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Sphere Performance and the Financial Crisis 2008-2009
– Evidence from the OMXS

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ABSTRACT

Influential sphere ownership and its implications on company performance is an area of continuous research. Previous literature focuses on agency costs and how these are affected by family ownership related to firm performance, but also on banking-relationships and investment horizons. We study the performance of Investor, Industrivärden and Kinnevik firms and non-sphere firms listed on the OMXS Large Cap and Mid Cap from the first quarter 2006 to the third quarter 2009. Thus, we are able to study how the sample firms in general and the sphere firms in particular were affected by the crisis starting in early 2008. We find evidence that the Investor and the Industrivärden firms did not experience as heavy drops in excess stock returns as the other firms during the crisis, confirming some branches of agency cost theory's claim that they would be more stable. These firms also report higher debt-to-capital ratios; Investor has a higher ratio for the entire period and for Industrivärden we find an increase during the crisis period. For Kinnevik, we cannot find any difference from the non-sphere firms, which argues for the effects of having a specific sphere bank. It seems like sphere firms acted very conservatively regarding investments during the crisis, which gives no support to arguments of extended investment horizons, but that is a matter of concern in the definition of efficient investments during the crisis. What we have seen though is that the firms invest in general in accordance with the industry they operate in.

Key Words: Sphere firms, family ownership, financial crisis

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Introduction

Among scholars it is yet controversial whether sphere influence is a beneficial form of ownership and particularly what the effects are during recessions. Previous research dating back to the late 1970s within corporate finance and governance has provided findings of the importance and drawbacks of internal capital markets, banking relationships and large shareholders' effect on managerial efficiency.

One such area is that of large influential shareholder ownerships, including e.g. studies of family firms, conglomerates and closed-end funds. Anderson and Reeb (2003) argue that family firms perform better than nonfamily firms. Their results are inconsistent with the hypothesis that minority shareholders are adversely affected by family ownership, suggesting that it is an effective organizational structure. Partly connected to this branch of research are that of agency costs and the effect of managerial ownership. Jensen and Meckling (1976) find a relationship between the separation of management and investors and the size of agency costs, where agency costs are increasing in this separation. Many scholars have sought to empirically test this hypothesis on mainly American firms and the general conclusion of the accumulated papers is that firms with few, large and coordinated shareholders will be more efficient.

Few studies have however been carried out on Swedish firms, which is surprising as Swedish enterprise is characterized by several old spheres, possessing large shares of the market. Also, there is a lack of papers investigating the effect of large shareholder owner structure during crises. Yet, it seems obvious that these areas are of common interest. Business media in Sweden reports that some of the Swedish spheres managed through the crisis without particularly heavy losses compared to other investors[1]. If this is the case, it implies that ownership structure could better explain the ex post realized returns and performance during the crisis period, rather than e.g. market beta, size and book-to-market that typically are used in estimating models of ex ante returns and valuations. Another experience outside of media and theory; a person working within the Swedish corporate finance industry posted us the question: "Say that Sandvik and Atlas Copco are equal in every aspect except that one of them is trading at premium at the stock exchange. What could be the reason for that?" The answer the person sought was based in ownership structure, namely that Atlas Copco is a part of the Wallenberg consortium (Investor) and Sandvik is not. If this were true, there would also be differences among the spheres.

There are more influential spheres in Sweden other than Wallenberg/Investor, for instance the Stenbeck/Kinnevik sphere and Industrivärden/Handelsbanken. In addition to these, there are also some spheres mainly investing and managing firms who are not traded on the stock exchange, such as Bonnier. Investor, Kinnevik and Industrivärden would however be considered as the most important ones because of

[1] Ollevik, Nils-Olof (2008).

their size, age and investments. Investor and Industrivärden are in many aspects very similar; they are both associated with a large bank, most of their possessions are large cap firms, they diversify their investments over industries and they control their investments through a listed investment firm. One difference is that Industrivärden is not associated with a particular family; however, Wallenberg's investment group Investor is no longer governed by family members only but rather by businessmen and – women with extensive experience from management and board positions, as in the case with Industrivärden. Kinnevik is also an influential sphere with investments in large companies, but with the difference that they are not related to a specific bank and their portfolio of firms is less diversified.

It is useful to study all the three spheres, in order to obtain a wider perspective on the impact of strong ownership on firm performance, or of sphere ownership more precisely. We analyze excess stock returns, profitability, investment rates and debt-to-capital ratios for 127 firms listed on the OMXS Large Cap and Mid Cap to explore the effects of such ownership. Our sample period stretches from the last quarter 2005 to the third quarter of 2009; thus we will be able to study how the sample firms in general and the sphere firms in particular were affected by the crisis starting in early 2008.

When running the tests, we control for industry-related effects (both fixed and indexed), size and book-to-market effects and take heteroskedasticity, endogeneity, outliers and multicollinearity into consideration. We also re-run some tests to gain more robustness to our findings.

We find that the Investor and Industrivärden spheres did not drop as much in excess stock returns as the other firms during the crisis, supporting the idea that large shareholders bring stability to the market performance. For Investor, we also find that the excess returns in the non-crisis period were somewhat lower than for non-Investor firms. These two firms also report higher leverage ratios (debt-to-capital), in the case of Investor it is higher for the entire period and for Industrivärden we find an increase for the crisis period. For Kinnevik, we cannot conclude that they finance their capital differently from the non-sphere firms, suggesting that the Investor and Industrivärden spheres take use of their bank influences.

Profitability of the samples firms, not surprisingly, went down during the crisis. We cannot state that sphere control had any effects on firm profitability during the crisis, though we have seen that the Investor firms had lower profitability over the full sample-period when taking industry-specific effects into account. But this finding has to be taken more carefully since it could be explained by firm size.

In general the investment firms (i.e. Investor AB, Industrivärden AB and Investments AB Kinnevik) decreased their investment rates in 2008 compared to 2007, which talks against theories of family firms having extended horizons. Rather, it seems like the spheres acted very conservatively and did not take on additional risk. Overall we observe that the sample firms' investment rates are highly connected to the

industries they belong to. However, it should be noted that the number of observations is low. We find that Investor invested more when their portfolio firms invested less and vice versa, which could possibly be explained by cross-subsidization. For Industrivärden, there are no particular patterns in investment rates and for Kinnevik we observe that the investment rate for the portfolio firms constantly rose over the entire sample period, but it does not reveal anything fruitful about the validity of the cross-subsidization hypothesis.

To summarize our conclusions and relating back to what we expect to observe with respect to theory, there are two main findings. Our paper supports previous research arguing that banking-relationships are important assets for access to capital. Our data, which however lacks detailed information on where the firms borrow from and if they were in need of additional debt during the crisis, cannot state any evidence of lock-in effects. Hence, bank presence in the portfolio seems to be beneficial for the sphere. The stock returns for the Investor and the Industrivärden spheres did not drop as much as the other sample firms during the crisis; this talks in favor of the previous research on agency costs that argue for minority shareholders being better off with large shareholders in the firm ownership structure.

Section I presents theories and hypotheses from previous studies within this field. Section II clarifies the paper's research focus. Section III presents the choice of sample and study period, the definition of sphere firms, the test variables and summary statistics for the entire sample and sub-groups. In Section IV, we report the results and analyses from our empirical tests, and in section V we discuss the robustness and validity of our results as well as potential problems of endogeneity. Section VI is the conclusion which summarizes the main points of the paper and Section VII suggests some areas for future research. All tables and figures are found in the Appendix.

I. Sphere Performance and the Financial Crisis

In this section, we will present literature that relates to our study and the four areas we have for intention to investigate.

In previous literature, there are a lot of studies on family firms with several investments. In this study, two of the three chosen spheres are associated with families (Investor with Wallenberg and Kinnevik with Stenbeck) whereas one is not (Industrivärden). Even if none of them is totally governed by the family, the families still have large influence and most authors define family firms widely enough to make their findings applicable on our study as well.

A. Equity Prices and Governance

Previous research on large shareholders' effect on returns addresses the issues of agency costs. Several scholars argue that this corporate governance form decreases myopic behavior whereas some point at the risks associated with the separation of ownership and management.

According to theory of free-riding, in a company with a lot of small owners it may not be worth for any of them to spend resources on monitoring the performance of the management. Shleifer and Vishny (1986) discover a model in which the presence of large minority shareholders provides a partial solution to this free-rider problem. They point to that large shareholders increase expected profits and the more so the larger their ownership stake. This suggests that sphere firms which are characterized by having large and well known shareholders would benefit from this which could result in higher and/or more stable stock prices compared to other companies on the stock exchange.

Gompers, Ishii and Metrick (2003) investigate variations in shareholder rights by using a "Governance index", including 1 500 large firms during the 1990s. They observe strong correlation between stock returns and corporate governance. However, they experience problems in explaining causality, but state that if an 11.4 percentage point difference in firm value were even partially "caused" by each additional governance provision, then the long-run benefits of eliminating multiple provisions would be enormous.

Stein (1989) makes an attempt to answer the question; does the desire to achieve a high stock price induce corporate managers to behave myopically, inflating current earnings at the expense of longer term benefits? His underlying reasoning is that higher earnings today will be correlated with higher earnings in the future. The message of his paper is that managers' horizons can actually be very important. Shorter horizons lead to increasingly myopic behavior, even when stock market participants are rational, i.e. this suggests that managers who possess shares in the firm would have longer horizons which would also benefit external shareholders. Then shareholders and especially minority ones would benefit from sphere ownerships where horizons are extended and therefore earnings and stock prices would not be inflated.

La Porta, Lopez-de-Silanes and Shleifer (1998) present a different picture of the ownership structure than widely accepted in finance literature regarding that dispersed ownership would prevent minority shareholder expropriation. They point out that this view has been questioned lately, since a lot of firms in the US have large management ownership stakes. They suggest not only that, in many countries, large corporations have large shareholders, but also that these are active in corporate governance activities. They conclude that ownership concentration is a consequence of poor legal protection of minority shareholders which results in benefits for both small and large shareholders.

B. Managerial Efficiency and Profitability

The ownership effects on profitability have been debated for several decades. Agency costs are also relevant here as well as cross-subsidization and the effects when family CEOs and chairmen resign and are substituted by externals.

Jensen and Meckling (1976) were two of the first authors to argue for these effects. Their principal argument is that higher degree of separation between managers and the stockholders, the more agency costs there will be based on the assumption that managers act to maximize their own utility. Their definition of utility is including not only monetary but also social, physical and other benefits. They conclude that firms where the managers own all the equity will be the most efficient and vice versa.

Ang, Cole and Wuh Lin (2000) further develop Jensen and Meckling's findings by empirically testing their suggestions on American small businesses. They present two main results with the first being a confirmation that agency costs increase with outside managers. Moreover, they add an extra dimension by suggesting that agency costs also increase with the number of shareholders with the motivation that few strong shareholders easier can monitor managers than several individually weak ones.

In our study of three large Swedish spheres, these theories do not apply directly since the investment firms not necessarily are represented in their portfolio firms' management boards. However, as Hjelström (2007) notes, the Swedish closed-end investment firms influence their partially controlled firms' decisions and strategies in order to increase firm value. Earlier studies of Swedish companies show that managers often possess relatively high levels of shares themselves[2]. In that light, we should observe a majority of firms where managers maximize their own utility both by acting for the firm's best and by supporting own benefits.

Guedj and Papasaikoudi (2003) enlarge the principal-agency perspective. According to them, families with several investments allocate resources unequally among the portfolio firms in order to promote certain firms ahead of others. By doing so, the families can guarantee maintained superior performances in some firms and use the results from this for all portfolio firms. Large diversified spheres should, as follows from their reasoning, bear less risk and be more profitable regardless of the economic environment.

Several authors have studied the difference in value of family-founded and family-run businesses. McConaughy et al (1998) find that founding-family controlled firms both are more efficient and more valuable than other firms. In their comparison, they include several control variables e.g. size, industry and

[2] See e.g. Cronqvist and Nilsson (2003). They particularly study how minority holders' wealth is affected by agency costs in different sets of ownership structures.

managerial ownership. Some of their conclusions are that these firms have higher margins, present more rapid growth in sales and invest more than non-family firms.

Villalonga and Amit (2004) develop and complicate this picture somewhat. They suggest that family ownership creates abnormal value only when the founding family still serves as CEO or chairman of the board. The effect disappears when descendants or external people are hired to these positions. Yet, when the founding families are in charge, the firms enjoy superior performance within the same fields as McConaughy et al suggest. There is an important flaw in Villalonga and Amit's analysis, namely that the average age of the family firms in their sample firm is lower than for the non-family firms, which might have an effect on the measures they study.

Morck, Shleifer and Vishny (1988) investigate the relation between management ownership and market valuation. They present a positive relation between management ownership and firm value in the 0% to 5% range. Then in the 5% to 25% range the relation is negative, but above 25% the relation is positive again. They suggest that the reason for the negative relation between 5% and 25% is due to entrenchment effects. We have not taken different levels of ownership into account in our study, but it is worth to bear in mind that the impact on management ownership in sphere performance could be non-monotonic.

C. Leverage and Loan Implications

Overall, on leverage suggests that the supply of credits dropped during the financial crisis implying that firm leverage should have decreased. However, the literature presents advantages of and drawbacks resulting from banking-relationships: on the one hand, it should give easier access to capital; on the other hand it can generate lock-in effects.

The financial crisis has had severe implications on extended loans and the level of debt-to-capital level of companies, as documented by Ivashina and Scharfstein (2009). New loans to large borrowers in the US fell heavily during the last quarter of 2008, relative to the prior quarter. They observed the bad performance of large financial companies which caused short-term bank creditors to decrease their credit and made it hard for banks to renew their short-term debt. This made interest rate spreads go up, which resulted in a greater drop in lending than what is usually observed in economic downturns. This would suggest that firms decreased or at least not increased their borrowing to levels above normal during the financial crisis. Another conclusion Ivashina and Scharfstein draw is that if banks had liquidity issues during the crisis, they would be reluctant to extend credit to firms with which they had no prior relationship. Then if bank-borrower relationships matter for the lending process, borrowers of a liquidity-constrained bank could have problems

to sign new credit contracts with another because of lock-in effects, which clearly is a drawback of banking-relationships.

Cole (1998) also finds that a lender is more likely to extend credit to a firm with which it has a pre-existing relationship, but that the length of this relationship is unimportant, hence he discusses the impact of asymmetric information in lender-borrower relationships. Moreover, the results propose that the lender engender the valuable information from these relationships fast. This implies that the take-overs made by e.g. Investor, who acquired two firms during our sample period Husqvarna (2006) and Biovitrum (2009), can be incorporated in the analysis of how the debt-to-capital ratios changed, assuming that Investor's portfolio firms preferably borrow from the sphere's partially controlled bank SEB[3]. Cole states that the relationship is independent of reputational effects of the firm as proxied by age and of firm riskiness as proxied by size, leverage, return, and creditworthiness. That is why we in our study do not have to consider age and credit worthiness in particular when analyzing the presence and effects of banking relationships, but to consider size, leverage and return when analyzing debt-to-capital ratios.

Blackwell and Winters (1997) study the terms of credit and observe an inverse relation between the closeness of banking relationships and interest rates. In a sample of bank loans to small firms they also find a positive link between the bank's monitoring effort and the loan's interest rate. This would emerge from that banking-relationships result in less need of monitoring and that these cost savings would therefore as suggested be transmitted to the firms, in the form of lower interest rates. The authors study small private firms and therefore assert that they can not extrapolate the results on large, publicly traded firms. The reason is that there are no substantial cost savings from monitoring large firms since they are highly transparent, why only small firms would benefit from staying in banking relationships longer. Though, if there are benefits from the relationship other than decreased monitoring costs resulting in lower loan rates, those would apply to large firms as well and thus the conclusions would be applicable to our study as well, even though we are not investigating the terms of credit in this paper.

Greenbaum, Kanatas and Venezia (1988) have studied how a bank's access of private information of potential borrowers default risk affects the loan rate offered. They show that a bank's newer borrowers are treated more favorably in terms of loan rate than those of longer standing, given that the latter's default risk is known more precisely than that of the former. Consequently, they mean that the probability that the borrower will get an offer with a lower loan rate from a competitor is increasing with the length of the relationship. Though the credit worthiness of potential new borrowers were more uncertain during the financial crisis than during normal states of the economy and might have favored longer standing borrowers

[3] It is difficult to gather information on where the firms borrow from. We therefore assume that the Investor firms preferably borrow from their house bank SEB and Industrivärden from Handelsbanken. Hjelström (2007) finds that the investment firms aim at shaping strategic decisions in their portfolio firms, which would support our assumption.

for just the reason stated by the authors, that the default risk is known more precisely than for newer borrowers. Thus, even though the theory is contradictive to the others above concerning importance of relationship, it should have been reversed and therefore affirmative during the financial crisis.

Rajan (1992) argues that the costs of bank financing are not as clear as the benefits. Informed banks make flexible financial decisions which prevent a firm's projects from going away, the cost of this credit is that banks have bargaining power over the firm's earnings, once projects have started. Therefore the main conclusion of his paper is that there is a basic trade-off between bank debt and arm's-length debt.

D. Investment Utilization and Allocation

Combining ownership and management are by prior literature suggested to result in lower firm value, because of these managers inability to make efficient investment decisions, while managers in firms with specialized ownership instead would be more successful in assessing efficient investments. However, spheres might engage in cross-subsidization, i.e. an inefficient distribution of capital among the portfolio firms.

James (1999) examines the specialization of ownership and decision-making functions and state that these could instead cause considerable agency costs, which he shows may not be present in family businesses. He states that the extended horizon characteristics of family firms may provide the necessary incentives for decision makers to invest in line with the market rule, while limiting agency costs that arise when ownership and control are separated. This suggests that family-firms and spheres would combine the best of two worlds and therefore make investments when it is optimal. The findings of James show that greater attention needs to be placed on the family firm as a viable and effective form of economic organization.

There is a lot of literature on the conglomerate discount, i.e. that conglomerates are valued less than matched portfolios of the individual firms. Recent studies find that this diversification discount results from conglomerates' inefficient allocation of capital expenditures across divisions. We are not investigating whether this value discrepancy is at hand, but if there are signs of cross-subsidization in investment rates of the sample**.** One feature of a model of Scharfstein and Stein (2000) is that it implies a kind of "socialism" in internal capital allocation, whereby weaker divisions get subsidized by stronger ones. This adds up to the literature above about that there are some factors beside pure market driven ones about how sphere capital is allocated.

Rajan (1992) argues that while banking-relationships offers flexibility, the control they receive by extending credit could give rise to lock-in behavior. This confirms the theory discussed under debt-to-capital, that relationship-banking can distort the firm's incentives.

II. Research Focus

From the presentation of previous literature of our four research variables, we will now form a set of hypotheses that summarizes what we expect to observe in our data.

The large shareholders characterizing sphere firms would induce stability in stock prices, due to elimination of free-riding. Our sample period stretches over the financial crisis, where we expect the sphere firms to over-perform, i.e. not experience as heavy drops in returns as the non-sphere firms (*Hypothesis I*).

Previous research suggests that active large shareholders will aim at affecting the managerial decisions. This would result in sphere firms being more profitable and possibly manage through the crisis more effectively than non-sphere firms (*Hypothesis II*).

Banking relationships make the access to interest-bearing debt easier according to the literature. However, there might follow lock-in effects, making firms related to specific banks unable to borrow from other banks. We can therefore expect the Industrivärden and Investor spheres to have higher debt-to-capital ratios compared to other firms, including the Kinnevik sphere (*Hypothesis III*).

Concerning investment rates, the horizons have been given a lot of attention in conjunction with family firm ownership. From this we would expect the sphere firms' investment rates to be unrelated to the financial crisis (*Hypothesis IV*).

III. Data and Methodology

In this section we present our sample data, the performance measures and control variables used to carry out the empirical tests. Then we report summary statistics for the whole sample and comparative statistics between the subgroups sphere firms versus non-sphere firms; and crisis versus non-crisis period respectively.

A. Choice of Time Period and Sample

We are interested in studying the effects of sphere ownership on firm performance before and during the financial crisis, hence we have chosen the time period from the first quarter 2006 (fourth quarter 2005 for

investment rates) to the third quarter 2009 (fourth quarter 2008 for investment rates). There is no unified opinion of when the crisis started, which led us to explore some of the major events in 2007 and 2008 and evaluate the extent to which these gave evidence for when the crisis began. The Northern Rock bailout in September 2007 was one of the earliest victims of the subprime lending effects[4]; they were later nationalized by the United Kingdom government in February 2008. The Northern Rock is however only one out of several cases, although one of the most important ones, of financial break-downs in the mortgage industry during this period. Almeida, Campello, Laranjeira and Weisbenner (2009) investigate the effects of the credit crisis of 2007 and define the three first quarters of 2007 as the pre-crisis period. Ivashina and Scharfstein (2009) state that the peak of the crisis occurred in late 2008, hence when the market began to recover. With respect to this and certain events on the market we therefore define the first quarter of 2008 as the beginning of the crisis. For three of the tests, where we evaluate accounting measures, the crisis period will be until the third quarter of 2009, thus the last period in our sample. However, the market recovered in terms of stock returns already in the beginning of 2009, so the fourth quarter of 2008 will be the end period when analyzing stock returns.

The paper focuses on Swedish firms listed on the OMXS Large Cap and OMXS Mid Cap with one exception for Kinnevik-owned Metro International, which has an A and B share listed on the OMXS Small Cap. Some firms have been excluded because of late introduction on the stock exchange causing problems in obtaining sufficient accounting data. Totally 127 companies are included in the sample, however some of them have been introduced during the period so the total number of firm-quarter observations is 1 931. Out of these 127 companies, we identify 26 firms partially owned by spheres of which one, L M Ericsson AB, is owned by both Industrivärden and Investor[5]. The distribution of firms among spheres and the nine industry groups, as defined by Dagens Industri, is summarized in Table 1. Clearly, firms in the Financials group are overrepresented among the sphere firms (34.7%), which motivate us to take industry effects into account when running the regressions. We will do this by forming an equivalent number of dummy variables which will estimate these effects; for investment rate and stock returns we will also use industry indices to more confidently control for differences among industries and periods.

The accounting data is mainly downloaded from COMPUSTAT Global - Quarterly and in case of flaws we have complemented the data set with these missing values by manually going through quarterly reports for 75 firms. For banks and financial companies, we have used somewhat different measures for some of the variables due to the unique nature of their businesses, which will be described in connection to the usage of these measures. Since we use the same data for all firms within the industry and control for industry-specific

[4] BBC News (2007).

[5] In the empirical tests we will treat this as owned by both of them. When we use dummy variables for sphere ownerships, both the Investor and the Industrivärden dummy will equal one for L M Ericsson.

effects, most potential deviations will be cleansed out. In addition, we will test for robustness in the results by re-running the tests but exclude all financial firms.

Market data, i.e. stock prices (adjusted and unadjusted) and number of shares outstanding, is downloaded from Datastream Advance 4.0. We will use the unadjusted stock price multiplied by the number of shares outstanding to obtain the market equity, and the adjusted stock prices when comparing the stock returns over time since these correct for changes in the number of shares. For firms with more than one listed share, we use value-weighted returns incorporating both share prices according to the formula:

$$R_{i,t} = \left(\frac{P_{i,t}^{share\ 1} - P_{i,t-1}^{share\ 1}}{P_{i,t-1}^{share\ 1}}\right) \times \left(\frac{N^{share\ 1}}{N^{share\ 1} + N^{share\ 2}}\right) + \left(\frac{P_{i,t}^{share\ 2} - P_{i,t-1}^{share\ 2}}{P_{i,t-1}^{share\ 2}}\right) \times \left(\frac{N^{share\ 2}}{N^{share\ 1} + N^{share\ 2}}\right),$$

Where

$R_{i,t}$ = quarterly returns for firm i in quarter t,
$P_{i,t}$= price of the stock for firm i in period t,
N = number of shares.

B. Definition of Sphere Firms

The choice of spheres was carried out with respect to size, age and number of (partially) controlled firms on the OMXS; we only considered the spheres' core investments and operational investments, i.e. we did not regard private equity investments, which however usually not are listed on the OMXS Large Cap and Mid Cap. There was however some complementary concerns regarding the definition of which firms to define as sphere firms. First, the sphere portfolios vary over time as they acquire and dispose shares continuously. Second, their influence over the firms is dependent on the number of shares held and the number of board members. We dealt with the first problem by defining dummy variables for the three spheres and letting it equal 1 in each period for each firm when the relevant sphere owned shares in the observed firm. By this, we could for instance take into account that Investor acquired Husqvarna in early 2006 and BioVitrum in 2009[6]. Further, we observed that the spheres via their respective investment companies owned sufficient shares to obtain at least one board member. Hence, we solve the second issue by defining all sphere firms[7] as those firms where the investment firm owns shares and therefore do not consider how large their ownership is in

[6] Investor AB (2010).
[7] There are in total 26 sphere firms including the investment firms, of which nine in the Investor sphere (Investor, ABB, AstraZeneca, Atlas Copco, Electrolux, Husqvarna, Saab, SEB, BioVitrum), ten in the Industrivärden sphere (Industrivärden, Handelsbanken, Höganäs, Indutrade, Munters, Sandvik, SCA, Skanska, SSAB, Volvo), one in both the Investor and the Industrivärden sphere (L M Ericsson) and six in the Kinnevik sphere (Kinnevik, Metro International, Millicom, Modern Times Group, Tele2 and Transcom).

relation to other shareholders. In addition to these measurable characteristics of influence, there might be qualitative aspects, such as heritage and perceptions among investors that follow with sphere ownership contributing to performance.

C. Performance Measures

Firm performance could be measured in various ways. As this study aims at offering a broad view by presenting multiple results following from sphere influence and control, we have chosen four dependent variables to test.

Firm performance on the market will here be determined by the quarterly excess stock returns calculated using adjusted prices. We use the observed stock prices on the last banking day of each quarter and withdraw the risk-free rate, using the 3-month bond rate from Sweden's Central Bank Riksbanken.

We estimate profitability using earnings before interest and taxes (EBIT) divided by total assets. Profitability could ideally be measured as EBIT over turnover (net sales), but due to financial companies' deviating accounting standards this would generate misleading values as they might present both negative turnover and EBIT data.

Two of the spheres, Investor and Industrivärden, are connected to two of the largest Swedish banks: SEB and Handelsbanken, respectively. It is therefore interesting to study what effect this has on firm leverage. We measure this by the debt-to-capital ratio ($\frac{D}{D+E}$) which is interest-bearing debt over the sum of interest-bearing debt and shareholder's booked equity and by the ratio debt-to-assets where we divide the firms' interest-bearing debt by its total assets. The first measure is somewhat more precise in capturing the financing structure since it drops working capital, i.e. short-term liabilities such as payables to suppliers. We use the second measure to examine whether the inclusion of working capital results in different outcomes. For the banks, we include all long-term interest-bearing debt reported in the financial statements. The rationale for this is that long-term interest-bearing debt is not part of their operational business, which on the other hand short-term interest-bearing debt could be.

Also, due to the spheres' age and wide possessions, we investigate if sphere ownership has any effect on investment rate, particularly during the crisis period. Our evaluation measure for this is the annual capital

expenditures[8] divided by total assets. For financial firms, whose main investments are securities and/or shares in firms, we use the net cash flow from investment activities as an equivalent measure.

D. Control Variables

In order to cleanse out size effects and effects from differences in booked equity compared to the market value of equity, we form two control variables for this. Firm size is the natural logarithm of market equity plus booked value of debt, and book-to-market value is the ratio booked equity divided by market value of equity. Market equity is obtained by multiplying the number of shares outstanding with the unadjusted share price; in cases of dual-class shares we sum this calculation for both shares and obtain value-weighted average returns.

The sample firms' sensibility to changes in the market index is controlled for with an excess market return variable. We download data on Affärsvärldens Generalindex[9] to use as market proxy and withdraw the risk-free rate (3-month bond rate from Riksbanken). This will give us one average beta for all sample firms over the full period; we do not download individual firm's betas, but we control for cyclicality using industry indices as explained further down.

We also form three sphere dummy variables for each sphere that equals one when the relevant sphere owns shares in the observed firm and zero otherwise and nine industry dummies that equals one when the observed firm belongs to the relevant industry and zero otherwise. When we test the investment rate and the stock returns, we also use industry indices to investigate the sample firms' sensitivity to industry-specific variations. Dummy variables only control for fixed effects, i.e. the average effect during the sample period, whereas indices take fluctuations into account. To study the effect of the crisis, we form a crisis dummy that equals one for the defined crisis period and zero otherwise. Lastly, to check for difference-in-difference effects for the sphere firm ownership during the crisis, we form three difference-in-difference dummy variables. These will equal one if the observation belongs to one of the spheres and there was crisis, and zero otherwise, i.e. it is the product of each sphere variable times the crisis variable.

E. Summary Statistics

When collecting all variables of interest in Table 2 over the entire sample period, we observe in Panel A that the min-max spread for market return and risk-free rate are relatively wide which reflects the turn from boom

[8] We use annual data for this since a majority of the firms in our sample do not specify the investments in tangible assets in their consolidated quarterly cash flow statements.
[9] A wide index updated daily for the largest stocks on the OMXS. We download it from Datastream Advance 4.0.

to recession over the period. The prices on the market have at average gone down over the research period, as shown by the mean of the market return. Overall, the data set offers large spreads in all variables. Note also that the minimum value for book-to-market is negative and the maximum value for debt-to-capital exceeds 1.00, which is explained by Swedish Match reporting negative booked value of shareholders' equity in 2008 quarter 1 and 2. In the next session we will test for robustness in our findings by excluding outliers and see if these cause any effects on our conclusions.

Panel B reports the results from mean comparison tests on the independent and dependent variables. The tests were conducted using sample means for each firm over the period and grouping the results in order to enable comparisons[10]. The sphere firms are significantly larger than non-sphere firms in terms of the natural logarithm of market equity plus interest-bearing debt, when regarding statistical and economical significance. However, the results give some indications that sphere firms have had lower debt-to-assets ratio but higher debt-to-capital ratio although the t-statistics for these differences are not significant on all commonly applied levels. However, in the debt-to-assets measure, non-interest-bearing liabilities (e.g. working capital) are included which explains the reverse outcomes.

The non-sphere firms seem to over-perform sphere firms when studying the means of stock returns and return on assets. These values are however not significant; hence, these indications ought not to be perceived as representative. In addition, the min-max spread of excess stock returns ranges from -70.41% to 209.25%, so in that light the difference between the subgroups is not economically important. Moreover, we have in this test not cleansed away effects from our control variables and as the two groups differ with respect to firm size, book-to-market ratio and industry distribution (see Table 1); these will most likely be valuable to incorporate in the analysis.

From the correlation matrix in Panel C, we find that sphere ownership is almost uncorrelated with all independent variables apart from firm size. Also, the independent variables in the matrix do not show any strong correlation between the explanatory variables which supports that the multivariate tests we will perform further ahead are unbiased.

The central focus of the study is to investigate how the sample firms' performance measures and characteristics were affected during the financial crisis. Table 3 presents statistics on differences between the two sub-periods, crisis and non-crisis.

Panel A reports the results from a mean comparison test between the crisis and non-crisis period. The observed market performance in the crisis period is significantly lower, which consequently affects the book-

[10] We ran the test in STATA 9.2 using the command *ttest* and categorized them using a dummy variable sphere firm that equals one when the observed firm is owned by one of the spheres and zero otherwise.

to-market value as the market capital becomes lower. The firm profitability is also lower in the crisis period; the reported difference between the sub-periods is both statistically and economically significant. Also the debt-to-assets and debt-to-capital ratios went up during the crisis, although the increases are conservative in economic terms. Recall that we use another definition of the crisis period for the stock returns.

IV. Results and Analysis

In this section we will further investigate the sample firm performance by studying four different variables. First, we will analyze the quarterly stock returns over the period from the first quarter 2006 to the third quarter 2009. Thereafter, we will look at profitability, debt-to-capital ratio and finally investment rate. For investment rates we analyze annual data.

A. Stock Returns

When studying the quarterly stock returns, the performance measure is calculated according to the formula:

$\frac{(Weighted\ Stock\ Price_{i,t} - Weighted\ Stock\ Price_{i,t-1})}{Weighted\ Stock\ Price_{i,t-1}}$, where weighted stock price is used since some firms in the sample have dual-class traded shares, i.e. A and B shares or equivalent.

When graphing the industry value-weighted stock returns over the sample period from the first quarter 2006[11] to the third quarter 2009 (see Figure 1) we observe that the market began to recover already in the beginning of 2009. This goes in line with Ivashina's and Scharfstein's findings that the peak of the crisis occurred in late 2008[12]. Therefore, it can be misleading to treat 2009 as part of the crisis period when studying the stock returns as these compare the stock price in the current quarter with the previous one. Also, the results of market reactions are observed prior to accounting data, especially when studying returns instead of nominal prices. For instance, in our sample the prices in early 2009 were lower than in 2007 but the observed returns are higher in 2009 and 2007 due to the heavy drop in prices in 2008[13]. Due to this, we will in the analysis of stock returns define the crisis period as the four quarters of 2008 and treat 2009 as the after period. For the other three analyses 2009 will be included in the crisis period definition.

[11] The fourth quarter of 2005 does not generate observations for stock returns, as we do not collect data for the third quarter 2005. Hence, we have the number of shares outstanding and the stock prices for quarter 4 2005, which is used to calculate the quarterly return in the first quarter 2006.
[12] Ivashina, V. and Scharfstein, D. (2009).
[13] A numerical example: If the price fell from 100 SEK to 50 SEK in one period, the return is -50% and then recovered to 75 SEK in the next period, that return would be +50% although the price is lower than in the first period.

The industry indices are formed as the observed stock returns for each firm multiplied by its market equity divided by the total market equity within the industry, thus value-weighted indices. The energy index, which is more volatile during 2008-2009, consists of only three firms which make it more sensitive to firm-specific events.

When graphing the trends over the period, we used actual stock returns. However, when analyzing the market performance using multiple explanatory variables, we will use excess stock returns as performance measure. The main equation we estimate in this section is:

$$R_{i,t} - R_{f,t} = \beta_0 + \beta_1 \times \ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t-1} + \beta_3 \times (R_{m,t} - R_{f,t}) + \delta_{4i} \times \text{Crisis} + \delta_{5i} \times \text{Investor} + \delta_{6i} \times \text{Industrivärden} + \delta_{7i} \times \text{Kinnevik} + \delta_{8i} \times \text{Energy} + \delta_{9i} \times \text{Utilities} + \delta_{10i} \times \text{Manufacturing} + \delta_{11i} \times \text{Durables} + \delta_{12i} \times \text{Nondurables} + \delta_{13i} \times \text{Health} + \delta_{14i} \times \text{Financial} + \delta_{15i} \times \text{IT} + \delta_{16i} \times \text{Telecom} + \delta_{17i} \times \text{Investor} \times \text{Crisis} + \delta_{18i} \times \text{Industrivärden} \times \text{Crisis} + \delta_{19i} \times \text{Kinnevik} \times \text{Crisis} + \varepsilon_{i,t}$$

Where

$R_{i,t}$ = quarterly returns for firm i in quarter t,
$R_{f,t}$= the risk-free rate, the 3-months bonds issued by Riksbanken,
Firm Size = market equity plus interest-bearing debt,
Book-to-Market = shareholders' equity divided by the number of shares outstanding times the unadjusted share price; in this analysis we use the BtM observed in the beginning of the period[14],
Crisis = dummy variable that equals one for the observations in 2008 calendar quarter 1 to quarter 4 and zero otherwise.
Investor, Industrivärden, Kinnevik = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise,
Energy, Utilities, Manufacturing, Durables, Nondurables, Health, Financial, IT, Telecom = dummy variables for the nine industries that equal one if the firm belongs to the industry and zero otherwise.
Investor x Crisis, Industrivärden x Crisis, Kinnevik x Crisis = difference-in-difference dummy variables for each sphere during the crisis; they equal one when both the sphere dummy and the crisis dummy are one, and zero otherwise.

We use robust standard errors to correct for heteroskedasticity. Since we use panel data, we do not have to correct for clustering in the standard deviation, as this already is adjusted for.

[14] We use the BtM in the beginning of the period (quarter), since it is more interesting to study how the BtM affected the market performance during the period.

First we run the model over the period 2006 quarter 1 to 2008 quarter 4, i.e. we exclude 2009 entirely, in three variants. We do this because although we observe a market recovery in the beginning of 2009, the accounting data we use as control variables possibly do not reflect this recovery. The rationale for testing the regressions with the two different time periods is thus to see if the results are robust. In column (1), we regress the excess stock return on all variables except from the difference-in-difference estimators to check for sphere-fixed effects over the whole sample period. In column (2), we include these difference-in-difference dummies and in column (3) we exclude the industry-fixed effects to check for robustness in the results.

The results are reported in Table 4. The R-squared for the variants range between 0.2269 and 0.2286, thus fairly high given the volatility caused by the boom in 2006 and recession in 2008 we observed in Figure 1. We observe that the sample firms follow the excess return of the market proxy; the sample average market beta is estimated to 0.44 and different from zero on all levels of significance over the three variants. The interpretation is that if the excess return on the market increases by 10%, the average effect will be an increase in excess stock returns by 4.4%, keeping all other variables constant. However, it is reasonable to believe that the sample firms are unequally exposed to fluctuations in the market excess returns, why we will account for cyclicality using industry index returns and rather use the market excess return as a control variable.

We cannot draw any definite conclusions concerning the book-to-market and size factors; data indicates that large firms are associated with higher returns. However, we only find statistical support for this when we exclude the industry dummies so we cannot confidently evaluate its actual impact on the sample firms' stock returns.

Not surprisingly, the constant before the crisis dummy is negative (between -8.73% and -9.17%) and highly significant. We do not find any particular effects in any of the industry dummy variables which is reasonable, since the dummy variables report fixed industry effects (averages over the period) and the industry index returns have been volatile over the sample period.

In order to further investigate the crisis' effect on the sphere firms, we also run the regressions with difference-in-difference dummies for the three respective spheres. These will equal one for all observations where the firm was owned by one of the spheres and it was recession. Here, we find support for the Investor dummy and the Investor difference-in-difference dummy. The constant before the Investor dummy is negative and significant on the 5% level in the second and third column. However, the coefficient before the difference-in-difference dummy for Investor over the crisis period is positive and significant on the 1% level. If we were to compare two companies – one non-sphere and one Investor controlled – of equal size, book-to-market and that operate in the same industry during the crisis period, we would expect the Investor controlled firm to have a 4.17% (the sum of the Investor and difference-in-difference estimator) higher

quarterly excess return than the non-sphere firm. The coefficient before the Investor dummy is negative and significant when we include the difference-in-difference estimator, which would suggest that Investor firms sold on discount during the boom but on premium during the crisis.

We observe some changes when extending the sample period to 2009 quarter 3 (see Table 5). The model loses explanatory power in terms of R-squared (between 0.1165 and 0.1257), which is reasonable due to the high stock returns we observe during the market recovery in 2009. First, the reported intercept is logically higher due to the market recovery starting after the fourth quarter 2008 although it is not valid on any of the commonly used levels of significance. The book-to-market factor is now slightly positive; the effect is highly significant and estimated to roughly 1.50%. The size factor, on the other hand is more insignificant than before and the reported values lie around -0.1% and below. Therefore, we expect the size to be irrelevant for estimating stock returns over the full sample period.

Regarding the sphere firm dummies and difference-in-difference dummies, we view a larger and still significant positive effect of the Investor firms during the crisis. Actually, it even outweighs the negative effect of the crisis. However, the constant before the Investor dummy in the third column where we do not take the industry-fixed effects into account is still negative and significant. The interpretation is that the Investor firms mostly sold on discount relative to comparable firms over the non-crisis period, but on premium during the crisis. Interestingly, we note a negative effect on the Kinnevik dummy in the first variant where we do not take the specific effect of being controlled by Kinnevik during the crisis into consideration. This suggests that Kinnevik performed weakly over the sample period; we also find some weak support for this in the other two variants, although none of these are significant on the 10% level.

Lastly, we will use an alternative to the dummy variables when controlling for industry effects, namely the sensitivity to industry index returns. This is done in order to check for robustness of the previous results. We use the same value-weighted indices as in Figure 1. The equation we are estimating now is:

$$R_{i,t} - R_{f,t} = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times Book\ to\ Market_{i,t-1} + \beta_3 \times (R_{m,t} - R_{f,t}) + \delta_{4i} \times Crisis + \delta_{5i} \times Investor + \delta_{6i} \times Industrivärden + \delta_{7i} \times Kinnevik + \delta_{8i} \times Industry\ Return_{i,t} + \delta_{9i} \times \text{Investor} \times \text{Crisis} + \delta_{10i} \times \text{Industrivärden} \times \text{Crisis} + \delta_{11i} \times \text{Kinnevik} \times \text{Crisis} + \varepsilon_{i,t},$$

Where

$R_{i,t}$ = quarterly returns for firm i in quarter t,
$R_{f,t}$= the risk-free rate, the 3-months bonds issued by Riksbanken,
Firm Size = market equity plus interest-bearing debt,

Book-to-Market = shareholders' equity divided by the number of shares outstanding times the unadjusted share price; in this analysis we use the BtM observed in the beginning of the period[15],
Crisis = dummy variable that equals one for the observations in 2008 calendar quarter 1 to quarter 4 and zero otherwise.
Investor, Industrivärden, Kinnevik = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise,
Industry return = the value-weighted industry index returns for the nine industries, in each period there is one observation per industry that is reported for each firm within that industry.
Investor x Crisis, Industrivärden x Crisis, Kinnevik x Crisis = difference-in-difference dummy variables for each sphere during the crisis; they equal one when both the sphere dummy and the crisis dummy are one, and zero otherwise.

We correct for heteroskedasticity using robust standard errors.

The results from this regression are reported in Table 6. We immediately observe that the R-squared from the regressions are very high: between 0.7932 and 0.7985, suggesting that these results are more reliable than those we obtained in the previous model and that the usage of industry index returns instead of dummy variables gave further strength to the estimation. We will therefore treat the findings here as our main results.

The usage of industry index return as control variable does not violate the positive and significant effect of Investor ownerships during the crisis; the only effect is affirmative, namely a higher t-statistic bringing more validity to the results. However, we can conclude that the sample firms are more exposed to industry-specific risk than total market-specific risk, measured here as the return on the market proxy. The difference is both economically substantial and statistically significant. When including the index variable, the strength in the crisis variables decreases but is still significant on the 1% level, since part of its earlier reported effect is absorbed by this new variable. Hence, our general conclusion from this regression is that the sample firms' industry-specific risks are very high which makes it somewhat difficult to estimate the actual effects of the crisis, yet we still observe that it is negative. We saw earlier that the average excess stock return during the crisis was -17.52%. Here the effect during the crisis is about -5%, so the earlier regressions where we used industry dummy variables were better at showing the crisis-specific effects whereas in the second specification, the crisis-effect is incorporated in the industry indices. The first model specification, on the other hand, loses the cyclicality dimension as it reports sample period average industry effects.

[15] We use the BtM in the beginning of the period (quarter), since it is more interesting to study how the BtM affected the market performance during the period.

For Industrivärden, the difference-in-difference dummy is now significant on the 10% level and close to be significant on the 5% level. The reported coefficient is 4.98%, suggesting that even the Industrivärden controlled firms performed better than other firms during the crisis. Since this model specification with industry indices instead of industry dummy variables takes cyclicality into account, we should view this result as more reliable than the one we found in the previous tests.

B. Profitability

We measure profitability as EBIT/total assets. The main equation we are estimating is:

$$Profitability_{i,t} = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \delta_{8i} \times \text{Utilities} + \delta_{9i} \times \text{Manufacturing} + \delta_{10i} \times \text{Durables} + \delta_{11i} \times \text{Nondurables} + \delta_{12i} \times \text{Health} + \delta_{13i} \times \text{Financial} + \delta_{14i} \times \text{IT} + \delta_{15i} \times \text{Telecom} + \delta_{16i} \times \text{Investor} \times \text{Crisis} + \delta_{17i} \times \text{Industrivärden} \times \text{Crisis} + \delta_{18i} \times \text{Kinnevik} \times \text{Crisis} + \varepsilon_{i,t}$$

Where

Profitability = earnings before interest and taxes divided by total assets for firm i in quarter t,
Firm Size = market equity plus interest-bearing debt,
Book-to-Market = shareholders' equity divided by the number of shares outstanding times the unadjusted share price,
Crisis = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 calendar quarter 3 and zero otherwise.
Investor, Industrivärden, Kinnevik = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise,
Energy, Utilities, Manufacturing, Durables, Nondurables, Health, Financial, IT, Telecom = dummy variables for the nine industries that equal one if the firm belongs to the industry and zero otherwise.
Investor x Crisis, Industrivärden x Crisis, Kinnevik x Crisis = difference-in-difference dummy variables for each sphere during the crisis; they equal one when both the sphere dummy and the crisis dummy are one, and zero otherwise.

We correct for heteroskedasticity using robust standard errors.

The results from the regression are found in Table 7. In column (1) we include the industry variables, whereas we leave them out in column (2) in order to check for potential deviations and ensure the results in panel (1).

First, we should note that the energy industry dummy is dropped due to multicollinearity among the industry dummies. Data show that book-to-market had a statistically but not economically significant negative effect on profitability over the sample period, whereas firm size had a significant positive effect. We can also see that profitability fell by approximately 1%, keeping all other variables constant, during the crisis which lies in line with the results from the mean-comparison test presented in Table 3.

In Table 2, the results indicated but could not statistically show that the sphere firms' profitability is somewhat lower than the other firms. In the first variant of the model, we now find that the Investor firms were less operationally efficient during the sample period. The coefficient is both economically and statistically significant (on the 5% and 10% level respectively). The other sphere dummies are also negative by around 1%, but none of the others are significant on any of the significance levels, although the coefficients are negative and weakly hints under-performance compared to non-sphere firms.

In order to further investigate the crisis' effect on the sphere firms, we re-run the regressions but now include the difference-in-difference dummies for the three respective spheres. Table 8 reports the results from these regressions. There are no important changes from before; the Investor dummy is still significant and negative when we take the industry dummies into account. None of the sphere difference-in-difference estimators provide any statistical support. We can therefore not conclude that sphere control had any effect on firm profitability during the crisis.

The general conclusion is that the profitability went down during the crisis and that the Investor firms had lower profitability over the full sample-period when taking industry-specific effects into account. Moreover we find that large firms are associated with higher profitability and firms with high book-to-market with lower profitability. We found no clear pattern over industries when using the dummy variables. Therefore, we re-ran the test with industry indices as in the previous section with stock returns to control for robustness in the results. This did not bring any new results to the outcome, only affirmative to the previous tests.

Lastly, recall from the mean-comparison test that the sphere firms were larger than the non-sphere firms. If we exclude the size factor from the regression here, we lose the significance on the Investor dummy. In that light, we should be more careful in stating the under-performance of Investor firms; the reason for our findings could be explained by the fact that the firm size factor was positive and significant. Moreover, to comment on the low R-squared, the inclusion of industry dummy variables generates better explanatory power to the model.

C. Debt-to-Capital

Investigating firms' financing decisions will now be carried out through the regression

$$Debt\ ratio = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \delta_{8i} \times \text{Utilities} + \delta_{9i} \times \text{Manufacturing} + \delta_{10i} \times \text{Durables} + \delta_{11i} \times \text{Nondurables} + \delta_{12i} \times \text{Health} + \delta_{13i} \times \text{Financial} + \delta_{14i} \times \text{IT} + \delta_{15i} \times \text{Telecom} + \delta_{16i} \times \text{Investor} \times \text{Crisis} + \delta_{17i} \times \text{Industrivärden} \times \text{Crisis} + \delta_{18i} \times \text{Kinnevik} \times \text{Crisis} + \varepsilon_{i,t}$$

Where

Debt-rate = Interest-bearing debt divided by the sum of shareholders' equity and interest-bearing debt,
Firm Size = market equity plus interest-bearing debt,
Book-to-Market = shareholders' equity divided by the number of shares outstanding times the unadjusted share price,
Crisis = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise,
Investor, Industrivärden, Kinnevik = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise,
Energy, Utilities, Manufacturing, Durables, Nondurables, Health, Financial, IT, Telecom = dummy variables for the nine industries that equal one if the firm belongs to the industry and zero otherwise.
Investor x Crisis, Industrivärden x Crisis, Kinnevik x Crisis = difference-in-difference dummy variables for each sphere during the crisis; they equal one when both the sphere dummy and the crisis dummy are one, and zero otherwise.

We correct for heteroskedasticity using robust standard errors.

Table 9 present the results from the regressions. In column (1), we include all control variables whereas we have dropped the industry dummies in column (2) to check for potential differences. In column (1), the industry dummy for energy is dropped due to of multicollinearity. Two of the explanatory variables are statistically significant on the 0.1% level in both variants, namely firm size and crisis; also the constant before the book-to-market factor is significant on the 5% level. Data suggests that debt-to-capital ratio increases by approximately 3% as the natural logarithm firm size increase by 1.0, thus an increase in nominal value of the firm by 2.72 billion SEK. Further, the coefficient before the crisis dummy is 4.28% in both models. This indicates that the sample firms increasingly financed their assets by interest-bearing debt rather than equity during the crisis. A higher book-to-market ratio has a slightly positive significant effect on debt-to-capital ratios. However, the economic effect is conservative, so its importance in relation to the other factors is small.

The last variable we find statistical and economical significance for is the Investor variable. The results show that firms owned by Investor have a higher debt-to-capital ratio of about 9% over the full sample period, which is both economically and statistically strong. For the other two sphere variables, data does not support any effect even on the 10% significance level. Thus, when ignoring difference-in-difference effects, we cannot draw any general conclusions for the sphere firms collectively, but for Investor as an individual sphere.

In the next step, we will further investigate how the sphere firms' debt-levels were affected during the crisis. The results are summarized in Table 10. We do this by regressing the debt-to-capital ratio on the same variables as in Table 9 but we add on the three difference-in-difference dummies that equals one when there was crisis and the observed firm was owned by one of the spheres. In column (2) we re-run it but leave out the industry variables.

We find the same results for the variables firm size, book-to-market, crisis and Investor as before. When we study the sphere dummies and difference-in-difference dummies, however, the conclusion is extended. The constant before the Investor dummy is still positive and significant, but the difference-in-difference dummy is not significant on all commonly used levels of significance. This suggests that Investor firms do have higher debt-to-capital ratios, but they did not necessarily increase their debt-to-capital ratio more than other firms during the crisis. Hence, Investor firms' financing decisions were robust to the downturn in the economic climate. The constant on the Industrivärden difference-in-difference variable is positive and significant on the 0.01% level for both model (1) and (2). We can therefore conclude that firms owned by Industrivärden increased their levels of interest-bearing debts during the crisis, which also is what we have observed qualitatively[16]. Though, this does not necessarily imply that they deviate from the other firms in general over the full period when we do not take the sphere's crisis-specific effects into account. One reason for this can be explained by the banking-relationships theory; since Industrivärden is related to Handelsbanken, who did not exhibit as large losses as other Swedish banks, they should in general have better access to interest-bearing debt than other firms and during the crisis also better than the Investor sphere since SEB was more exposed to credit risks[17]. However, SEB received support from several sources: from the government through the national credit guarantee program, from a new stocks issue in 2009 that largely was financed through cash from Investor[18].

16 Mellqvist, Gabriel (2008).
17 See e.g. Lucas, Dan (2009) and Handelsbanken (2010): SEB and Swedbank had the highest exposures to credit risks of the four most important Swedish banks. SEB joined the government's guarantee program, which they initially did not intend to but as the profit fell rapidly and they had to reserve cash to secure for potential future losses they eventually decided to join it. A lot of the explanation lies in their heavy exposure to the Baltic States and Eastern Europe who were heavily affected in the early crisis period. Handelsbanken on the other hand did not participate in the program, which clearly shows that they were financially more stable and could lend out more than SEB.
18 SEB (2009), Rawet, Peter (2009) and Svenska Dagbladet (2009).

We also run the test on debt-to-assets instead of debt-to-capital to investigate differences in effects when including working capital (non-interest-bearing debt) and obtain results very similar to the previous ones. We can therefore conclude that the effect of including working capital in the regression is conservative and only provides robustness to our findings above. Given the higher observed R-squared when including industry dummy variables, we can also conclude that these seem to carry some degree of explanatory power although none of them individually are significant even on the 10% level.

In order to obtain a better understanding of the crisis effect on debt-to-capital ratios, we perform mean comparison tests for the value-weighted average nominal booked equity and for the value-weighted amount of interesting-bearing debt, to observe the actual average levels during the crisis period compared to the non-crisis period. We find that interesting-bearing debt went up by almost 25% during the crisis (with t-statistic -21.20) whereas the booked equity only went up by 10% (-25.12). We can therefore conclude that the increase in debt-to-capital ratios during the crisis is well explained by firms signing debt contracts rather than using equity to finance the capital, although they seem to have done both to various extents. Hence, it is appropriate to draw the conclusion that the firms were more leveraged during the crisis than before.

D. Investment Rate

We will now analyze the sample firms' investment rate. As most firms only report investment data in their annual reports and not in their interim reports, we will use fiscal year as time variable and only study annual data from the fourth fiscal quarter.

The model we are estimating is

$$Investment\ rate_{i,t} = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \delta_{8i} \times \text{Utilities} + \delta_{9i} \times \text{Manufacturing} + \delta_{10i} \times \text{Durables} + \delta_{11i} \times \text{Nondurables} + \delta_{12i} \times \text{Health} + \delta_{13i} \times \text{Financial} + \delta_{14i} \times \text{IT} + \delta_{15i} \times \text{Telecom} + \delta_{16i} \times \text{Investor} \times \text{Crisis} + \delta_{17i} \times \text{Industrivärden} \times \text{Crisis} + \delta_{18i} \times \text{Kinnevik} \times \text{Crisis} + \varepsilon_{i,t} \ ,$$

Where

Investment rate = capital expenditure (CAPEX) divided by total assets for firm i in year t,
Firm Size = market equity plus interest-bearing debt,
Book-to-Market = shareholders' equity divided by the number of shares outstanding times the unadjusted share price,
Crisis = dummy variable that equals one for the observations in 2008 and zero otherwise.

Investor, Industrivärden, Kinnevik = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise,
Energy, Utilities, Manufacturing, Durables, Nondurables, Health, Financial, IT, Telecom = dummy variables for the nine industries that equal one if the firm belongs to the industry and zero otherwise.
Investor × Crisis, Industrivärden × Crisis, Kinnevik × Crisis = difference-in-difference dummy variables for each sphere during the crisis; they equal one when both the sphere dummy and the crisis dummy are one, and zero otherwise.

We use robust standard errors to correct for heteroskedasticity.

The results from the regression are presented in Table 11. The energy dummy is left out in order to avoid multicollinearity.

In the first regression, where we estimate the presented equation, we obtain significance for most of the industry dummies. This is a bit misleading; the energy variable is dropped due to multicollinearity which is included in the intercept. Seemingly, the energy firms (three in the sample) have invested more during the sample period than firms in other industries which is natural as all three are in the oil business which requires large tangible assets. None of the spheres own shares in energy firms. The constants before the crisis and the sphere firm dummies are not significant on any of the commonly used levels of significance. When we exclude the industry dummies, we still do not find any statistical indication for the determinants of investment rates.

One reason for the weak statistical results can be the low number of observations compared to the other performance measures. Other explanations could be the sample firms varying access to capital together with the uncertainty in investment benefits during the crisis leading them to dedicate existing resources on maintaining operational business. We also tested for difference-in-difference dummies in this model, but these did not provide any statistical guidance, so from these findings we cannot tell whether the sphere firms changed their investment patterns.

When we use industry investment rates[19] instead of dummies as in Table 12, we observe that the sample firms' investment rates are highly correlated with the industry indices; the average coefficient is 0.572. None of the other variables are significant, which suggests that firms' investment patterns are unrelated to size, crisis, book-to-market and sphere ownership.

[19] We calculate these for each firm by taking each firm's share of the industry's total market equity and multiplying by its investment rate in the end of that year.

When calculating the means of the industry investment indices, three of the industries report deviating data. Financials and IT firms have very low investment rates; the explanation for the low mean for financials is that many of the firms might have disposed shares in their investments and for both financials and IT that their businesses do not require large tangible assets. The energy industry, on the contrary, presents a very high mean (18.6% compared to the overall sample mean of 3.6%) which is not very surprising since there are only three energy firms in our sample with all of them engaging in oil production which relies heavily on tangible assets. We therefore run a last regression (see Table 13) without these outliers and find weak significance (t-statistic -1.68 corresponding to a p-value of 9.40%) for the Investor difference-in-difference estimator. The interpretation would in this case be that Investor firms except from the financials who are excluded here had a 2% lower investment rate during the crisis, which is an economically important decrease. This might be in line with the previous argument that instability on the market made investment opportunities uncertain. Yet, they should have access to investment capital despite the economic recession given their relationship to SEB and Investor AB (investment firm). However, the number of observations is now even lower than before and we ignore the outlier industries and the significance level is higher than we usually accept in this study, so the analysis rests on weaker data set-up for the results.

It is difficult to investigate the possible existence of cross-subsidization in the data. Therefore, we analyze each sphere individually by dividing the groups into the investment firm and the portfolio firms and graphing their investment rates over the sample period (see Figure 2a to Figure 2c). We find that Investor invested more when their portfolio firms invested less and vice versa; the correlation between Investor's investment rate and their portfolio firms' value-weighted average investment rate equals -0.9053, thus strongly negative. If this is interpreted as Investor spending less cash on external firms when the investment rate in the portfolio firms was high, this could possibly be explained by cross-subsidization. However, we cannot state that there is an inefficient allocation of capital without further investigation of how Investor AB (investment firm) distributes its investments. Still it is obvious that Investor AB (investment firm) disposed rather than acquired shares during the sample period, which could be explained by the uncertainty on the market. Moreover, their sphere bank SEB was highly affected by the crisis so instead of exploiting possible investment projects, they might have prioritized to accumulate back-up finances in case of further credit losses for SEB. Given that they have long investment horizons[20] and the stock prices were low during the crisis, they should have perceived the investment opportunities as attractive. This suggests that they, despite their large cash balance, were restricted by their portfolio firms' performances from acquiring new shares. Though, we have found

[20] See Strandberg, Hans (2010): Investor AB's CEO Börje Ekholm claims that they can take short-term losses, since they aim at keeping their investments long and with his own words "could regard owning them forever".

qualitative evidence that the investment firms have financed their investments in some portfolio firms by reducing the holdings in others[21].

For Industrivärden, the graph does not provide any particular pattern in investment rates. Lastly, for Kinnevik, we observe that the investment rate for the portfolio firms constantly rose over the entire sample period, but the pattern the investment firm followed does not reveal anything fruitful about the validity of the cross-subsidization hypothesis.

In general the investment firms decreased their investment rates in 2008 compared to 2007, which talks against theories suggesting that family firms have extended horizons and therefore should be indifferent to the state of the economy when deciding on efficient investment opportunities. Rather, it seems like the spheres acted very conservatively and did not take on additional risks or alternatively, that they did not view many investments as efficient. This can have given the spheres a more reliable image among other investors on the market, which could be another explanation for why Investor and Industrivärden's firms offered higher returns during the crisis period. On the other hand, as pointed out, they might have missed long-term efficient opportunities by following this conservative investment strategy.

V. Robustness and Validity of Results

One possible remark on the tested models could be the decision not to separate the investment firms (i.e. Investor, Industrivärden and Kinnevik) from their portfolio firms. As we found when separating them in the investment rates analysis, there were some important differences and it is possible that they also generate different returns on the market, have different capital structure and exhibit different levels of profitability. In this section we will discuss and clarify these potential implications on the results. First, we test for potential differences in results if we separate the investment firms from their respective portfolio firms. Second, we investigate how firms who had high investment rates before the crisis were affected during the crisis and if there were any industry or sphere ownership patterns. Third, we test for potential deviations when excluding the financial firms who report accounting differently from the other industries. Fourth, we re-run the regressions but exclude outliers in the firm size and book-to-market variables. Lastly, we discuss endogeneity in the sample data and in the tests.

[21] Dagens Industri (2009).

A. Exclusion of the Investment Firms from the Sphere Groups

We test for this by, for each sphere, separating and analyzing the investment firms and their portfolio firms' performances. First we do this for the market performance measure: we form an index based on the portfolio firms' value-weighted stock returns over the period. The results are found in Figure 3a to Figure 3c. Obviously, the portfolio indices follow the investment firms' market performances very closely. Hence, nothing points to the direction that cross-subsidization, if they do cross-subsidize, has any negative impact on the market's perceived value.

For the debt-to-capital we find when separating the investment firms from the sphere groups and tabulating the sample average ratios that the investment firms were less leveraged during all periods. This would by the fact the investment firms do not possess any important tangible assets and as such do not need debt to finance their assets side. It motivates a re-test of the debt-to-capital ratios to check for potential deviations from the results presented. The results from the robustness test does however not implicate on our previous results; hence, we can just conclude that the investment firms are less leveraged, but that exclusion of these in the model does not have any effect on the coefficients of the sphere dummy variables. Possibly, the difference in leverage in the investment firms could be absorbed by other control variables in the model specification.

Lastly, we investigate differences in profitability, as reported in Figure 4a to Figure 4c. For Investor and Industrivärden's portfolio firms we observe a stable average level over the period, whereas their investment firms report more volatility in profitability. The same counts for Kinnevik, with the exception that the portfolio firms' average performance is somewhat volatile at the beginning of the sample period. Another remark for Kinnevik is that there was only one observation below 0%, namely for the investment firm in 2006.

B. High Investment Firms

For the investment rate test, it is also interesting to study if the firms who invested more than the sample average before the crisis changed their investment behavior during the crisis. The rationale here is that these firms should require more tangible assets and therefore it should be easier to observe crisis-specific effects. We do this by calculating the pre-crisis mean of investment rate, which is 4.24%. Then we split the sample and study only the high-investment firms over the full sample period, to check (i) if they were particularly affected by the crisis and (ii) if sphere ownership caused any significant differences. We then have 51 firms left out of which two are controlled by Investor, five by Industrivärden and three by Kinnevik. This answers to 19.6% sphere firms in this test as compared to 20.5% in the entire sample; thus, the distribution is fairly similar when viewing all sphere firms as a group, yet Investor is underrepresented and the other spheres

overrepresented. We run this test first without controlling for industry indices and then by including it. However, this does not result in any significant factors, apart from the intercept and the industry index factor in the first regression.

We then exclude the IT, energy and financial sectors since, as we have already concluded, these industries deviate largely from the overall market average. The result then is that the Investor firms who had high investment rates before the crisis decreased their investment rate by 4.2% during the crisis. However, this group is small (two firms) and the number of observations in this version is only 127, so we should be very cautious with these findings.

C. Exclusion of Financial Firms

Financial firms' annual reports are quite different from other industries', because of the nature of their business. A common practice in many finance papers is to exclude financial firms and institutions. However, financial firms constitute a substantial part of the Stockholm Stock Exchange and the spheres we have chosen to focus on possess many important financial firms, so we still found it reasonable not to ignore these in the multivariate analysis. The control and performance measures extracted from the financial firms were chosen so that they corresponded well to the other firms' variables and we controlled for industry-specific risks in all parts of the analysis. The results might yet have been different if we had excluded these from the sample, which motivates further robustness tests to control for this.

Concerning stock returns, we first re-run the tests from Table 5, i.e. when we study the full sample period, treat the four quarters of 2008 as the crisis period on the market and control for industry-specific effects using dummies. In the second version, where we include all industry dummy variables and the difference-in-difference estimators, the results look somewhat different. The Investor dummy is still negative (-4.1%) but the p-value is now 12.6% compared to 5.7% when we included financials and the Investor difference-in-difference dummy is more positive (12.2%) and still significant on all commonly used levels. The Kinnevik dummy is also negative in this test and the p-value is now 6.9% compared to 11.5% before; in the Kinnevik group, we had however only one financial firm, namely the investment firm Investments AB Kinnevik. In the previous section where we graphed the performances for the investment firms and their portfolio firms separately, however, we found a high correlation between the two so the results are somewhat surprising.

We then re-run the test presented in Table 12 i.e. when we instead control for industry indices. The results are largely similar to before; the Investor difference-in-difference estimator is also here more positive and significant. The same counts for the Industrivärden difference-in-difference estimator which now has a p-value of 6.1% and the constant is 6.3%. To sum up the effects from excluding financial firms, we now see

even stronger indications that Investor and Industrivärden's portfolio firms performed better than the rest of the sample firms on the market, yet the results do not deviate particularly much when we ignore the financial firms.

For the profitability analysis, we obtain some interesting results that can infer on our previous findings. When we test profitability and control for size, book-to-market, industry dummies and sphere dummies we find significance for the Investor and Industrivärden dummies who are negative (-1.9% and -1.6% respectively). If we exclude all industry dummies, the results are very similar. When we in the multivariate analysis section investigated all industries, we only found significance for the Investor dummy in the first of these regressions. Hence, we can conclude that exclusion of financial firms would generate a somewhat different analysis with even stronger evidence for Investor and Industrivärden's under-performance compared to other sample firms.

When we include the difference-in-difference dummies, we find that both the Industrivärden dummy and difference-in-difference estimator is negative and significant on the 5% level, whereas only the Investor dummy is negative but the difference-in-difference estimator is now positive and close to significant on the 10% level. Although this last variable is not significant, it seems like the Investor firms (excluding financial firms) performed somewhat worse than the other sample firms during the pre-crisis period, which mostly was characterized by the economic boom, but their performance did not decrease very much during the crisis.

Since we have already excluded the financial firms in the analysis of investment rates, we will not treat it further in this section. The last performance measure we will test for robustness on is the debt-to-capital ratio. There we do not find any deviating results from before, apart from some minor differences in t-statistics. The constant before firm size, which previously was significant on all levels of significance, is now significant on the 5% level.

To conclude the robustness tests where we exclude the financial firms, we mostly find further support for the earlier findings, which suggests that the choice of corresponding measures for the financial firms was appropriately chosen. One deviation is found for stock returns, namely that the Kinnevik firms at average sold on discount over the entire sample period compared to non-Kinnevik firms.

D. Exclusion of Outliers

In this part we test if the exclusion of outliers in the sample data could implicate on our findings. Table 2 showed that the min-max spreads in ln(Firm Size) and Book-to-Market were large. When examining the 5% tails for these variables we find that there exists some outliers for Book-to-Market in both tails, especially in the 95th centile which was reported to 2.09 whereas the maximum is 43.45 for Lundin Mining in 2008 quarter

4 where their adjusted stock price heavily dropped by 69%. Regarding firm size, there are outliers particularly in the 5th centile, which is reported to 7.21 compared to the mean 9.43 and the sample minimum 4.76.

We first re-run our main equation for estimating excess stock returns, i.e. with difference-in-difference dummies and industry index returns as reported in Table 6 column (2). The results are reported in Table 14. The number of observations left is now 1 450 compared to 1 782 and the R-squared has decreased from 0.7985 to 0.4696. The book-to-market coefficient is now more positive and significant, 0.17 (t-statistic 7.32) instead of 0.01 (2.74), suggesting that an increase in book-to-market ratio by 0.1 in the beginning of the quarter would generate a 1.7% higher return at the end of the period. The Investor difference-in-difference dummy is now slightly less positive with p-value 0.2% and the Investor dummy does no longer have any statistical significance. This gives more robustness to previous results indicating Investor's superior market performance and it also indicates that the Investor firms not necessarily performed worse in the non-crisis period when excluding these outliers.

We then re-run the regression on profitability as in Table 8 column (1). The results from this test shows that the Investor firms not necessarily performed worse, neither in the crisis nor the non-crisis period compared to other firms. Of the industry dummies, durables is now significant on the 10% level and its coefficient is 0.028 suggesting that this industry performed better than others when excluding outliers. The crisis dummy is now significant on the 1% level and less negative, whereas the firm size factor loses explanatory power. Lastly, the book-to-market is more negative and significant on the 1% level.

Lastly, for investment returns, we re-run the test where we use industry investment value-weighted indices. This does not bring anything new to our previous findings, apart from that the industry investment return variable is more significant.

E. Endogeneity in the Sample Data

It is difficult to first identify and then eliminate potential endogeneity in statistical analyses. The area of interest in this study is the performance of large Swedish investment companies' portfolio firms. We have found some evidence of superior performance in our data; however, the relationship between ownership and firm performance is somewhat unclear, i.e. if firm performance is determined by sphere ownership or vice versa.

We find that Investor's portfolio firms performed better than the other sample firms during the crisis. The immediate conclusion one might draw is that they do so because of their ownership structure, i.e. that the shareholders benefit from the Investor influence. Conclusions of this kind are however superficial and do not take into account the fact that the large investment companies might only choose to invest in stable and well-

performing firms. If this is the case, which is difficult to prove, is true, the interpretation of the results should be that Investor AB has been successful in acquiring good firms, rather than that they perform well because Investor AB owns substantial shares in these.

Sias (1997) partly addresses this problem, when he argues that closed-end funds to a larger extent are held by individual investors whereas the portfolio firms are to a higher degree are owned by institutional investors. Naturally, individual investors are more sensitive to market fluctuations, and as Hjelström (2007) notes, Swedish closed-end investment companies with large control via high shares seldom liquidate or dispose ownership. This can be partly shown in a study of the trading activity in these firms over the crisis period, although it will not fully cover whether the spheres' long-term investment horizon affects the firm performance. Future research on this endogeneity problem could investigate differences in trading volume during recessions between sphere and non-sphere firms to see if this has any determining effect on stock returns.

The existence of this endogeneity is not certain, due to the difficulties in identifying it, but the awareness of its potential impact on the results ought to be regarded in order to avoid rapid and biased conclusions.

VI. Conclusions

The empirical results from our multivariate analyses bring some interesting findings for the market performance of the sample firms. The excess stock returns for Investor's portfolio firms seem to have been less volatile and rather unaffected by the market recession; however, with this follows also that they did not offer particularly high returns in the non-crisis period. This result is robust to exclusion of 2009 in the sample period and the use of industry index returns. In one of the tests we find that the Industrivärden sphere also had a more balanced development on the market. This clearly lies in line with the argument that the presence of large shareholders is associated with more stable prices, thus confirming *Hypothesis I*. In that sense, holding stocks issued by sphere firms can be regarded as a form of insurance; investors do not experience as high returns in booms, however they are compensated by not experiencing as heavy drops in economic recessions. We did not find equivalent results for Kinnevik. One possible reason for this could be the composition of its portfolio which is less diversified and heavier on more modern industries, whereas Investor's and Industrivärden's possessions are dominated by large, old industry firms. This could also be a matter of reputational aspects, although this is difficult to control for. We do not find any evidence for the conglomerate discount theorem, since the investment firms seem to have performed equally as their portfolio firms.

Earlier studies of Swedish spheres have suggested that the investment firms aim at forming their portfolio firms' strategies. If we apply the theory of decreased agency costs in family firms where managers also own shares, we would expect the sphere firms to have higher managerial efficiency and be more profitable than the other sample firms. However, we do not find any support for this argument; instead, we find that the Investor sphere presented less profitability when controlling for industry-fixed effects. We can therefore not regard *Hypothesis II* as valid in our data. Concerning the crisis, we cannot draw any conclusions for how the spheres performed in comparison with the others; the overall effect for all sample firms were not surprisingly lower profitability. We also saw that exclusion of financial firms would generate an even stronger evidence for the under-performance of Investor and Industrivärden compared to other sample firms, however we found no deviation during the crisis.

Two of the spheres, Investor and Industrivärden, own large shares in important banks. If their portfolio firms benefit from this in terms of better access to capital, which we have assumed based on previous literature, the theory of banking-relationships can be explained in our data. The Investor firms present substantially higher debt-to-capital ratios over the sample period and the Industrivärden firms raised their ratio more than the other sample firms did at average during the crisis. The results for Investor are robust to the exclusion of the difference-in-difference estimator for the Investor effect during the crisis and both spheres are robust to the exclusion of industry control variables. We do not find any evidence for Kinnevik financing their capital differently from the non-sphere firms, which lead us to suggest that the presence of an internal sphere bank is associated with higher leverage ratio, thus supporting *Hypothesis III*. It must also be noted that the debt-to-capital ratio on average went up for all firms during the crisis, keeping all other variables constant, which we saw was an effect of a higher increase in interest-bearing debt than in booked equity during the crisis period. This violates previous empirical results that the supply of credit diminished and resulted in lower leverage ratios.

The firms invest in general in accordance with the industry they belong to; three of the industry indices deviated largely from the overall average. When excluding these we found a weak indication that the Investor firms invested less during the crisis; for the sample firms in general we did not find that they invested differently from other firms, neither during the crisis nor before. From the findings in earlier studies, we would expect the spheres to be indifferent to the economic climate due to having longer investment horizons. In the case of the investment firm Investor we would expect them to have an even higher investment rate than before the crisis, as they had hoarded much cash and the prices on the market prices went down. However, we observe the opposite, namely a drop in investment rate. The evaluation of these findings lies in the definition of what an efficient investment was during the crisis. The reason for contradictive results could be conservativeness in deciding on investment projects due to the uncertainty in their portfolio firms' performances, forcing them to hold back-up finances. This constitutes a form of an alternative lock-in effect,

other than that previous scholars have found in banking relationships. Therefore, our data supports the *Hypothesis IV* for Industrivärden and Kinnevik, where the investment rates were unaffected by the crisis. For Investor though, we cannot support *Hypothesis IV*, as they showed a deviating investment pattern during the crisis and the underlying reasons for that would need further investigation.

VII. Future Research

Despite the heavy amount of work dedicated to corporate governance effects on firm performance, there are still many areas to yet to be discussed, particularly within the Swedish spheres.

First, our study could be developed and made broader. We have not taken the degree of ownership into account, but just defined all investment firms' core investments as sphere firms, and not studied valuation measures other than stock returns. As Morck, Shleifer and Vishny (1988) find, the effect on the firm value varies within different intervals, so it could be of interest to investigate if their findings also apply on the Swedish spheres or if their characteristics are very different.

Moreover, in order to generalize the conclusions concerning the crisis-specific effects, the sample period could be extended to explore whether there are similarities with other crises historically. The financial crisis was unique, just like all crises, in the sense that the Swedish banks were in focus which might have had certain implications on how the spheres were affected and responded. We have partly referred to this in our analysis, especially for the debt-to-capital ratio and investment rate, but longer research periods are required in order to identify these unique characteristics. In addition to this, it would also be interesting to empirically analyze the importance of holding a large cash buffer which we qualitatively have found that at least Investor did.

In previous literature, scholars have addressed several interesting questions that would need more detailed data to answer. The impact of banking relationships is difficult to assess, as it requires lists of where the firms borrow from. However, costs on interest-bearing loans could proxy for this under the assumption that banking relationships generate beneficial terms of credit. We cannot either draw any conclusions about the existence and effect of cross-subsidization. Since the firms both acquire and divest shares we observe a net effect of investment and thus do not distinguish where each investment is made. Swedish business media have reported that the spheres, at least Industrivärden, did cross-subsidize by rearranging the portfolio composition in order to maintain performance in some of the firms[22]. Scholars could, if they manage to

[22] Dagens Industri (2010).

design good research models, further study how spheres allocate capital and what effects that have on performance.

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Appendix

Table 1.
Distribution of Firms over Industry Groups and Owners

Panel A: Number of firms by owner (columns) and by industries (rows). The industry categories are commonly used in Swedish Business Press One firm in the sample, L M Ericsson AB, is owned by both Investor and Industrivärden.
Panel B: The division of controlled companies in the sphere portfolios' sorted on industry. Here reported in percentages.

Panel A: Number of Firms per Category

	Industrivärden	*Investor*	*Investor/ Industrivärden*	*Kinnevik*	*Non-sphere*	***All Owners***
Durables	0	2	0	2	14	**18**
Energy	0	0	0	0	3	**3**
Financials	2	2	0	1	26	**31**
Health	0	2	0	0	7	**9**
IT	0	0	1	0	9	**10**
Manufacturing	5	3	0	1	31	**40**
Nondurables	0	0	0	0	5	**5**
Telecom	0	0	0	2	1	**3**
Utilities	3	0	0	0	5	**8**
TOTAL	**10**	**9**	**1**	**6**	**101**	**127**

Panel B: Distribution of Controlled Firms

	Industrivärden	*Investor*	*Investor/ Industrivärden*	*Kinnevik*	*Non-sphere*	***All owners***
n	*10*	*9*	*1*	*6*	*101*	***127***
Durables	0.0%	22.2%	0.0%	33.3%	13.9%	**14.2%**
Energy	0.0%	0.0%	0.0%	0.0%	3.0%	**2.4%**
Financials	20.0%	22.2%	0.0%	16.7%	25.7%	**24.4%**
Health	0.0%	22.2%	0.0%	0.0%	6.9%	**7.1%**
IT	0.0%	0.0%	100.0%	0.0%	8.9%	**7.9%**
Manufacturing	50.0%	33.3%	0.0%	16.7%	30.7%	**31.5%**
Nondurables	0.0%	0.0%	0.0%	0.0%	5.0%	**3.9%**
Telecom	0.0%	0.0%	0.0%	33.3%	1.0%	**2.4%**
Utilities	30.0%	0.0%	0.0%	0.0%	5.0%	**6.3%**

Table 2.

Descriptive Statistics for the Full Sample and Comparison between Ownership Structures

Panel A: Presenting summary statistics of the performance measures and control variables of the full sample. *Firm Size* is the sum of interest-bearing debt and market equity, where market equity is calculated as the number of shares outstanding at time t times the unadjusted price at time t. *Book-to-Market* is the booked shareholder's equity divided by the market equity at time t. *Market Return* is the quarterly change in Affärvärldens Generalindex, reported in percentages. *Debt-to-Assets* is total of interest-bearing debt divided by total assets. *Debt-to-Capital* is total interest-bearing debt divided by the sum of interest-bearing debt and shareholder's equity. *Stock Return* is the quarterly change in stock prices for each firm; in case of dual-class shares, it is the value-weighted average return calculated as the fraction of A-shares times the adjusted price of the A-share plus the fraction of B-shares (or equivalent) times the adjusted price of the B-share; this is reported in percentages. *Excess Stock Return* is the *Stock Return* minus the *Risk-free Rate,* which is the 3-month bond rate issued by the Swedish Central Bank Riksbanken. *Profitability (Assets)* is earnings before interest and tax (EBIT) divided by total assets, reported in percentages. *Investment Rate* is capital expenditures (CAPEX) divided by total assets, reported in percentages.

Panel B: The results from a mean comparison test between the sub-groups Sphere Firms (i.e. firms partially controlled by Investor AB, Industrivärden AB or Investments AB Kinnevik) and Non-Sphere Firms.

Panel C: Correlation matrix with the variables *Sphere Firm, Firm Size, Book-to-Market, Debt-to-Assets, Excess Stock Returns and Profitability*.

Panel A: Summary Statistics for the Dependent and Independent Variables in the Full Sample

Variable	*Data period*	*Mean*	*Std. Dev.*	*Min*	*Max*
Ln(Firm Size)	Quarterly	9.43	1.60	4.76	14.10
Book-to-Market	Quarterly	0.81	1.86	(0.01)	43.45
Market Return (%)	Quarterly	(0.48)	12.23	(25.00)	15.86
Debt-to-Assets	Quarterly	0.26	0.18	0.00	0.81
Debt-to-Capital	Quarterly	0.38	0.25	0.00	1.04
Stock Return (%)	Quarterly	2.29	24.66	(69.56)	212.50
Excess Stock Return (%)	Quarterly	(0.27)	25.10	(70.41)	209.25
Risk-free Rate (%)	Quarterly	2.57	1.49	0.16	4.41
Profitability (%)	Quarterly	2.40	4.65	(45.46)	35.61
Investment Rate (%)	Annually	4.15	6.40	(32.07)	38.80

Panel B : Mean Comparison Test for Sphere and Non-Sphere Firms

Variables	*Data Period*	*Non-Sphere Firms*	*Sphere Firms*	*t-statistic*
Ln(Firm Size)	Quarterly	9.03	10.90	(23.60)****
Book-to-Market	Quarterly	0.77	0.95	(1.73)*
Ln(Total Assets)	Quarterly	8.84	10.87	(21.12)****
Debt-to-Assets	Quarterly	0.26	0.24	1.93
Debt-to-Capital	Quarterly	0.38	0.39	(1.01)
Stock Return (%)	Quarterly	2.56	1.32	0.87
Excess Stock Return (%)	Quarterly	0.00	(1.24)	0.87
Profitability (%)	Quarterly	2.47	2.10	1.42
Investment Rate (%)	Annually	4.36	3.34	1.38
** p<0.1, ** p<0.05, *** p<0.01, **** p<0.001*				

Panel C: Correlation Matrix

	Sphere Firm	*Firm Size*	*Book-to-Market*	*Debt-to-Assets*	*Excess Stock Return*	*Profitability*
Sphere Firm	1.00					
Firm Size	0.48	1.00				
Book-to-Market	0.04	(0.03)	1.00			
Debt-to-Assets	(0.04)	0.22	(0.10)	1.00		
Excess Stock Return	(0.02)	0.00	(0.07)	(0.03)	1.00	
Profitability	(0.03)	0.03	(0.09)	(0.18)	0.10	1.00

Table 3.
Comparison between Before and During the Crisis Period.

The results from a mean comparison test between the sub-groups Crisis (defined as the period 2008 quarter 1 to 2009 quarter 3, except from Stock Return, Excess Stock Return and Market Return where the period is 2008 quarter 1 to 2008 quarter 4) and Non-Crisis.

Mean Comparison Test for Crisis and Not Crisis.

Variables	*Data Period*	*Not Crisis*	*Crisis*	*t-statistic*
Ln(Firm Size)	Quarterly	9.52	9.33	2.54**
Book-to-Market	Quarterly	0.56	1.10	(6.50)***
Ln(Total Assets)	Quarterly	9.24	9.31	(0.85)
Debt-to-Assets	Quarterly	0.25	0.27	(2.71)**
Debt-to-Capital	Quarterly	0.37	0.40	(2.71)**
Stock Return (%)	Quarterly	8.73	-14.45	19.61***
Excess Stock Return (%)	Quarterly	6.36	-17.52	19.91***
Market Return (%)	Quarterly	5.55	-16.21	56.02***
Profitability (Assets) (%)	Quarterly	2.94	1.81	5.19**
Investment Rate (%)	Annually	4.23	3.93	0.46

Figure 1.
Index Returns (Quarterly) 2006:Q1-2009:Q3

The graph shows the industry index returns over the sample period. 2005 quarter 4 is base period with return equal to 0% for all industries. The indices are value-weighted and were calculated by dividing each firm's market equity by the total market equity of its industry, summing all those values together and calculating returns as the industry market equity in period t divided by the industry market equity in period t-1 and withdrawing 1. The graph reports the returns in decimals; hence the vertical axis ranges from -50% to +100%.

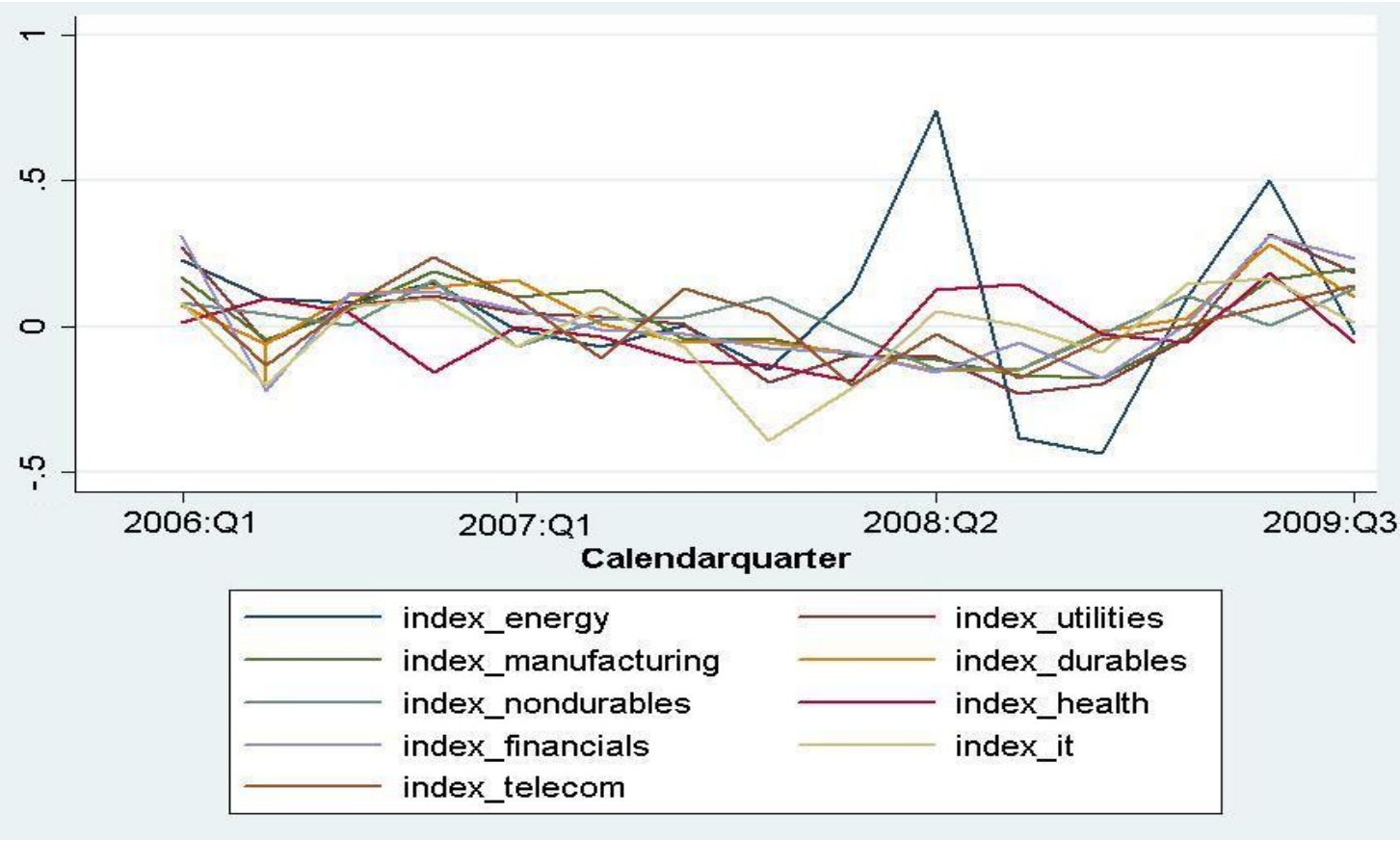

Table 4.
Excess Stock Returns 2006 Quarter 1 to 2008 Quarter 4.

The table reports the results from the main regression: $R_{i,t} - R_{f,t} = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times Book\ to\ Market_{i,t-1} + \beta_3 \times (R_{m,t} - R_{f,t}) + \delta_{4i} \times Crisis + \delta_{5i} \times Investor + \delta_{6i} \times Industrivärden + \delta_{7i} \times Kinnevik + \delta_{8i} \times Energy + \cdots + \delta_{16i} \times Telecom + \varepsilon_{i,t}$, where $R_{i,t}$ = quarterly returns for firm i in period t, $R_{f,t}$= the risk-free rate, here the 3-mo bonds issued by Riksbanken, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price; in this analysis we use the BtM observed in the beginning of the period, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to quarter 4 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Energy, Utilities, Manufacturing, Durables, Nondurables, Health, Financial, IT, Telecom* = dummy variables for the nine industries that equal one if the firm belongs to the industry and zero otherwise. *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. We correct for heteroskedasticity using robust standard errors. *Energy* is dropped due to multicollinearity.

	(1)	(2)	(3)
	Exc. Stock Return	Exc. Stock Return	Exc. Stock Return
Intercept	-0.0483	-0.0470	-0.0683
	(-0.72)	(-0.71)	(-1.66)
Book-to-market	-0.00576	-0.00498	-0.00605
	(-1.14)	(-0.96)	(-1.24)
Firm size	0.00571	0.00572	0.00810*
	(1.28)	(1.28)	(1.96)
Exc Market Return	0.440***	0.440***	0.440***
	(6.73)	(6.73)	(6.71)
Utilities	-0.0141	-0.0155	
	(-0.24)	(-0.27)	
Manufacturing	0.00246	0.00225	
	(0.05)	(0.04)	
Durables	-0.0247	-0.0249	
	(-0.45)	(-0.45)	
Nondurables	0.0106	0.0106	
	(0.19)	(0.19)	
Health	0.00319	0.00327	
	(0.06)	(0.06)	
Financials	0.0102	0.00989	
	(0.19)	(0.18)	
IT	-0.00198	-0.00203	
	(-0.03)	(-0.03)	
Telecom	0.0488	0.0494	
	(0.77)	(0.78)	
Investor	-0.0144	-0.0434*	-0.0517*
	(-0.76)	(-1.99)	(-2.52)
Industrivärden	-0.0108	-0.0124	-0.0179
	(-0.45)	(-0.41)	(-0.64)
Kinnevik	-0.0230	-0.00685	0.00234
	(-0.92)	(-0.24)	(0.08)
Crisis	-0.0873***	-0.0917***	-0.0912***
	(-5.12)	(-5.14)	(-5.11)
Investor+crisis		0.0851**	0.0845**
		(2.83)	(2.82)
Industrivärden+crisis		0.00581	0.00597
		(0.17)	(0.18)
Kinnevik+crisis		-0.0522	-0.0510
		(-1.20)	(-1.15)
N	1408	1408	1408
R-squared	0.2286	0.2269	0.2285

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.
Excess Stock Returns 2006 Quarter 1 to 2009 Quarter 3 with Industry Dummies.

The table reports the results from the main regression: $R_{i,t} - R_{f,t} = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times Book\ to\ Market_{i,t-1} + \beta_3 \times (R_{m,t} - R_{f,t}) + \delta_{4i} \times Crisis + \delta_{5i} \times Investor + \delta_{6i} \times Industrivärden + \delta_{7i} \times Kinnevik + \delta_{8i} \times Energy + \cdots + \delta_{16i} \times Telecom + \varepsilon_{i,t}$, where $R_{i,t}$ = quarterly returns for firm i in period t, $R_{f,t}$= the risk-free rate, here the 3-mo bonds issued by Riksbanken, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price; in this analysis we use the BtM observed in the beginning of the period, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to quarter 4 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Energy, Utilities, Manufacturing, Durables, Nondurables, Health, Financial, IT, Telecom* = dummy variables for the nine industries that equal one if the firm belongs to the industry and zero otherwise. *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. We correct for heteroskedasticity using robust standard errors. *Energy* is dropped due to multicollinearity.

	(1)	(2)	(3)
	Exc. Stock Return	Exc. Stock Return	Exc. Stock Return
Intercept	0.0552	0.0576	0.0443
	(0.87)	(0.90)	(1.16)
Book-to-market	0.0149***	0.0151***	0.0126***
	(3.97)	(4.05)	(3.53)
Firm size	-0.000614	-0.000647	-0.000494
	(-0.14)	(-0.14)	(-0.12)
Exc Market Return	0.641***	0.641***	0.643***
	(10.11)	(10.11)	(10.10)
Utilities	-0.0443	-0.0451	
	(-0.80)	(-0.81)	
Manufacturing	-0.0115	-0.0119	
	(-0.24)	(-0.24)	
Durables	-0.0156	-0.0161	
	(-0.31)	(-0.32)	
Nondurables	-0.0214	-0.0217	
	(-0.41)	(-0.41)	
Health	-0.0147	-0.0143	
	(-0.29)	(-0.28)	
Financials	-0.0135	-0.0139	
	(-0.28)	(-0.28)	
IT	0.000513	0.000456	
	(0.01)	(0.01)	
Telecom	0.0451	0.0451	
	(0.78)	(0.77)	
Investor	-0.0155	-0.0426	-0.0416*
	(-0.78)	(-1.90)	(-2.06)
Industrivärden	-0.00385	-0.00969	-0.0170
	(-0.17)	(-0.36)	(-0.73)
Kinnevik	-0.0610*	-0.0479	-0.0256
	(-2.34)	(-1.57)	(-0.92)
Crisis	-0.0956***	-0.103***	-0.102***
	(-5.54)	(-5.65)	(-5.61)
Investor+crisis		0.102***	0.102***
		(3.38)	(3.39)
Industrivärden+crisis		0.0223	0.0223
		(0.72)	(0.72)
Kinnevik+crisis		-0.0508	-0.0496
		(-1.15)	(-1.10)
N	1783	1783	1783
R-squared	0.1257	0.1235	0.1145

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6.
Excess Stock Returns 2006 Quarter 1 to 2009 Quarter 3 with Industry Indices.

The table reports the results from the main regression: $R_{i,t} - R_{f,t} = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times Book\ to\ Market_{i,t-1} + \beta_3 \times (R_{m,t} - R_{f,t}) + \delta_{4i} \times Crisis + \delta_{5i} \times Investor + \delta_{6i} \times Industrivärden + \delta_{7i} \times Kinnevik + \delta_{8i} \times Industry\ Return + \varepsilon_{i,t}$, where $R_{i,t}$ = quarterly returns for firm i in period t, $R_{f,t}$= the risk-free rate, here the 3-mo bonds issued by Riksbanken, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price; in this analysis we use the BtM observed in the beginning of the period, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to quarter 4 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. *Industry return* = the value-weighted industry index returns for the nine industries. We correct for heteroskedasticity using robust standard errors.

	(1) Exc. Stock Return	(2) Exc. Stock Return
Intercept	0.0388	0.0423
	(1.10)	(1.20)
Book-to-Market	0.00942**	0.00946**
	(2.70)	(2.74)
Firm size	-0.00172	-0.00182
	(-0.48)	(-0.51)
Exc Market Return	0.245***	0.245***
	(4.20)	(4.19)
Industry return	0.780***	0.781***
	(19.56)	(19.56)
Investor	-0.00871	-0.0327*
	(-0.63)	(-2.18)
Industrivärden	-0.00592	-0.0192
	(-0.34)	(-0.91)
Kinnevik	-0.0345	-0.0254
	(-1.61)	(-1.02)
Crisis	-0.0481**	-0.0576***
	(-3.21)	(-3.67)
Investor+crisis		0.0911***
		(3.93)
Industrivärden+crisis		0.0498
		(1.80)
Kinnevik+crisis		-0.0346
		(-0.78)
N	1782	1782
R-squared	0.7933	0.7895

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7.
Profitability 2006 Quarter 1 to 2009 Quarter 3.

The table reports the results from the main regression: $Profitability = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \cdots + \delta_{15i} \times \text{Telecom} + \varepsilon_{i,t}$ where *Profitability* = EBIT divided by total assets, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise. We correct for heteroskedasticity using robust standard errors. Energy is dropped due to multicollinearity.

	(1) Profitability	(2) Profitability
Intercept	-0.0274	-0.00679
	(-1.25)	(-0.42)
Book-to-Market	-0.00204***	-0.00205***
	(-4.43)	(-4.55)
Firm Size	0.00585***	0.00420**
	(3.46)	(2.66)
Utilities	0.00670	
	(0.40)	
Manufacturing	0.0101	
	(0.68)	
Durables	0.0212	
	(1.34)	
Nondurables	0.0127	
	(0.79)	
Health	-0.0149	
	(-0.65)	
IT	0.0287	
	(1.72)	
Telecom	0.00102	
	(0.06)	
Financials	-0.00974	
	(-0.57)	
Kinnevik	-0.0105	-0.00727
	(-1.06)	(-0.83)
Investor	-0.0166*	-0.0117
	(-2.24)	(-1.67)
Industrivärden	-0.0163	-0.0118
	(-1.30)	(-1.04)
Crisis	-0.00970***	-0.01000***
	(-5.29)	(-5.36)
N	1804	1804
R-squared	0.1323	0.0048

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8.
Profitability 2006 Quarter 1 to 2009 Quarter 3 with Difference-in-Difference Estimators.

The table reports the results from the main regression: $Profitability = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \cdots + \delta_{15i} \times \text{Telecom} + \varepsilon_{i,t}$ where *Profitability* = EBIT divided by total assets, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Industry return* = the value-weighted average return within each index. *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. We correct for heteroskedasticity using robust standard errors. Energy is dropped due to multicollinearity.

	(1) Profitability	(2) Profitability
Intercept	-0.0278	-0.00699
	(-1.26)	(-0.43)
Book-to-market	-0.00214***	-0.00215***
	(-4.41)	(-4.54)
Firm size	0.00589***	0.00423**
	(3.47)	(2.66)
Utilities	0.00698	
	(0.42)	
Manufacturing	0.0103	
	(0.68)	
Durables	0.0213	
	(1.34)	
Nondurables	0.0128	
	(0.79)	
Health	-0.0149	
	(-0.64)	
IT	0.0288	
	(1.72)	
Telecom	0.000861	
	(0.05)	
Financials	-0.00965	
	(-0.57)	
Kinnevik	-0.0138	-0.0106
	(-1.29)	(-1.11)
Investor	-0.0187*	-0.0137
	(-2.41)	(-1.86)
Industrivärden	-0.0132	-0.00859
	(-1.14)	(-0.83)
Crisis	-0.00966***	-0.00991***
	(-4.65)	(-4.72)
Investor+crisis	0.00374	0.00341
	(0.75)	(0.69)
Industrivärden+crisis	-0.00697	-0.00706
	(-0.96)	(-0.97)
Kinnevik+crisis	0.00743	0.00732
	(1.32)	(1.33)
N	1803	1803
R-squared	0.1323	0.0049

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9.
Debt-to-Capital Ratio 2006 Quarter 1 to 2009 Quarter 3.

The table reports the results from the main regression: $Debt\ Ratio = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \cdots + \delta_{15i} \times \text{Telecom} + \varepsilon_{i,t}$ where *Debt-rate* = Debt-to-Capital, i.e. interest-bearing debt divided by the sum of shareholders' equity and interest-bearing debt, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise. We correct for heteroskedasticity using robust standard errors. Telecom is dropped due to multicollinearity.

	(1) Debt-to-Capital	(2) Debt-to-Capital
Intercept	0.0420	0.0494
	(0.24)	(0.68)
Firm size	0.0291***	0.0318***
	(3.87)	(4.38)
Book-to-Market	0.00466*	0.00474*
	(2.18)	(2.12)
Crisis	0.0428***	0.0428***
	(9.67)	(9.72)
Utilities	-0.0311	
	(-0.19)	
Manufacturing	0.0742	
	(0.49)	
Durables	-0.0120	
	(-0.08)	
Nondurables	0.0723	
	(0.39)	
Health	-0.0494	
	(-0.30)	
Financials	0.110	
	(0.73)	
IT	-0.169	
	(-1.06)	
Energy	-0.00771	
	(-0.05)	
Investor	0.0909*	0.0860*
	(2.22)	(2.26)
Industrivärden	-0.0218	-0.0283
	(-0.32)	(-0.40)
Kinnevik	0.00233	-0.00482
	(0.02)	(-0.04)
N	1804	1804
R-squared	0.1812	0.0752

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10.

Debt-to-Capital Ratio 2006 Quarter 1 to 2009 Quarter 3 with Difference-in-Difference Estimators.

The table reports the results from the main regression: $Debt\ Ratio = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \cdots + \delta_{15i} \times \text{Telecom} + \varepsilon_{i,t}$, where *Debt-rate* = Debt-to-Capital, i.e. interest-bearing debt divided by the sum of shareholders' equity and interest-bearing debt, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. We correct for heteroskedasticity using robust standard errors. *Energy* is dropped due to multicollinearity.

	(1) Debt-to-Capital	(2) Debt-to-Capital
Intercept	0.0395	0.0483
	(0.23)	(0.67)
Firm Size	0.0296***	0.0322***
	(3.91)	(4.42)
Book-to-Market	0.00496*	0.00504*
	(2.20)	(2.15)
Utilities	-0.00536	
	(-0.03)	
Manufacturing	-0.0312	
	(-0.19)	
Durables	0.0751	
	(0.49)	
Nondurables	-0.0115	
	(-0.07)	
Health	0.0732	
	(0.39)	
Financials	-0.0485	
	(-0.29)	
IT	0.111	
	(0.74)	
Telecom	-0.166	
	(-1.04)	
Crisis	0.0368***	0.0367***
	(7.87)	(7.87)
Investor	0.0812*	0.0789*
	(2.05)	(2.18)
Industrivärden	-0.0465	-0.0534
	(-0.67)	(-0.74)
Kinnevik	0.00211	-0.00582
	(0.02)	(-0.05)
Investor+crisis	0.0149	0.0155
	(0.80)	(0.83)
Industrivärden+crisis	0.0512***	0.0517***
	(3.72)	(3.75)
Kinnevik+crisis	-0.00102	-0.000525
	(-0.04)	(-0.02)
N	1804	1804
R-squared	0.1820	0.0767

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11.
Investment Rate 2005 to 2008.

The table reports the results from the main regression: $Investment\ rate = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \cdots + \delta_{15i} \times \text{Telecom} + \varepsilon_{i,t}$ where *Investment rate* = capital expenditure (CAPEX) divided by total assets, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise. We correct for heteroskedasticity using robust standard errors. *Energy* is dropped due to multicollinearity.

	(1) Investment rate	(2) Investment rate
Intercept	0.227***	0.0695*
	(5.49)	(2.29)
Firm size	-0.00552	-0.00269
	(-1.67)	(-0.82)
Book-to-market	0.000665	0.000637
	(0.61)	(0.58)
Utilities	-0.116***	
	(-3.45)	
Manufacturing	-0.140***	
	(-4.88)	
Durables	-0.137***	
	(-4.54)	
Nondurables	-0.127***	
	(-3.50)	
Health	-0.149***	
	(-4.60)	
Financials	-0.134***	
	(-4.63)	
IT	-0.152***	
	(-4.63)	
Telecom	-0.0512	
	(-1.16)	
Kinnevik	-0.00425	0.0170
	(-0.17)	(0.72)
Investor	0.00135	-0.0148
	(0.07)	(-0.69)
Industrivärden	0.00262	-0.00290
	(0.14)	(-0.16)
Crisis	-0.00654	-0.00547
	(-1.34)	(-1.12)
N	467	467
R-squared	0.2240	0.0153

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12.

Investment Rate 2005 to 2008 with Difference-in-Difference Estimators and Industry Indices.

The table reports the results from the main regression: $Investment\ rate = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Industry investment rate} + \varepsilon_{i,t}$ where *Investment rate* = capital expenditure (CAPEX) divided by total assets, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Industry investment rate* = the value-weighted average investment rate within the industry, *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. We correct for heteroskedasticity using robust standard errors. *Energy* is dropped due to multicollinearity.

	(1) Investment rate
Intercept	0.0440
	(1.16)
Firm size	-0.00220
	(-0.59)
Book-to-market	0.000718
	(1.50)
Crisis	-0.00526
	(-0.95)
Industry investment rate	0.572***
	(4.15)
Kinnevik	0.00942
	(0.63)
Investor	-0.0126
	(-0.93)
Industrivärden	-0.00322
	(-0.35)
Investor+crisis	-0.00475
	(-0.59)
Industrivärden+crisis	0.00185
	(0.27)
Kinnevik+crisis	-0.00867
	(-0.35)
N	467
R-squared	0.1545

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 13.
Investment Rate 2005 to 2008 with Difference-in-Difference Estimators, Industry Indices and Exclusion of Outlier Industries.

The table reports the results from the main regression: $Investment\ rate = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Industry Investment rate} + \varepsilon_{i,t}$ where *Investment rate* = capital expenditure (CAPEX) divided by total assets, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Industry investment rate* = the value-weighted average investment rate within the industry, *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. We correct for heteroskedasticity using robust standard errors.

	(1) Investment rate
Intercept	0.0306
	(0.93)
Firm size	-0.00260
	(-0.55)
Book-to-market	0.000422
	(0.87)
Crisis	0.00286
	(0.54)
Industry investment	0.480**
rate	(2.81)
Kinnevik	0.0107
	(0.60)
Investor	-0.0122
	(-0.74)
Industrivärden	-0.00255
	(-0.23)
Investor+crisis	-0.0139
	(-1.68)
Industrivärden+crisis	-0.00267
	(-0.43)
Kinnevik+crisis	-0.00608
	(-0.24)
N	423
R-squared	0.1086

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 2a.
Separation of Investor AB (investment firm) from the Investor Portfolio Firms – Investment Rate.
The graph shows the investment rate for Investor AB (red line) and the value-weighted investment rate for the portfolio firms (blue line, calculated as each Investor portfolio firm's investment rate times its fraction of the total market equity in the portfolio, excluding Investor AB). The results are reported in decimals, hence the vertical axis ranges from -4% to +4%.

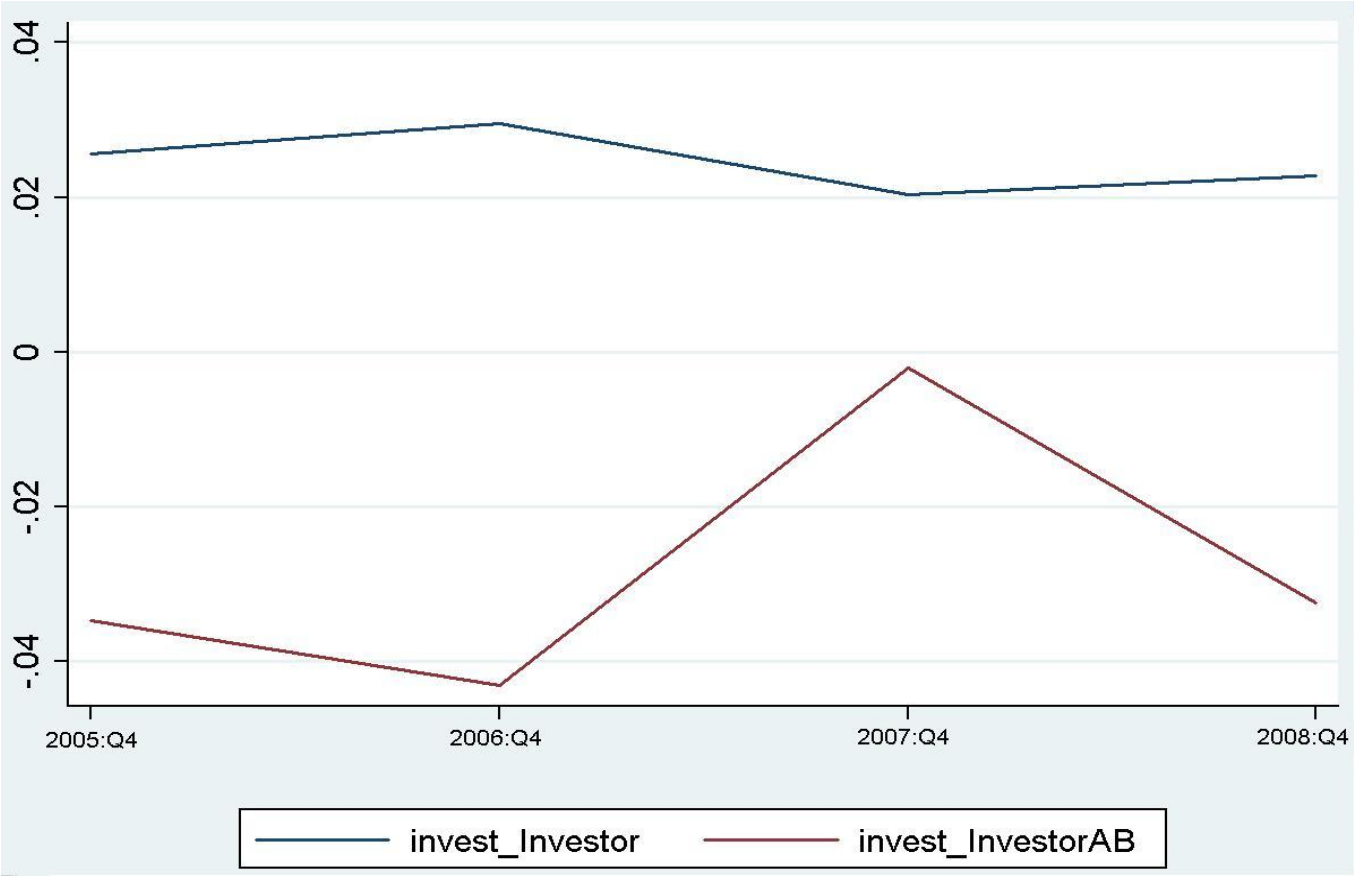

Figure 2b.

Separation of Industrivärden AB (investment firm) from the Industrivärden Portfolio Firms – Investment Rate.

The graph shows the investment rate for Industrivärden AB (red line) and the value-weighted investment rate for the portfolio firms (blue line, calculated as each Industrivärden portfolio firm's investment rate times its fraction of the total market equity in the portfolio, excluding Industrivärden AB). The results are reported in decimals, hence the vertical axis ranges from -5% to +10%.

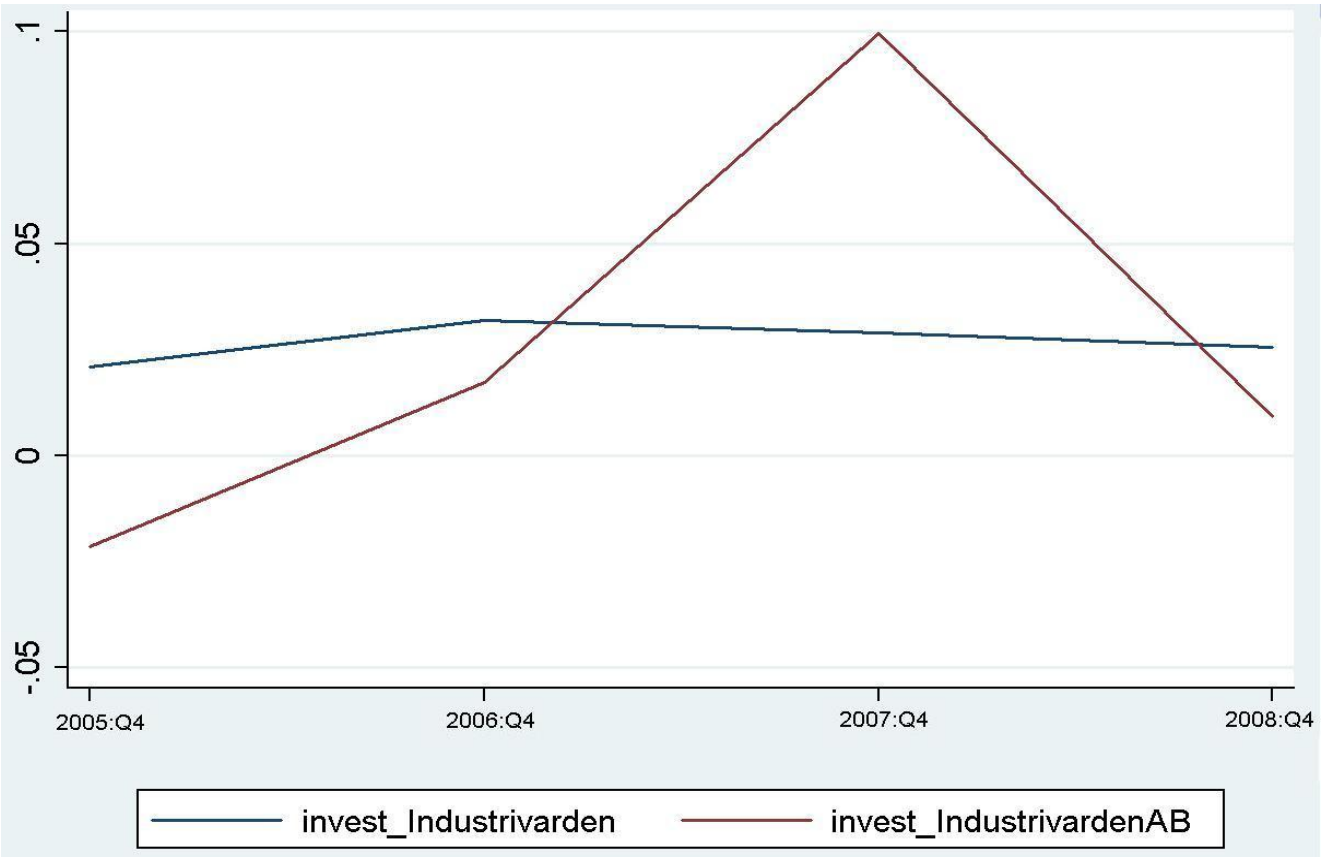

Figure 2c.
Separation of Investments AB Kinnevik (investment firm) from the Kinnevik Portfolio Firms – Investment Rate.

The graph shows the investment rate for Investment AB Kinnevik (red line) and the value-weighted investment rate for the portfolio firms (blue line, calculated as each Kinnevik portfolio firm's investment rate times its fraction of the total market equity in the portfolio, excluding Investment AB Kinnevik). The results are reported in decimals, hence the vertical axis ranges from -5% to +15%.

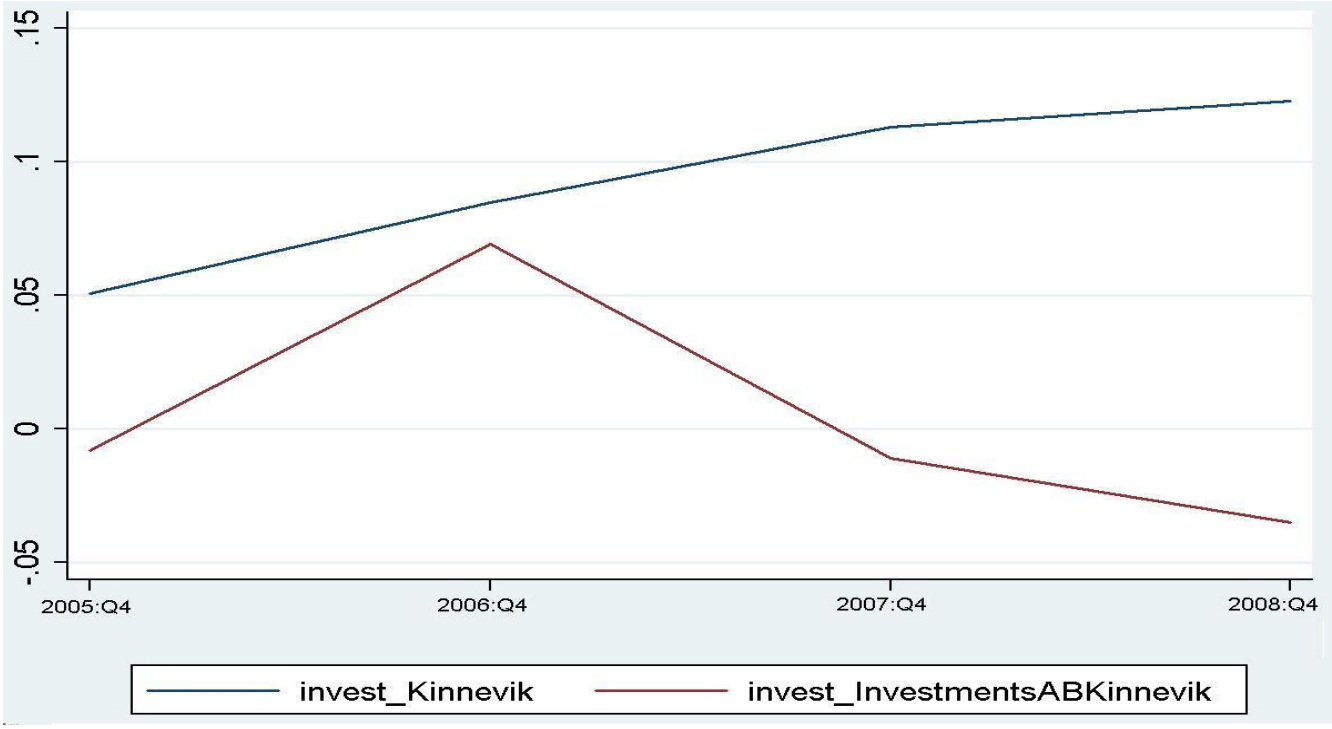

Figure 3a.
Separation of Investor AB (investment firm) from the Investor Portfolio Firms – Stock Returns
The graph shows the stock return for Investor AB (red line) and the value-weighted stock return for the portfolio firms (blue line, calculated as each Investor portfolio firm's stock return times its fraction of the total market equity in the portfolio, excluding Investor AB). The results are reported in decimals, hence the vertical axis ranges from -20% to +20%. The base period is 2005 quarter 4.

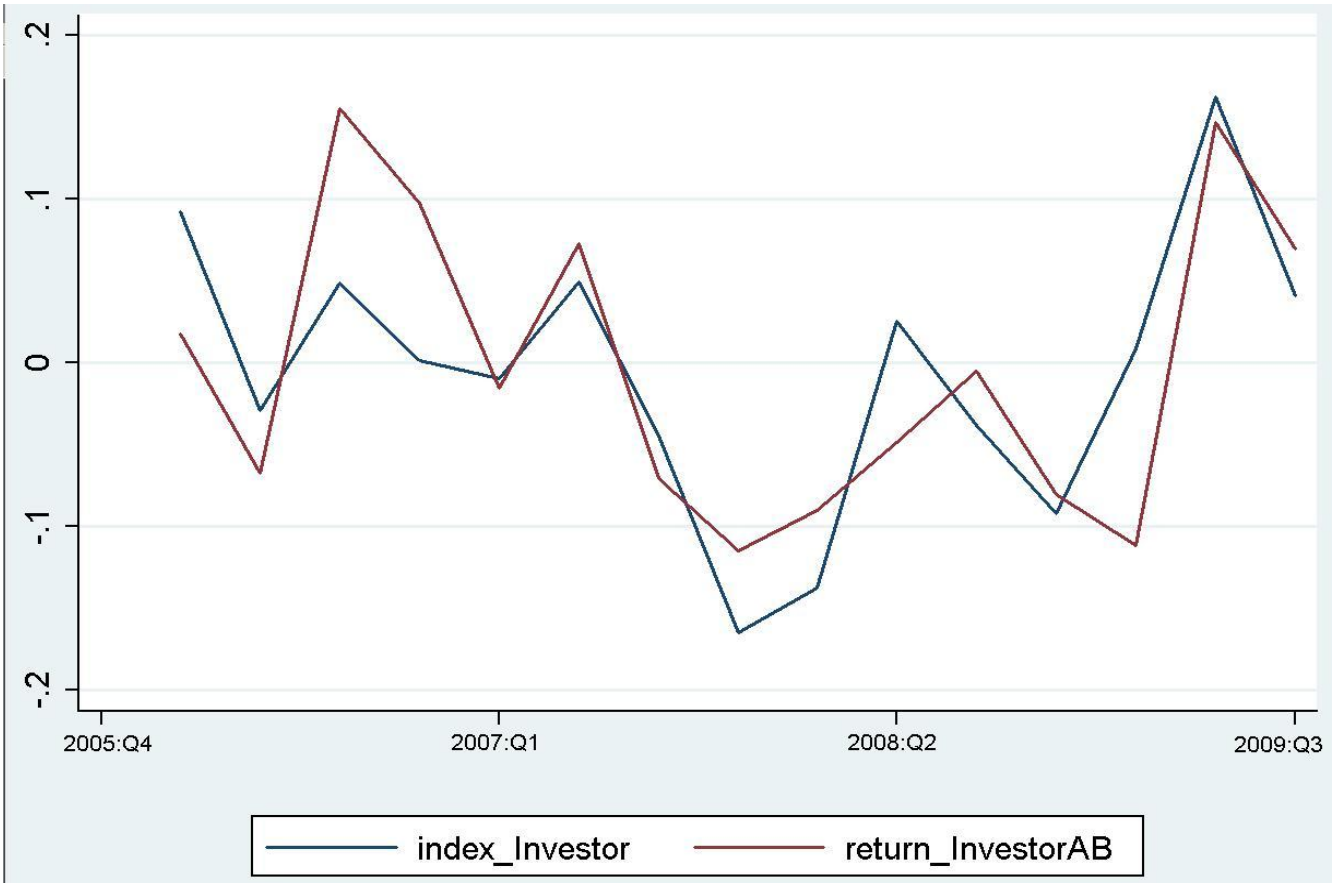

Figure 3b.

Separation of Industrivärden AB (investment firm) from the Industrivärden Portfolio Firms – Stock Returns

The graph shows the stock return for Industrivärden AB (red line) and the value-weighted stock return for the portfolio firms (blue line, calculated as each Industrivärden portfolio firm's stock return times its fraction of the total market equity in the portfolio, excluding Industrivärden AB). The results are reported in decimals, hence the vertical axis ranges from -30% to +20%. The base period is 2005 quarter 4.

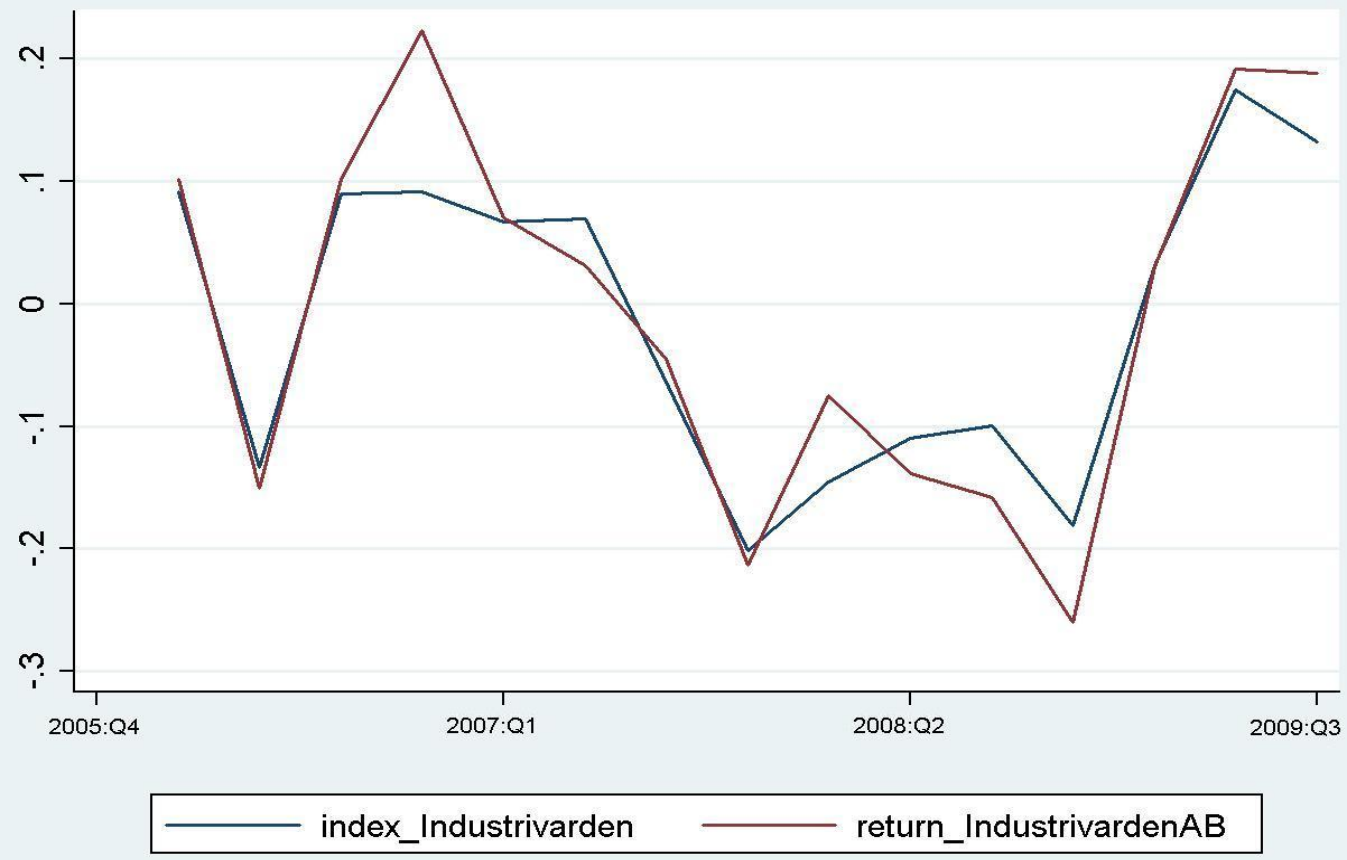

Figure 3c.

Separation of Investment AB Kinnevik (investment firm) from the Kinnevik Portfolio Firms – Stock Returns

The graph shows the stock return for Investment AB Kinnevik (red line) and the value-weighted stock return for the portfolio firms (blue line, calculated as each Kinnevik portfolio firm's stock return times its fraction of the total market equity in the portfolio, excluding Investment AB Kinnevik). The results are reported in decimals, hence the vertical axis ranges from -40% to +40%. The base period is 2005 quarter 4.

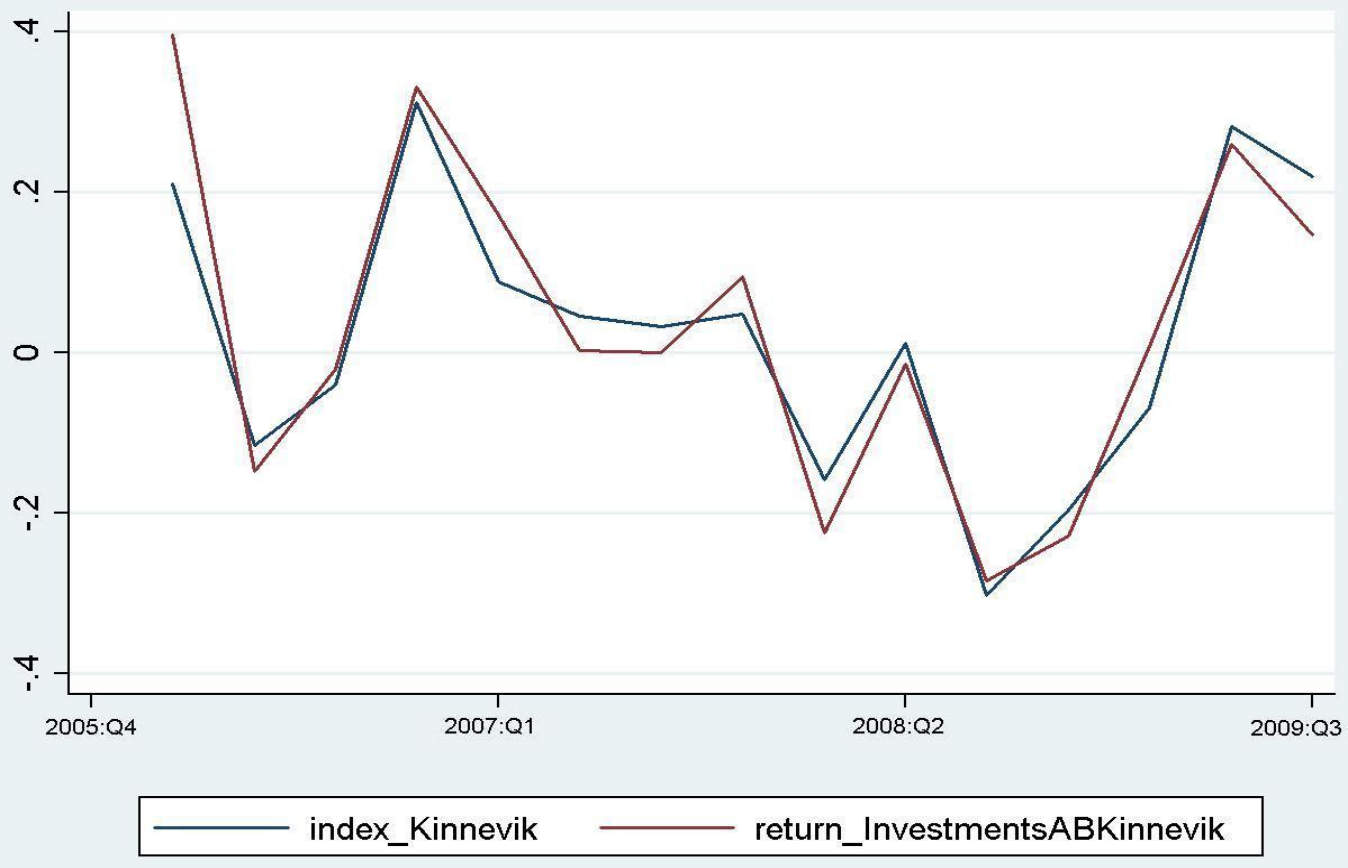

Figure 4a.
Separation of Investor AB (investment firm) from the Investor Portfolio Firms – Profitability

The graph shows the profitability (EBIT divided by total assets) for Investor AB (red line) and the value-weighted profitability for the portfolio firms (blue line, calculated as each Investor portfolio firm's profitability times its fraction of the total market equity in the portfolio, excluding Investor AB). The results are reported in decimals, hence the vertical axis ranges from -10% to +10%. The base period is 2005 quarter 4.

Figure 4b.

Separation of Industrivärden AB (investment firm) from the Industrivärden Portfolio Firms – Profitability

The graph shows the profitability (EBIT divided by total assets) for Industrivärden AB (red line) and the value-weighted profitability for the portfolio firms (blue line, calculated as each Industrivärden portfolio firm's profitability times its fraction of the total market equity in the portfolio, excluding Industrivärden AB). The results are reported in decimals, hence the vertical axis ranges from -30% to +20%. The base period is 2005 quarter 4.

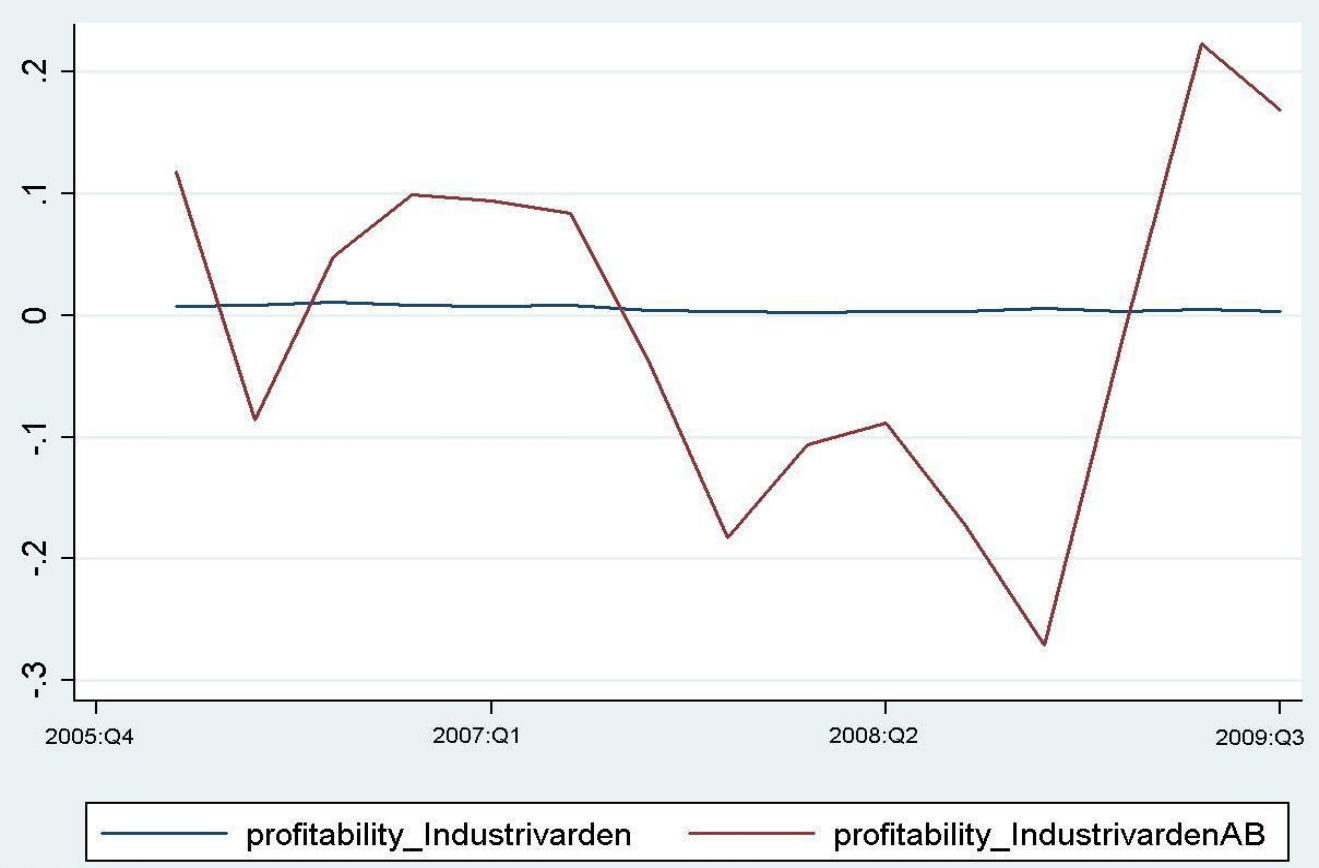

Figure 4c.

Separation of Investments AB Kinnevik (investment firm) from the Kinnevik Portfolio Firms – Profitability

The graph shows the profitability (EBIT divided by total assets) for Investments AB Kinnevik (red line) and the value-weighted profitability for the portfolio firms (blue line, calculated as each Kinnevik portfolio firm's profitability times its fraction of the total market equity in the portfolio, excluding Investments AB Kinnevik). The results are reported in decimals, hence the vertical axis ranges from 0% to +15%. The base period is 2005 quarter 4.

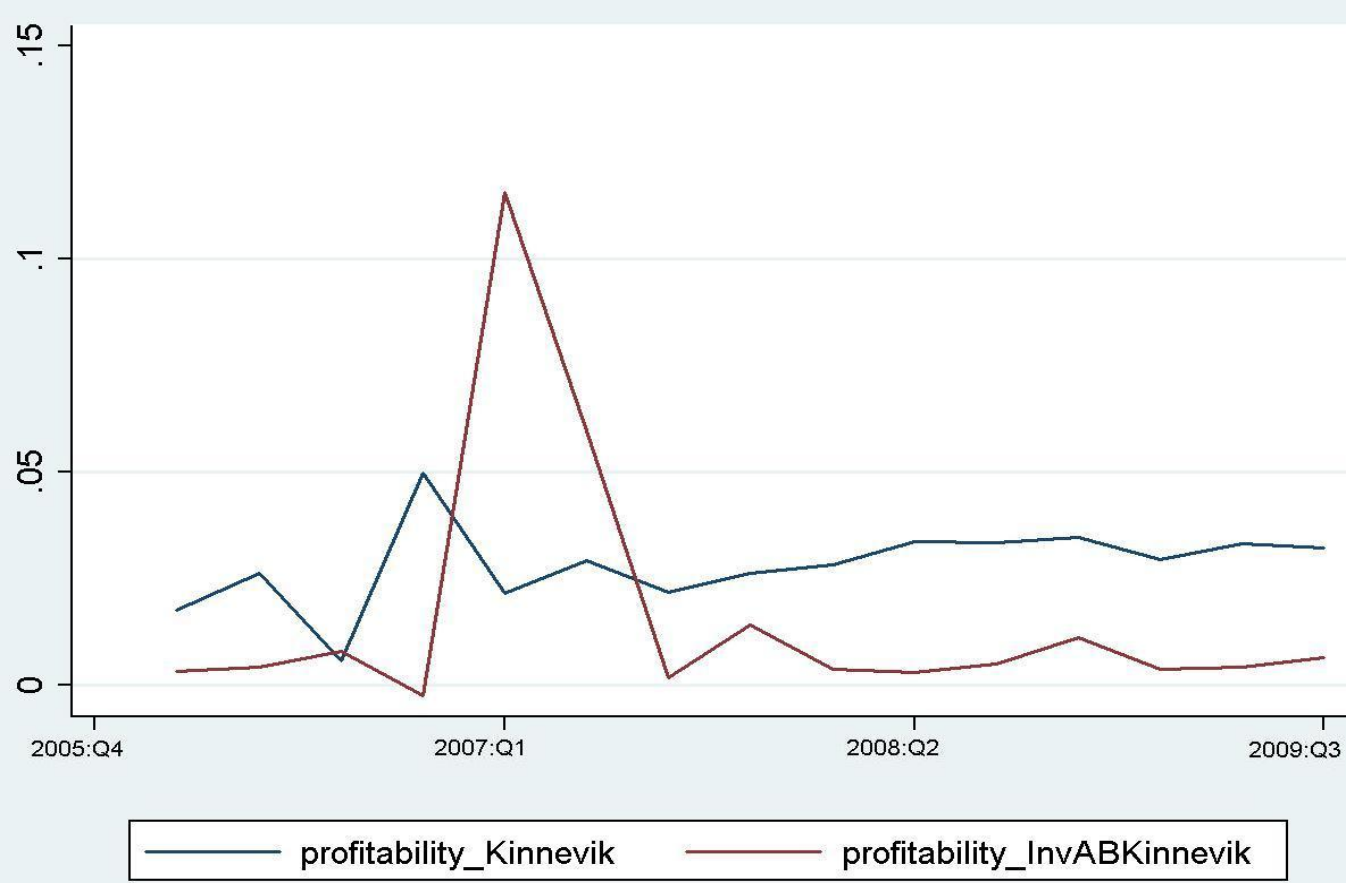

Table 14.
Excess Stock Returns 2006 Quarter 1 to 2009 Quarter 3 with Industry Indices and Exclusion of Firm Size and Book-to-Market Outliers.

The table reports the results from the main regression: $R_{i,t} - R_{f,t} = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times Book\ to\ Market_{i,t-1} + \beta_3 \times (R_{m,t} - R_{f,t}) + \delta_{4i} \times Crisis + \delta_{5i} \times Investor + \delta_{6i} \times Industrivärden + \delta_{7i} \times Kinnevik + \delta_{8i} \times Industry\ Return + \varepsilon_{i,t}$, where $R_{i,t}$ = quarterly returns for firm i in period t, $R_{f,t}$= the risk-free rate, here the 3-mo bonds issued by Riksbanken, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price; in this analysis we use the BtM observed in the beginning of the period, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to quarter 4 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. *Industry return* = the value-weighted industry index returns for the nine industries. We correct for heteroskedasticity using robust standard errors.

	(1) Exc. Stock Returns
Intercept	-0.0209
	(-0.29)
Book-to-Market	0.172***
	(7.32)
Ln(Firm Size)	-0.00393
	(-0.54)
Exc Market Return	0.172**
	(2.90)
Industry retu	0.697***
	(16.84)
Investor	-0.0217
	(-0.78)
Industrivärden	-0.0250
	(-0.64)
Kinnevik	0.00439
	(0.10)
Crisis	-0.0720***
	(-4.34)
Investor+crisis	0.0884**
	(3.15)
Industrivärden+crisis	0.0271
	(0.86)
Kinnevik+crisis	-0.0621
	(-1.46)
N	1450
R-squared	0.4696

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15.
Debt-to-Capital Ratio 2006 Quarter 1 to 2009 Quarter 3 with Difference-in-Difference Estimators and Exclusion of Firm Size and Book-to-Market Outliers.

The table reports the results from the main regression: $Debt\ Ratio = \beta_0 + \beta_1 \times ln(Firm\ Size_{i,t}) + \beta_2 \times \text{Book to Market}_{i,t} + \delta_{3i} \times \text{Crisis} + \delta_{4i} \times \text{Investor} + \delta_{5i} \times \text{Industrivärden} + \delta_{6i} \times \text{Kinnevik} + \delta_{7i} \times \text{Energy} + \cdots + \delta_{15i} \times \text{Telecom} + \varepsilon_{i,t}$, where *Debt-rate* = Debt-to-Capital, i.e. interest-bearing debt divided by the sum of shareholders' equity and interest-bearing debt, *Firm Size* = market equity plus interest-bearing debt, *Book-to-Market* = shareholders' equity divided by the number of shares outstanding times the unadjusted share price, *Crisis* = dummy variable that equals one for the observations in 2008 calendar quarter 1 to 2009 quarter 3 and zero otherwise. *Investor, Industrivärden, Kinnevik* = dummy variables for the three spheres that equal one if the firm is partially owned by the relevant sphere and zero otherwise, *Investor+crisis, Industrivärden+crisis, Kinnevik+crisis* = difference-in-difference estimators, the factor of the sphere dummies and the crisis dummy. We correct for heteroskedasticity using robust standard errors. *Energy* is dropped due to multicollinearity.

	(1) Debt-to-Capital
Intercept	-0.0430
	(-0.36)
Firm Size	0.0382**
	(3.26)
Book-to-Market	0.0142
	(1.21)
Utilities	-0.00883
	(-0.13)
Manufacturing	0.0830
	(1.62)
Durables	-0.0131
	(-0.24)
Nondurables	-0.0129
	(-0.10)
Health	-0.0419
	(-0.65)
Financials	0.0564
	(1.11)
IT	-0.156***
	(-2.65)
Telecom	-0.0520
	(-0.31)
Crisis	0.0437***
	(8.21)
Investor	0.0902*
	(2.21)
Industrivärden	-0.0936
	(-1.05)
Kinnevik	0.0658
	(0.42)
Investor+crisis	0.0154
	(0.74)
Industrivärden+crisis	0.0264
	(1.71)
Kinnevik+crisis	-0.0717**
	(-2.79)
N	1468
R-squared	0.0965

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$