Pension Reform, Ownership Structure, and Corporate Governance:

Evidence from Sweden[*]

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Abstract: Conventional wisdom holds that pension reforms by spurring the importance of pension funds may increase stock market development and improve corporate governance. Sweden offers a unique natural experiment to analyze the microeconomic effects of pension reforms on ownership structure, corporate governance and firm valuation. The Swedish pension reform increased the participation of institutional investors in the domestic stock market and caused a significant reshuffling in the ownership of the existing pension funds. The availability of detailed micro data on firm ownership allows us to document the effects of the pension reform on ownership structure and corporate governance of listed companies. We exploit the exogenous timing in the increase in pension funds' holdings to address endogeneity concerns. We show that firm valuation increases if government pension funds increase their equity stakes. However, controlling shareholders are reluctant to relinquish control and the control premium increases. Our results go against the conventional wisdom suggesting that an increase in institutionalized saving decreases ownership concentration and private benefits of controls, and offer a more malign view of the impact of institutional holdings on ownership concentration and corporate control.

Introduction

Demographic trends and aging populations are pushing for pension reforms from pay-as-you-go to fully funded pension systems. Pension reforms may considerably affect the financial system through various channels. So far, the economic profession has mainly explored the impact of pension reforms on saving (see, for instance, Attanasio and Brugiavini, 2003, and Attanasio and Rohwedder, 2003).

The transition from an unfunded to a fully funded pension system relies on the introduction of pension funds investing individual savings in financial assets, including domestic equity. Pension reforms are thus expected to cause an increase in institutionalized saving (Khorana, Servaes and Tufano, 2005). Pension funds and other institutional investors in turn are widely believed to play an important role in corporate governance and may affect the development of the financial system.

First, stock valuation may increase as a consequence of the increased demand for equity. For given private benefits of control, this may drive up controlling shareholders' opportunity cost of holding the controlling block and increase the likelihood that controlling owners relinquish control (Helwege, Pirinsky and Stulz, 2005).[1]

Second, and more importantly from a corporate governance point of view, pension funds acquiring large stakes in listed companies have an incentive to monitor managers and controlling shareholders, to engage in negotiations with management, to make proxy proposals, and to get involved in the choice of board members. This could have an effect on corporate policies, may limit controlling shareholders' ability to extract private benefits of control, and could lead to a more dispersed ownership structure (Burkart, Panunzi and Shleifer, 2003).

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[1] Pagano, Panetta and Zingales (1998) and Ritter (1991) also show that controlling owners time their primary equity sales after price increases.

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For these reasons, there is a widespread belief among policymakers that pension reforms instigate mechanisms leading to improved corporate governance and increased shareholder discipline.

To the best of our knowledge, this paper is the first attempt to explore these issues. We exploit the Swedish pension reform as a laboratory. We believe that Sweden provides an ideal natural experiment for a number of reasons. First, in 2000, Sweden realized a pension reform that has caused an inflow of new funds into private and public pension funds, and a substantial reallocation of assets of public pension funds. The Fourth AP Fund (AP4), a government-owned pension fund that had traditionally been an active equity investor, was forced to sell most of its equity participations and to reallocate funds to the government and some newly created government pension funds. The reallocation of assets of this pension fund and the subsequent inflow of funds in public and private pension funds serve as ideal natural experiments for how substantial changes in institutional ownership structure affect firm valuation and corporate policies.

Second, we have access to detailed data on the ownership structure of Swedish listed companies for the years preceding and following the pension reform. Hence, we can explore the effects of the increased presence of pension funds not only on firm valuation but also on ownership structure and various aspects of firm-level corporate governance.

Third, unlike the United States where firms tend to be widely held, ownership structures in Sweden vary a great deal. While dispersed ownership is more common in Sweden than in most other European countries, a large fraction of Swedish firms displays concentrated ownership, often through the use of dual class shares, pyramiding and cross-holdings (Faccio and Lang, 2002). We can thus study the relationship between firm performance and ownership for a rich set of ownership structures.

Using the dismantlement of the AP4 pension fund and the successive expansion of the new public and private pension funds' stockholdings as two alternative natural experiments, we consistently find that an exogenous increase in the holdings of government pension funds is associated with an increase in shareholder value. In contrast, equity stakes by pension funds affiliated to industrial groups, and in particular to industrial groups controlled by families, if anything decrease firm value. The empirical evidence is consistent with the interpretation that the effects on firm performance are due to differences in monitoring activity of pension funds and their propensity to affect corporate policies. The control premium increases when government pension funds buy a participation in a firm and the controlling shareholders either increase their control blocks or exploit the pension funds whose vote they indirectly control to increase their voting power. Family-controlled pension funds thus seem to be used by the controlling families as a mechanism to enhance the entrenchment of corporate control.

Overall, we find that the increase in institutionalized saving did not result in a decrease in ownership concentration. Our results suggest that if private benefits of controls are large, ownership concentration may even increase in response to institutional investors' monitoring. Interestingly, while we find a correlation between changes in holdings of controlling shareholders (and their related funds) and government pension funds, we do not find an analogous correlation with changes in ownership of private pension funds, which have similar investment strategies to government pension funds but may be less involved in corporate governance.

 Our paper also contributes to the literature on shareholder activism and institutional ownership. The existing literature has mostly focused on pension funds and other institutional investors in the U.S. and has failed to identify systematic effects of institutional ownership on firm value (Karpoff, 2001). Existing empirical evidence lends support to competing views. Some papers find that institutional shareholders degrade firm performance either because they

do not have the skills to improve firm performance or because their objectives conflict with value maximization (Carleton, Nelson and Weisbach, 1998; Woidtke, 2002); others researchers report that institutional owners are substantially ineffective and only a minority of studies finds evidence that institutional owners, and pension funds in particular, increase shareholder value by monitoring firms.

The mixed results of these studies may depend on the following two challenges faced in this literature. First, previous studies rarely rely on changes in ownership and attempt to capture institutional investors' monitoring using specific episodes of activism. However, it is difficult to observe institutional investors' attempts to affect firm policies as only a minority of these attempts consist of shareholder proxy proposals. This makes it difficult to go beyond clinical studies of specific institutional investors, such as CALPERS. Second, these studies suffer from the problems common to all the literature on ownership and performance. It is impossible to draw conclusions about causal relations simply by saturating firm performance regressions with a large number of firm characteristics in addition to ownership information (see Demsetz and Lehn, 1985; Himmelberg et al., 1999; and Coles, Lemmon, and Meschke, 2006).

As an alternative approach, instrumental variables could be employed to assess the independent effect of ownership structure on firm performance and resolve questions about the direction of causality, but the lack of valid instruments has thus far limited the use of this approach (Coles, Lemmon, and Meschke, 2006). We exploit the substantial exogenous shock to institutional ownership caused by the Swedish pension reform to investigate its effects on firm performance, the value of control and ownership concentration. By employing this exogenous variation in ownership, we mitigate concerns about endogeneity affecting the previous literature.

Additionally, contrary to existing studies on U.S. data, we can proxy for changes in the expected monitoring activity by using exogenous changes in institutional ownership. This allows us to assess the effects of institutional ownership in a large scale experiment instead of evaluating specific episodes of shareholder activism.

The rest of the paper is organized. Section I describes the institutional context of the Swedish pension reform. Section II summarizes the data on ownership of Swedish firms by pension funds and other major shareholders. Section III analyzes the effects of AP4 divestment. Section IV describes the effects of the of private and public pension funds asset expansion on firm valuation, control premia and ownership concentration. Section V concludes.

I. The Swedish Pension Reform

On January 1, 2000, Sweden introduced a multi-tier pension system that incorporates elements of both defined benefits and defined contribution plans. Employers pay 18.5 percent of an employee's salary into the fund for future pension liabilities: 16 percent of this contribution goes into the *Income Pension* (IP) system, the defined benefit pay-as-you-go component of the new system, and the remaining 2.5 percent goes into the *Premium Pension* (PP) system, the defined-contribution component of the new scheme. For individuals with no or low pensions, the new pension system provides a guarantee pension, completely funded by the government from general tax revenues. In addition, there exist private pension savings schemes, which consist of employer contributions to the pension savings of employees with relatively high salaries and of voluntary savings by individuals. Most of the private pension savings are invested in mutual funds.

The pension reform created new, potentially large shareholders in the Swedish stock market and greatly enhanced the resources available to the existing public and private pension funds, which are entitled to manage the pension savings.

First, five public pension funds, known as AP Funds, were created from the reorganization of the so-called buffer funds, established in 1960 in order to provide a buffer for occasional deficits arising from situations in which social security disbursements would exceed income from contributions. These five funds —AP1, AP2, AP3, AP4 and AP6— manage the "defined benefits" pension assets and invest about 60 percent of their assets in domestic and foreign equities. They became operational on January 1, 2001. Among the five buffer funds existing before 2001, only one, AP4, was an active investor in the Swedish stock market, with a portfolio that consisted almost exclusively of Swedish equities. AP4 fund was also particularly active in corporate governance. AP6 fund's mandate was to invest largely in private equity of unlisted small and medium-sized enterprises. The remaining four, AP1, AP2, AP3 and AP5, invested mostly in fixed income securities. As a part of the transition, the buffer funds transferred approximately SEK 150 billion to the state budget to compensate for increased transitory pension expenses. The buffer funds were then merged in the course of 2000 and separated into five independent funds, AP1, AP2, AP3, AP4, and AP6. Each fund was endowed with assets of approximately SEK 125 billion and all became active in the Swedish stock market. As a result of the distribution of the buffer funds, the share of equity decreased substantially in the portfolio of the AP4 pension fund, while it increased in the AP1, AP2 and AP3 funds.[2]

Second, the PP money created an inflow into mutual funds assets. Employees can direct their PP money into a choice of approximately 500 private mutual funds, selected by the government after negotiation of the fees. If an employee does not select a mutual fund, the

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[2] The defined benefit investments are subject to a number of investment restrictions, including: (i) at least 30% of assets must be invested in low-risk interest-bearing securities, and (ii) no more than 10% of a fund's assets may be invested in a single company or issuer.

money is managed by the government default mutual fund, AP7 (also known as the Premium Savings Fund). The AP7 pension fund was also newly created at the end of 2000 and started trading on January 1, 2001. So far, the assets of about one third of employees are in the default account. The AP7 fund invests more than 90 percent of its assets in equity. The return earned on PP investments depends on the performance of the mutual funds selected and the investment risk is borne by the employees.

The pension reform has led to an increase of new investments in domestic and foreign equity of around SEK 20 billion per year. Even though this amount is less than 1 percent of the Swedish stock market capitalization in 2001[3], it is a large amount considering that in 2000 only SEK 100 million of the public pension funds' assets was held in equity. The increase in domestic equity investments, even though substantial, has been limited by the fact that foreign equity holdings by especially the public pension funds increased to an even greater extent, as the reorganization of the public pension system coincided with the removal of foreign investment restrictions that were constraining the holdings of foreign assets to at most 2 percent of the public pension funds' assets. In addition, the choice of mutual funds in the PP system includes a large number of mutual funds specializing in foreign equity.

Anecdotal evidence suggests that especially public pension funds may have affected corporate governance. In fact, pension funds have become active members of board nomination committees and have attempted to influence corporate policies. For instance, in April 2002, AP1, AP2, AP3, AP4 and AP7, supported by some private pension funds, strongly opposed a three-year employee stock option scheme at Skandia, a large insurance company, because the scheme was judged too generous. As a consequence the board withdrew the initial proposal and offered a less generous one-year scheme, accepted by the pension funds and a vast majority of the company's shareholders.

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[3] Table 1 in the Appendix presents details about the Swedish primary exchange.

In what follows, we use the dismantlement of AP4 and the subsequent increase of public and private pension funds' stockholdings as alternative natural experiments to identify the effects of an increase in institutional saving on the ownership structures and corporate governance of firms.

II. Data and Descriptive Statistics

A. Data Sources

The Swedish pension reform offers a unique context to study the effect of changes in institutional ownership on firm valuation and corporate governance because Sweden has very detailed data on almost all shareholders of listed companies. Under Swedish law, *Värdepapperscentralen AB* (VPC), the Central Security Registry, is required to publish two lists each year of all stockholders owning more than 500 shares of Swedish listed companies.[4] Using these records, we obtain biannual information on the top 200 shareholders of Swedish listed companies from December 1999 to January 2005. Overall, these records provide information on the owners of over 95 percent of the market capitalization of Swedish publicly traded companies. For the average company, we have ownership information on 83 percent of total equity, and for all companies taken together we have information on 87 percent of total equity (as measured in terms of voting shares). While our ownership and share price data is complete at the end of our sample period in 2005, we have data on ownership for only 63 percent of listed firms in 1999. We also have ownership information on several firms that have de-listed during the sample period. We include these firms where possible in the analysis.

Additionally, *SIS Ägarservice AB*, a Swedish company that collects information on the ultimate owners of Swedish listed companies, compiles monthly information on the top 200

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[4] These lists are published only with a time lag and are not easily accessible to the public. Hence, they do not allow market participants to replicate the positions of other investors.

owners of 36 of the largest listed companies using records provided by VPC. The gathering of monthly information is commissioned by the listed companies themselves, as they aim to monitor their investor base. We obtain the monthly ownership files on these 36 firms directly from *SIS Ägarservice*.

Another advantage of using Swedish data is that companies' ownership structures vary a great deal. On the one hand, Sweden has the highest percentage of widely held firms in continental Europe, but on the other hand Swedish companies make the greatest use of dual class shares, pyramiding and cross-holdings (Faccio and Lang, 2002). Consequently, for a large number of listed firms there is substantial difference between the control rights and cash flow rights of the main shareholder, creating a misalignment of incentives between insiders and outsiders. The ownership data are broken down by class of shares and we also have information on the voting ratio applicable to each class of shares.

Our ownership data set contains holdings held both directly by the owner and indirectly via brokerage houses and custodian banks, allowing us to trace the identity of shareholders and compute ultimate ownership. Moreover, we have information on foreign shareholders of Swedish companies, including holders of American Depository Receipts (ADRs).

Using these data, we compute the number of stocks controlled by a single investor that are held directly and indirectly through other listed companies. We obtain information on the stockholdings of an investor via trusts, foreign holding companies, or private companies from *SIS Ägarservice AB*. *SIS Ägarservice* not only identifies indirect holdings through trusts, holding companies, and custodian banks, but also allows the shares held by family members and other closely related owners to be grouped into a single record.[5] This enables the

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[5] See Sundin and Sundqvist (2001) for a detailed description of the methodology.

identification of controlling groups and the relation of family members to the family head, and is a truly unique feature of the data.

We complement the information on individual stockholdings with data on corporate return and risk characteristics from *SIX Trust*, which provides information on the closing prices and dividend yields of the companies listed on the Stockholm Stock Exchange, and with accounting variables from *Market Manager*. This data set also provides information on the individuals who sit on the boards of Swedish listed companies.

B. Ownership Variables

As we note above, in Sweden companies with disperse ownership structures coexist with companies that have complex, concentrated ownership structures and employ dual class shares, pyramiding and cross-holdings. The most common mechanism to enhance control rights involves the use of dual class shares, which deviates from the one-share-one-vote rule most commonly observed in the United States and allows owners to have a larger share of control than cash flow rights. Pyramiding and cross-holdings are also widely used, especially in medium-sized companies.

As a consequence of dual class shares, pyramiding and cross-holdings, a large difference can arise between the control rights and the cash-flow rights of the principal shareholder. The larger the wedge between control and cash-flow rights, the less the controlling shareholder is driven by monetary incentives, and the more likely he will pursue interests other than maximizing shareholder value (La Porta, Lopez-de-Silanes and Shleifer, 2002, and Claessens, Djankov, Fan and Lang, 2002). For the case of Sweden, where investor protection is quite strong on average, Cronqvist and Nilsson (2003) show that the agency costs of the separation between control and cash flow rights are sizable and may reach 25 percent of the company's value.

For this reason, we take pyramiding and cross-holdings into account to determine the separation between ownership and control, as is now common in the literature (see, for instance, Claessens et al., 2002, and Faccio and Lang, 2002). When tracing indirect ownership, we maintain pension funds as independent entities, although in some instances they are controlled by the same shareholders that control listed companies. Because of our distinct interest in the role of pension funds, we analyze the investment policies of these funds and their effects separately in the empirical analysis.

We classify a firm as having a controlling owner if the largest shareholder has direct and indirect voting rights that sum to 10 percent or more. If no shareholder holds 10 percent of the voting rights, we classify the company as widely held. Since 10 percent voting rights is frequently sufficient to exert control, this cut-off is used extensively in the literature (e.g., La Porta et al. 1999; La Porta et al., 2002).

While direct ownership involves shares registered in the shareholder's name, indirect ownership through pyramiding and cross-holdings involves shares held by entities that the ultimate shareholder controls. Since the principal shareholders are frequently themselves financial institutions or corporate entities, we identify the ultimate shareholders of these financial institutions or corporate entities. Often, we need to trace through a long chain of indirect ownership stakes that involves numerous corporations to identify the ultimate owner of the votes.

For example, a shareholder has x percent indirect control of firm A if she controls directly firm B (i.e., if she holds at least 10 percent of the voting rights of firm B) that, in turn, directly controls x percent of the votes of firm A. The control chain from A to B can be a long sequence of firms, each of which has control (greater than 10 percent voting rights) over the next one. If there are several chains of ownership, we sum the control rights across all of these

chains. When multiple shareholders have over 10 percent of the votes, we pick the largest controlling owner. Control rights equal zero if the company is widely-held.

We also compute the direct and indirect cash-flow rights of the controlling shareholder. The shareholder may hold cash-flow rights directly and indirectly. For example, if the controlling shareholder of firm A holds a fraction y of cash-flow rights in firm B and firm B in turn holds a fraction x of the cash-flow rights in firm A, then the controlling shareholder's indirect cash-flow rights in bank A are equal to the product of x and y. If there is a chain of controlling ownership, then we use the products of the cash-flow rights along the chain. To compute the controlling shareholder's total cash-flow rights we sum all direct and indirect cash-flow rights.

After going through this search process, we divide companies into seven categories. First, widely-held firms do not have a controlling owner, i.e., no legal entity owns 10 percent or more of the voting rights. Second, we create six distinct categories of controlling owners who own a minimum of 10 percent of the voting rights of the bank: (1) the State,[6] (2) families (or individuals), (3) pension funds (including the AP funds and the private Premium Pension funds), (4) financial institutions (including banks, insurance companies, and mutual funds), (5) foreign individuals and institutions, and (6) Other (including charities which are not under the control of families).

C. Descriptive Statistics on Pension Fund Holdings and Control of Listed Companies

The Swedish pension reform has caused an inflow of funds in public and private pension funds. Besides the public pension funds we describe above, we obtain the full list of

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[6] We consider companies to be government-owned if the state directly or indirectly has control of 50% or more of the shares. In classifying government ownership we add up all stakes by individual Ministries (generally the Ministry of Finance or the Ministry of Industry, Employment and Communications) and other government bodies.

eligible private pension funds (i.e., mutual funds that have been qualified to participate in the PP system) from the Financial Supervisory Authority of Sweden.[7]

At the end of 2000, a total of 462 investment funds managed by 67 different fund managers were available to investors in the PPM. By the year 2004, the number of funds reached 681 and the number of assets managers exceeded 80, and total PP funds under management exceeded SEK 137 billion (in historical prices). About 60 percent of the fund managers are based outside of Sweden, largely from the United States or elsewhere in Europe, but foreign fund managers manage less than 10 percent of total investments. The default AP7 pension fund is the single largest PP investor with 31 percent (or SEK 42 billion) of total PP investments. About 90 percent of AP7 funds are invested in equity, both domestic and abroad. Other significant players in the PP market are AMF Pension Fondförvaltning, Folksam LO, HQ Fonder, Länsförsäkringar Fondförvaltning, Nordea Fonder, Robur Fonder, SEB Fonder, and SPP Fonder, all of which are domestic players. These private pension funds also experienced increases in funds under management due to inflows of private voluntary savings (arising from employer contributions and voluntary savings).

Table 1 describes the presence of pension funds in the Swedish stock market starting from 1999 (based on the firms included in our sample). The public and private pension funds gradually increased their stockholdings from 15.6 percent in 1999 to 19 percent of total equity in mid-2005, an increase of 20 percent. By mid-2005 the AP funds owned approximately 4 percent of total equity and the private pension funds owned close to 15 percent of total equity. The AP4 fund, which traditionally focused on investments in equity and whose assets where redistributed among the other AP funds at the end of the year 2000, experienced a decrease in equity holdings, as did the AP6 funds which increased its focus on private equity. All other

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[7] See Table A.2 for a list of the private funds and asset managers included in our sample.

funds increased their equity holdings substantially starting in 2001. This generated substantial reshuffling in the holdings of government pension funds.

Table 2 shows that the magnitude of pension funds' positions in Swedish listed companies is quite different. On average, AP4 and AP6's holdings in domestic companies amount to more than 2 percent of total voting rights. Not surprisingly, they have lower portfolio turnover than the other pension funds and for this reason they may have a greater incentive to affect corporate policies.

We proxy the deviation from the market portfolio for pension fund p by $D = 0.5 * \sum_{i=1}^{n} \left| w_i^p - w_i^m \right|$, where w_i^p is the weight of stock i in the portfolio of pension fund p, w_i^m is the weight of stock i in the market portfolio, and n is the number of stocks listed in the market. D takes on a value between zero (denoting exact replication of the market portfolio) and one (maximum deviation from the market portfolio). Table 2 shows the values of D for different classes of investors, including the AP funds, at different points in time. While all pension funds maintain quite well diversified portfolios, we observe that AP1 and AP2 mimic the market portfolio most closely.

Table 3 shows that ownership concentration has been quite stable on average during the period 1999-2005, although there is a large variation across firms, with ownership concentration increasing in a large number of firms. Prior to the pension reform in 2000, the largest shareholder of the typical firm owned about 31.9 percent of voting rights. This increased to about 35.8 percent at the onset of the pension reform, and then gradually reduced to 33.3 percent by mid-2005.

Table 4 shows Swedish companies' largest five shareholders by type of investor. While pension funds tend to be significant shareholders in most firms, they rarely are the principal shareholder. In total there are 4 firms for which an AP fund and 16 firms for which a

private pension fund was the principal shareholder at some point during the period 1999 to 2005, and for only 15 out of these 20 companies the pension fund holds a controlling stake if we apply the 10% voting rights cutoff rule. Obviously, we exclude these companies where pension funds are the principal shareholder from the empirical analysis when analyzing the effects of changes in pension funds holdings on ownership concentration.

The principal shareholders in most firms tend to be individuals, followed by financial institutions. Family ownership of firms is widespread.[8] Still, pension funds frequently are among the top-5 largest shareholders. For example, in June 2005, the number of firms for which a pension fund was among the top-5 largest shareholders was 13 for the AP2 fund, 8 for the AP3 fund, and 11 for the AP 4 fund. In mid-2001, the AP4 fund was the 10th largest shareholder for the median firm. Together with the private pension funds, the AP funds are the most prominent shareholders across all firms. Additionally, as shown in Table 5, the data indicate that pension funds spread their investments and invest in the majority of firms.

Pension funds and, in particular, the AP funds, tend to invest in firms that are larger than average and have relatively less ownership concentration. It is also interesting to note that the wedge between voting rights and cash-flow rights tends to be positive for principal shareholders, averaging about 10%. This suggests that principal shareholders and pension funds differ in an important way as the wedge is positive on average for principal shareholders but negative for pension funds, averaging about -0.7 percent.

III. An exogenous change in pension fund ownership

As described in the previous section, because of the pension reform, AP4, a government pension fund with large stockholdings in the Swedish stock market and

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[8] Among listed firms that are controlled by individuals or families are some of Sweden's best known companies, including Electrolux, Ericsson, Atlas Copco, Investor, SEB, and WM-data (all controlled by Marcus Wallenberg and family), Hennes & Mauritz (Stefan Persson and family), Axel Johnson (Antonia Ax: Son Johnson and family), Hagstromer & Qviberg (Mats Qviberg and Sven Hagstromer and families), Lundbergs and Industrivärden (Fredrik Lundberg and family), and Stenagruppen (Dan Sten Olsson and family).

traditionally active in corporate governance, was forced to sell most of its equity participations to transfer assets to the government and to the other government pension funds between December 2000 and June 2001.

Table 6 shows that this caused a significant reshuffling in the Swedish stock market. AP4 sold participations equivalent to 2.5 percent of the votes in 51 of the 238 Swedish listed companies for which we have ownership data. As shown in Panel C of Table 6, these holdings were not transferred to the other government pension funds.

This reshuffling of pension funds' holdings represents a significant and largely exogenous decrease in institutional ownership, which we can use to provide a first analysis of the effects of changes in institutional ownership on firm valuation and ownership structure.

Table 7 suggests that firms in which AP4 and, more in general, government pension funds hold a higher share of cash flow rights have higher valuation. The result is robust to controlling for the equity stake of the principal shareholder and the ratio between control and cash flow rights of the principal shareholder, which proxies for the entrenchment effect of ownership concentration. Other controls include firm size, proxied by the logarithm of the number of employees, the ratio of R&D expenses to total assets and industry and time effects.

These correlations have a causal interpretation only if the firms whose stocks AP4 sold are inherently equal to the remaining firms. We believe that AP4's sales are largely exogenous as they were forced by the implementation of the pension reform. Given that AP4 sold most of its stockholdings, it seems reasonable to assume that it was unable to choose to sell only the stocks of some firms whose valuation was expected to decrease for other factors. Also, the size of the sales was unlikely to be large enough to determine a drop in stock prices.

Still, to address these concerns, in Column (6) we control for firm fixed effects which should capture any time-invariant firm characteristics. Since we look at the effect of ownership on a very limited time horizon (December 2000 to January 2001), firm fixed

effects are likely to absorb all firm heterogeneity. Our estimates suggest that a higher equity stake of the AP4 improves firm performance because after controlling for firm fixed effects the changes in the stake of AP4 are positively correlated with firm performance. Thus, the decrease in the holdings of AP4 between December 2000 and June 2001 seems to have decreased shareholder value.

Table 8 suggests that the effects that we observe on firm valuation may be related to corporate governance. The principal shareholder's percentage of voting rights decreases in firms in which AP4 decreases its holdings and is in general positively related to the holdings of the AP4 fund. Hence, a decrease in institutional investment seems to lead to a decrease in ownership concentration.

If the positive correlation between changes in the stockholdings of the AP funds and the principal shareholders is indeed driven by the desire of the latter to maintain control on corporate policies, we should also observe that the value of a marginal vote is larger when the probability of disagreement on corporate policies is higher due to the presence of an AP fund. Hence, the value of a marginal vote should decrease when AP4 sells its participations.

It is common to measure the market value of a marginal corporate vote implicitly as the difference between the prices of multiple and limited-voting shares (see, for instance, Zingales, 1995, Rydqvist, 1996, and Nenova, 2003). The premium of multiple voting shares is commonly believed to depend on the likelihood that a vote will be pivotal in a proxy contest and the price it will fetch in case of such a contest (Zingales, 1995). The first clearly depends on ownership concentration because the probability that a marginal vote is pivotal is zero if the largest owner holds more than 50 per cent of the votes, while the latter depends on the magnitude of private benefit of control.

The dismissal by AP4 of its stockholdings may affect the control premium in several ways: First, the premium of control may increase in the size of pension funds' shareholdings

because votes become more valuable as controlling shareholders attempt to resist pension funds' influence during proxy contests. Second, and a related point, pension funds may affect the value of a marginal vote by changing the probability of a takeover. The latter could in turn change either because pension funds significantly affect the ownership concentration of firms or because they are more or less likely to tender their shares in the event of a takeover. Finally, pension funds may monitor management and controlling shareholders in a way that decreases private benefits of control. This would lead to a decrease of the control premium.

Whatever is the exact channel through which pension funds may try to affect corporate governance and policies, we would expect that when AP4 sold its stockholdings 1) the control premium decreased if previously controlling shareholders were attempting to resist changes 2) the control premium increased if by monitoring AP4 was decreasing private benefits of control.

To explore the effect of pension funds' holdings on the value of a marginal vote, we identify a total of 29 listed companies with dual-class shares and for which both A and B shares are listed. We then calculate the control premium for these 29 companies as the ratio between one voting right and one cash flow right, corrected in order to make voting premiums comparable across companies with different voting arrangements, similarly to Zingales (1995) and Rydqvist (1996). Next, we run a regression of the changes in the voting premium during a six months period on contemporaneous changes in the cash flow rights of pension funds. To capture contemporaneous changes in ownership structure that may affect the probability that the marginal vote is pivotal, we control for changes in the share of votes of the principal shareholder (see also Zingales, 1994, and Nenova, 2003).[9]

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[9] In non-reported specifications we also control for changes in the Shapley value (instead of changes in the voting rights of the principal shareholder). The Shapley value is a power index and measures the probability of being pivotal to the voted decision. The Shapley value is defined as the Milnor and Shapley (1978) power index for oceanic games of a given shareholder. The oceanic voting game has a finite number of atomic players (i.e., all large shareholders) and an "ocean" of players with infinitesimal weight (small shareholders). The Shapley value measures the extent to which each large owner is pivotal to the voted decision. As atomic players, we only

In Table 8, we report parameter estimates of the relationship between changes in pension fund holdings and changes in control premiums, controlling for contemporaneous changes in ownership structure. Given the small number of observations the results are only marginally statistically significant. However, we find that the control premium decreases between December 2000 and June 2001 in firms in which government pension funds decrease their participations.

This suggests that principal shareholders attempted to resist AP4 influence, and that, as a consequence, when AP4 sold its stakes, the value of an additional vote decreased.

IV. The effects of an increase in pension funds' holdings

In this section, we analyze the effects on the increase in private and public pension funds holdings starting in January 2001 on firm valuation, ownership concentration and the control premium.

A. Identification

Contrary to the dismissal of shareholdings by AP4, the increase in shareholdings by private and public pension funds was gradual. In particular, while the timing in the expansion of shareholdings may be considered to be determined by the implementation of the pension reform and thus exogenous with respect to the evolution of firm characteristics, the way in which pension funds selected stocks certainly may have depended on firm-specific time-varying factors. Hence, a mere correlation between pension funds' shareholdings and the evolution of firm valuation or ownership concentration would not imply causality. For instance, pension funds and principal shareholders could have in common a long horizon on their investment. For this reason, they could choose to increase their shareholdings when firm stocks are temporarily undervalued.

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consider the five largest shareholders in terms of voting rights; all other shareholders are considered part of group of non-atomic players.

To overcome these potential problems, we exploit the exogenous timing of the Swedish pension reform to obtain a quasi-natural experiment. First, we notice that after 2001, pension funds began to acquire positions in the Swedish stock market. The timing of expansion in their assets can be considered exogenous because after January 2001 pension funds looked for opportunities to buy blocks of various sizes without putting a price pressure on the market.

Clearly, the way pension funds were choosing which stocks to buy is endogenous as it depends on expectations about firms' future performance. Pension funds' stated objective is, however, to maintain a portfolio of Swedish companies that broadly mimics the index. Similarly, pension funds may have attempted to build a portfolio similar to the one of other domestic mutual funds. In particular, pension funds may favor stocks that are included in a blue chip index of the most liquid stocks in the market. Hence, we conjecture that increases in pension funds' holdings over time are related to (i) the average rate of expansion of pension funds' assets, (ii) whether or not a stock is included in the OMX30 index of the 30 most frequently traded stocks in the market, and (iii) the company's market capitalization, and (iv) the company's weight in the portfolio of other mutual funds. In particular, in periods of strong asset expansion, pension funds may have predominantly bought companies that carried a significant weight in the index or in domestic mutual funds' portfolios.

We exploit this intuition to construct two sets of instruments for the changes in pension funds' holdings as follows. First, we use a company's market capitalization, its weight the portfolios of mutual funds at year-end 2000 – the year preceding the pension reform – as well as a dummy variable that indicates whether or not a stock was included in the OMX30 index in 2000 as instruments to capture that pension funds had a stated preference for these stocks. Second, we use time fixed effects interacted with the companies' market capitalization, weights in the mutual funds' portfolios and the OMX30 index dummy variable,

all calculated in 2000, as instruments to capture the notion that changes in mutual funds holdings have been largely deterministic. In this way, we exploit variation due to the fact that pension funds expanded their holdings faster in companies with the characteristics they prefer. The variation in pension funds' holdings we capture with our instruments is likely to be exogenous since, as we discuss above, the rate of asset expansion across all firms was largely deterministic, and the predetermined market capitalization of the company , its weight in mutual funds' portfolios or whether or not a firm is included in the OMX30 index are unlikely to be related to the changes of the largest shareholders' blocks or to firm valuation after the pension reform. We are also able to include in most specifications firm fixed effects, some time-varying firm characteristics, such as a proxy for firm size, and time fixed effects, which control for systematic factors that may have affected firm characteristics around the time of the pension reform.

Table 9 shows that public and private pension funds increased their shareholdings in similar companies more or less at the same time (columns 1 and 2). Regressions (3) and (4) in Table 9 are examples of the first stage regressions, which we will be using in the second stage to instrument for pension funds' holdings. These regressions show that in some years, private and public pension funds increased their holdings to a larger extent in firms that in 2000 were included in the OMX30 index, in firms that had larger market capitalization, and in firms in which Swedish mutual funds had a larger ownership share. The F-test of the validity of instruments (i.e., test on the joint significance of the excluded instruments) developed by Bound et al. (1995) supports the choice of our instruments.

B. Results

Table 10 shows that also after the pension reform an increase in the government pension funds' holdings appears to positively affect firm valuation. This result is robust to including firm fixed effects (column 2) and using the instrumentation strategy described

above (column (3)). These results are also robust to controlling for the holdings of independent and related pension funds (columns (4) and (5)), which are also instrumented in the instrumental variables regressions like in Table 9.

In Table 11, however, we find no effect of changes in the holdings of government pension funds on the control rights of the principal shareholders. If anything, controlling shareholders appear to decrease their holdings when private pension funds increase their shareholdings (regressions (1) to (3)).

Several private pension funds in our dataset are controlled by the same shareholders that control listed companies as principal shareholders.[10] On average, when these related pension funds invest in the same companies that these shareholders control, they hold a stake of about 3.5 percent of the company's CF rights (while the principal shareholder controls on average about 30.8 percent of the voting rights). Principal shareholders could increase their voting rights by increasing the shareholdings of related pension funds in the companies they control. Hence, we check whether the pension funds related to the controlling shareholder of a given firm increase their control block when the government pension funds increase their shareholding. We find that this is indeed the case (regressions (4) to (6)). This indicates the presence of conflicts of interest in pension funds that are not run independently from industrial firms. This finding points in the same direction of Cocco and Volpin (2005) who suggest that in U.K. pension funds that are not independent from corporate managers may be run in the interest of the firm's shareholders, instead of the pension fund's trustees. We show that the conflict of interest may go a longer ways and related pension funds may be used to protect the control benefits of principal shareholders to a larger extent than the security benefits accruing to all shareholders pro-rata.

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[10] There are 6 groups of family-controlled pension funds, each of which consists of several funds: Hagstromer and Qviberg related funds (HQ), Wallenberg/Investor related funds (SEB), Lundberg/Industrivarden related funds (SHB), Stenbeck/Kinnevik related funds (Aktie-Ansvar/AA), Kamprad/Ikea related funds (Catella/IKEA), and Dinkelspiel related funds (Ohman).

The evidence presented in regressions (7) and (8) on changes in the value of a marginal vote proxied by changes in the control premium indicates that increases in the shareholdings of government pension funds increase the value of a marginal vote. This suggests that government pension funds do attempt to affect firm policies.

V. Concluding remarks

Our paper represents a first attempt to evaluate the effects of pension reforms and institutionalized saving on ownership structure and corporate governance. We use the Swedish pension reform of 2000 as a natural experiment to explore how substantial changes in institutional ownership structure affect firm valuation and corporate policies. Specifically, we exploit the substantial exogenous shock to institutional ownership caused by the Swedish pension reform to investigate its effects on firm performance, the value of control and ownership concentration. By employing this exogenous variation in ownership, we mitigate concerns about endogeneity affecting much of the existing literature on corporate ownership and performance. We further address endogeneity concerns by exploiting the time-series dimension in our ownership data, which is much more detailed than the type of data generally used in the literature, and allows us to compute ultimate ownership for each major shareholder of each firm. Additionally, contrary to existing studies on U.S. data, we can proxy for changes in the expected monitoring activity of pension funds by using exogenous changes in institutional ownership. This allows us to assess the effects of institutional ownership in a large scale experiment instead of evaluating specific episodes of shareholder activism.

Using the dismantlement of one of the main government-owned pension funds (the AP4 fund) and the successive expansion of the new public and private pension funds' stockholdings as two alternative natural experiments, we consistently find that an exogenous

increase in the holdings of government pension funds is associated with an increase in shareholders' value. For pension funds affiliated to family-controlled industrial groups, we find, if anything, the opposite, suggesting that the positive effects on firm performance are due to differences in monitoring activity of unaffiliated pension funds and their propensity to affect corporate policies.

We also find that the control premium increases when government pension funds buy a participation in a firm and that the controlling shareholders either increase their control blocks or exploit the affiliated pension funds to increase their voting power. This suggests that controlling shareholders are reluctant to relinquish control to pension funds and that family-controlled pension funds are used by the controlling families as a mechanism to enhance the entrenchment of corporate control.

Overall, we find that the increase in institutionalized saving did not result in a decrease in ownership concentration. Our results suggest that if private benefits of controls are large, ownership concentration may even increase in response to institutional investors' monitoring. Our results go against the conventional wisdom suggesting that an increase in institutionalized saving decreases ownership concentration and private benefits of controls, and offer a more malign view of the impact of institutional holdings on ownership concentration and corporate control.

References

Attanasio, Orazio P. and Agar Brugiavini 2003, Social security and Households Savings, *Quarterly Journal of Economics* 118, 1075-1120.

Attanasio, Orazio P. and Susann Rohwedder 2003, Pension Wealth and Household Saving: evidence from pension reforms in the UK., *American Economic Review* 93, 1499-1521.

Bound, J., D.A. Jaeger, and R.M. Baker, 1995, Problems with Instrumental Variables: Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable is Weak, *Journal of the American Statistical Association* 90, 443-450.

Burkart, Mike, Fausto Panunzi and Andrei Shleifer 2003, Family Firms, *Journal of Finance* 58, 2167-2201.

Carleton, Willard T., James M. Nelson, and Michael Weisbach, 1998, The influence of institutions on corporate governance through private negotiations: Evidence from TIAA-CREF, *Journal of Finance* 53, 1335-1362.

Claessens, Stijn, Simeon Djankov, Joseph P. H. Fan, and Larry H. P. Lang, 2002, Disentangling the incentive and entrenchment effects of large shareholdings, *Journal of Finance* 55, 2741-2772.

Cocco, Joao F. and Volpin, Paolo F. 2005, The Corporate Governance of Defined Benefit Pension Plans: Evidence from the United Kingdom, ECGI - Finance Working Paper No. 76/2005

Coles, Jeffrey L., Michael Lemmon, and J. Felix Meschke, 2006, "Structural Models and Endogeneity in Corporate Finance: The Link between Managerial Ownership and Corporate Performance," Arizona State University, mimeo.

Cronqvist, Henrik and Mattias Nilsson (2003), Agency costs of controlling minority shareholders, *Journal of Financial and Quantitative Analysis,* 38, 695-719.

Demsetz, Harold, and Kenneth Lehn, 1985, "The Structure of Corporate Ownership: Causes and Consequences," *Journal of Political Economy* 93, 1155-1177.

Faccio, Mara, and Larry H. P. Lang, 2002, The ultimate ownership of Western European corporations, *Journal of Financial Economics*, 65 365-395.

Helwege, Jean, Christo Pirinsky and René M. Stulz 2005, Why do firms become widely held? An analysis of the dynamics of corporate ownership, mimeo Ohio State University.

Himmelberg, Charles, R. Glenn Hubbard, and Darius Palia, 1999, "Understanding the Determinants of Managerial Ownership and the Link between Ownership and Performance," *Journal of Financial Economics* 53, 353-384.

Karpoff, Jonathan M., 2001, The Impact of Shareholder Activism on Target Companies: A Survey of Empirical Findings, mimeo University of Washington.

Khorana, Ajay, Henri Servaes, and Peter Tufano, 2005, Explaining the Size of the Mutual Fund Industry Around the World, *Journal of Financial Economics* 78, 145-185.

La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer, 1999, Corporate Ownership Around the World, *Journal of Finance* 54, 471-517.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, 2002, Investor protection and corporate valuation, *Journal of Finance* 57, 1147-1170.

Nenova, Tatiana, 2003, The value of corporate votes and control benefits: A cross-country analysis, *Journal of Financial Economics* 68, 325-351.

Pagano, Marco, Fabio Panetta and Luigi Zingales 1998, Why do companies go public? An empirical analysis, *Journal of Finance* 53, 27-64.

Rydqvist, Kristian 1996, Takeover Bids and the Relative Prices of Shares that differ in their Voting Rights, *Journal of Banking and Finance* 20, 1407-1425.

Sundin, Anneli, and Sven-Ivan Sundqvist, 2001, Owners and powers in Swedish listed companies (Dagens Nyheter, Stockholm).

Woidtke, Tracie, 2002, Agents watching agents?: Evidence from pension fund ownership and firm value, *Journal of Financial Economics* 63, 99-131.

Zingales, Luigi, 1995, What determines the value of corporate votes?, *Quarterly Journal of Economics* 110, 1047-1073.

Table 1
Equity Market Shares for Different Classes of Pension Funds

This table reports the stockholdings (as a percentage of the total market) for different types of public and private pension funds. Stockholdings are reported in terms of voting rights (panel A) or cash flow rights (panel B) and weighted by firm market capitalization. Total market capitalization. We include only firms for which we have ownership information.

	Date	State pension funds	Of which:						Private pension funds	Total pension funds	Total market capitalization (in trillions of SEK)
			AP1	AP2	AP3	AP4	AP6	AP7			
Panel A: Voting rights	Dec 1999	3.04	0	0	0.56	2.17	0.31	0	10.19	13.23	2.75
	Jun 2000	2.81	0	0	0.40	2.08	0.33	0	9.18	11.99	3.51
	Dec 2000	3.27	0	0	0.55	2.30	0.41	0	9.75	13.03	2.81
	Jun 2001	3.07	0.42	0.74	0.67	0.77	0.38	0.10	9.84	12.91	2.40
	Dec 2001	3.28	0.45	0.77	0.78	0.90	0.27	0.10	10.32	13.60	2.32
	Jun 2002	3.93	0.61	0.88	0.83	1.12	0.34	0.15	11.27	15.21	1.76
	Dec 2002	3.85	0.62	0.88	0.92	1.15	0.15	0.13	10.63	14.48	1.53
	Jun 2003	4.05	0.73	0.99	0.94	1.19	0.03	0.17	10.89	14.94	1.64
	Dec 2003	3.86	0.67	0.98	0.96	1.10	0.01	0.14	11.30	15.16	2.00
	Jun 2004	3.50	0.61	0.95	0.93	0.87	0.00	0.14	11.14	14.64	2.25
	Dec 2004	3.69	0.65	1.05	0.89	0.93	0.00	0.17	12.00	15.69	2.48
	Jun 2005	3.78	0.68	1.05	0.87	0.94	0.01	0.23	11.97	15.75	2.72
Panel B: Cash-flow rights	Dec 1999	4.43	0	0	0.64	3.30	0.49	0	11.20	15.63	2.75
	Jun 2000	4.05	0	0	0.49	3.13	0.43	0	9.57	13.62	3.51
	Dec 2000	4.23	0	0	0.59	3.15	0.49	0	10.93	15.16	2.81
	Jun 2001	3.84	0.60	0.93	0.73	0.96	0.45	0.17	12.02	15.86	2.40
	Dec 2001	4.13	0.66	0.96	0.84	1.14	0.36	0.17	12.74	16.87	2.32
	Jun 2002	4.46	0.76	0.98	0.88	1.24	0.38	0.22	13.58	18.04	1.76
	Dec 2002	4.55	0.78	1.03	1.05	1.33	0.18	0.18	12.94	17.49	1.53
	Jun 2003	4.85	0.91	1.12	1.11	1.43	0.03	0.25	13.52	18.37	1.64
	Dec 2003	4.55	0.82	1.12	1.09	1.31	0.01	0.20	14.34	18.89	2.00
	Jun 2004	4.43	0.81	1.15	1.08	1.17	0.01	0.21	14.65	19.08	2.25
	Dec 2004	4.24	0.74	1.16	0.98	1.14	0.00	0.22	14.61	18.85	2.48
	Jun 2005	4.38	0.77	1.15	0.97	1.17	0.01	0.31	14.68	19.06	2.72

Table 2
Pension fund Holdings

This table presents averages across the sample and sample period of the size of pension funds' percentage of voting rights; the percentage of cash flow rights; the deviation

from the market portfolio for investor p as proxied by $D = 0.5 * \sum_{i=1}^{n} \left| w_i^p - w_i^m \right|$, where w_i^p is the weight of stock i in the portfolio of investor p, w_i^m is the weight of stock i

in the market portfolio, and n is the number of stocks listed in the market; the number of stocks in pension funds portfolios; and the portfolio turnover calculated as new position as a percentage of total positions. Note that the diversification measure takes a value between zero (exact replication of the market portfolio) and one (maximum deviation from the market portfolio).

Type of investor	Voting rights (in %)	Cashflow rights (in %)	Diversification measure (deviation from market portfolio)	Number of stocks in portfolio	Turnover
AP1	0.83	0.97	0.32	26	15.87%
AP2	0.92	1.05	0.29	88	15.30%
AP3	1.71	1.91	0.38	53	6.83%
AP4	2.41	2.74	0.35	48	3.81%
AP6	2.61	2.57	0.56	34	4.66%
AP7	0.14	0.19	0.35	50	15.70%
Private pension funds	1.27	1.57	0.50	35	8.85%

Table 3
Voting Rights of the Largest Blockholder over Time

This table reports summary statistics of the percentage of total voting rights held directly and indirectly by the largest blockholders, averaged across all firms in the sample for which we have ownership data, by date. We also report the total number of firms for which we have both ownership and stock price data, as well as the total number of officially listed firms.

Variable	Average	Median	Maximum	Minimum	St. Dev.	Number of firms with ownership data	Of which: with stock price data	Total number of listed firms
Dec 1999	31.93	29.46	92.47	0.75	21.09	208	190	300
Jun 2000	34.23	31.64	92.65	0.22	20.11	229	210	..
Dec 2000	35.93	33.02	100.00	2.95	20.23	238	225	311
Jun 2001	35.83	32.28	100.00	2.79	20.68	251	235	..
Dec 2001	35.42	31.08	100.00	1.67	21.04	259	244	305
Jun 2002	35.36	31.49	100.00	0.94	20.51	266	252	..
Dec 2002	35.12	31.40	100.00	0.59	20.90	272	261	297
Jun 2003	35.63	31.82	100.00	0.87	20.37	277	266	..
Dec 2003	35.92	31.68	100.00	0.79	20.32	278	267	282
Jun 2004	34.35	30.02	100.00	5.00	19.91	284	275	..
Dec 2004	33.40	28.85	92.70	4.97	19.78	286	277	277
Jun 2005	33.27	28.77	92.70	4.97	19.85	287	278	..
Total	34.73	30.74	100.00	0.22	20.38	3135	2980	

Table 4
Distribution of Largest Shareholdings by Shareholder Type

This table reports the maximum and the median ranking of the size of the shareholding (in terms of voting rights) by shareholder type, as of June 2001, as well as the frequency of being the largest to the fifth largest shareholder of the firm by shareholder type, for June 2001 and June 2005.

Type			December 2000					June 2005				
	Maximum	Median	Largest	2nd largest	3rd largest	4th largest	5th largest	Largest	2nd largest	3rd largest	4th largest	5th largest
AP1	9th	18th	0	0	0	0	0	0	0	0	0	0
AP2	5th	20th	0	0	0	0	2	0	0	7	1	5
AP3	2nd	13th	0	1	1	0	4	0	1	5	1	1
AP4	4th	10th	2	0	0	2	3	0	0	0	8	3
AP6	1st	16th	4	6	2	3	0	0	0	0	0	0
AP7	15th	36th	0	0	0	0	0	0	0	0	0	0
Private pension funds	1st	16th	8	30	61	70	79	4	27	66	94	97
Individual	1st	106th	118	94	65	79	76	140	98	81	73	64
Financial institution	1st	78th	10	16	34	39	29	8	17	29	19	21
Mutual fund	1st	82th	3	2	0	1	1	3	3	2	2	10
Foundation	1st	105th	3	5	4	5	3	3	3	4	6	3
Foreign	1st	69th	83	73	62	36	33	92	105	63	55	48
Other	1st	104th	22	23	21	14	18	37	33	30	27	34
Total number of firms	251	251	251	250	250	250	250	287	287	287	286	286

Table 5
Firm Characteristics, sample average, bi-annual data over the sample period

This tables reports averages across the sample firms and the sample periods of the main variables used in the empirical analysis.

Variable	Average	Median	Standard deviation	Minimum	Maximum	# of obs
All firms:						
3-shareholder concentration ratio of voting rights (in %)	48.50	46.61	23.61	0.22	100.00	3135
5-shareholder concentration ratio of voting rights (in %)	54.45	53.59	23.50	0.22	100.00	3135
Hirschmann-Herfindahl index of voting rights	1812.06	1156.26	1883.75	0.05	10000.00	3135
Voting rights of the largest shareholder (in %)	32.76	28.77	21.64	0.17	100.00	3135
Cashflow rights of the largest shareholder (in %)	23.35	18.72	16.62	0.17	96.74	2942
Wedge for the largest shareholder (in %)	9.17	0.00	12.96	-48.59	96.70	2942
Return (in %)	7.89	3.33	51.59	-98.15	853.26	2980
Market capitalization (in billions SEK)	9.04	0.58	42.50	0.00	1370.00	4053
Firms with state pension funds shareholdings:						
3-shareholder concentration ratio of voting rights (in %)	45.32	43.03	22.36	0.62	100.00	1438
5-shareholder concentration ratio of voting rights (in %)	51.40	48.79	21.52	0.67	100.00	1438
Hirschmann-Herfindahl index of voting rights	1631.89	980.90	1805.03	0.15	8599.23	1438
Voting rights of the largest shareholder (in %)	30.76	25.20	21.18	0.33	92.70	1438
Cashflow rights of the largest shareholder (in %)	21.59	16.28	16.01	0.33	79.50	1251
Wedge for the largest shareholder (in %)	8.45	0.00	12.52	-20.17	49.10	1251
Return (in %)	1.90	1.40	34.54	-84.38	301.67	1387
Market capitalization (in billions SEK)	19.20	2.59	64.90	0.02	1370.00	1415
Firms with pension funds shareholdings:						
3-shareholder concentration ratio of voting rights (in %)	48.22	46.38	23.32	0.35	100.00	2726
5-shareholder concentration ratio of voting rights (in %)	54.30	53.29	22.94	0.45	100.00	2726
Hirschmann-Herfindahl index of voting rights	1775.04	1123.06	1814.51	0.07	10000.00	2726
Voting rights of the largest shareholder (in %)	32.40	28.33	21.33	0.17	96.74	2726
Cashflow rights of the largest shareholder (in %)	23.10	18.51	16.50	0.17	96.74	2534

Variable	Average	Median	Standard deviation	Minimum	Maximum	# of obs
Wedge for the largest shareholder (in %)	9.01	0.00	12.35	-47.69	51.71	2534
Return (in %)	7.87	4.17	50.22	-98.15	853.26	2591
Market capitalization (in billions SEK)	10.70	0.78	48.40	0.00	1370.00	2634
Firms without pension funds shareholdings:						
3-shareholder concentration ratio of voting rights (in %)	50.41	48.92	25.39	0.22	100.00	409
5-shareholder concentration ratio of voting rights (in %)	55.51	56.81	26.93	0.22	100.00	409
Hirschmann-Herfindahl index of voting rights	2058.76	1354.89	2279.72	0.05	10000.00	409
Voting rights of the largest shareholder (in %)	35.16	31.40	23.47	0.22	100.00	409
Cashflow rights of the largest shareholder (in %)	24.91	22.34	17.25	0.22	84.05	408
Wedge for the largest shareholder (in %)	10.19	0.71	16.21	-48.59	96.70	408
Return (in %)	8.06	0.00	59.99	-86.21	462.52	389
Market capitalization (in billions SEK)	0.18	0.07	0.52	0.00	6.79	394

Table 6
Reshuffling of AP4 fund investments to other AP funds between Dec 2000 and June 2001

Panel A: All observations

Average change in voting rights (in %) held by:	Average	St. dev.	Min	Max	Observations
AP4	-0.54	1.63	-15.82	0.81	238
AP funds other than AP4	0.20	1.64	-7.83	13.18	238

Panel B: Only observations where change in voting rights by AP4 is not zero

Average change in voting rights (in %) held by:	Average	St. dev.	Min	Max	Observations
AP4	-2.51	2.75	-15.82	0.81	51
AP funds other than AP4	0.93	1.99	-5.93	4.01	58

Panel C. Reduction in AP4 holdings and holdings of the other AP funds

The dependent variable is the change in the voting rights held in firm *i* by AP funds other than the AP4 fund over the period Dec 2000 – June 2001. Regressions 2, 4, and 6 only include observations where the voting rights held by AP4 fund changed over the period Dec 2000 – June 2001. The constant is included in all regressions, but the coefficient is omitted. Robust standard errors are presented between brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Δ Voting rights held by AP4 fund	-0.148	0.005	-0.094	-0.026	-0.094	-0.016
	(0.091)	(0.080)	(0.086)	(0.078)	(0.087)	(0.079)
Log(Market cap)			0.115**	0.308**	0.125***	0.323**
			(0.047)	(0.129)	(0.046)	(0.124)
6-month return					-0.350*	-0.305
					(0.184)	(0.761)
Voting rights of largest shareholder					-0.006	-0.009
					(0.004)	(0.011)
Observations	238	51	229	51	229	51
R-squared	0.02	0.00	0.04	0.09	0.05	0.10

Table 7
The valuation effects of changes in pension fund ownership between Dec 2000 and June 2001

The dependent variable is the Tobin q of firm i. Only observations referring to Dec 2000 and June 2001 are used. The constant is included in all regressions, but the coefficient is omitted. Robust standard errors are presented between brackets.

	(1)	(2)	(3)	(4)	(5)
Cashflow rights held by AP4 fund	1.436*		1.303*	1.355*	0.087**
	(0.791)		(0.784)	(0.818)	(0.040)
Cashflow rights held by state pension funds		1.054***			
		(0.291)			
Cashflow rights held by state pension funds other than the AP4 fund			1.007***	1.017***	
			(0.322)	(0.325)	
Cashflow rights held by private pension funds				-0.018	
				(0.270)	
Cashflow rights of the largest shareholder	0.019	0.008	0.012	0.012	-0.015
	(0.107)	(0.105)	(0.106)	(0.106)	(0.040)
Ratio of control rights to cashflow rights of the largest shareholder	-0.007	-0.006	-0.007	-0.007	0.023
	(0.028)	(0.028)	(0.028)	(0.028)	(0.017)
Log of the number of employees	-0.396	-0.699	-0.785	-0.759	
	(0.936)	(0.903)	(0.934)	(1.008)	
Ratio of R&D expenses to total assets	0.871	2.093	1.879	1.941	
	(11.325)	(11.179)	(11.207)	(11.259)	
Industry Effects	Yes	Yes	Yes	Yes	No
Firm Effects	No	No	No	No	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes
Observations	437	437	437	437	438
R-squared	0.01	0.04	0.04	0.04	0.99

Table 8
Changes in holdings of the largest shareholder and the control premium around the time of "closure" of the AP4 fund

In regressions (1) to (4) the dependent variable is the change in voting rights of the largest shareholder over the period Dec 2000 to Jun 2001. Only observations in which the principal shareholder is not a pension funds and the identity of the controlling shareholder does not change between periods are included. In regressions (5) and (8), the dependent variable is the change in the control premium between Dec. 2000 and June 2001, defined as the ratio between one voting right and one cash flow right, corrected in order to make voting premiums comparable across companies with different voting arrangements, similarly to Zingales (1995), during a six month period. Regression 4, 7 and 8 only includes the subset of firms for which the change in the holding of the AP4 fund over the period Dec 2000 to Jun 2001 is negative. The constant is included in all regressions, but the coefficient is omitted. Robust standard errors are presented between brackets.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Δ Voting rights of the largest shareholder				Δ Control premium			
Δ Cashflow rights of the AP4 pension fund	0.640**		0.758**	0.286*	0.002		0.002	
	(0.260)		(0.310)	(0.152)	(0.001)		(0.001)	
Δ Cashflow rights of all state pension funds		0.492*				0.001		0.002
		(0.291)				(0.001)*		(0.001)*
Δ Cashflow rights of state pension funds other than AP4			0.339					
			(0.322)					
Δ Cashflow rights of principal shareholder					-0.001	-0.000	-0.001*	-0.001*
					(0.001)	(0.001)	(0.000)	(0.000)
Log of the firm's market capitalization	0.346*	0.186	0.300*	0.175				
	(0.187)	(0.148)	(0.176)	(0.120)				
6-month period stock return of the firm	0.392	0.516	0.576	1.681**				
	(0.996)	(0.997)	(0.997)	(0.701)				
Observations	193	193	193	34	29	29	16	16
R-squared	0.02	0.02	0.02	0.21	0.06	0.20	0.26	0.35

Table 9
Pension funds' investment allocation

In regressions (1) and (2), the dependent variable is the change in cash flow rights of government pension funds. In regressions (3) and (4), the dependent variables is the share of cash flow rights of government and private pension funds, respectively. OMX30 is a dummy variable that indicates whether the stock is part of the OMX 30 index or not. All observations starting from June 2001 are included.

	(1)	(2)	(3)	(4)
	Δ CF rights of state pension funds		CF rights of state pension funds	CF rights of private pension funds
Δ Cashflow rights of private pension funds	0.048***	0.051***		
	(0.018)	(0.019)		
Log of the firm's market capitalization		0.005	0.453***	1.391***
		(0.011)	(0.039)	(0.133)
6-month period stock return of the firm		0.008	-0.542***	-1.509***
		(0.114)	(0.141)	(0.407)
Voting rights of the largest shareholder		0.001		
		(0.001)		
OMX30 in 2000			0.105	-2.745***
			(0.414)	(0.979)
OMX30 in 2000*2002			0.421	-1.320
			(0.480)	(1.357)
OMX30 in 2000*2003			1.130**	-0.525
			(0.444)	(1.430)
OMX30 in 2000*2004			0.774*	-0.503
			(0.415)	(1.457)
OMX30 in 2000*2005			0.629	-1.328
			(0.475)	(1.792)
Market cap in 2000			0.000	0.000
			(0.000)	(0.002)
Market cap in 2000*2002			-0.001	-0.008***
			(0.001)	(0.003)
Market cap in 2000*2003			-0.001	-0.001
			(0.001)	(0.003)
Market cap in 2000*2004			0.000	0.000
			(0.000)	(0.000)
Market cap in 2000*2005			0.001	0.002
			(0.001)	(0.003)
Cashflow rights of mutual funds in 2000			0.073***	0.547***
			(0.015)	(0.060)
CF rights of mutual funds in 2000*2002			0.037*	0.097
			(0.019)	(0.067)
CF rights of mutual funds in 2000*2003			0.007	0.019
			(0.016)	(0.063)
CF rights of mutual funds in 2000*2004			0.003	0.011
			(0.016)	(0.064)
CF rights of mutual funds in 2000*2005			0.000	0.000
			(0.000)	(0.000)
Time fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes
Observations	2412	2320	2058	2058
R-squared	0.02	0.02	0.32	0.56
F-test of excluded instruments	--	--	14.47	29.08
F-test of excluded instruments (p-value)	--	--	0.000	0.000

Table 10
Firm valuation and pension fund holdings after the pension reform

The dependent variable is the Tobin q of firm i at time t. All observations starting from June 2001 are included. Regressions (3) and (5) are instrumental variable regressions. As instruments for the CF rights of state pension funds, CF rights of private pension funds and CF rights of related private pension funds variables we use (i) a company's market capitalization in 2000, a company's weight in portfolios of mutual funds in 2000, (iii) a dummy variable that indicates whether or not a stock is included in the OMX30 index 1n 2000, and (iv) time fixed effects interacted with each of these three variables.

	(1) OLS	(2) OLS	(3) IV	(4) OLS	(5) IV
CF rights of state pension funds	0.300***	1.829***	0.351***	0.291***	0.191***
	(0.065)	(0.659)	(0.067)	(0.064)	(0.063)
CF rights of private pension funds	-0.019	-0.839**	-0.044***		
	(0.026)	(0.328)	(0.013)		
CF rights of independent private pension funds				-0.034	-0.475***
				(0.139)	(0.146)
CF rights of related private pension funds				-0.077	-0.376**
				(0.165)	(0.184)
Voting rights of the largest shareholder	0.003	0.005	-0.007**	0.004	-0.009***
	(0.013)	(0.183)	(0.003)	(0.013)	(0.003)
Wedge	-0.023	-0.093	-0.016***	-0.022	-0.017***
	(0.045)	(1.031)	(0.002)	(0.045)	(0.002)
Log of employees	-0.235**		-0.234***	-0.259**	-0.163***
	(0.116)		(0.033)	(0.109)	(0.037)
Ratio of R&D expense to total assets	0.038		-0.278	-0.041	-0.072
	(1.164)		(0.299)	(1.157)	(0.308)
Time effects	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	No	No	Yes	No
Firm effects	No	Yes	No	No	No
Observations	2502	2505	2226	2502	2226
R-squared	0.02	0.14	--	0.02	--

Table 11

Changes in holdings of the largest shareholder and in the control premium after the pension reform

Dependent variable in regressions (1) to (3) is the voting rights of the principal shareholder. Dependent variable in regressions (4) to (6) is the voting rights of related private pension funds. Dependent variable in regressions (7) and (8) is the change in control premium. In regressions (1) to (6), observations are included starting from June 2001 are included if the principal shareholder in not a pension fund. Additionally, in regressions (2), (5) and (6), only the subset of observations of firms controlled by a family is included. In regressions (7) and (8), all observations starting from June 2001 are included. Regressions (2) and (5) are estimated using instrumental variables using the same set of instruments as used for the IV regressions as in Table 10.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
							\$\Delta\$ Control premium	
	Voting rights of the principal shareholder			Voting rights of related private pension funds				
CF rights of state pension funds	-0.014	2.123	-0.140	0.015**	0.038***	0.235***		
	(0.142)	(1.530)	(0.142)	(0.007)	(0.014)	(0.068)		
CF rights of private pension funds	-0.283***	-0.886**						
	(0.048)	(0.392)						
CF rights of independent private pension funds			-0.707***	-0.016*	-0.032**	-0.071		
			(0.177)	(0.009)	(0.014)	(0.108)		
6-month stock return	-0.683	0.159	-0.464	0.008	0.025	0.062*		
	(0.471)	(0.617)	(0.473)	(0.025)	(0.036)	(0.035)		
Log of market capitalization	0.713*	-0.615	0.446	-0.024	-0.033	-0.056		
	(0.412)	(0.639)	(0.411)	(0.022)	(0.033)	(0.037)		
\$\Delta\$ CF rights of state pension funds							0.001*	0.001*
							(0.000)	(0.000)
\$\Delta\$ CF rights of private pension funds							-0.000	
							(0.000)	
\$\Delta\$ CF rights of independent private pension funds								-0.008
								(0.006)
\$\Delta\$ CF rights of related private pension funds								-0.000
								(0.001)
\$\Delta\$ Voting rights of principal shareholder							-0.000	-0.000*
							(0.000)	(0.000)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Observations	2217	1079	2217	2217	1194	1079	261	261
R-squared	0.91	0.94	0.91	0.59	0.64	0.60	0.01	0.04

Appendix

Table A.1.
Swedish Stock Market Information

This table reports summary statistics of the main characteristics of the companies listed on the Stockholm stock exchange.

	1999	2000	2001	2002	2003	2004	2005
Trading volume (SEK billion)	2 608.9	4 455.9	3 994.4	2 701.8	2 453.2	3 390.7	3 763.5
Number of shares traded, (million)	14,690	27,901	47,044	63,988	82,305	83,037	72,064
Average transaction size (SEK thousand)	309	324	376	274	262	324	320
Number of transactions (thousand)	8,426	13,764	10,628	9,869	9,365	10,477	11,757
Average daily volume (SEK million)	10,353	17,753	15,978	10,807	9,852	13,402	14,876
Average number of transactions per day	33,436	54,835	42,512	39,477	37,610	41,410	46,470
Year-end market capitalization (SEK billion)	3 182.2	3 130.7	2 480.8	1 562.6	2 066.9	2 492.3	3 314.8
Turnover rate, %	94	107	134	122	124	134	124
Change in index, %	66	-12	-17	-37	30	18	33
Number of trading days	252	251	250	250	249	253	253
Number of new companies, net	54	46	24	10	5	10	9
Number of delisted companies, net	30	35	30	18	20	15	14
Number of listed companies at year-end	300	311	305	297	282	277	272
USD exchange rate with SEK	8.53	9.54	10.67	8.83	7.19	6.61	7.96

Source: OMX, Stockholmborsen, WDI, and IFS

Table A.2.
Swedish National Pension System

Government Pension Funds: Första AP-fonden (First AP-fund, AP1), Andra AP-fonden (Second AP-fund, AP2), Tredje AP-fonden (Third AP-fund, AP3), Fjärde AP-fonden (Fourth AP-fund, AP4), Sjätte AP-fonden (Sixth AP-fund, AP6), Sjunde AP-fonden (Seventh AP-fund, AP7).

Private Premium Pension Funds: About 600 pension funds in total. S denotes Swedish fund; F denotes Foreign fund. The following asset managers manage pension funds that own shares in the companies included in our sample: AIG fonder (F), AMF Pension fonder (S), Axa fonder (F), Aktia fonder (F), Aktie-Ansvar fonder (S), Alfred Berg fonder (F), Aragon Fondkommission AB (F), Banco fonder (S), DnB/Carlson fonder (S), Carnegie fonder (S), Carnegie fonder (Luxemburg) (F), Catella fonder (S), Cicero fonder (S), Credit Suisse fonder (F), Didner & Gerge aktiefond (S), DnB NOR fonder (F), Öhman Fondkommission AB (S), Öhman fonder (S), East Capital fonder (S), Enter fonder (S), Erik Penser Fondkommission (S), Evli fonder (Finland) (F), Fidelity fonder (F), FIM fonder (Finland) (F), Firstnordic fonder (S), Folksam fonder (S), Folksam LO fonder (S), Fondita fonder (F), Gustavus Capital fonder (S), HQ Fonder (F), Hagströmer & Qviberg Fondkommission (S), CDC Ixis fonder (F), Insight Investments fonder (F), Kaupthing fonder (S), Lannebo fonder (S), Länsförsäkringar fonder (S), Merrill Lynch fonder (USA) (F), JP Morgan Chase fonder (F), Morgan Grenfell fonder (F), Nordea fonder (S), Odin fonder (Norge) (F), Pictet fonder (USA) (F), Robur fonder (S), SEB fonder (S), SHB/SPP fonder (S), Sampo fonder (F), Seligson & Co fonder (F), Simplicity fonder (S), Skagen fonder (Norge) (F), Skandia fonder (S), Spiltan & Pelaro fonder (S), Storebrand fonder (F), Västernorrlandsfonden (S).

Source: PPM and Financial Supervisory Authority of Sweden.