor that drives the SBO activity in different industries. Previous research by Schleifer and Vishny (2007) lifts up the importance of mispricing of stocks in an acquisition setting. They found empirical evidence for that mispricing seems to explain the majority of deals, where relatively undervalued firms are subject to more takeover activity and overvalued firms tend to be more likely to be the acquiring firms. We want to test if this holds on an industry level in an SBO-setting as well. The difference is that we want to see if mispricing affects who acquires an already acquired and PE-owned firm, rather than if it affects the acquisition in the first place.

3 Theoretical Roadmap

Our hypotheses are based upon two broad finance theories: industry momentum and asymmetric information. We will now discuss each of them in turn and explain how they relate to our study.

3.1 Industry Momentum

As discussed in the earlier literature section, the industry momentum phenomenon implies that there exists temporary mispricing in the market for different industries; this can be a result both of rational (Berk, Green and Naik, 2000) and irrational investors (Daniet et al, 1998).

This temporary mispricing in the marketplace for industries is something that PE-firms are aware of, and make use of, when choosing exit-strategy. Since the target firms are delisted when bought out and are not publicly traded, the PE-firm does not know the exact market value of the target firm. When estimating the market value, the PE-firm will often use comparable firms in the same industry that are publicly traded to assess how the market will value the target firm (Bhojraj and Lee, 2009). However, since the PE-firm owns the target firm and has full information on it, it can also perform a fundamental valuation of the firm using a discounted cash flow valuation method or similar. The PE-firm thereby has better prerequisites to make a more correct valuation of the target firm. Through these two analyses, the PE-firm can determine if the market's valuation with limited information is favorable (overvalued) or unfavorable (undervalued).

As we assume that PE-investors are rational, this information about the market's valuation in relation to their own valuation will affect their choice of exit strategy. Overvalued target firms would benefit from an IPO while undervalued firms would rather be kept until the market reverses, as complies with a market timing trading strategy. However, since the holding period of PE-firms is limited and there is pressure for not decreasing the IRR (Anson, 2004), the decision to continue to hold the target until the market reverses would not be a reasonable alternative. A more rational exit strategy would be to sell to another investor that understands the true value of the firm. Since we assume that there is only one category of actor with the same amount of information, other PE-firms, the rational choice of exit strategy would be an SBO.

3.2 Asymmetric Information

In contract theory, asymmetric information exists when one of the contracting parties has more information than the second party (Akerlof, 1970). Asymmetric information is present in PE-firm transactions, since PE-firms have more information about their target firm than any potential investors when deciding to exit the target firm.

We will use the weak efficient market hypothesis as a starting point for our discussion of asymmetric information. The weak efficient market hypothesis states that all past public information is incorporated into prices (Fama, 1970). We will divide the market's population into three groups: i) those with private and public information, ii) those with both past and current public information, and iii) those with only past public information. In this split, there exists information asymmetry as the first group holds more information than the second group and the second group holds more information than the third group. Hence, the market will be divided into three groups where asymmetric information is the separating factor. In our model, the private equity investors that own the targets belong to actors with insider information, that is group i), while investors that are active in searching for new information belong to group ii) and the rest of the market, with information shed in public announcements or annual reports, belongs to group iii). Naturally, private equity investors will have information faster than the rest of the market since they own the target firms, resulting in a time lag until the market holds the same information.

Since the market lacks the inside information about the target firm that the PE-firm holds, they will not be able to price the firm correctly. Instead the market will value the firm as other firms on the market. As a result, the PE-firms that hold good target firms that are more valuable than what the market is willing pay will decide not to go public with the firm. Following this reasoning, only firms that will be correctly valued by the market will be sold to the market place.

However, we assume that the market's valuation will reverse over time and that the mis-pricing will diminish if no new event occurs. This market timing aspect of the valuation can partly be explained by the communicated information by PE-firms, but also by semi-rational investors (group ii) who will take the lead in acting upon new information. The rest of the market will then see the actions of the semi-rationales and prices will begin to reflect the fact

that the entire market now has incorporated the new information. However, when the PE-firm again receives new information that the market does not have, the divergence in information, and hence valuation, will increase again.

This division of groups based on asymmetric information holds for all the industries, but the magnitude of asymmetric information might be larger in some industries when even public information is hard to interpret. In order to proxy the proportion of information asymmetry in an industry we will use the concept of soft and hard information. The more soft information there is in an industry, the more asymmetric information there will be between the PE-firm and the market (Landier, Nair and Wulf, 2009).

3.3 Underlying Hypotheses

Based on our theoretical roadmap we will now formalize two hypotheses that we will test in the remainder of the paper. We will conduct a test to assess whether the increase in the amount of SBOs can be explained by PE-firms applying a market timing strategy. This strategy means that they only sell their target firms to other PE-firms when the market undervalues the industry to which the target firm belongs. Our first hypothesis deals with the difference in SBOs across industries. There has been much research on industry differences in the field of first buyouts, but no such research to our knowledge, related to SBOs. There are, however, reasons to believe that there are differences in the amount of SBOs taking place across industries, as in first buyouts. This leads us to our first hypothesis:

Hypothesis 1: There is a difference in the amount of Secondary Buyouts across industries, both with respect to share of total Secondary Buyouts and with respect to the point in time when the Secondary Buyouts take place.

The second hypothesis we will test relates the valuation of an industry by the market to the exit strategy chosen by the PE-firm.

Hypothesis 2: The amount of Secondary Buyouts in an industry can be explained by the market's valuation of that industry. As an industry is undervalued, it will experience a higher share of Secondary Buyouts than when it is overvalued.

The second hypothesis has two aspects, i) it states that as an industry increases in valuation, it should experience a smaller share of SBO, and ii) an industry that is undervalued should constitute a greater fraction of SBOs of total SBOs compared to an industry that is overvalued. We will now proceed to test these hypotheses.

4 Data

In order to proceed to test our hypotheses, we need three types of data: Data on SBOs, data for our valuation proxies, and data on information softness.

4.1 Secondary Buyouts

In order to find out which deals are SBOs, we need to obtain data on acquisition choice and exit choice. To obtain this, the database Zephyr was used, which contains data for deals and appropriate vendor-, acquirer- and target information. Zephyr is published by Bureau Van Dijk and has the advantage that it distinguishes SBOs from other exits. The exit type SBO (Zephyr uses the term IBO) is assigned a deal if both the acquirer and the vendor are private equity firms or another type of financial sponsor. Another advantage of Zephyr is its broad coverage of European deals.

We limited our scope to deals where the vendor of the target firm is based in Western Europe. The reason for limiting our study to Western Europe is to study a group of firms with large similarities within the group, but also which is clearly separated and different to companies outside the group. These countries are similar in their stringent disclosure requirements, as opposed to the US and other regions. The countries we included in the definition of Western Europe follow Zephyr's definition. The main reason for not including Eastern Europe is the difference in political and financial institutions. We further narrowed the sample down to deals that occurred in the time period 2000-2010. This is due to small SBO activity in the years prior to this period, and hence it would not contribute with much value to our analysis. In addition, we only included completed deals. This left us with 68,562 observations. Lastly, we narrowed the sample by only using the share of the sample where a transaction exceeded 50 percent, which is the limit where the acquiring company receives control over the target. For the majority of deals, the share acquired was reported. For those where such information was

missing (6.9 percent of deals in acquisition, 7.6 percent of SBO, 8.1 percent of IPO), we made a random draw to sort out if the deals where over 50 percent or not.

This scope left us with 35,811 deals, of which 2,959 were SBOs. Table 1 shows a breakdown of what deal types have occurred in the time period 2000-2010. As can be seen, the SBO activity has increased in absolute terms during the last decade but with great variation between the years. When looking at amount of SBO as a fraction of total exits in table 2, we see that a peak was reached in 2007, with 11.7 percent.

Table 1: **The amount of exits through different common exit strategies in absolute numbers year 2000-2010**

Year	Acquisition	SBO	MBO	IPO
2000	1219	159	150	102
2001	2105	136	269	65
2002	2353	129	309	40
2003	2635	190	348	29
2004	2864	275	338	83
2005	3173	383	313	117
2006	3369	455	305	165
2007	3313	504	313	161
2008	3160	354	257	50
2009	3156	148	206	22
2010	2452	226	154	48
Total	29799	2959	2962	882

[1]Data compiled from Bureau Van Dijk. Includes observations from Western Europe and only exits that exceed 50% of shares in target firm.

From table 1 and table 2, we see that the most common exit strategy is acquisition, which is when the target form is sold to a strategic buyer that will experience synergies from the acquisition (Hillier, Grinblatt and Titman, 2008). There are two main subcategories to acquisitions depending on what type of synergies that occur: i) strategic acquisition and ii) conglomerate acquisitions. An acquisition is defined as strategic if it involves operating synergies. In that case, the firms would profit more together than if they were standalone, perhaps because they have complementing capabilities or because competition is reduced. A conglomerate acquisition is when a firm sees financial synergies in buying another firm. Examples of synergies include that the firm's cost of capital is lowered, possibility to make tax gains or other similar type of benefits.

The second type of exit strategy is SBO, which is when a financial sponsor sells to another

Table 2: **The share of different exit strategies of total exits across time**

Year	ACQshare	IPOshare	IBOshare	MBOshare
2000	0.748	0.063	0.098	0.092
2001	0.817	0.025	0.053	0.104
2002	0.831	0.014	0.046	0.109
2003	0.823	0.009	0.059	0.109
2004	0.804	0.023	0.077	0.095
2005	0.796	0.029	0.096	0.079
2006	0.785	0.038	0.106	0.071
2007	0.772	0.038	0.117	0.073
2008	0.827	0.013	0.093	0.067
2009	0.894	0.006	0.042	0.058
2010	0.851	0.017	0.078	0.053
Total	0.814	0.024	0.081	0.081

[3]Share is defined as the amount of exits using the exit-strategy in the year divided by total exits in the year. Data compiled from Bureau Van Dijk. Includes observations from Western Europe and only exits that exceed 50% of shares in target firm.

financial sponsor (Bonini, 2010). The financial sponsor's interest to buy a firm comes from their belief that the firm might be sold with a profit in the future.

The third type of exit strategy is to sell the firm to the market, through an IPO. The motives can be to generate more capital to the firm, or simply to be traded publicly (Hillier, Grinblatt and Titman, 2008). This exit strategy is often very sensitive to hot and cold equity markets (Sousa, 2010), which can be seen as the volatility in amount of IPOs from year to year is high in the tables 1 and 2.

A Management Buyout (MBO) is when the company's current management acquires the firm. This might occur when a previous owner decides to leave the firm, when there are restructuring activities or when the current owners think that the market undervalues their firm. It might also be the case that a PE-firm, after holding the firm for a period, sells it back to the previous owners (Hillier, Grinblatt and Titman, 2008). This exit strategy is about as common as SBO. As can be seen from tables 1 and 2 above, there is a steep increase in acquisition activity in the middle of the decade, which peaks in the years of 2006 and 2007. Several researchers explain the variation in general acquisition activity with conditions of the market. Hence, we will control for this overall effect by using demeaned data.

Since our hypothesis concerns how the SBO activity differs between industries rather than the total amount of SBOs, the next step will be to match the SBO with the industry in which

the target belongs to. We used Zephyr to match every target firm with its US Primary siccode, which we then used to divide the targets in the 14 industries defined by Fama and French. Our industries are presented in table 3. The number of takeovers for each industry and the number of SBOs in each industry is shown in table 4 and 5.

Table 3: **Industry overview and description**

Industry	**Industry Description**
Consumer NonDurables (NoDurbl)	Food, Tobacco, Textiles, Apparel, Leather, Toys
Consumer Durables (Durbl)	Cars, TV's, Furniture, Household Appliances
Manufacturing (Manuf)	Machinery, Trucks, Planes, Chemicals, Paper
Energy (Enrgy)	Oil, Gas, and Coal Extraction Products
High Technology (HiTech)	Computers, Software, and Electronic Equipment
Telecom (Telcm)	Telephone and Television Transmission
Shops (Shops)	Wholesale, Retail, and Some Services (ex. Laundries)
Healthcare (Hlth)	Healthcare, Medical Equipment, Drugs
Utilities (Utils)	Electrical Power, Natural Gas, Water Utilities
Management (Mngt)	Engineering, Accounting, Management Consultancy
Services (Serv)	Advertising, Repair, Amusement, Child Care
Financials (Fins)	Finance Servies, Commercial Banks, Insurance
Mining (Mining)	Metal mining, Gold and Silver Ores
Others (Others)	Construction, Beverages, Electrical Work

[4]Industries defined using Fama and French's four digit US siccode definition for 10 industries. We further used Orbis to divide the original industry "Others" to four industries and received 14 industries to study, instead of 10 industries.

As we can see in table 5, the amount of SBOs differ heavily across industries. However, to understand if this difference is because of a general increase in acquisition activity or an increase in SBOs, it is more informative to look at how the share of SBO out of total exits within the industry has developed for each industry over time.

In the data presented in table 6, there seem to be a strong variation in the share of SBOs across industries and over time. We will test if this variation can be statistically supported in our empirical test.

4.2 Price-earnings Ratio

The second piece of information we need is financial data on different industries in order to test the hypothesis that the variance in amount of SBOs across industries is driven by respective industry's valuation. The US primary siccodes were used in ORBIS to find the identification numbers for each company (SEDOL-number), which we then used to find the company's finan-

Table 4: **Total exits in industries across time**

Year	NoDur	Durbl	Manuf	Enrgy	HiTech	Telcm	Shops
2000	213	41	268	22	290	64	162
2001	389	81	435	22	358	83	292
2002	483	49	416	26	409	87	377
2003	640	48	424	26	387	93	474
2004	643	78	448	37	473	84	468
2005	664	85	570	30	534	103	582
2006	755	67	555	42	545	90	697
2007	807	95	565	31	527	108	546
2008	745	82	494	32	500	78	543
2009	486	53	426	27	450	75	690
2010	356	56	346	41	403	62	467
Total	6181	735	4947	336	4876	927	5298

Year	Hlth	Utils	Mngt	Serv	Fins	Mining	Others
2000	39	43	29	78	128	4	249
2001	73	62	61	137	189	8	385
2002	64	64	56	144	207	11	438
2003	74	72	85	124	245	8	502
2004	81	74	116	165	278	11	604
2005	92	83	99	189	287	10	658
2006	105	80	120	199	281	7	751
2007	96	76	124	227	307	17	765
2008	104	101	93	175	225	9	640
2009	91	112	89	157	254	13	609
2010	97	104	85	130	230	11	492
Total	916	871	957	1725	2631	109	6093

[a]Data over the total, absolute number of exits in each industry. An exit is defined as when a PE-firm divests 50% or more shares in a target firm. The data is taken from Bureau Van Dijk Zephyr and is limited to Western Europe.

Table 5: **Total number of SBO in industries across time**

Year	NoDur	Durbl	Manuf	Enrgy	HiTech	Telcm	Shops
2000	18	8	42	2	15	7	23
2001	19	6	37	0	18	4	17
2002	21	7	32	0	20	4	13
2003	34	7	33	1	19	11	25
2004	50	10	53	2	31	6	36
2005	72	16	91	3	31	7	53
2006	88	9	92	3	49	9	74
2007	104	17	104	4	48	16	61
2008	68	21	72	1	27	4	45
2009	26	1	18	1	14	6	18
2010	29	9	52	1	21	3	31
Total	529	111	626	18	293	77	396

Year	Hlth	Utils	Mngt	Serv	Fins	Mining	Others
2000	6	0	2	8	5	0	23
2001	3	3	7	4	4	0	14
2002	7	1	1	3	3	1	16
2003	9	5	0	4	16	0	26
2004	8	4	6	10	11	0	48
2005	10	7	9	14	16	0	54
2006	14	4	7	17	17	0	72
2007	15	6	12	28	22	1	66
2008	14	11	9	10	8	0	64
2009	5	10	3	9	10	0	27
2010	10	12	7	15	13	0	23
Total	101	63	63	122	125	2	433

[a]Absolute number of SBOs in an industry, defined as PE-firm divesting a target firm to another financial institution. Industries are defined by US siccodes following Fama French industry portfolio definitions. Data is compiled from Bureau van Dijk Zephyr sorted as western Europe, divestures of above 50% of shares in target firm.

Table 6: **Share SBO of total exits in industries across time**

Year	NoDur	Durbl	Manuf	Enrgy	HiTech	Telcm	Shops
2000	0.085	0.195	0.157	0.091	0.052	0.109	0.142
2001	0.049	0.074	0.085	0.000	0.050	0.048	0.058
2002	0.043	0.143	0.077	0.000	0.049	0.046	0.034
2003	0.053	0.146	0.078	0.038	0.049	0.118	0.053
2004	0.078	0.128	0.118	0.054	0.066	0.071	0.077
2005	0.108	0.188	0.160	0.100	0.058	0.068	0.091
2006	0.117	0.134	0.166	0.071	0.090	0.100	0.106
2007	0.129	0.179	0.184	0.129	0.091	0.148	0.112
2008	0.091	0.256	0.146	0.031	0.054	0.051	0.083
2009	0.053	0.019	0.042	0.037	0.031	0.080	0.026
2010	0.081	0.161	0.150	0.024	0.052	0.048	0.066
Total	0.084	0.149	0.127	0.056	0.061	0.082	0.077

Year	Hlth	Utils	Mngt	Serv	Fins	Mining	Others
2000	0.154	0.000	0.069	0.103	0.039	0.000	0.092
2001	0.041	0.048	0.115	0.029	0.021	0.000	0.036
2002	0.109	0.016	0.018	0.021	0.014	0.091	0.037
2003	0.122	0.069	0.000	0.032	0.065	0.000	0.052
2004	0.099	0.054	0.052	0.061	0.040	0.000	0.079
2005	0.109	0.084	0.091	0.074	0.056	0.000	0.082
2006	0.133	0.050	0.058	0.085	0.060	0.000	0.096
2007	0.156	0.079	0.097	0.123	0.072	0.059	0.086
2008	0.135	0.109	0.097	0.057	0.036	0.000	0.100
2009	0.055	0.089	0.034	0.057	0.039	0.000	0.044
2010	0.103	0.115	0.082	0.115	0.057	0.000	0.047
Total	0.112	0.069	0.065	0.070	0.047	0.014	0.070

[a]Share SBO (PE-firm's divesture of target firm to other financial institution) of total exits(all PE-firm divestures) in each industry where data is compiled from Bureau van Dijk Zephyr sorted for Western Europe, divestures over 50% of shares. Industries defined by Fama French industry portfolios based on US siccodes.

cial data in Thompson Data Streamer. The sample of companies is limited to Western Europe and to publicly traded firms. This left us with 6498 observations, with the distribution among industries as shown in table 7.

There are several factors that affect the price-earnings ratio. One factor is future growth. Firms that are expected to have high future growth (for example technology firms) will have a higher price-earnings ratio than firms that are more mature. A second factor that will affect the price-earnings ratio is the previous year's earning. Since we use a trailing measure for earnings where the measure for price is changing over time, a bad report in the previous year would affect the earnings measure and show a low earning. However, if the firm has been showing positive indicators for the current year and the market believes that the firm will make better profits this year, this will be reflected in the price measure. As a result, if profits are expected to increase, this will be reflected in an increasing price-earnings ratio (Molodovsky, 1953). The price-earnings ratios differ heavily across industries, as can be seen from the table 7. The difference in price-earnings ratios of industries reflects that one has different beliefs about the industries. In industries that are characterized by growth and rapid changes, price-earnings ratios would be higher. In contrast, in stabilized industries with low growth, price-earnings ratios would to be lower.

Energy is the industry with the highest price-earnings ratio. Many oil companies, which accounts for a major part of the energy industry, engage in risky drilling projects with uncertain cash flows, this risk is reflected in the price-earnings ratio. Also, since major pressure is directed towards this industry to invent alternative energy sources, and a lot of research is invested in this area as an answer to the pressure, one would expect growth and changes to take place in this industry in the future. In manufacturing however, the low price-earnings ratio reflects people's expectation towards its limitation to growth since the market is very mature with many strong players and stable cash flows. This reduces the risk in the industry and results in a lower price-earnings ratio.

Another perspective of why price-earnings ratios differ across industries is the profit perspective. Powell (1996) arguments and shows empirical evidence for that the variation of a firm's profit, to an extent of 10 percent, can be explained by which industry the firm belongs to. The industry measures used to reach the result were competitive power, entry barrier and industry

Table 7: **Price-earnings ratio of industry portfolios constructed by market cap over time**

Year	NoDur	Durbl	Manuf	Enrgy	HiTech	Telcm	Shops
2000	21.76	12.92	16.07	15.59	30.38	46.97	16.12
2001	17.40	15.86	13.83	16.96	23.24	31.90	20.50
2002	14.31	11.11	10.46	33.38	14.66	18.86	14.31
2003	14.86	13.08	12.79	22.73	20.10	16.75	14.35
2004	15.67	12.08	14.33	24.94	18.75	15.79	14.99
2005	18.09	6.34	16.03	19.43	19.92	12.82	15.88
2006	18.42	13.79	15.07	16.06	18.14	13.27	19.08
2007	19.32	13.20	15.76	24.03	16.91	15.73	16.13
2008	12.49	4.87	8.16	11.90	9.51	8.78	8.19
2009	15.49	14.24	13.01	35.89	15.70	8.76	13.68
2010	14.40	18.78	13.39	27.57	19.45	17.92	13.08

Year	Hlth	Utils	Mngt	Serv	Fins	Mining	Others
2000	34.83	15.59	45.15	22.28	20.17	15.02	14.37
2001	28.21	16.63	43.68	20.67	17.66	14.86	12.71
2002	18.71	11.86	16.67	12.74	14.84	17.82	11.05
2003	20.08	12.27	17.16	15.83	14.31	24.99	13.98
2004	17.46	13.72	18.09	13.89	13.92	25.84	15.81
2005	19.00	13.44	18.51	19.35	14.22	21.35	16.22
2006	15.57	15.69	19.84	19.66	12.90	16.76	17.87
2007	14.68	13.83	17.70	16.45	10.58	27.58	17.64
2008	10.92	11.80	10.60	7.36	5.52	6.27	11.37
2009	11.46	10.74	12.23	13.07	8.58	21.76	16.72
2010	9.58	11.03	15.16	18.60	4.83	26.61	14.79

[a] *Source:* Data for the yearly price, earnings and market capitalization is found from Thompson Datastreamer and compiled into industry portfolios based on market capitalization. The industries are based on Fama French industry portfolio definitions using US 4-digit siccodes. The firms used in the sample are found using Bureau van Dijk Orbis sorted by Western Europe, publicly traded, and US siccodes (for each industry as determined by Fama French definition).

Table 8: **Number of publicly traded firms in each industry**

Industry	**Mean**
NoDurbl	591
Durbl	154
Manuf	767
Enrgy	195
HiTech	911
Telcm	205
Shops	510
Hlth	301
Utils	128
Mngt	40
Serv	238
Fins	2086
Mining	40
Others	378
Total	1038

[5]Data compiled from Orbis. Average number of observations in every industry on an annual basis. The total average observations per year are 1038.

concentration. Higher entry barrier, higher industry concentration and lower competitiveness would lead to higher profit. From this perspective, since the energy industry has very high entry barriers as it is bound to actual resources, it also has a high industry concentration and lower competition, which further explains its higher price-earnings ratio. Manufacturing does have relatively high entry barriers as well, as it generally requires a large capital investment. However, in this case, the absence of growth opportunities seems to dominate the positive profit effect of belonging to the manufacturing industry.

There is an additional factor to why some industries tend to have higher price-earnings ratios, which is the leverage-ratio. Both price and earnings are measures of the value of the firm's equity. With higher leverage, a company will have a lower price-earnings ratio, all things equal (Leibowitz, 2002).

We can also see some variation in the price-earnings ratio within industries across time. This reflects the market's changing expectations for growth, profit or leverage. This might be due to a technology innovation, a change in regulation, an alteration in the competitive environment or another type of structural event. However, in the long run, price-earnings ratios within an industry tend to converge to an industry average according to previous research (Basu, 1977).

Deviations from the industry average price-earnings ratio can be the result of three categories

of factors, i) market-wide factors, ii) industry-specific factors and iii) mispricing. The first two categories represents events that reflects a structural change in the market or industry that alter investors' belief about that industrys future. The third category reflects trends in investment behavior that is of irrational nature and would classify as mispricing. When using the price-earnings ratio as an explanatory factor for the SBO activity, we are more interested in the third class of change. However, this is not entirely separated from structural changes that affect the price-earnings ratio in a specific industry. In order to make some type distinction between when changes in price-earnings ratio reflects one or the other, we will control for the information structure of industries. As will be described in the section *Soft Information*, less information available means more information asymmetry and a higher probability of mispricing. However, when comparing the price-earnings ratio across industries, one should keep in mind that they might reflect both mispricing issues and structural changes that differ across industries.

We do, nevertheless, separate the price-earnings ratio from the type of events that affect the price-earnings ratio in the market as a whole by using demeaned price-earnings data.

4.3 Book Value

Similarly, we will complement the price-earnings data with price-to-book value data for each company in the sample. The data is collected and organized in the same way as the price-earnings data and presented in table 9. The data shows that there are considerably stronger structural differences in the price-to-book value across industries. Industries such as *non-durables*, *energy* and *health* have very high price-to-book values across the entire period, whereas industries such as *durables* and *manufacturing* have very low price-to-book values. The structural difference is most likely related to the amount of capital needed to operate in the industries. *Manufacturing* demands more capital tied into fixed assets than firms operating in the *health* industry. The difference may also represent a difference in the maturity of the firm within the industries and how much future growth is expected.

4.4 Soft Information

Lastly, we have also collected data to control for how easily an outsider can find and interpret information from firms in different industries. This is done by following the procedure set out

Table 9: **Price-to-Book Value data for industry portfolio constructed by market cap over time**

Year	NodDur	Durbl	Manuf	Enrgy	HiTech	Telcm	Shops
2000	70.25	2.39	9.97	70.66	29.22	43.32	51.87
2001	64.28	2.01	8.57	65.77	19.81	33.23	55.13
2002	63.09	1.91	6.70	59.42	10.82	27.09	45.72
2003	62.32	2.26	7.88	59.81	13.84	28.34	50.90
2004	62.60	2.20	8.65	67.73	13.14	28.27	54.66
2005	57.21	2.45	9.78	67.34	13.49	22.31	47.49
2006	57.11	2.79	10.31	57.62	13.47	24.74	41.18
2007	59.86	3.10	11.31	55.63	12.78	29.21	37.81
2008	40.76	1.37	6.15	35.83	7.78	17.64	22.70
2009	48.47	2.30	8.61	55.01	12.14	20.10	34.03
2010	33.38	3.48	7.92	29.75	10.17	3.49	22.03

Year	Hlth	Utils	Mngt	Serv	Fins	Mining	Others
2000	136.11	28.00	61.47	99.51	15.39	150.76	23.67
2001	108.80	22.78	53.15	81.41	11.75	162.59	24.88
2002	82.69	22.65	36.25	55.46	9.39	144.70	17.93
2003	87.16	22.72	39.52	64.48	9.19	130.84	22.31
2004	56.79	21.92	50.21	57.59	10.17	115.27	23.42
2005	61.44	23.19	59.78	57.12	10.34	44.13	26.85
2006	53.87	26.84	62.66	79.28	11.70	56.47	29.48
2007	41.86	24.30	63.75	71.17	9.46	81.14	29.23
2008	34.52	15.13	52.49	36.68	5.20	19.62	18.17
2009	40.88	14.67	58.06	52.62	6.68	164.18	23.91
2010	41.24	9.00	46.32	37.53	4.92	150.63	12.24

Source: Data for the book value, yearly price and shares outstanding is found from Thompson Datastreamer and compiled into industry portfolios based on market capitalization. The industries are based on Fama French industry portfolio definitions using US 4-digit siccodes. The firms used in the sample are found using Bureau van Dijk Orbis sorted by Western Europe, publicly traded, and US siccodes (for each industry as determined by Fama French definition).

by Landier, Nair and Wulf (2009). We will use data from the National Survey of Small Business Finance from 1987 and 1998 and calculate the absolute change in average distance between the firms headquarter and their primary lender within each two-digit U.S siccode classification between 1987 and 1998. As we are using the two-digit industry classification, we will be able to construct 60 industry groups. To match the soft information data with the 14 Fama-French industry portfolios, which are based on four-digit U.S siccodes rather than two-digit siccodes, the two-digit siccodes will be matched into groups that are equivalent to the Fama-French groupings. Since there are more two-digit industry groups than Fama-French industries, the price-earnings data will appear several times for the two-digit siccode groups. In table 10 we combined the softness measure into the Fama French 14 industry groups to show the relative softness of each industry.

Table 10: **Metric of industry softness, average change in distance between firm headquarter and primary lender year 1987-1998 summarized by the Fama French industries**

Industry	**Softness**
NoDur	-10.905
Durbl	1.123
Manuf	-38.378
Enrgy	20.436
HiTech	23.414
Telcm	-1.793
Shops	3.886
Hlth	9.152
Utils	0.029
Mngt	-3.737
Serv	18.160
Fins	2.468
Mining	-0.786
Others	4.778
Total	-1.861

[6]Data compiled from National Survey of Small Business Finance, year 1987 and 1988. The number of softness is calculated as the difference in distance between the firm's headquarter and its primary lender. A positive sign means that the distance increased during the period, reflecting an industry with hard information. A negative sign means that the distance decreased during the period, reflecting an industry with soft information.

5 Method

In this section we will describe the method we will use to test our hypotheses. We follow a similar procedure as the one defined by Mitchell and Mulherin (1996), but with adjustments to suit our study. We will test our two hypotheses in turn.

5.1 Industry Differences in Secondary Buyout Trends

This section aims to test if there is a significant difference in SBO activity across industries. The section relates mainly to test the first of the two hypotheses we have set out. We will begin by outlining a method for testing if there is a variation in SBOs across industries. This will be followed by a method for testing if the average point in time for SBOs taking place is different in different industries. If there is no significant variation between the industries, then we will not be able to test if there is any relationship between valuation of industries and the amount of SBOs taking place.

5.1.1 Variation in Amount of Secondary Buyouts across Industries

To test if there is any variation between industries, we will perform a Pearson Chi-square test on the SBO data. If there is no variation in amount of SBOs between the industries, we would expect the proportion of SBOs taking place in each industry to be the same as the proportion for the market as a whole. If there is a difference in the proportion of SBOs taking place across the industries, we will instead find that there is a difference between the observed proportions of SBOs taking place from the expected value. The formula for the chi-square test is:

$$chi_i^2 = \frac{(observed_i - expected_i)^2}{expected_i} \tag{1}$$

$$H_0 : expected = observed \tag{2}$$

$$H_1 : expected \neq observed \tag{3}$$

In order to test if SBOs follow the same distribution across industries during the 10-year period, we will calculate the expected number of SBOs as:

$$expectedSBOindusty_i = \frac{SBOtotalinmarket}{TotalExitsinMarket} \cdot exitinindustry_i \tag{4}$$

The observed number of SBOs is the sum of the SBOs over the ten-year period within each industry. From these variables we can calculate the chi-square for the sample and determine whether the null hypothesis can be rejected. If it is rejected, it supports our hypothesis that there is a significant variation in SBOs between the industries.

5.1.2 Time Clustering of Secondary Buyouts within Industries

Once we have established if there is a significant variation in the amount of SBOs taking place across industries, we will continue our study by assessing if there is a difference in the timing of when SBOs take place across industries. This is of interest since we believe that the valuation of the industries varies over time. In effect, since the industries are overvalued at different times, the timing of SBO will cluster at different times for different industries if our hypothesis holds.

To test if there is a difference in the timing of SBOs across industries, we will use an ANOVA F-test. This test uses the data to test the variance of the sample and determine if the mean SBO point in time varies across industries. Each SBO-observation will be assigned a number ranging from 1 to 11 depending on which year the SBO takes place. If the buyout takes place in year 2000, the buyout will be assigned the number 1. Similarly, if the buyout takes place in year 2007, it will be assigned the number 8, and so forth. Once every SBO has been assigned a value, we will group the values by which industry they belong to and calculate the mean and the variance of these values for each industry. The F-test will then be performed to determine if the variance in mean timing of SBO differs across industries. If we find that the variance is significantly different between industries, this would support the hypothesis that there is an inter-industry difference in timing of SBO activity.

5.2 Market Valuation and Its Effect on Secondary Buyouts

We will now proceed to develop a method for testing if our second hypothesis holds. If it holds, it means that the amount of SBO within an industry is dependent on the market's valuation of the industry. In this step we will describe the method to be used to test for a relationship between industry valuation and amount of SBOs. As a proxy for the market's valuation of

industries, we will use the price-earnings ratio. The price-earnings ratio is of interest since it shows how much the market is willing to pay for one stock of the firm, in relation to its earnings. The measure is comparable across firms since it relates the stock price to the earnings of the firm. If we had only used share price, the measure would not be comparable since the price depends on how many shares are outstanding. By relating the price to earnings we can see how much an investor is willing to pay for each currency unit of earning. Since the price measure reflects the market's valuation of the firm's equity value, and the earnings measure is historically based, we believe that the price-earnings ratio is a good reflection of how the market values the firm. If the price-earnings ratio for a value-weighted portfolio of stocks for an industry falls, we believe that the market is going towards lower valuation or undervaluation of the industry, whereas if the price-earnings ratio increases it goes towards higher valuation or overvaluation. Since there are other factors that affect the market participants' valuation of the market as a whole, such as increased liquidity, we will use demeaned price-earnings ratio. This means that the industries' price-earnings ratio is demeaned by the price-earnings ratio of the market as a whole. This will sort out market-wide effects that affect all industries.

5.2.1 Regressions using the Absolute Amount of Secondary Buyouts

To test the relationship between market's valuation and SBOs, we will begin by studying the change in the absolute number of SBOs across time and industries. To test our hypothesis we need to control for industry effects and time effects. To do so, we will construct a fixed effect regression. This regression will include time fixed effects and industry fixed effects. In order for the fixed effect regression to yield significant results, we need to have a significant variation in the intra-industry groups. Therefore, the sum of SBO rather than the share of SBO within the industries for each year will be used in a first step to test the relationship. The regression we will run is:

$$\gamma_{ij} = \alpha + \beta_1 PEratio_{ij} + a_i + e_j + \varepsilon \tag{5}$$

Where *gamma* is the amount of SBOs in absolute values in industry i and year j, *alpha* is a constant, *beta* is a coefficient, *PEratio* is the price-earnings ratio of industry i in year j, *epsilon* is the error term, a are industry fixed effects and e are time fixed effects.

This regression should give evidence on whether or not our market-timing hypothesis for

SBOs holds true. However, by using the absolute number of SBOs in an industry, there will probably be several market-wide factors that cause general increases in the amount of SBOs and in the market valuation, which we do not account for when only using the absolute number of SBOs. Therefore, we will also run the test for a fractional measure of SBO.

5.2.2 Regressions Based on the Share of Scondary Buyouts

To further test our second hypothesis that the choice of SBO as an exit strategy depends on market valuation, and addressing the issue of a general market trend, we will continue by using a fraction rather than the absolute number of SBO. The change in SBOs is then set in relation to the general activity in the private-equity market. However, there are also factors that could cause the total share of SBOs to increase that pertain to market-wide events rather than industry-specific events. Possible such market-wide events include increases in market liquidity that might affect the SBO-activity in a larger extent than acquisition activity overall, and hence would affect the share of SBO. We would like to control for such market factors that may affect the total amount of SBO activity in the market. In order to correctly control for industry effects and market-wide effects, but with variation across time, we will run a fixed effect regressions using industry fixed effects and time fixed effects. In a first step, we will run the simplest version of the regressions without any fixed effects to see if there exists a relationship. This is because fixed effects sometimes make it difficult to gain statistical significance when used on a relative small sample size. The regression specification will follow the fixed effect specification below, but without fixed effects. These regressions will not be as robust as the fixed effect regressions.

We will use two different fractions to measure the SBO activity in industries: i) SBOs in an industry as a fraction of total exits in the industry, and ii) SBOs in an industry as a fraction of total SBOs. These two fractions are based one somewhat different assumptions on how valuation affects the SBO activity, as discussed below. The first regression on share of SBO is:

$$\omega_{ij} = \alpha + \beta_1 PEratio_{ij} + a_i + e_j + \varepsilon \tag{6}$$

Where *omega* is the amount of SBOs as a fraction of total exits in industry i and year j, *alpha* is a constant, *beta* is a coefficient, *PEratio* is the price-earnings ratio of industry i in year j, *epsilon* is the error term, a are industry fixed effects and e are time fixed effects.

This regression takes into account the effect of valuation on SBO in a given industry over time. It considers not only the effect of valuation today, but also relates to the trend in valuation over time in that industry. Hence, if two industries have the same magnitude of mispricing but one industry just experienced a huge drop in valuation, this will be accounted for in the regression using this definition of share of SBO.

The second regression on share of SBO is as follows:

$$\theta_{ij} = \alpha + \beta_1 PEratio_{ij} + a_i + e_j + \varepsilon \tag{7}$$

Where *theta* is the share of secondary buyout in the industry of total secondary buyouts in the market and the other variables are defined as in equation 6.

The regression using the second definition of share of SBO studies the effect of SBO caused by the magnitude of mispricing in different industries in a given year. Hence, it aims to see if the market's valuation of the industries can explain the split of SBO between the different industries. It accounts for the magnitude of mispricing in a static manner, rather than over time. The definition of our hypothesis covers both these aspects.

5.2.3 Regressions Controlling for Soft Information

As a last control, we will use a measure for the degree of softness in information in the different industries. This is interesting since if the industry contains a lot of hard information, it will be easier for the market to value firms in that industry as compared to firms in other industries. As a result, there should be less mispricing when a PE-firm divests a firm in industries with hard information. This is controlled for in the regression below:

$$\omega_{hj} = \alpha + \beta_1 PEratio_{ij} + \beta_2 S_h + a_i + e_j + \varepsilon \tag{8}$$

Where S is a measure for how hard the information is in the industry h defined by the two-digit siccodes, and the other variables are defined as in equation 6 and 7. The variable i represents the Fama French 14 industries whereas h are the 60 two-digit industries.

We will also control for how soft the information in the industry is, using our second definition

of share of SBO. The regression is as follows:

$$\theta_{hj} = \alpha + \beta_1 PEratio_{ij} + \beta_2 S_h + a_i + e_j + \varepsilon \tag{9}$$

Where the variables are defined as in equation 8. With these regressions we hope to be able to support or reject our hypothesis that the amount of SBOs in an industry depend on the market's valuation of that industry.

5.3 Robustness Check Using Price to Book Value

To create a robustness check for our regressions, we will also use the price-to-book value measure for each firm within the industries instead of the price-earnings measure and run the same regressions. The price to book value shows how much an investor is willing to pay for each dollar of assets that the firm holds. Similarly to the price-earnings ratio, the level of the ratio will differ across industries and across companies due to factors such as capital structure, reliance on fixed assets to generate revenue and the choice of buying versus leasing assets. The benefit of using the price-to-book value measure is that the book value of assets tends to be more stable over time than earnings. It is also a measure that can be used for companies that have a negative earning in the previous period.

6 Result

Now that we have collected all the data and developed a method for testing our hypothesis, we will proceed to perform the actual test and report the results. This section is organized to follow the same structure as in the *Method* section.

6.1 Industry Differences in Secondary Buyout Trends

6.1.1 Variation in Amount of Secondary Buyouts across Industries

Table 11 below shows the total number of SBOs in each industry, the expected number of SBOs, the chi-square for each industry and the sum of the chi-square across the industries. The result from the chi-square test for our dataset over SBOs yields a chi-square of 280.38. Since we have 13 degrees of freedom, the critical value for a 5 percent significance level is 22.36. Hence, this

result is highly significant and thereby shows that there is a considerable variation in how many SBOs that take place in different industries.

Table 11: **A test of the difference in amount of SBO:s across industries**

Industry	**Observed**	**Expected**	**Chi-squared**	**Total chi-squared**
Nodur	503	494.5683	.1437498	280.3757
Durbl	111	60.42348	42.33428	280.3757
Manuf	622	403.0699	118.9134	280.3757
Enrgy	18	27.62216	3.351875	280.3757
HiTech	301	403.8097	26.17529	280.3757
Telcm	77	76.20757	.0082399	280.3757
Shops	396	435.5423	3.589997	280.3757
Hlth	245	173.9539	29.01663	280.3757
Utils	63	71.60388	1.033838	280.3757
Mngt	63	78.67384	3.122631	280.3757
Serv	122	141.8102	2.767392	280.3757
Fins	125	216.2914	38.5319	280.3757
Mining	2	8.960761	5.407152	280.3757
Others	459	514.4628	5.979283	280.3757

[7]This table shows statistical evidence for that there is a significant difference in amount of SBOs between industries. The second column shows the observed amount of SBO in the industry. The third column shows the expected amount of SBOs in an industry, calculated as the total SBO in the market times the total amount of exits in the industry divided by the total exits in the market (see equation 4). The third columns presents the chi-square for each industry which is calucated as (observed-expected) squared divided by the expected (see equation 1). Column 4 presents the total Chi-square is calculated by summing the chi-squared for all industries, and is significant on a 1 percent level.

The data shows that several industries experienced an observed amount of SBOs that differ from what is expected. It might be interesting to see in this stage, before we run the regressions, if there seem to be any correlation between over- and underrepresentation of SBO and the market's easiness to interpret information. Intuitively, hard information would mean that the market has easier to extract and interpret information from the industry. This would mean less asymmetric information in that industry and hence less need for SBOs. A table on industry softness, which is the proxy we use for the degree of asymmetric information, was presented in table 10.

Industries that have significantly lower-than-expected SBO activity are *financials* and *high technology*, both of which are categorized as industries with hard information. This is consistent with our hypothesis. Since the market can interpret the information in these industries better, they should be subject to less valuation inaccuracies, which would lead to less need to sell to another PE-firm as compared to the market. When looking at industries with higher-than-

expected amount of SBO-activity, we see that two of them, *durables* and *health* do categorize as industries with hard information, while the third one *manufacturing* is categorized as an industry with soft information. The high SBO-activity in manufacturing relates well to the fact that it is difficult to understand information from that industry, but the other two are more counterintuitive. It should be noted that although they are considered as industries with hard information in absolute terms, but the degree of hardness is relatively weak. However, in order to test if there is an actual relationship between information, valuation and SBO, we need to test for it, which is done further ahead in the essay.

Now that we have proved there is a variation in the amount of SBOs taking place across industries, we proceed to the next step of our method and test to see if there is a difference in timing across the industries.

6.1.2 Time Clustering of Secondary Buyouts within Industries

Table 12, column (1), shows the average SBO point in time and the standard deviation of the average SBO point in time for each industry.

The average SBO point in time is compared to when in time the average exit took place in each industry. The average point in time for exits in each industry is shown in column (2) in table 12. In order to test if the average SBO point in time is the same across all industries, we performed an F-test on the data. The result of our test shows a significant difference in variance, with a p-value of 0.0013. The results are presented in table 13.

Thus, we can see that there is a significant difference in the average SBO point in time across the industries. This supports our first hypothesis that the industries are not driven by the exact same trend, but that there are some inter-industry differences in the clustering of both exits and SBOs.

As can be seen from table 12, the average point in time for SBOs lies in the range of 2005.5 to 2006.9, which is equivalent to June 2004 through December 2006. The average for the entire market is 2005.6, which is approximately in July 2005. Industries with early time clusters for SBOs are *mining*, *durables* and *telecom*, whereas *utilities*, *management* and *service* have late time clusters. Comparing the SBO-clustering to the general exit-clustering of each industry might be more interesting since it does not only indicate a general surge in acquisition activity

Table 12: **Average point in time of SBO in the industries and Exit in the industriesand standard deviation**

Industry	Average year SBO	Average year exit	Difference
NoDur	2005.76	2005.38	0.38
	2.42	2.72	0.00
Durb	2005.41	2005.20	0.22
	2.84	2.96	0.00
Manuf	2005.44	2005.20	0.24
	2.75	2.92	0.00
Enrgy	2005.50	2005.44	0.06
	2.66	3.05	0.00
HiTech	2005.38	2005.32	0.06
	2.71	2.96	0.00
Telcm	2005.01	2004.96	0.05
	2.82	2.96	0.00
Shops	2005.63	2005.75	-0.12
	2.63	2.81	0.00
Hlth	2005.66	2005.60	0.06
	2.81	2.97	0.00
Utils	2006.90	2005.72	1.18
	2.66	3.08	0.00
Mngt	2005.92	2005.61	0.31
	2.79	2.76	0.00
Serv	2006.07	2005.39	0.68
	2.75	2.88	0.00
Fins	2005.78	2005.36	0.41
	2.66	2.92	0.00
Mining	2004.50	2005.58	-1.08
	3.54	3.00	0.00
Others	2005.69	2005.56	0.14
	2.55	2.83	0.00
Total	2005.63	2005.44	0.21
	2.65	2.87	0.26

[8]The table shows at what point in time the SBO tend to cluster in different industries (column 2), and compares it the point in time when the exit clusters (column 3). The second line for each industry shows the standard deviation for when the exits take place. Every industry's observation is assigned a number ranging from 1 to 11 depending on which year it occurred. A smaller number in indicates an earlier clustering of SBO, compared to other industries.The third column shows the difference between the second and third column. A negative difference between SBO clustering and exit clustering indicates that the number of SBO:s clustering within an industry is later than the exit clustering. The larger the magnitude of the difference, the larger is the difference between SBO clustering and exit clustering within an industry.

Table 13: **Result from the ANOVA F-test on the difference in point of time for SBO between industries**

Source	SS	df	F	Prob greater than F
Between Groups	223.719735	13	2.46	0.0025

[9]The statistics above shows that there is a significant industry difference with respect to timing. We see that the between groups variable is significant, with 13 degrees of freedom, on a 0.25 percent significance level.

but more reflects a change of exit strategy choice in that industry. We see that *mining* and *durables* are industries where SBO occurred significantly before the exit clustering, whereas *utilities*, *service* and *finance* are industries with a later SBO-clustering compared to exit-clustering. According to our hypothesis, the time clustering in an industry should indicate that the undervaluation in that industry is most apparent around that time. This will be tested for in the coming section, but it might be interesting with an intuitive discussion from a valuation perspective already at this stage. Table 7 shows the price-earnings ratios for each industry over time, which is the proxy used for the market's valuation.

The industry *mining* is one of the industries with early time clustering of SBOs, both compared to other industries but also compared to its own exit activity. It had its peak of SBO in 2004. At that time the price-earnings ratio was high compared to the entire market. The price-earnings ratio had also increased within the industry from 2000 to 2004. This is counterintuitive to our hypothesis, but might be due to small sample of only 2 SBO observations in the industry. When looking at the industry *durables*, the SBOs were clustered around 2005, which is before most other industries. It is also early in relation to its own exit clustering. The biggest dip in price-earnings ratio for the *durables* industry was in 2005, when it experienced an all time-low for the decade with a price-earnings ratio of 6.34. This is consistent with our hypothesis that undervaluation creates a surge in SBOs. For the industry *telecom*, with early SBO activity compared to other industries but relatively late compared to its own exit activity, we see a similar pattern. The SBO is clustered around 2005 and there we see a heavy downwards trend in the price-earnings ratio, from 46.97 in 2000 to 12.82 in 2005. We also see that the SBO clustering in 2005 is one year later than the exit clustering in 2004. When looking at the valuation, we see that the price-earnings ratio was lower during the SBO clustering in 2005 (12.82) compared to the price-earnings ratio in the time of the exit clustering year 2004 (15.79). Also *telecom* shows a trend that support our hypothesis that a lower valuation leads to more SBOs in a given time period.

Some industries are also significantly later in their SBO activity relative to the general exit activity. For an example, the majority of SBOs in the industry *service* occurred in 2006, while the majority of exit occurred in 2005. However, the difference in price-earnings ratio is small for the same time period. The industry *utilities* follows a similar pattern, with the majority

of SBOs occurred in 2007 while majority of exit occurred in 2006. Relating this to the price-earnings ratio, we see that 2006/2007 was the period when *utilities* shifted from being overvalued to undervalued, in relation to the overall market. This is consistent with our market-timing hypothesis.

Hence, the clustering within industries seems to be related to either an undervaluation of the industry compared to the rest of the market, or an undervaluation compared to itself during previous years.

Generally, in year 2004-2006, all industries except *mining* and *others* have lower price-earnings ratios than in 2000. Year 2004-2006 is also the period when most of the industries are experiencing a clustering in SBO. Since the average holding period of PE-firms is 3-5 years, one might relate the clustering of SBO with the heavy decrease in price-earnings ratio during the same period. This is accounted for in our fixed effect regressions.

6.2 Market Valuation and Its Effect on Secondary Buyouts

Now that we have found significant result for that the SBO-activity differs across industries with respect to time and amount, we will proceed to test the relation between the market's valuation of industries and SBO-activity in those industries as outlined in the method section.

6.2.1 Regressions using the Absolute Amount of Secondary Buyouts

We will begin by testing how the absolute amount of SBOs changes as a function of the price-earnings ratio. This regression is first run without any fixed effects and then including time fixed effects and industry fixed effects in order to account for that every industry has observations that occur several times in our data, once for every year. When we do not include fixed effects we find a significant, negative relation between the number of SBO in an industry and year and the market's valuation of the industry. This result is consistent with our second hypothesis. However, once we include fixed effects in the regression, we find a positive correlation between the price-earnings ratio in an industry and the amount of SBOs in the industry. The regression shows that for each increase in the price-earnings ratio of 1, the number of SBOs increase with 0.395. This should be compared to the standard error in amount of SBOs of 0.146. Since the marginal effect of price-earnings ratio is greater than the standard error, the result is also

Table 14: **Table of (1) the absolute number of SBO in an industry and year against the price-earnings ratio for that year without fixed effect and (2)the absolute number of SBO in an industry and year against the price-earnings ratio for that year with fixed time and industry effects**

	(1)	(2)
	Absolute number of SBO	Absolute number of SBO
pe-ratio	-0.729	0.385
	(-4.65)	(3.16)
2001		-1.441
		(-0.60)
2002		-0.509
		(-0.20)
2003		3.872
		(1.68)
2004		10.36
		(4.24)
2005		19.00
		(4.40)
2006		24.85
		(4.28)
2007		28.98
		(4.58)
2008		19.06
		(4.66)
2009		3.765
		(1.12)
2010		6.666
		(2.72)
Constant	23.01	6.792
	(9.79)	(1.50)
Observations	154	154

[10]This table shows the regression where the absolute number of SBO is the dependent variable and the price-earnings ratio, which is the proxy for valuation, is the independent variable. In column (1) the regression does not include any fixed effects. In column (2) we have included time and industry fixed effects. The table reports the coefficient of year dummies 2000-2010. The regression coefficient is both statistically and economically significant. Both regressions are statistically significant result on a 5 percent significance level.

economically significant.

When studying the fixed effects in the regression, most of the industry dummies are significant with varying signs. The exceptions are the industries *shops*, *manufacturing* and *others*. We also see from the regression result that the coefficient is significant and positive (0.39). The positive coefficient is, however, counterintuitive to our hypothesis, since we believe that a higher valuation would make the exit choice of IPO and trade sales more attractive, and hence the choice of SBO less attractive.

At this point we would like to highlight a potential flaw with regressing the absolute amount of SBOs against the price-earnings ratio. The problem with studying the absolute number of SBOs and regressing against the price-earnings ratio is that the regression will not account for a general surge in the amount of exits. If there were a general increase in liquidity in the market, this would lead investors to place more money into the equity market. Since the amount of equity that can be purchased is finite (i.e. supply is constant over the short term) the price on assets will increase. The increased price would lead to a higher price-earnings ratio for each stock. At the same time, the increased liquidity will also affect the PE-firms. The PE-firms will receive a higher price for their divestures, and also find many potential buyers for their holdings. This will lead to a higher amount of total exits in period of higher liquidity. The liquid markets will allow the PE-firms to find cheap borrowing, which they can use to finance new investments. As a result, the PE-firms will also experience a higher liquidity and will want to use their liquidity to undertake new investments. One way of finding good investments is to buy from other PE-firms. Thereby, the amount of SBOs will increase at the same time as the price-earnings ratio will increase, which explains the intuition behind the positive coefficient. The problem would be mitigated by instead regressing the price-earnings ratio against fractions of SBO of total exits, using shares instead of absolute amounts. We will present the results from these regressions in the following sections. In both cases we will use the price-earnings ratio and fraction of SBOs from the same year.

6.2.2 Regressions Based on the Share of Secondary Buyouts

Below we will present and discuss the regression results for regressions 6 and 7 that focus on the share of SBOs as a fractions rather than absolute amount. We will begin by running the

regressions without fixed effects. In column (1) the dependent variable is share of SBO defined as SBO of total exits. In column (2) the share of SBO is defined as SBO of total SBOs. This result is presented in table 15. The regressions in table 15 show significant negative correlation

Table 15: **Table of (1) share SBO of total exits and (2) share SBO of total SBOs against the price-earnings ratio**

	(1)	(2)
	Share SBO of total exits	Share SBO of total SBOs
pe-ratio	-0.00130	-0.00155
	(-1.98)	(-3.22)
Constant	0.0823	0.0795
	(15.58)	(11.91)
Observations	154	154

[11]This table shows the regression where share of SBO is the dependent variable and the price-earnings ratio, which is the proxy for valuation, is the independent variable. In column (1) Share of SBO is defined as SBO of total exits within an industry. In column (2) Share of SBO defined as SBO in an industry of total SBOs in a given year. The value in parenthesis is the t-statistic for each papameter. The regression coefficient is both statistically and economically significant, and tells us as the price-earnings ratio increase with 10, the share of SBO will decrease with 1.3 percent and 1.6 percent respectively.

between the market valuation of an industry and the share of SBOs using both definitions of share of SBO. The result is consistent with the hypothesis that a high market valuation leads to a lower share of SBOs in that industry. If we look at the results in column (1), we can see that if the price-earnings ratio increases by 1, the share of SBOs of total exits in that industry should decrease by 0.0013. From the result in column (2), we see that if the price-earnings ratio increases by 1, the share of SBO of total SBOs that year will decrease by 0.0015. Hence, in these first-step regressions of share of SBO, we see that there seems to exist a relationship between valuation and the share of SBO. Through these regressions we have been able to take away some of the market-wide factors that affect both the market valuation and the absolute amount of SBOs.

However, these pooled cross-section regressions disregard the fact that some observations belong to the same industry. In order to take into account the industry and time specific factors that might affect the regression, we will run the same regressions with fixed effects. The fixed effect regressions will control for time- and industry specific effects that may affect both the price-earnings ratio and amount of SBOs in that industry, such as a deregulation. When we include fixed time and industry effects in the regression we find statistically insignificant result, which is shown in the table 16.

Table 16: **Regression Table of (1) share SBO of total exits and (2) share SBO of total SBOs against the price-earnings ratio including fixed industry and time effects**

	(1)	(2)
	Share SBO of total exits	Share SBO of total SBOs
pe-ratio	0.000246	0.000165
	(0.44)	(0.60)
2001	-0.0450	0.0000860
	(-3.60)	(0.01)
2002	-0.0410	0.000698
	(-2.85)	(0.07)
2003	-0.0283	0.000708
	(-2.10)	(0.08)
2004	-0.0209	0.000884
	(-1.74)	(0.11)
2005	0.000637	0.00128
	(0.05)	(0.14)
2006	0.000975	0.00158
	(0.07)	(0.16)
2007	0.0283	0.00185
	(1.93)	(0.20)
2008	0.000305	0.00219
	(0.02)	(0.21)
2009	-0.0456	0.00194
	(-2.84)	(0.16)
2010	-0.0119	0.000803
	(-0.85)	(0.09)
Constant	0.0890	0.0695
	(5.36)	(3.50)
Observations	154	154

[12]This table shows the fixed effect regressions where Share of SBO is the dependent variable and the price-earnings ratio is the independent variable. In column (1) Share of SBO is defined as SBO of total exits within an industry. In column (2) Share of SBO defined as SBO in an industry of total SBOs in a given year. The table shows the coefficients for the price-earnings ratio of an industry and its affects the number of SBOs in a year. It also shows the coefficients of year dummies 2000-2010. The numbers in parenthesis in the t-value for each parameter. The coefficient is statistically insignificant for both regressions. When including time- and year fixed effects, the price-earnings ratio has no explanatory power on Share of SBO.

Interestingly, the fixed regression results are insignificant. This is most probably due to the fact that the fractions used are very small and that the changes across years are very small, so when fixed effects are used in the regression, it is difficult to find significant results. When comparing the regression results using the two definitions of share of SBO, we see that the t-value is slightly more statistically significant using the share of SBO defined as SBO of total SBOs, but the coefficient is slightly less economically significant. The smaller economical significance can be explained by that the valuation is better in explaining what is happening within an industry (higher share of SBO or lower share of SBO) than between industries.

The second interesting observation is that both regressions show a positive correlation between the fraction of SBO and the price-earnings ratio. This may imply that even when we are using a fraction measure, we do not manage to take away the effect that an increased liquidity would have on total SBO activity. This might suggest that when there is more activity on the market, this leads to a higher amount of increase in SBO activity than other exit-strategies. However, the coefficient is very small compared to the standard error, so the results are neither statistically nor economically significant.

Another reason to the insignificant result would be that when accounting for industry-specific effects, such as deregulation, technological advancements etc., the actual number of the price-earnings ratio has little value in describing the SBO activity in an industry. It might also be that the industries are subject to different information structures that make one industry's negative valuation a stronger indicator of mispricing than the other. This is accounted for in the regressions further ahead with soft information as a control variable. The regressions above state that an industry's contribution to total SBO cannot be explained by the valuation of the industry, after considering industry fixed effects.

6.2.3 General Analysis of Fixed Effects

Our regression shows varying results regarding fixed effects. For the regression where the dependent variable is the amount of SBOs, the result does show a significant coefficient on valuation. However, the sign of the coefficient is probably affected by general market trends. This is why share is more interesting to study. When not including fixed effects in the share of SBO regressions, we obtained significant results on the coefficient. However, then we were not considering

the fact that some observations belong to the same industry. By not taking that into account, we are disregarding the time trend within that industry. This is something that we do not want to do, since the time trends within industries are just as important. Just because one industry is more undervalued does not necessarily mean that it will experience a larger share of SBO than other less undervalued industries. Perhaps some other industries just experienced a huge drop, which investors believe will be recoverable, while the already undervalued firm might not be expected to bounce back as quickly. Then one would expect that the industries that just dropped in valuation would increase more in SBO-activity, although the magnitude of undervaluation is not as low for them as for some industries that have been undervalued a long time. If there is little possibility that it will bounce back in a period of 3-5 years although it is undervalued, then it will be hard to find another PE-investor who will want to buy it.

This time trend is essential in a market timing strategy, and hence the fixed effects regressions are the ones taking into account this time trend. When having considered the time trend within industries, it seems that variation in valuation across industries has less to say.

6.2.4 Regressions Controlling for Soft Information

We will now use the degree of soft information within an industry to control for how prone the industry is to mispricing. We will re-run regression 6 and 7 but including a variable that measure the degree of soft information in the given industry. As explained in the section *Theoretical Roadmap*, the data for soft information is a proxy for the degree of asymmetric information. A higher value indicates more hard information and less asymmetric information. When including this control variable, we use a more narrow industry definition, so that we have 60 industries rather than 14. The data for soft information is then combined with the price-earnings ratio data.

In column (1) the regression controlled for soft information is obtained by defining the dependent variable as the share of SBOs in an industry of total exits in the industry. In column (2) the regression is obtained by defining the dependent variable as the share of SBO in an industry of total SBOs, in a given year. When including the soft information variable as a control variable, we see in column (1) that all three coefficients are negative and significant on a 10 percent significance level. The regression result shows that as the price-earnings ratio

Table 17: **Regression table of (1) share SBO of total exits and (2) share SBO of total SBOs against the price-earnings ratio controlling for information softness and including fixed industry and time effects**

	(1)	(2)
	Share SBO of total exits	Share SBO of total SBOs
pe-ratio	-0.00131	0.00000868
	(-1.69)	(0.04)
information softness	-0.0000506	0.00000640
	(-1.71)	(0.80)
interaction term	-0.0000203	-0.00000283
	(-2.27)	(-1.61)
2000	0.0528	-0.0000331
	(2.14)	(-0.01)
2001		0.000500
		(0.13)
2002	0.000579	0.000151
	(0.04)	(0.04)
2003	0.00789	0.000383
	(0.66)	(0.11)
2004	0.0336	0.000315
	(2.50)	(0.10)
2005	0.0385	0.000753
	(2.62)	(0.24)
2006	0.0420	-0.000240
	(2.56)	(-0.08)
2007	0.0778	-0.000306
	(3.17)	(-0.10)
2008	0.0181	
	(1.16)	
2009	-0.0257	-0.000364
	(-2.10)	(-0.11)
2010	0.0331	0.000243
	(2.45)	(0.08)
Constant	0.0613	0.0158
	(5.91)	(4.17)
Observations	540	583

[13]This table shows the fixed effect regressions controlled for information structure, where Share of SBO is the dependent variable and the price-earnings ratio is the independent variable. In column (1) Share of SBO is defined as SBO of total exits within an industry. In column (2) Share of SBO is defined as SBO in an industry of total SBOs in a given year. The first regression shows a statistical significant result of the price-earnings ratio on 10 percent level. The coefficient is negative and tells us that if the price-earnings ratio would increase with 10, the Share of SBO would decrease with 1.3 percent. The interaction term is also statistically significant, and tells us that industries with hard information will experience an additional decrease of SBO caused by valuation, compared to industries with soft information. The second regression shows an insignificant result of the coefficient, both statistically and economically.

increases, the fraction of SBOs of total exits in a given industry decreases. This is consistent with our second hypothesis that a relatively high market valuation will lead to a relatively low share of SBO. The variable absolute softness is also negative and significant. This implies that, ceteris paribus, industries with hard information tend to experience a smaller share of SBO than industries than industries with a lot of hard information.

Another term of interest in this regression is the interaction term between information softness and valuation. This interaction term shows the additional effect of valuation on share of SBO that depends on soft information. This is consistent with our belief on the effect of asymmetric information on SBOs. Less asymmetric information, leads to a more accurate valuation, which leads to a smaller share of SBO. The coefficient is negative and statistically significant on a 5 percent level, and says that if the industry's absolute information hardness increases with 1000 units, the share of SBO will decrease with 0.0203 times the price-earnings ratio. Since the standard deviation of the interaction term is smaller than the coefficient, we can conclude that it is economically significant as well.

It tells us that the share of SBO does not only depend on if the industry is overvalued or not but also on how easy it if to obtain information from that industry. If two industries have the same valuation but different information structure, the regression above tells us that the industry with more difficulties to communicate information will experience a higher share of SBO. This might be because in industries with soft information one can be more sure that the valuation is a result of mispricing, but in an industry with hard information it would be more probable that the valuation actually reflects operating changes in the industry. And, since we assume that SBO occurs due to mispricing and not bad outlook in real terms, it is intuitive that the regression result show an additional negative effect of valuation on share of SBO that is due to soft information.

In column (2), we have run the same regression but instead used the share of SBO that is calculated as SBO in an industry in a given year as a fraction of total SBOs during that year. When including the control variable in the fixed effect regression, we see that none of the variables are significant. Both the t-value and the coefficient of the price-earnings coefficient decreased comparing to the corresponding regression without the soft information variable. The coefficient is now less positive than before. The insignificant result in this regression probably

also reflects a lack in variation as discussed in the section above. However, the decreased economic and statistical significance indicates that when controlling for the different information structures of industries, then valuation comes out as less important in determining an industry's share of total SBOs in a given year.

6.2.5 General analysis of Soft Information

When including the information control variable in our regressions, we see varying results. In the first regression with share of SBO as SBO of total exits, the coefficient of price-earnings ratio becomes more statistically and economically significant. In the second regression, with share of SBO as SBO of total SBOs, the coefficient of price-earnings ratio becomes less statistically and economically significant. In the first regression, it tells us that when sorting out the information structure of the different industries, the valuation does seem to be a driver behind an industry's share of SBO. In the second regression, it tells us that when controlling for the information aspect, it is even more difficult to look at industries' magnitude of mispricing to predict how the SBOs will be distributed across industries, in a given year.

The interaction term of information and price-earnings ratio is negative for both regressions. If the price-earnings ratio is the same but the industry conveys hard information rather than soft information, the share of SBO will decrease (increase) more in the industry with hard information if the price-earnings ratio is positive (negative).

What is interesting is that in industries with soft information, the effect on valuation creates an opposite behavior than our hypothesis. If the industry is a soft-information industry, it will have a negative absolute softness value. Hence, if the price-earnings ratio is positive (negative), the product when multiplied with the coefficient of the interaction term will be positive (negative). Hence, a positive price-earnings ratio in a soft information industry will have two effects (for those regressions where the coefficient of the price-earnings ratio is negative): i) it will decrease the share of SBO through the effect on the price-earnings ratio, ii) it will increase the share of SBO through the effect on the interaction term. However, since the coefficient on price-earnings ratio is larger than the one the interaction term, the first effect will dominate even for soft information industries.

6.2.6 General analysis of the two definitions of Share of Secondary Buyouts

We see varying results depending on which definition of share of SBO we use. In the regression controlled for information, this difference becomes most evident. These two definitions are based on different assumptions, as mentioned in the method section. While the first one aim to see if valuation can explain the share of SBO in a given industry over time, the second definition aims to see if valuation can explain the split of SBO into different industries in a given time period. Hence, the first definition accounts for trends within an industry, while the second definition looks at the magnitude of mispricing in a specific time period.

In summary, the valuation of an industry is better in explaining intra-industry movements of SBO, rather than inter-industry differences of the distribution of SBO.

6.2.7 Robustness Check Using Price to Book Value

We have repeated the procedure above using price to book value instead of price-earnings ratio as a robustness check for our results. The results from these regressions are presented in table 18 and 19 and show similar results to the regressions using the price-earnings ratio. We find that the regressions in table 18 show a negative relation between price to book value that is significant, however, once industry dummies are added to the regressions as in table 19, the results are no longer significant.

Table 18: **Table of (1) share SBO of total exits and (2) share SBO of total SBOs against the price-book value ratio**

	(1)	(2)
	SBO of total exits	Share SBO of total SBOs
bv-ratio	-0.000399	-0.000580
	(-3.32)	(-5.31)
Constant	0.0844	0.0843
	(17.44)	(12.63)
Observations	154	154

[14]This table shows the regression where share of SBO is the dependent variable and the price-book value ratio, which is the proxy for valuation, is the independent variable. In column (1) Share of SBO is defined as SBO of total exits within an industry. In column (2) Share of SBO defined as SBO in an industry of total SBOs in a given year. The value in parenthesis is the t-statistic for each papameter. The regression coefficient is both statistically and economically significant. Both regressions are statistically significant on a 5 percent significance level.

Table 19: **Regression Table of (1) share SBO of total exits and (2) share SBO of total SBOs against the price to book-value ratio including fixed industry and time effects**

	(1)	(2)
	Share SBO of total exits	Share SBO of total SBOs
bv-ratio	0.000171	-0.0000130
	(1.00)	(-0.18)
2001	-0.0445	-0.0000446
	(-3.48)	(-0.00)
2002	-0.0404	-0.000129
	(-2.91)	(-0.01)
2003	-0.0277	-0.000131
	(-2.11)	(-0.02)
2004	-0.0199	-0.000178
	(-1.75)	(-0.02)
2005	0.00244	-0.000283
	(0.19)	(-0.03)
2006	0.00254	-0.000299
	(0.20)	(-0.03)
2007	0.0299	-0.000337
	(2.31)	(-0.04)
2008	0.00256	-0.000421
	(0.15)	(-0.04)
2009	-0.0446	-0.000302
	(-3.21)	(-0.03)
2010	-0.00892	-0.000321
	(-0.62)	(-0.03)
Constant	0.0852	0.0719
	(5.40)	(3.47)
Observations	154	154

[15]This table shows the fixed effect regressions where Share of SBO is the dependent variable and the price-to-book value ratio is the independent variable. In column (1) Share of SBO is defined as SBO of total exits within an industry. In column (2) Share of SBO defined as SBO in an industry of total SBOs in a given year. The table shows the coefficients for the price-to-book value ratio of an industry and how it affects the number of SBOs in a year. It also shows the coefficients of year dummies 2000-2010. The numbers in parenthesis in the t-value for each parameter. The coefficient is statistically insignificant for both regressions. When including time- and year fixed effects, the price-to-book value ratio has no explanatory power on Share of SBO.

7 Conclusion

This essay set out to test how the market valuation of different industries affects the choice of conducting an SBO. The study offers evidence for that there is a difference across industries both in relation to the amount of SBOs and to when in time the bulk of SBOs are conducted. The study also provides some support to the theory that the choice of conducting an SBO depends on how the market values the industry that the target firm belongs to.

First, our empirical test examined if there is a significant difference in the amount and timing of SBOs across industries. We found that in regard to the amount of SBOs, some industries experience a higher SBO-activity than what is expected. Particularly, the industries *durables* and *health* fell into this group. On the other hand, the industries *financials* and *high technology* experience a lower SBO-activity than expected. Regarding timing, some industries have a relatively early SBO clustering, for example *durables* and *telecom*, while some other industries such as *services* and *management* have a relatively late SBO clustering. The significant results tell us that the industry differences in acquisition activity that has been subject to research regarding first buyouts, also apply in this SBO setting. By finding evidence in support of this hypothesis, we can conclude that there is a significant difference in SBO-activity across industries. Thereby, we believe that when a PE- firm decides to make an exit, the choice to conduct an SBO will be affected by the industry belonging of the target firm.

Secondly, we conducted a test to examine if the variation of the amount and timing of SBOs depend on how the market values the industry. We only found limited support for this hypothesis when studying how the price-earnings ratio relates to the amount of SBOs in the industry. Using the absolute amount of SBO in different industries as the dependent variable, the fixed effect regressions gave us a positive and significant coefficient. However, due to the general increase in market liquidity that might have driven both the increase in valuation and the increase in SBOs, we wanted to test the same regression that set SBO is proportion to another metric. When we did not include fixed effects we found significant negative correlation between the share of SBOs and market valuation. However, when we included fixed effects the regressions did not yield any statistically or economically significant results, and does thus not confirm our hypothesis.

We do believe that there is some possibility that our hypothesis does in fact hold true. When

we included a control for soft information in our regressions we found a negative correlation between price-earnings ratio and the amount of SBO in an industry, that was significant on a 10 percent level. Since we believe that the availability of hard information is important for the ability of outside investors to value the firm, this regression is more correct than the regressions excluding the information variable. That this regression is significant gives hope that if there had been more observations available, or if we could use a more effective measure of mispricing, we would be able to support our hypothesis. We believe that the insignificance of our result is mainly due to few observations and that the use of fixed effects takes out much of the explanatory power in the regressions.

In conclusion, we have gained support for the belief that industry belonging is an important driver of the choice of conducting an SBO, however, the essay only provides some evidence for that the market's valuation of the industry is the underlying determinant for why some industries have more SBOs than others.

7.1 Problematization and suggested further research

We would like to acknowledge a few potential flaws in our study that might compromise the accuracy of our results, mainly stemming from how we have chosen to conduct the empirical test and from the data that it is based on.

First of all, we believe that the study could benefit from a more thorough industry classification. We chose to follow the Fama French industry portfolios, however, these portfolios were constructed several years ago, but the industry landscape is quickly changing so the classification may not be accurate. There has been a large increase in the importance of the service sector, and the high technology industry has been strongly diversified during the years. This change makes the industry classifications somewhat outdated, and as a result our market valuation measures become less fine-tuned. A second problem in regard to the industry classifications is that the data for soft information follows a different industry classification from the data for market valuation (that is the price-earnings data). Although most of the two-digit siccode industries where possible to match with a Fama French portfolio, there were several two-digit siccode industries that fell into two Fama French industries. This was solved by placing those siccode groups to the Fama French portfolio which most of the firm should be in. Another

problem regarding the industries has been the trade-off between how many industry groups we should have and how many observations (and thus accuracy) in each industry. We decided to use 14 portfolios as we believe this gave the best trade-off between number of observations in each industry without making the industry definitions to wide and black-boxy.

We would also like to acknowledge that the data we used for market valuation does not include firms that have been delisted during the time period 2000-2010, this is due to difficulty in collecting financial data for delisted firms. This is problematic from several aspects. First, we have more firms in the sample in the later years than in the earlier year, which may have led to a bias in the price-earnings data, since there are more observations in the later years it may lead to less accurate values in the earlier years leading to a problem of heteroeskadacity. A greater problem with not including delisted firms in the study is that the firms that have been delisted are often firms that hold large explanatory power to the study. Many of the firms that are delisted have been so because of a takeover or merger, and thus are those observations that may be of most interest when PE-firms are considering making an exit. The firms that tend to be targeted for these types of takeover are often poorly run firms or firms that offer synergies to the acquiring firm. Even though the price-earnings ratio for these firms tends to be erratic around the announcement for the deal, we believe that prior to the announcement it is not possible to predict if these firms are systematically over- or undervalued. If these firms had been included in the study, we do not believe they affect our measure of valuation in the long run. Some delisted firms, however, have been delisted due to distress followed by bankruptcy. These firms will have a much lower price-earnings ratio than other firms in the sample as a result of the distress; thus, by not including these firms the result is biased upwards.

It should also be noted that the price-earnings ratio is an accounting sensitive measure. Thereby, if different firms use different accounting principle, it will affect the earnings measure of the ratio. For two otherwise identical firms, the choice of accounting measure may result in different earnings measures and thereby different price-earnings ratio.

As SBOs is a recent phenomenon in the private equity market, there is still a lot of research that needs to be conducted on the area. After this study on industry factors and market timing that we have conducted, we believe that this is an interesting area that could benefit from further research. We would like to suggest a few specific topics that we believe would be

interesting to gain more knowledge in.

First of all, we believe it would be interesting to conduct a study on market timing and SBO that explicitly accounts for market conditions. Perhaps, a control could be added to account for availability of debt and market liquidity. We believe that this could add explanatory power to the study, and may shed more light on how market conditions affect SBOs.

It would also be interesting to conduct this study for a broader number of exit strategies, and study how the market's valuation of industries and the degree of soft information in the industries affect the choice of conducting an IPO as exit strategy.

Lastly, we believe another interesting study would use other measures for market valuation, such as EBITDA margins, or perhaps even operational measure (for example in the industry shops it may be interesting to study price per store). We also believe that a future study might explicitly relate industry wide effects with the amount of SBO. Perhaps if there is a deregulation in an industry this will affect the choice of exit strategy.

8 Summary

In the period of 2000-2010, the exit strategy SBO, where a PE-firm sells an investment to another PE-firm, has caught attention and gained ground as an accepted strategy for exit. Several previous studies have lifted up reasons for the general surge in SBOs, where high market liquidity and cold equity markets have been mentioned as important driving factors. However, we have aimed to study the SBO activity from a mispricing perspective on an industry level, where every industry constitutes one observation per year. Following the theory of industry momentum, we expected to see mispricing of industries and reversal effects in the observed industries over time. We argue that PE-firms try to make use of this type of mispricing. However, in order for investors to sort out when mispricing exists, one needs to have information. Following the theory of asymmetric information, we divided the market into two broad groups: PE-investors with insider information, and the market with public information. From this outlook, we assumed that PE-firms would have better information on whether a firm is mispriced or not. If a firm would belong to an industry that is mispriced and undervalued by the market, our hypothesis is that SBO would rise as an attractive exit strategy.

Following this theoretical roadmap, we used data from Zephyr to collect SBO-information

and Thompson Data Streamer to collect information on valuation of different industries, where we used the price-earnings ratio as a proxy for valuation. Further, we used the demeaned price-earnings ratio in order to avoid general market trends.

The method we used to test our hypothesis followed a three-step approach. First, we tested if the amount of SBOs differs across industries by calculating the difference of the observed amount of SBO and the expected amount of SBO. The second test was to see if the timing of SBO differed between industries. The third test was to test our second hypothesis; that SBO-activity within an industry can be explained by the market's valuation.

When testing this, we found significant results for that industries are different with respect to timing and frequency of SBOs. It supported our further progression to use the industries as different observations to test our second hypothesis. In our fixed effect regression, we used share of SBO as the dependent variable, defined as i) SBO of total exits in a given industry, and, ii) SBO in an industry of total SBOs. When running the fixed effect regression, however, we found that the valuation aspect became insignificant. Hence, it seemed that the absolute value of the price-earnings ratio has little to say regarding both the share of SBO of total exits and the share of SBO of total SBOs.

However, since our hypothesis of mispricing is based on the level of asymmetric information, it felt intuitive to control for the degree of asymmetric information in our study as well. If the market has better information about some industries, then this information asymmetry will not be as large. The degree of asymmetric information is controlled for using a soft information variable. When controlling for soft information, it brings forth the valuation's effect on SBO when the dependent variable is the share of SBO of total exits. The regression showed that a higher valuation in an industry would decrease the industry's share of SBO, with a significance level of 10 percent. Hence, we can conclude that our second hypothesis also seems to hold true, when controlling for information softness. For the second definition of share of SBO, no significant regression is yielded. Hence, our regression also shows that when sorting out industry and time fixed effects, the mispricing mechanism cannot explain the split of total SBO into its constituent industries. However, other potential reasons for the insignificant result might be due to relatively small sample size and a small variation in the share of SBO, combined with the usage of fixed effect regressions.

References

[1] G. Akerlaf. The market for 'lemons': Quality uncertainty and the market mechanism. *Journal of Economics*, 84:488–500, 1970.

[2] B. Ambrose and D. Winters. Does and industry effect exist for leveraged buyouts? *Financial Management*, 21, No.1, Leverage Buyouts Special Issue:89–101, 1992.

[3] M. Anson. Trends in private equity. *Journal of Wealth Management*, 7:84–91, 2004.

[4] Shleifer A. Barberis, Nicholas and Vishny. R. A model of investor sentiment. *Journal of Financial Economics*, 49:307–343, 1998.

[5] S. Basu. The levered p/e ratio. *Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis*, 32:663–682, 1977.

[6] Green R. Berk, J. and V. Naik. Optimal investment, growth options, and security returns. *The Journal of Finance*, 54:1553–1607, 2000.

[7] S. Bhojraj and C. Lee. Who is my peer? a valuation-based approach to the selection of comparable firms. *Journal of Accounting Research*, 40:407–439, 2002.

[8] S. Bonini. Secondary buy-outs. *Working paper*, 2010.

[9] Hirshleifer D. Daniel, Kent and Subrahmanyam. A. A theory of overconfidence, self-attribution, and security market under- and overreactions. *The Journal of Finance*, 53:1839–1886, 1998.

[10] E. Fama. Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25:383–417, 1970.

[11] Grinblatt Hillier and Titman. *Financial Markets and Corporate Strategy*, volume European Edition. 2008.

[12] Nair Landier, A. and J B., Wulf. Trade-offs in staying close: Corporate decision making and geographic dispersion. *The Review of Financial Studies*, 22:1119–1148, 2009.

[13] M. Leibowitz. The levered p/e ratio. *Financial Analysts Journal*, 58:68–77, 2002.

[14] M.L. Mitchell and J.H. Mulherin. The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics*, 41:193–229, 1996.

[15] M. Molodovsky. Some aspects of price-earnings ratios. *The Analysts Journal*, 9:65–78, 1953.

[16] T.J. Moskowitz and M. Grinblatt. Do industries explain momentum? *The Journal of Finance*, 54:1249–1290, 1999.

[17] J.H. Mulherin and A.L. Boone. Comparing acquisitions and divestitures. *Journal of Corporate Finance*, 6:117–139, 2000.

[18] T.C. Powell. How much does industry matter? an alternative empirical test. *Strategic Management Journal*, 17:323–334, 1996.

[19] A. Schleifer and R.W. Vishny. Stock market driven acquisitions. *Journal of Financial Economics*, 70:295–311, 2003.

[20] M. Sousa. Why do pe firms sell to each other? *Working paper*, 2010.

[21] P. Stromberg. The new demography of pe. *Working paper*, Swedish Institute for Financial Research:Stockholm School of Economics, 2007.

[22] Y. Wang. Why buy and at what price? *Working paper*, 2010.