Selection Bias and Event Studies:

The Case of Takeover Likelihood and Takeover Premium

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Abstract

In this paper we use Heckman selection models to analyze the relation between the likelihood of the firm becoming a takeover target, the takeover premium, and the use of dual class shares. Ordinary Least Squares regressions suggest that the use of dual class shares is associated with higher takeover premium. However, we also document that the use of dual class shares reduces the likelihood that the firm will be taken over. When we control for the fact that takeovers targets are selected we no longer find a significant relation between the takeover premium and the use of dual class shares. Hence, our results suggest that the takeover premium is indeed influenced by private information about the likelihood of takeover. Our results have implications for the analysis of abnormal returns at corporate events in general since cross-sectional tests of abnormal returns may be influenced by selection bias.

Keywords: Takeover likelihood, takeover premium, Heckman selection, dual class shares

JEL Classification: G34; G32

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Abstract

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Introduction

In this paper we use Heckman selection models to analyze the relation between the likelihood of the firm becoming a takeover target and the takeover premium. If firms were taken over randomly we could ignore the fact that takeover premiums are not observed for all firms and use ordinary regressions. Such a random occurrence of corporate takeovers assumption is however unlikely, i.e. takeovers do not happen randomly. Firms that experience a takeover event are selected. Our empirical analysis also documents that i) the determinants of the takeover premium change significantly when we control for the private information about the likelihood of a takeover and ii) that the likelihood of a takeover and the takeover premium indeed are not independent. Our results have implications for the analysis of abnormal returns at corporate events in general since cross-sectional tests of abnormal returns may be influenced by selection bias.[1] In their survey of the empirical takeover literature Betton, Eckbo, and Thorburn (2008) state that "*there are unresolved econometric issues of endogeneity and self-selection*". Furthermore, the authors argue that even if corrections for self-selection often are discussed in the literature, actual corrections are rarely implemented in empirical tests.

Several papers have analyzed the likelihood that a firm will become a takeover target.[2] Other papers have analyzed the determinants of the takeover premium at corporate takeovers.[3] Some papers have analyzed both the likelihood of a takeover and the takeover premium without controlling for potential selection problems.[4] For example, Cai and Vijh (2007) document that executive stock options affect both the likelihood that the firm will become a takeover target and the takeover premium. However, to our knowledge, they do not control

[1] For a discussion of the event study methodology in financial economics, see MacKinlay (1997).
[2] See e.g. Walkling and Long (1984), Hasbrouck (1985), Palepu (1986), Morck et al. (1989), Mikkelson and Partch (1989), Ambrose and Megginson (1992), Dickerson et al. (2002).
[3] See e.g. Jensen and Ruback (1983), Huang and Walkling (1987), Bradley et al. (1988), Franks and Harris (1989), Stulz et al. (1990), Moeller (2005).
[4] See e.g. Song and Walkling (1993).

for the potential selection problem when analyzing the determinants of the takeover premium. Based on our results we could not rule out the possibility that their results for the takeover premium might change if the selection problem is controlled for.

Shareholders and owner-managers in firms that would receive a low takeover premium may be unlikely to negotiate and accept the terms of a tender offer or merger. It is also possible that shareholders and owner-managers who choose not to negotiate and accept an offer would be offered even higher takeover premiums than shareholders in other firms who choose to accept an offer. The reason is that the former group might have a relatively higher reservation offer price level.

We analyze the Swedish market for control. Analyzing Swedish data provides some advantages given the research issue at hand. First, due to Swedish corporate law, the terms of most tender offers are negotiated between the bidder and the large shareholders in the target before they are made public. Once the large shareholders in the target have accepted the terms, the offer is made public and extended to all shareholders. Thus, if the bidder and the block-holders in the target do not reach an agreement we do not observe a tender offer in the data and this is precisely the selection bias we are interested in.

Second, a majority of the firms in our sample use dual class shares. Grossman and Hart (1988) show theoretically how dual class shares may make takeovers more costly for the bidder. Dual class shares facilitates for the incumbent in the target firm to demand compensation for the loss of private benefits of control. And since all private benefits are not necessarily transferable to the bidder dual class shares may work as an anti-takeover device. Thus, our focus on dual class shares when testing how the potential selection bias affects the inference from cross-sectional analysis of the takeover premium can be theoretically motivated and the Swedish environment facilitates the empirical analysis.

The Anglo-Saxon corporate governance model is often criticized for being myopic and put too much emphasis on short term profits. Gaspar, Massa, and Matos (2005) also document that firms with more short term shareholders are more likely to be taken over and receive lower takeover premiums. It has been argued that dual class shares facilitate for controlling shareholders and owner-managers to invest more in firm specific managerial capital and have longer time horizons (Taylor and Whittred, 1998). Thus, dual class shares may reduce the myopia and short term behaviour. On the other hand, dual class shares may lead to negative entrenchment effects (see e.g. Claessens, Djankov, Fan, and Lang, 2002). Our empirical analysis explores whether dual class shares are associated with higher takeover premiums (reduced myopia) or just a reduced likelihood that the target shareholders will receive a takeover premium (entrenchment).

Our data consist of an unbalanced panel with the largest listed non-financial firms on the Stockholm Stock Exchange 1985-2005. There are 2158 firm years for 208 firms. Eighty-seven firms were subject to a non-partial tender offer during our sample period.[5] The average and median takeover premium is 25 percent and 24 percent, respectively. We first document that the use of dual class shares is associated with higher takeover premium. Second, the use of dual class shares is also associated with a reduced likelihood of a non-partial takeover. And when we control for the reduced likelihood of a non-partial takeover, we no longer find a significant relation between the use of dual class shares and the takeover premium. Finally, our results suggest that the takeover premium is significantly influenced by private information about the likelihood of takeover.

Walkling (1985) tests whether the bid premium affects the probability that the number of shares acquired exceeds the shares sought by the bidder. Comment and Schwert (1995) analyze how the predicted likelihood that the firm will introduce an antitakeover mechanism

[5] At negotiated block trades (partial takeovers) we do not observe the takeover premium paid by the bidder and the involved parties do not have to disclose the price at which the block was traded.

is related to both the probability of a takeover and the takeover premium. They find that poison pills are associated with higher takeover premiums. They also document that the predicted likelihood that the firm will introduce a poison pill is negatively related to the probability of a takeover. Cai and Vijh (2007) document that firms where the managers have larger holdings of restricted stock and options in the firm are more likely to get acquired. The takeover premium is also negatively related to the target managers' stock and option holdings. None of these studies examine whether the analysis of takeover premiums is affected by selection bias.

However, Gaspar et al's (2005) methodology is very similar to ours. They study how shareholders investment horizons are related to the market for corporate control. First, OLS regressions are estimated with the takeover premium as dependent variable. The results show that firms with more short term shareholders receive lower takeover premiums. They then estimate Heckman selection models and find that firms with more short term shareholders are also more likely to be taken over. Sample selection is empirically relevant but it does not change their main results, i.e. controlling for sample selection does not change the negative relation between short term shareholders and the takeover premium. Our results suggest that dual class shares, arguably a proxy for long-term shareholdings, reduce the likelihood of a takeover but have no effect on the takeover premium once sample selection is controlled for. Thus, in the context of takeovers, dual class shares appear to have negative entrenchment effects but no positive effects in terms of reduced myopia.

Another related paper is Eckbo, Maksimovic, and Williams (1990). These authors use limited dependent variable techniques to construct consistent ML estimators that controls for the fact that private information truncates the residual term. Their results suggest that managers of bidders, but not targets, have valuable private information about the potential synergies from proposed mergers. The data we use is different in that it contains information

on companies that did not experience an event of takeover. Our methodology allows to model non-specific information and not just the information specific to the gains from mergers modelled by Eckbo et al (1990). Our results suggest that target managers and/ or large shareholders indeed have private information and that this influences the takeover premium.

The next section presents our econometric methodology. The data used in the empirical tests and our models specification are presented in section three. The empirical results are reported in section four. Section five summarizes and concludes.

2. Methodology

The issue of selection bias has received a fair amount of attention in the empirical corporate finance literature. Researchers have long been aware of the fact that corporate finance decisions are not arbitrary and typically reflect premeditated decisions of firms managers and owners to "self-select into their preferred choices" (Li and Prabhala, 2007). Although an increasing number of papers try to account for selectivity, their approach often merely attempts to correct for potential bias in estimated parameters. Our approach is different in that we use a selection model to incorporate and control for unobservable private information possessed by firms and investors. Gaspar et al (2005) use the same methodology in their robustness tests.

Following Heckman (1979), we adopt a baseline selection model, which is (arguably) the most popular modelling choice in corporate finance. In our context, accounting for self-selection consists of two steps. First, we have to specify a model for self-selection, using finance theory to model why some firms are taken-over while others are not. In the second stage we link the random variables driving self-selection to the magnitude of the takeover premium.

We start with a population regression in which the takeover premium *P* is a function of some variables *X*. This regression must be estimated using a sub-sample of firms that were subject of successful takeovers, the firms which self-select into choice *S* (sell) as opposed to not sell (*NS*). Selection, *C*, is specified using a probit model in which firm *i* chooses *S* if the net benefit from doing so, a scalar W_i, is positive. Writing the selection variable W_i as a function of explanatory variables Z_i, we obtain the system

$$C = S \equiv W_i = Z_i \gamma + \eta_i > 0 \qquad (1)$$

$$C = NS \equiv W_i = Z_i \gamma + \eta_i \leq 0 \qquad (2)$$

$$P_i = X_i\beta + \varepsilon_i \qquad (3)$$

where Z_i denotes publicly known information influencing a firm's choice, γ is a vector of probit coefficients, and η_i is orthogonal to public variables Z_i. Assuming that η_i and ε_i are bivariate normal, we can derive the likelihood function and the maximum likelihood estimators for (1)-(3).

Importantly, in the above framework selection can be interpreted as an omitted variable problem, while the omitted variable itself can serve as a proxy for unobserved private information (Li and Prabhala, 2007). Essentially, the omitted self-selection variable controls for and tests for the significance of private information in explaining the ex-post outcome of corporate control events.

In the equations (1) and (2), η_i is the part of W_i not explained by public variables Z_i. Thus, η_i can be interpreted as the private information driving the takeover event. The ex-ante expectation of η_i should be zero. Ex-post after firm i decides on whether to accept the takeover bid (*C=S*) or not (*C=NS*), the expectations of η_i can be updated. The revised expectation, $E(\eta_i \mid C)$, is thus an updated estimate of the firm's private information. To test whether the private information in a firm's acceptance of the takeover bid affected the

magnitude of the takeover premium, we would regress outcome P on $E(\eta_i \mid C)$. But $E(\eta_i \mid C) = \lambda_C(.)$ is the inverse Mills ratio term that is exactly what is used in the model to adjust for self-selection (Heckman, 1979). Thus, correcting for selection bias is equivalent to testing the private information. The inverse Mills ratio is an estimate of the private information underlying a firm's choice and testing its significance is a test of whether private information possessed by a firm explains ex-post outcomes (Li and Prabhala, 2007).

3. Data and Model Specification

3.1. Sample Selection

We start with an unbalanced panel dataset containing accounting and stock market data for the largest non-financial Swedish firms listed on the Stockholm Stock Exchange 1985-2005. The accounting data is collected from the Findata Trust database. The sample contains the vast majority of the largest non-financial public firms in this time period. Some large firms that were only listed for one or two years before delisting are not included in the sample.

The accounting data is combined with ownership data from Sundqvist (1985-1993), Sundin and Sundqvist (1994-2002), Fristedt, Sundin, and Sundqvist (2003) and Fristedt and Sundqvist (2004-2006).[6] This source reports the 25 largest owners in all listed firms as of January each year. Sundin and Sundqvist provide detailed information on coalition structures and families in a wide sense. Thus, if two families are known to cooperate, their shareholdings are aggregated by Sundqvist et al. We have followed their definitions of ownership coalitions. After the collection of ownership data, the sample consists of 208 firms and 2158 firm years.

A first rough estimate of non-partial takeover activity is also collected from the publications by Sundqvist et al. since they report all delistings. In Sweden, almost all non-

[6] These publications are referred to as Sundqvist et al below.

partial takeovers are preceded by a public tender offer (Bergström and Rydqvist, 1989). According to Swedish corporate law, any shareholder or group of shareholders in the target that has 10% of the shares or votes can block a legal merger. Therefore, the terms of the tender offer are often negotiated between the bidder and the large shareholders of the target before the public announcement. When the large blockholders have accepted the terms of the bid, a public tender offer is made for all target shares, including the blockholders' shares (Rydqvist, 1993). Most bids are non-partial and contingent on 90% of the shareholders accepting the offer. To separate other delistings from actual non-partial takeovers, we use daily newspapers.[7] Our final takeover sample consists of 87 successful non-partial tender offers.

The fact that we only look at successful takeovers suggests that all blockholders ultimately accepted the offer, sometimes after a revision of the offer. Some non-partial takeovers start with a hostile tender offer, i.e. an offer that has not been discussed with the blockholders in the target. The bidder then negotiates with the blockholders in the target and the offer might be revised. If a rival bidder offers a higher price, the blockholders in the target are not forced to sell to the initial bidder even if they have agreed on the terms of the initial offer. However, since the terms of most tender offers are typically negotiated between the bidder and the blockholders in the target before they are made public, we do not observe many failed bids. On the other hand, failed negotiations are common, i.e. the bidder and the blockholders in the target start negotiations but do not reach an agreement and we do not observe a tender offer. Furthermore, blockholders in potential target firms may negotiate with several potential bidders before reaching an acceptable offer, or deciding not to sell.

[7] Part of this data was provided by Kristian Rydqvist.

Table 1 panel A summarizes our sample. On average, our sample roughly contains 100 firms each year and roughly comprises 70 percent of the Swedish stock market capitalization. On average, 4 firms are taken over each year.

3.2. Descriptive Statistics

In Table 2, we provide descriptive statistics for the 208 firms and 2158 firm years in our sample. The largest block of equity contains 31 percent of the firm's cash flow rights on average (*Equity*). The average controlling owner holds 47 percent of the voting rights (*Votes*). The difference between *Equity* and *Votes* is due to the high frequency of dual class shares. Almost 77 percent of the firms in our sample have dual class shares (see panel B). The median controlling shareholder has almost 16 percent more voting rights than cash flow rights (*Votes - Equity*). The median firm has assets with a book value of 1583 million SEK (*Size*), has financed 21.3 percent of the total assets with long-term debt (*Leverage*), and has a *Tobin's q* of 1.123. *Tobin's q* is defined as the sum of the market value of equity and the book value of total debt divided by the book value of total assets.

The sample is split by whether the firm was a takeover target in 1985-2005. The firm is classified as a takeover target all years (N=759) prior to the successful non-partial takeover. The mean and the median difference tests suggest that the controlling owner in takeover targets have more cash flow rights. The median difference test suggests that the controlling owners in takeover targets have slightly less voting rights. The separation between votes and capital is smaller in takeover targets.[8] The average and median target firm has a higher Tobin's q than the non-target firms.

In panel B, we report statistics for four binary variables. Almost 77 percent of the firms have *Dual Class Shares*. In 41.7 percent of the firms, the second largest shareholder

[8] Note that mean differences are tested on the natural logarithm of *Votes - Equity*, *Firm Size*, and *Tobin's q*.

holds at least 10 percent of the voting rights (*Outside Block*). Dual class shares decrease the probability that the firm will be a takeover target while firms with an outside block holder are more likely to be a takeover target.

3.3. Takeover Premium Estimates

In order to estimate the takeover premium we collect stock-prices for the firms subject to successful non-partial tender offers. The announcement dates are collected from the Affärsdata database and Thomson One Banker. Stock prices are collected from Datastream. We estimate the takeover premium in three ways since it is unclear whether the offer price is adjusted for market movements and market-risk the days before the offer. First, we calculate the raw returns around the tender offer. Second, we calculate the market adjusted returns. Third, we calculate the market model adjusted returns (MacKinlay, 1997).[9] Affärsvärldens Generalindex (AFGX) is used as a proxy for the market. This index is value weighted and comprises roughly 99 percent of the Swedish stock market. The market model parameters are estimated from 240 days before the offer to 20 days before the offer.

Among the 87 takeover targets, 59 firms have dual class shares and 23 firms have both classes of shares listed. If the takeover target has dual class shares but only one class is listed, the premium on the listed shares is used as a proxy for the premium on the non-listed shares. If the takeover target has two classes of shares listed the returns and abnormal returns are estimated on a value weighted portfolio. Twelve bids differentiate between A and B shares, i.e. the offer price is higher for the A shares.[10] Among these twelve bids, the average voting premium is 11.5 percent. The correlation between the voting premium in the offer and the voting premium on the stock market the month before the offer is 84 percent (calculated

[9] It is not possible to calculate the takeover premium based on the offered price since some of the non-cash offers include convertibles and warrants for which we do not have complete information.

[10] According to Swedish law, the bidder can differentiate the offer price between A and B shares. The bidder cannot differentiate the offer price among A shareholders and B shareholders, respectively.

for the 23 observations with dual class shares listed), i.e. it appears as if the voting premium in the offer reflects different market prices before the offer. However, the causality between these two premiums is of course ambiguous. Rydqvist (1996) shows that the voting premium dramatically increases at control contests. It is likely that the voting premium would increase if a public tender offer is anticipated, especially if the tender offer is expected to include a voting premium.

The average raw returns and abnormal returns from ten days before the offer to ten days after the offer are reported in table 3 panel A. All three measures show significant returns on day -9 and day -5 to +1. A price run-up before the tender offer has also been detected in earlier studies, e.g. Schwert (1996). None of the returns after day +1 is significant. Furthermore, we have examined the returns between day -20 to day -11 but we found no significant returns. The significant average returns vary between 0.5 percent the days before the tender offer to almost 18 percent on the day of the offer. The highest one-day return at the tender offer is roughly 65 percent while the lowest is zero.

In panel B we report cumulative raw returns and abnormal returns for various intervals. The raw return from ten days before the tender offer to the day after the tender offer is roughly 25 percent. The market model adjusted return is roughly 24 percent over the same time period. The raw return and adjusted returns from the day before the tender offer to the day after the tender offer are roughly 20 percent. These numbers are similar to the takeover premiums at tender offers in the US reported by e.g. Jensen and Ruback (1983).

3.4. Model Specification

Inspired by Grossman and Hart (1988) we focus on the relation between the use of dual class shares and the takeover premium. We estimate the use of dual class shares as the difference between the largest shareholder's fraction of the firm's voting rights minus his/ her fraction of

the firm's cash flow rights, i.e. as *Votes – Equity*. However, the implication of *Votes – Equity* being 0.1 might be different when *Votes* is 0.5 and *Equity* 0.4 compared to a situation when *Votes* is 0.15 and *Equity* 0.05. We therefore include *Equity* per se in the regression model as well. A certain premium in $ would result in a different takeover premium measured in percentage of firm value. We therefore include firm *Size* as an explanatory variable. There should be less potential value creation when a well performing firm is acquired. *Tobin's q* is included in the model to capture this effect. Finally, a large outside blockholder might influence the price at which a bidder is able to takeover the firm. *Outside Block*, which is equal to one if the second largest shareholder holds more than 10 percent if the voting rights in the firm, and zero otherwise, is therefore included as an explanatory variable.

The *Size* and *Tobin's q* variables are similar to control variables used by Cai and Vijh (2007) when they run regressions with the takeover premium as dependent variable. They include variables for relative size of the bidder and target firms and the target firms' book-to-market ratio. They also include variables for i) the market value of holdings of the CEO in the bidder, ii) method of payment (cash dummy), iii) the acquirer's book-to-market ratio, iv) industry relatedness between the target and the bidder, and v) side payments to the target CEO. We cannot include information about the bidder or the tender offer in our system of equations since this information is not known prior to the tender offer, i.e. we cannot predict a tender offer by the characteristics of the bidder or the tender offer. However, we do test the impact of the method of payment on the takeover premium in OLS regression in the robustness section below.

We use the same variables as explanatory variables when estimating the likelihood that the firm will be taken over. However, we need to add at least one variable in order to meet the identification criteria. Stulz (1988) shows how managers can increase their voting power by increasing firm leverage. The managers thereby entrench themselves from

the market for corporate control. *Leverage* is therefore added to the selection equation.[11] Whether dual class shares influence the takeover premium, the likelihood of a takeover or both is as empirical question. We therefore include *Votes – Equity* and *Equity* per se in the takeover probability model. Given wealth constraints, there should be fewer potential bidders for a larger firm, ceteris paribus. *Size* is therefore included in the takeover probability model as well. Finally, a large outside blockholder might also influence the likelihood of a takeover. In fact, it is not uncommon that it is the second largest shareholder that makes a non-partial takeover of the firm. Hence, we include *Outside Block* in the takeover probability model. Finally, we include a variable for duration dependence. Each year the variable *ldur* is equal to the natural logarithm of the number of years a specific firm has been included in the dataset. We include this variable in order to control for the pure effect of time. One can hypothesize that this duration dependency of the takeover event may decrease or increase over time.

We end up estimating the following system of equations:

$$Premium = \beta_0 + \beta_1 Equity + \beta_2 (Votes - Equity) + \beta_3 Size + \beta_4 Tobin's\, q + \beta_5 Outside\, block + u_1$$

and *Premium* is observed if

$$\gamma_0 + \gamma_1 Leverage + \gamma_2 Equity + \gamma_3 (Votes - Equity) + \gamma_4 Size + \gamma_5 Tobin's\, q + \gamma_6 Outside block + \gamma_7 ldur + u_2 > 0$$

where $u_1 \sim N(0, \sigma)$, $u_2 \sim N(0, 1)$, and $corr(u_1, u_2) = \rho$.

The model is estimated by maximum likelihood. Regression estimates using the nonselection hazard (Heckman, 1979) provide starting values for the maximum likelihood estimation. In unreported tests we have also estimated the model using Heckman's (1979) two-step procedure. The two-step parameter estimates are obtained by augmenting the regression equation with the nonselection hazard computed using Probit estimates of the selection

[11] *Leverage* may therefore influence the takeover premium as well. However, in our data there is no significant relationship between *Leverage* and the takeover premium.

equation. The results from the two-step procedure are similar but marginally statistically weaker than the results reported below.

4. Empirical Results

4.1. Ordinary Regressions

Four different estimates of the takeover premium are used in the reported empirical analysis, the cumulative raw returns and the cumulative market model adjusted return over the 12-day window (day -10 to +1) and 3 day window (day -1 to day +1), respectively. The results for the market adjusted return and other event windows are basically the same as the ones reported.

We begin our empirical analysis by running OLS regressions with estimates of the takeover premium as dependent variable. The results are reported in the first columns of panels A-D in table 4. The use of dual class shares (*Votes-Equity*) is significantly positive in all OLS models. The significance level varies from the 5 percent level for the longer event window to the 10 percent level for the shorter event window. The other variables are insignificant (*Equity, Firm Size, Tobin's q*, and *Outside Block*).

4.2. Heckman Selection Models

We now turn to Heckman selection models where we first estimate the likelihood that the firm will be taken over. The results are reported in the second columns of panels A-D in table 4. The use of dual class shares (*Votes-Equity*) is negatively significant, i.e. separation of voting rights from cash flow rights by vote-differentiated shares reduces the likelihood that the firm will be taken over. This result is consistent with Grossman and Hart's (1988) argument that shares will with differentiated voting rights will reduce the likelihood of takeovers if some of the incumbent's private benefits are not transferable to the bidder.

Consistent with Stulz (1988) argument the likelihood of a takeover is also negatively related to *Leverage*. Managers and controlling shareholders can insulate

themselves from the market for corporate control by increasing firm leverage since it increases their voting power in the firm, ceteris paribus. The presence of a large outside blockholder (at the 10 percent level) and duration dependence (at the 1 percent level) significantly increases the likelihood of a takeover while firm performance (*Tobin's q*) significantly reduces the likelihood of a takeover (at the 10 percent level).

In the third columns of panels A-D in table 4 we report estimated premium equation where we control for private information about the likelihood of a takeover. The coefficient on *Votes-Equity* is now insignificant. Thus, when we control for the fact that we do not observe a takeover premium for all firms there is no significant relation between the use of dual class shares and the takeover premium.

Some of the other coefficients also changes substantially. *Firm size* becomes negatively significant in panel B, *Tobin's q* becomes highly negatively significant in panels C and D, while *Outside Block* is positively significant in panels C and D. All these variables are insignificant in the OLS regressions. The Likelihood Ratio test also rejects the hypothesis that the selection equation and the takeover equation are independent (at the 1 percent level in all panels). Thus, the OLS results in the first column are biased.

4.3. Robustness Tests

We perform some robustness test. We first test whether *Leverage* indeed is unrelated to the takeover premium. The results are reported in table 5 panel A. *Leverage* is insignificant for all four measures of the takeover premium. Thus, *Leverage* appears to significantly decrease the likelihood of a takeover but does not appear to be related to the takeover premium. We have also included *Leverage* in the premium equation and used other variables to identify the system of equations. The results do not change, i.e. *Leverage* is negatively significant in the selection equation and insignificant in the premium equation.

Several papers have documented that cash tender offers are associated with higher takeover premiums. We include a cash dummy in our premium equation. The cash dummy is positive but insignificant in the estimated OLS models in panel B. Furthermore, including the cash dummy does not change the other results compared to the reported models in table 4. We have also tested the correlation between the cash dummy and the Mill's ratio from the Heckman model. The correlation is insignificantly negative, i.e. the non-selection hazard rate of a takeover is not significantly related to the method of payment. The insignificant correlation suggests that the private information proxied by the Mill's ratio is not revealed in the method of payment. Thus, the dependence of the premium and selection equations appears not to be driven by the fact that we cannot include a method of payment variable in the selection equation.

We have also included other variables in the selection equation and the premium equation. Including firm liquidity (tangible assets/ total assets), Return on Assets (EBITD/ total assets) and firm age do not change our main results. And including these variables in the OLS regression with the takeover premium as dependent variable does not change the relation between the use of dual class shares and the takeover premium.

One potential problem with our estimates of the takeover premium is that we do not observe the market price on unlisted A-shares (36 observations) before the tender offer. In the reported tests above we have approximated the takeover premium on unlisted A-shares with the takeover premium on the listed B-shares. We perform a series of tests to explore whether this approximation affects our results. We first insert a dummy equal to one if the firm has unlisted A shares in both the selection equation and the premium equation. The dummy is insignificant in all estimated models and the other results are virtually unchanged. Second, we adjust the estimated premium for the four target firms that have non-listed A shares and receive a tender offer that price-differentiate between A and B shares. The

adjustment of the premium is done by adding the product of the extra premium on the A-shares in the tender offer and the fraction of A shares of total shares in the firm. This adjustment assumes that the prices of the A and B shares are the same before the tender offer. Using the adjusted premium in the estimated models does not change the results.

However, in unreported tests the estimated takeover premium is significantly higher for the dual class firms without listed A-shares compared to the dual class firms with listed A-shares. Thus, either a dual class firm with non-listed A-shares receives a higher takeover bid than a dual class firm with listed A-shares, ceteris paribus. Or using the takeover premium on the listed B-shares as a proxy for the takeover premium on the unlisted A-shares overestimates the takeover premium on the non-listed A-shares. We think the first explanation is more plausible. Listed A-shares means per definition that the A-shares are more or less dispersed. When the A-shares are not listed it usually means that the controlling owner holds all of them in one block. And if the incumbent controls all A-shares he/ she can maximize the proceeds from the sale of control rights and receive a higher takeover premium (Zingales, 1995).

Furthermore, *Vote-Equity* is not statistically different if the dual class firm has listed A-shares compared to dual class firms with unlisted A-shares (unreported). And the statistically significant positive relation between *Vote-Equity* and the takeover premium in the OLS regressions remains even if we only include the 23 firms with listed A-shares in the estimation. Thus, the positive OLS relation between *Votes-Equity* and the takeover premium does not appear to be driven by the firms for which we have approximated the takeover premium on the A-shares.

The bidder differentiated between A and B shares in 12 of the 59 tender offer for dual class firms (28 targets were single class firms). We define a variable *Bid A/ Bid B* as the offer price for A shares divided by the offer price for B shares minus 1. Thus, if the offer

price is the same for A and B shares the variable is equal to zero. The variable is also equal to zero for single class firms. *Bid A/ Bid B* is a negatively significant in the first two models reported in panel C. This result suggests that the total takeover premium is reduced when the bidder price differentiate between A and B shares. This result remains roughly the same if we only include the 59 targets with dual class shares in the estimation, i.e. only the firms where a differentiated bid actually is possible.

However, when we insert a variable capturing the different market prices of A and B shares the month before the tender offer (*Price A/ Price B*), the variable capturing different offer prices for A and B shares (*Bid A/ Bid B*) becomes insignificant. The variable for different market prices before the tender offer is on the other hand negatively significant. Again, the results remain roughly the same if we only include the 59 dual class firms in the estimation. It appears as if a larger voting premium on the A shares the month before the tender offer reduces the total takeover premium. We interpret this result in terms of a run-up in especially the A shares in anticipation of a takeover. The mark-up (potentially a higher bid on the A shares) on the A shares is then reduced at the tender offer and this is reflected in a lower total takeover premium. For the 23 observations with listed dual class shares the correlation between the price difference between A and B shares on the market before the tender offer and at the tender offer is 84 percent.

The results in panel C should be interpreted with caution since we do not observe the market prices of the A-shares in the dual class firms where the A shares are not listed. The estimations in models 3 and 4 assume that the market voting premium is zero for these firms. If we only include the 23 firms that have dual class shares listed in panel C *Bid A/ Bid B* and *Price A/ Price B* are still negative but become insignificant in models 1 and 2 and models 3 and 4, respectively.

5. Summary and Conclusion

In this paper we have explored the relation between the takeover premium and the likelihood of a takeover. Focus has mainly been on the cross-sectional relation between the use of dual class shares and the takeover premium and the likelihood of a takeover, respectively. Dual class shares are positively and significantly related the takeover premium and negatively and significantly related to the likelihood of a takeover. When we control for the private information about the likelihood of a takeover, the relation between dual class shares and the takeover premium becomes insignificant. Furthermore, firm performance and outside block-holders become significant determinants of the takeover premium once we control for private information. These variables were insignificant in the ordinary regressions. Generally, our results suggest that the takeover premium and likelihood of a takeover are not independent.

We think our results have two implications. First, ordinary cross-sectional analysis of abnormal returns at corporate events may be influenced by selection bias and therefore lead to flawed conclusions. Second, dual class shares appear to be associated with negative entrenchment effects in terms of lower probability of receiving a takeover premium. Dual class shares do not appear to be associated with positive effects in terms of higher takeover premiums as a result of reduced myopic behaviour of controlling shareholders and owner-managers.

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Table 1. *Frequency of successful non-partial takeovers among large Swedish non-financial firms listed on the Stockholm Stock Exchange 1985-2005*

Year	1. Number of Sample Firms	2. Percentage of market cap.	3. Number of non-partial Takeovers of Sample Firms	4. Percentage of Sample Firms being taken over
1985	80	60.3	0	0.0
1986	89	70.7	3	3.4
1987	90	66.9	6	6.7
1988	86	60.1	2	2.3
1989	93	73.1	4	4.3
1990	93	70.1	3	3.2
1991	90	71.2	0	0.0
1992	91	72.8	2	2.2
1993	94	78.4	2	2.1
1994	110	81.1	0	0.0
1995	118	78.3	6	5.0
1996	132	81.2	3	2.3
1997	143	75.6	2	1.4
1998	142	70.5	13	9.1
1999	130	53.0	9	6.9
2000	120	70.5	8	6.7
2001	104	49.1	3	2.9
2002	100	50.5	9	9.0
2003	90	49.3	3	3.3
2004	87	49.6	2	2.3
2005	76	51.2	7	9.2

Note: In this table, we provide statistics on the number of sample firms and the frequency of successful non-partial takeovers among Swedish non-financial firms listed on the Stockholm Stock Exchange 1985-2005. The sample consists of 208 firms and 2158 firm years. 87 firms were subject to successful non-partial tender offers.

Table 2. *Descriptive statistics large Swedish non-financial firms 1985-2005*

Panel A: Continuous variables

	Total Sample, N=2158		Not takeover target, N=1399		Takeover targets, N=759		Difference	
	Mean	Median	Mean	Median	Mean	Median	t-test	Ranksum test
Equity	0.312	0.280	0.301	0.270	0.333	0.300	-3.752***	-4.130***
Votes	0.471	0.464	0.477	0.500	0.460	0.410	1.644	1.989**
Votes - Equity[1]	0.159	0.150	0.176	0.180	0.127	0.100	7.659***	7.328***
Firm Size[1]	10543	1552	12502	1440	6933	1825	1.334	0.407
Leverage	0.237	0.213	0.240	0.213	0.233	0.215	0.869	-0.090
Tobin's q[1]	1.473	1.123	1.462	1.109	1.493	1.141	-1.856*	-2.390**

[1] mean difference tested on the natural logarithm of these variables.

Panel B: Binary variables

	Total Sample, N=2158 Proportion	Not takeover target, N=1399 Proportion	Takeover targets, N=759 Proportion	Difference Proportion test
Dual Class Shares	0.766	0.792	0.719	3.808***
Outside Block	0.417	0.402	0.444	-1.870*

Note: In this table, we provide summary statistics for the 208 firms and 2158 firm years in our sample. The sample is split by whether the firm was subject to a successful non-partial tender offer or not during 1985-2005. The firm is classified as a takeover target all years (N=759) prior to the successful non-partial takeover. *Equity* is defined as the controlling shareholder's (largest voteholder) fraction of cash flow rights in the firm. *Votes* is defined as the controlling shareholder's fraction of voting rights in the firm. *Firm Size* is defined as the book value of total assets in Million SEK. *Leverage* is equal to the value of long-term debt divided by the book value of total assets. *Tobin's q* is defined as the sum of market value of equity and book value of debt divided by the book value of total assets. *Dual Class Shares* is equal to one if the firm has issued shares with differential voting rights, and zero otherwise. *Outside Block* is equal to one if the second largest shareholder holds at least 10 percent of the voting rights, and zero otherwise. Median Difference tested by means of Wilcoxon- Ranksum test. *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Table 3. Estimates of the takeover premium

Panel A: Raw returns and abnormal returns around the announcement of a tender offer

	Raw return	*Market adjusted return*	*Market model adjusted return*
-10	0.0003	-0.0008	-0.0005
-9	0.0082***	0.0081***	0.0078***
-8	0.0050	0.0037	0.0041
-7	0.0011	-0.0016	0.0001
-6	0.0002	-0.0006	-0.0003
-5	0.0066***	0.0058**	0.0060**
-4	0.0063**	0.0053**	0.0051**
-3	0.0074**	0.0054*	0.0057**
-2	0.0087***	0.0069**	0.0077***
-1	0.0110***	0.0119***	0.0105***
0	0.1788***	0.1760***	0.1765***
+1	0.0149**	0.0148**	0.0150***
+2	-0.0003	0.0011	0.0006
+3	0.0017	0.0035	0.0024
+4	-0.0014	-0.0016	-0.0017
+5	-0.0007	-0.0029	-0.0013
+6	0.0000	0.0012	0.0006
+7	-0.0014	0.0000	-0.0014
+8	-0.0007	-0.0026	-0.0023
+9	0.0020	0.0018	0.0027
+10	0.0001	0.0005	0.0011

Panel B: Cumulative returns and abnormal returns around the announcement of a tender offer

	Cumulative raw return	*Market adjusted cumulative return*	*Market model adjusted cumulative return*
-10 to +10	0.2534***	0.2359***	0.2385***
-10 to +1	0.2487***	0.2349***	0.2378***
-5 to +5	0.2332***	0.2261***	0.2265***
-5 to +1	0.2339***	0.2260***	0.2265***
-1 to +1	0.1990***	0.2027***	0.2020***

Note: In this table we present the stock market returns around the announcement of the 87 non-partial takeovers. In panel A stock market raw returns and abnormal returns are reported from 10 days before to 10 days after the first news about the tender offer. Abnormal returns are estimated as market adjusted and market model adjusted, respectively. In panel B cumulative raw returns and cumulative abnormal returns are reported for various intervals. The announcement dates are collected from the Affärsdata database and Thomson One Banker. Stock prices are collected from Datastream. If the target firm has two classes of shares listed (23 observations) the returns and abnormal returns are estimated on a value weighted portfolio. Affärsvärldens Generalindex (AFGX) is used to estimate the returns on the market. The significance of the returns and the market adjusted returns are tested by means of t-test. The significance of the market model adjusted returns is tested by means of z-values (MacKinlay, 1997). *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Table 4. Estimated regression models

Panel A: Premium estimated as cumulative raw return day -10 to +1

		Heckman Selection	
	OLS on premium	*Selection*	*Premium*
Equity	-0.0571	0.4167	0.0030
	(-0.68)	(1.60)	(0.03)
Votes - Equity	0.2901	-0.9838	0.0077
	(2.57)**	(-2.16)**	(0.05)
Ln(Firm Size)	-0.0155	0.0037	-0.0181
	(-1.65)	(0.15)	(-1.64)
Ln(Tobin's q)	-0.0108	-0.1438	-0.0413
	(-0.33)	(-1.69)*	(1.29)
Outside Block	0.0048	0.1850	0.0472
	(0.15)	(1.77)*	(1.29)
Leverage		-0.8367	
		(-3.67)***	
ldur		0.2075	
		(2.75)***	
p-value LR test of indep. eqns		0.0021	

Panel B: Premium estimated as cumulative market model adjusted return day -10 to +1

		Heckman Selection	
	OLS on premium	*Selection*	*Premium*
Equity	-0.0544	0.4251	-0.0100
	(-0.65)	(-0.10)	(-0.10)
Votes - Equity	0.2249	-0.9928	-0.0102
	(2.11)**	(-2.17)**	(-0.07)
Ln(Firm Size)	-0.0213	0.0027	-0.0218
	(-2.35)**	(0.11)	(-2.18)**
Ln(Tobin's q)	-0.0166	-0.1496	-0.0372
	(-0.50)	(-1.77)*	(-1.09)
Outside Block	0.0046	0.1869	0.0433
	(0.14)	(1.78)*	(1.19)
Leverage		-0.9072	
		(-3.79)***	
ldur		0.2105	
		(2.98)***	
p-value LR test of indep. eqns		0.0007	

Panel C: Premium estimated as cumulative return day -1 to +1

		Heckman Selection	
	OLS on premium	*Selection*	*Premium*
Equity	-0.1079	0.4030	-0.0682
	(-1.19)	(1.58)	(-0.59)
Votes - Equity	0.2201	-0.8654	-0.2350
	(1.66)*	(-2.02)**	(-1.26)
Ln(Firm Size)	-0.0114	0.0079	-0.0093
	(-1.13)	(0.33)	(-0.98)
Ln(Tobin's q)	-0.0250	-0.1453	-0.0867
	(-0.71)	(-1.72)*	(-2.74)***
Outside Block	0.0034	0.1702	0.0651
	(0.10)	(1.69)*	(1.69)*
Leverage		-0.6958	
		(-4.47)***	
ldur		0.1331	
		(4.52)***	
p-value LR test of indep. eqns		0.0000	

Panel D: Premium estimated as cumulative market model adjusted return day -1 to +1

		Heckman Selection	
	OLS on premium	*Selection*	*Premium*
Equity	-0.0803	0.4167	-0.0414
	(-0.88)	(1.63)	(-0.34)
Votes - Equity	0.2342	-0.8932	-0.2059
	(1.74)*	(-2.05)**	(-1.29)
Ln(Firm Size)	-0.0153	0.0066	-0.0154
	(-1.52)	(0.27)	(-1.63)
Ln(Tobin's q)	-0.0267	-0.1390	-0.0883
	(-0.75)	(-1.65)*	(-2.80)***
Outside Block	0.0162	0.1679	0.0861
	(0.48)	(1.68)*	(2.22)**
Leverage		-0.7283	
		(-5.39)***	
ldur		0.1613	
		(4.50)***	
p-value LR test of indep. eqns		0.0000	

Note: In this table, we provide results from estimated OLS regressions and Heckman selection models. The Heckman models are estimated with Maximum Likelihood. The sample contains 208 Swedish listed firms and 2158 firm years from 1985-2005. 87 firms were subject to a successful non-partial tender offer. Estimates of the takeover premium are dependent variables. In panel A (C) the takeover premium is estimated as the cumulative raw return day -1 to +10 (day -1 to +1). In panel B (D) the takeover premium is estimated as the cumulative market model adjusted return day -1 to +10 (day -1 to +1). Coefficients are reported with hereroscedasticity robust t- and z-statistics, respectively, in parentheses. *Equity* is defined as the controlling shareholder's (largest voteholder) fraction of cash flow rights in the firm. *Votes* is defined as the controlling shareholder's fraction of voting rights in the firm. *Firm Size* is defined as the book value of total assets in Million SEK. *Leverage* is equal to the value of long-term debt divided by the book value of total assets. *Tobin's q* is defined as the sum of market value of equity and book value of debt divided by the book value of total assets. *Outside Block* is equal to one if the second largest shareholder holds at least 10 percent of the voting rights, and zero otherwise. *ldur* is the natural logarithm of the number of years the firm has been included in the dataset before the specific firm –year observation. *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Table 5: Additional OLS regression models with the takeover premium as dependent variable

Panel A: Cumulative returns

	M1 *Raw Return* *Day -10 to +1*	*M2* *Raw Return* *Day -1 to +1*	*M3* *Market model adjusted return* *Day -10 to +1*	*M4* *Market adjusted model return* *Day -1 to +1*
Leverage	0.0534	0.1241	0.0303	0.1160
	(0.51)	(1.14)	(0.30)	(1.09)
p-value>F	0.6088	0.2573	0.7622	0.2806

Panel B: Cumulative returns

	M1 *Raw Return* *Day -10 to +1*	*M2* *Raw Return* *Day -1 to +1*	*M3* *Market model adjusted return* *Day -10 to +1*	*M4* *Market model adjusted return* *Day -1 to +1*
Cash Dummy	0.0284	0.0516	0.0336	0.0506
	(0.92)	(1.65)	(1.07)	(1.61)
Equity	-0.0623	-0.1175	-0.0607	-0.0896
	(-0.75)	(-1.33)	(-0.73)	(-1.01)
Votes - Equity	0.2941	0.2273	0.2295	0.2413
	(2.58)**	(1.67)*	(2.12)**	(1.74)*
Ln(Firm Size)	-0.0148	-0.0101	-0.0204	-0.0140
	(-1.56)	(-1.01)	(-2.25)**	(-1.40)
Ln(Tobin's q)	-0.0096	-0.0228	-0.0151	-0.0244
	(-0.29)	(-0.65)	(-0.46)	(-0.70)
Outside Block	0.0045	0.0027	0.0042	0.0156
	(0.14)	(0.08)	(0.13)	(0.47)
p-value>F	0.0077	0.0129	0.0130	0.0229

Panel C: Cumulative market model adjusted returns

	M1 *Day -10 to +1*	*M2* *Day -1 to +1*	*M3* *Day -10 to +1*	*M4* *Day -1 to +1*
Cash Dummy	0.0317	0.0483	0.0365	0.0539
	(1.01)	(1.54)	(1.16)	(1.74)*
Equity	-0.0663	-0.0965	-0.0476	-0.0743
	(-0.81)	(-1.10)	(-0.58)	(-0.85)
Votes - Equity	0.2698	0.2906	0.2858	0.3094
	(2.42)**	(2.02)**	(2.54)**	(2.19)**
Ln(Firm Size)	-0.0169	-0.0098	-0.0140	-0.0063
	(-1.81)*	(-0.95)	(-1.51)	(-0.61)
Ln(Tobin's q)	-0.0171	-0.0268	-0.0154	-0.0248
	(-0.52)	(-0.78)	(-0.48)	(-0.74)
Outside Block	0.0063	0.0128	0.0119	0.0248
	(0.19)	(0.55)	(0.36)	(0.73)
Bid A/ Bid B	-0.4252	-0.5201	0.2448	0.2720
	(-1.84)*	(-2.28)**	(0.59)	(0.68)
Price A/ Price B			-1.4206	-1.6795
			(-2.07)**	(-2.47)**
p-value>F	0.0055	0.0073	0.0033	0.0020

Note: In this table, we provide results from estimated OLS regressions on the 87 takeovers. Estimates of the takeover premium measured as the cumulative raw returns or the cumulative market model adjusted returns are dependent variables. The raw returns and the market adjusted returns are cumulated from the day -10 to day +1 or from day -1 to day +1. Coefficients are reported with heteroscedasticity robust t-statistics in parentheses. *Equity* is defined as the controlling shareholder's (largest voteholder) fraction of cash flow rights in the firm. *Votes* is defined as the controlling shareholder's fraction of voting rights in the firm. *Firm Size* is defined as the book value of total assets in Million SEK. *Leverage* is equal to the value of long-term debt divided by the book value of total assets. *Tobin's q* is defined as the sum of market value of equity and book value of debt divided by

the book value of total assets. *Outside Block* is equal to one if the second largest shareholder holds at least 10 percent of the voting rights, and zero otherwise. *ldur* is the natural logarithm of the number of years the firm has been included in the dataset before the specific firm –year observation. *Bid A/ Bid B* is equal to the offered price for the A shares divided by the offered price for the B shares minus one at the tender offer. If the tender offer does not differentiate between A and B shares or if the firm does not have A and B shares it is equal to zero.*Price A/ Price B* is equal to the price of the A shares divided by the price of the B shares minus one at the beginning of the month of the tender offer. If the firm does not have listed A and B shares it is equal to zero. *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.