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Block Trading, Ownership Structure, and the Value of Corporate Votes

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Block Trading, Ownership Structure, and the Value of Corporate Votes*

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Abstract:

This paper shows that open market block trading can provide a link between private benefits of control enjoyed by large shareholders and the "voting premium", i.e. the price difference between voting and non-voting shares. We first demonstrate in a microstructure model with informed traders and short-selling constraint that the trading activity of blockholders translates into a spread between the prices of voting and non-voting shares. In contrast to the extant theory, this model can explain the voting premium in the absence of corporate takeovers. In the empirical part of the paper, we show for a comprehensive sample of German dual-class companies that large trades occur more often in voting shares than in non-voting shares, and that the block trading activity in voting shares is strongly correlated with the voting premium. Moreover, the effect of the ownership structure on the voting premium becomes insignificant once we control for the block trading activity in voting shares.

JEL Classification Codes: G30, G34

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1. Introduction

It is empirically well established that share prices reflect private benefits of control which are enjoyed by only a few major blockholders. Estimates of the proportion of the share price that can be attributed to these private benefits of control range between 5% for the US (Lease, McConnell and Mikkelson, 1983) and 82% for Italy (Zingales, 1994). The aim of this paper is to re-examine the mechanism that links private benefits of control to share prices. A thorough understanding of how private benefits are reflected in share prices is relevant for at least two fields in corporate governance: First, it will foster our understanding of the relationship between a firm's ownership structure and its market value. Second, it is relevant for the estimation of private benefits of control from stock market data, especially because such estimates are often used as proxy for minority shareholder expropriation.

Previous studies (Grossman and Hart, 1988; Bergström and Rydqvist, 1992; Zingales, 1995; Rydqvist, 1996) identify corporate takeovers as the link between private benefits of control and share prices. They argue that the takeover premium reflects the private benefits of the future owner of the firm, so that the market value of control is a part of the expected takeover premium. This theory turned out to be successful in many cross-sectional empirical studies of dual-class firms. Nevertheless, for most countries for which evidence is available (see Section 2 for a short review), takeovers are too infrequent and takeover premia are too small to explain the so-called voting premium, i.e., the observed price difference between voting and non-voting shares. Therefore, takeover premia cannot be the only link between private benefits of control and share prices.

This paper proposes an alternative theory that is based on open market block share purchases rather than takeovers. We argue that blockholders form a coalition in order to share private benefits. If such a coalition becomes unstable, current blockholders or outsiders might want to buy small blocks of voting shares in the market in order to improve their bargaining power in the coalition. If the market for the company's shares is not perfectly liquid, such block purchases will drive up prices resulting in a transfer of wealth from the buyer of the block to some of the holders of voting shares. In the theoretical part of the paper, we demonstrate that the random demand for small blocks of voting shares translates into a spread between voting and non-voting share prices. Hence, open market block share purchases can potentially explain the observed voting premium or a part of it. In an empirical analysis of 79 German dual-class companies, we provide substantial evidence for the new theory. In particular, we find that large trades are executed more often in voting shares than in non-voting shares and that the block trading activity in voting shares can explain a substantial part of the variation in the voting premium. We also show that the effect of the ownership structure on the voting premium becomes insignificant once we control for the block trading activity in voting shares.

As usual in the literature on the market value of control, we focus on dual-class companies, because the market value of control can be easily measured for these companies. Note, however, that the phenomenon and our theory is not restricted to dual-class firms. The share price of any single-class firm will contain a voting premium, although it might be impossible to disentangle it from the value of the cash-flow rights.

The technical challenge of our argument is to explain why block purchases have a price impact and why typical holders of voting shares can expect a gain from selling their shares to block buyers. To this end, we present a microstructure model in the veins of Kyle (1985) and Kyle and Vila (1991). In this model, the market is driven by a blockholder who might order an additional block of voting shares and by a number of potentially informed investors who might receive a signal about the future value of the firm and trade on this information. As market makers cannot distinguish between orders of informed traders and orders of the blockholder, the blockholder's block purchase will lead to a temporary price increase of voting shares and to a transfer of wealth from blockholder to informed traders. Due to short-selling restrictions, potentially informed investors can obtain the full value of their potential information only if they already own voting shares when they receive their signal. Hence, they will buy voting shares in a previous period and, given that there are many potentially informed investors, the price of voting shares will be higher than the price of non-voting shares – even though the terminal payoff is identical for both types of shares.

Our theory yields a number of testable implications, including some that cannot be derived from the takeover theory. We test these implications in the empirical part of the paper, using data on 79 German dual-class companies from 1974 to 2000. We use German data, because Germany is one of the largest capital markets for which (at least historically) the takeover theory is not a convincing explanation of the observed voting premium.

We first construct a measure of the block trading activity in voting shares: For each company and each year, we identify the 5 percent largest trades in the combined sample of voting and non-voting shares. Our measure of the block trading activity in voting shares is the percentage of these largest trades that was executed in voting shares. We establish that, after controlling for differences in liquidity, 56 percent of the 5 percent largest trades were executed in voting shares compared to 44 percent in non-voting shares. This corroborates our model's implication that the block-trading activity is stronger in voting shares than in non-voting shares. Our model also implies that the block trading activity in voting shares depends on the firm's ownership structure, because the ownership structure determines the stability of the ruling coalition and thereby the likelihood of further open market block purchases. We indeed find that the block trading activity in voting shares is significantly negatively related to the size of the largest block of voting shares. Finally, we present overwhelming evidence that the block trading activity in voting shares is positively related to the voting premium. Using instrumental variables regressions, we show that the well-known dependence of the voting premium on the ownership structure is only indirect: The voting premium depends on the block trading activity, which in turn depends on the ownership structure. Once we control for the block trading activity, the ownership structure has no significant effect on the voting premium.

The rest of the paper is organized as follows. The next section reviews the empirical evidence for our claim that the takeover theory can only explain a part of the observed voting premium. Section 3 presents the microstructure model and the theoretical results. Section 4 discusses the model's empirical implications, and Section 5 describes the dataset. In Section 6, we define and analyze a measure for the block trading activity in voting shares. Section 7 explores the empirical relationship between this measure and the voting premium. Section 8 concludes and discusses the relevance of our results for the relationship between ownership and control. The appendix contains a list of all variables used and the proofs of the propositions.

2. Corporate takeovers and the voting premium

There are two variants of the theory that explains the voting premium by corporate takeovers. The non-cooperative variant (Grossman and Hart, 1988, Harris and Raviv, 1988, Zingales, 1995, Rydqvist, 1996) assumes that most of the company's shares are widely held and that two bidders engage in a takeover contest for 50 percent of the company's votes in order to obtain private benefits of control. In this setting, the price of voting shares is bid up to the lower of the two bidders' reservation prices, so that the price difference between voting and non-voting shares reflects the expected private benefits of the unsuccessful bidder. This theory is convincing for developed countries of English and Scandinavian origin where companies are indeed widely held and takeover contests are common.[1] In other countries, however, shares are typically not widely held (La Porta et al. 1999) and hostile takeovers are rare (Rossi and Volpin, 2003). Still, we observe substantial (often even comparatively large) voting premia in these countries.

Bergström and Rydqvist (1992) present a cooperative version of the takeover theory. They assume that the bidder wants to buy 100 percent of the target firm and therefore negotiates the acquisition with the incumbent blockholder. Due to her bargaining power, the incumbent blockholder can extract a part of the bidder's private benefits of control, i.e. the bidder pays a premium on voting shares. While this model does not rely on *hostile* takeovers, it still predicts differential takeover bids for voting and non-voting shares. In the remainder of this section, we therefore review the empirical evidence on differential takeover bids and the voting premium for various countries. In particular, we want to find out whether differential takeover bids can explain the price difference between voting and non-voting shares empirically.

Table 1 displays some key results of twelve empirical studies on the value of the voting right. The first three columns describe the analyzed sample. The fourth column displays the ex-ante voting premium, i.e. the average relative price difference between voting and non-voting shares. This price difference varies between 5.4% for the US and 81.5% for Italy. In addition, the table shows the number of tender offers with differential bids that are reported in these studies, the average premium paid for

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[1] DeAngelo and DeAngelo (1985) report, however, that voting shares of U.S. dual class companies are not widely held.

voting shares relative to non-voting shares in these tender offers, and the ex-post voting premium, which is the average tender offer premium multiplied by the probability of a differential tender offer. The table shows that even for the US and the UK, the ex-post voting premium is much lower than the ex-ante voting premium. The studies for Israel, Germany, Switzerland and Italy, report no differential bids but still substantial ex-ante voting premia.[2] Only for Canada, ex-ante and ex-post voting premia are of comparable size. Hence, Table 1 suggests that the takeover theory cannot explain the observed ex-ante voting premium (except for Canada).

One might try to reconcile the evidence presented in Table 1 with the takeover theory by recognizing that there are events other than tender offers that can terminate the dual-class structure. Frequently, dual-class firms choose to convert non-voting shares into voting shares in order to simplify their share structure. If non-voting shares are treated unfavorably in such dual-class stock unifications, these stock unifications might explain the discrepancy between ex-ante and ex-post voting premium in Table 1. The empirical evidence shows, however, that this is not the case, at least for the U.S., Israel, Germany, Switzerland, and Italy. Typically, non-voting shares are converted one-to-one into voting shares without any compensation to voting shareholders. In those cases, in which voting shareholders receive a compensation, the compensation is considerably lower than the previous voting premium. Hence, compared to the ex-ante voting premium, non-voting shares benefit from dual-class stock unifications.[3] Only for the U.K., there is evidence that voting shareholders receive a compensation in dual class stock unifications that justifies the observed ex-ante voting premium (see Ang and Megginson, 1989). To sum up, differential takeover premia and stock unifications can explain the size of the ex-ante voting premium for Canada and the U.K. For the U.S., Israel, Germany, Switzerland, and

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[2] Except for Lease, McConnell and Mikkelson (1983) and Zingales (1994), the papers with zero differential tender offers in Table 1 do not explicitly state that there were no differential tender offers during the sample period. However, all of them used the takeover theory to justify the price difference, so that they had a strong incentive to present this supporting material if it had been available. Moreover, according to our own research, there has been only a single differential takeover bid in post-war Germany; it occurred in 2003 and involved a takeover premium of 42%.

[3] See Lease, McConnell and Mikkelson (1983), Hauser and Lauterbach (2002), Dittmann and Ulbricht (2003), Kunz and Angel (2003), and Bigelli (2004) for an empirical analysis of the terms of conversion in, respectively, U.S., Israeli, German, Swiss, and Italian dual class unifications.

Italy, however, a large part of the voting premium cannot be attributed to takeovers or stock unifications.

There is also more direct evidence that the takeover hypothesis cannot be the whole story. Maynes (1996) analyzes 46 Canadian dual-class firms, 19 of which have a so-called “participation coattail”, i.e. a company by-law which states that, in case of a takeover bid, the holders of restricted voting shares have the right to convert their shares one-to-one into superior voting shares and tender them to the bidder. This by-law effectively prevents tender offers with differential bids. Consequently, the takeover theory predicts that the voting premium should be zero for firms with such a participation coattail. Maynes (1996) finds however that the voting premium is still 5.5 percent for firms with participation coattail compared to 8.2 percent for firms without coattail provision.

So although there is a lot of evidence in favor of the takeover theory, the empirical literature clearly shows that this theory cannot fully explain the observed size of the voting premium for many countries. Therefore, we are going to develop an alternative (or rather: additional) theory that might explain the remaining part. This theory is based on open-market block share purchases of a blockholder who wants to increase her voting power in the company. Such block purchases have been documented in the context of dual-class firms by Rydqvist (1996) and Bruner (1999).

3. A microstructure model of the voting premium

This section presents a microstructure model that describes the trading in voting and non-voting shares of a dual-class firm. There are two types of traders: a blockholder who potentially buys voting shares because she can derive private benefits from them, and a number of potentially informed investors who might observe the quality of the firm and trade on this information. We first show that, in expectation, potentially informed investors gain on their superior information at the cost of the blockholder. We then describe how this expected gain is reflected in stock market data.

3.1 Set-up of the model

We consider one blockholder, N potentially informed investors, and an unspecified number of uninformed investors. All individuals are risk-neutral. The model has three stages. At time t = 1, non-voting shares and a part of the voting shares (the free-float) are sold to investors. At time t = 2, trading takes place in voting and non-voting shares. At time t = 3, all shares are liquidated and receive the liquidation payment $\widetilde{L}$ which takes on $\overline{L}$ and $\underline{L}$ ($\underline{L} < \overline{L}$) with equal probabilities. $\widetilde{L}$ is realized before time t = 2 but remains unknown to all but one investor until time t = 3. Throughout the paper, symbols with tilde refer to random variables. Realizations of random variables are denoted by the same symbols without a tilde.

Before time t = 2, the blockholder learns her private signal $\widetilde{B}$, which is equal to $\overline{B} > 0$ with probability α and zero otherwise. $\widetilde{B}$ is the additional monetary value of private benefits she can obtain at time t = 3 if she owns an additional block b of voting shares, where b is a constant. We do not explicitly model how the opportunity to obtain private benefits arises. Zwiebel (1995) presents a model in which blockholders form coalitions in order to obtain and share private benefits. If such a coalition becomes unstable (e.g. due to the death of a pivotal blockholder) an outsider might want to buy a block in order to become member of a future coalition. Also before time t = 2, one of the N potentially informed investors observes $\widetilde{L}$, and each of them is equally likely to make this observation. We assume that $\widetilde{B}$ and $\widetilde{L}$ are independent, that α < ½, and that $\overline{B} \geq (\overline{L} - \underline{L})b/2$. The last two conditions prevent two tedious case distinctions which we will discuss after Proposition 2.

At time t = 2, each investor (informed and uninformed) and the blockholder can buy or sell voting and/or non-voting shares. We assume that posting an order results in an infinitesimal cost, so that individuals who do not expect a gain from trading do not trade. Thus, only the informed investor and the blockholder will potentially trade. Let y_v and y_{nv} be the informed trader's demand for voting and non-voting shares, respectively. Positive numbers are buy orders and negative numbers sell orders. We assume that short-selling is not allowed, i.e., $-y_v$ and $-y_{nv}$ are bounded by the number of respective shares held by the investor. Let u_v and u_{nv} denote the corresponding orders of the blockholder. The market is organized as proposed by Kyle (1985): A market maker observes the total orders $y_v + u_v$ and $y_{nv} + u_{nv}$ but not the individual orders. He does know the structure of the game, but not the realizations of $\widetilde{B}$ or $\widetilde{L}$ before time t = 3. The market for market making is competitive, so the market maker will set a price equal to the expected liquidation value conditional on the two trading volumes observed: $P_2^v = P_2^{nv} = E(\widetilde{L} \mid y_v + u_v, y_{nv} + u_{nv})$

We assume that the informed trader can only order the quantities $b/2$, 0, or $-b/2$. Further, we assume that the number M of voting shares sold to the public at time $t = 1$ is a multiple of $b/2$: $M = m\, b/2$ with m being an integer, and that $m < N$, i.e. only some of the potentially informed investors can own a block of $b/2$.

3.2 Equilibrium prices and voting premium

As the blockholder is also subject to the infinitesimal cost of posting an order, she will never place an order if $B = 0$. Likewise, she will never place an order for non-voting shares, because private benefits can only be obtained from voting shares. As a consequence, the informed investor will also never trade in non-voting shares, because every trade in non-voting shares would reveal the private signal to the market maker, who would adjust prices immediately.

Proposition 1: (Equilibrium at time $t = 2$)

a) The blockholder will
   - buy a block b of voting shares if she observes $B = \overline{B}$.
   - not trade if she observes $B = 0$.

b) The informed investor will
   - buy $b/2$ voting shares if he observes $L = \overline{L}$,
   - sell $b/2$ voting shares if he observes $L = \underline{L}$ and if he owns at least $b/2$ voting shares,
   - not trade if $L = \underline{L}$ and if he does not own at least $b/2$ voting shares.

There are two cases in which the informed investor will realize a trading gain: (1) if he sells $b/2$ voting shares and the blockholder orders b; and (2) if he orders $b/2$ and the blockholder orders nothing. In both cases, the total order is $b/2$, so the market maker cannot infer the informed investor's information from the total order. In case (1), the blockholder will therefore pay an unfavorably high price and realize a trading loss. Since the market maker makes zero profits on average, the expected loss of the blockholder equals the expected gain of the informed trader.

Due to the assumed short-selling restriction, the informed investor can sell shares on a negative signal only if he already owns $b/2$ shares. If he does not own $b/2$ shares at time $t = 2$, he cannot gain from his superior information if $L = \underline{L}$. Therefore, all potentially informed investors will want to buy a block of $b/2$ voting shares at time t = 1. As there are (by assumption) more potentially informed investors than blocks $b/2$ in the free-float, the price of voting shares is bid up to the potentially informed investors' reservation price that is higher than the expected liquidation value of the shares.

Proposition 2: At time $t = 1$, the price for non-voting shares is equal to the expected liquidation value: $P_1^{nv} = E(\tilde{L}) = \frac{1}{2}(\overline{L} + \underline{L})$. Trading in voting shares takes place at a premium

$$\pi = P_1^{v} - P_1^{nv} = \frac{\alpha(1-\alpha)}{(1-\alpha)N + \alpha m}\frac{(\overline{L} - \underline{L})}{2}. \quad (1)$$

The block purchase premium, π, strictly increases in the probability, α, that the blockholder can obtain additional private benefits (as long as $\alpha < ½$). All voting shares are held by potentially informed investors.

Proposition 2 states that the price of voting shares is higher if block purchases are more likely. This result holds as long as $\alpha < ½$. If α exceeds some threshold above ½, then the price of voting shares decreases with increasing α. The reason is that the driving force behind the block purchase premium is the uncertainty about whether the blockholder will buy a block in the market. If $\alpha = 0$ or $\alpha = 1$, there is no uncertainty and the block purchase premium is zero. Also note that the trading activity of the informed trader translates into a cost to the blockholder when she buys a block b. If her private benefits $\overline{B}$ fall below a threshold below $(\overline{L} - \underline{L})b/2$, these costs are larger than $\overline{B}$, and we would obtain an equilibrium in mixed strategies. The proofs of the two propositions and the precise thresholds for α and $\overline{B}$ are given in the appendix.

Table 2 displays some values of the block purchase premium, π, for different probabilities α and different amounts of private information $\overline{L} - \underline{L}$. The example assumes that the voting share free float is 40%, which is a typical value for the dual-class firms in the sample we consider in Section 4. In addition, we assume that there are $N = 50$ potentially informed traders, that the block size $b = 2\%$, and that the value of the firm is normalized to one. The first line shows that a probability $\alpha = 1\%$ and private information of ± 5% (i.e., $\overline{L} - \underline{L} = 0.1$) result in a block purchase premium of $\pi = 0.001\%$. If we stipulate that the modeled period is one trading day, the annual block purchase premium is approximately $250 \cdot \pi = 0.25\%$, because a year has about

250 trading days. An additional expected annual income of 0.25% discounted at a rate of 5.5% results in a relative price difference between voting and non-voting shares of 4.5%. Note that this is about the size of the relative price difference we observe in the U.S. (cf. Lease, McConnell and Mikkelson, 1983). Hence, the model can generate realistic voting premia under plausible assumptions.[4]

4. Testable implications of the model

The model yields a number of testable implications that can be divided into two classes. The first class contains those hypotheses that can also be derived from the standard theory by Rydqvist (1996) and Zingales (1995). These are hypotheses about the block purchase probability α in our model and, respectively, the takeover probability in the Rydqvist/Zingales model. Clearly, any variable that has a positive impact on the takeover probability should also have a positive effect on the block purchase probability. In both models, an increase in the respective probability leads to a higher voting premium (see Proposition 2). Therefore, both models imply that the voting premium should be a declining function of the largest block of voting shares, because a control contest is unlikely when the largest block of voting shares is large. Moreover, the voting premium should decrease in the firm's market capitalization, because the bigger the firm, the more expensive it is to buy a block (or even the whole firm). These hypotheses have been tested and mostly confirmed in many empirical studies (see, e.g., Smith and Amoako-Adu, 1995). Therefore, we will not explicitly test them again.

The more interesting hypotheses implied by our model are those that cannot be derived from the Rydqvist/Zingales model. These are hypotheses about block purchases, i.e., the proposed mechanism that links private benefits of control to share prices. We consider three such hypotheses in this paper:

1. Large trades are more likely to occur in voting shares than in non-voting shares.

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[4] Our assumptions b = 2% and α = 1% imply that, on average, 5% of the voting shares are bought by blockholders each year. In the sample that is described in Section 5, the free float of voting shares is 42% on average and varies by an average 5.8% from year to year in absolute terms. Hence, our assumptions regarding b, α, and the free float are plausible.

2. The block-trading activity in voting shares is negatively related to the size of the largest voting block and to the market capitalization of the firm.
3. The block-trading activity in voting shares is positively correlated with the voting premium and can explain a part of the variation in the voting premium.

The next section describes the construction of the dataset. After that, we will introduce a measure for the block-trading activity in voting shares and then consider each of the three hypotheses in turn.

5. The dataset

Most of the dataset has been constructed from Karlsruher Kapitalmarkt Datenbank (KKMDB), a scientific database that contains daily German stock market data from 1974 onwards. Dual class companies have been identified by their German security identification number: The first five digits identify the firm and the last digit the class of shares. For all these dual-class firms we compiled ownership information, the number of outstanding shares and charter provisions regarding voting power and dividend differences from *Handbuch der deutschen Aktiengesellschaften*, the German equivalent of Moody's Manual. We excluded firms for which (1) there are no differences in voting rights, (2) one or both classes are subject to trading restrictions or (3) we could not find any information on the voting arrangement. In addition, we excluded one company (Sixt A.G.) that unified its dual class structure twice within eight years only to issue new non-voting shares a few weeks later both times. No other company introduced new non-voting shares after unifying its dual-class structure.

Daily price, return and volume data stem from KKMDB. When we construct annual observations, we aggregate volumes over the calendar year and use prices from the last day of June on which non-zero trades are recorded for voting and non-voting shares. Annual information on the numbers of shares outstanding and on the ownership structure were compiled from *Handbuch der deutschen Aktiengesellschaften*. For the calculation of abnormal returns, we need the returns on the full Frankfurt market portfolio (DAFOX), which have also been provided by KKMDB. The final sample contains data on 79 companies and spans the 27 years from 1974 to 2000.

6. Empirical evidence on the block trading activity in voting shares

6.1 PBV: A measure for the block trading activity in voting shares

Our dataset does not contain the size of individual trades. It does contain, however, the trading volume and the number of trades for each trading day and for each security. Therefore, we can calculate the average trade size for each trading day and each security as the ratio of the euro trading volume and the number of trades. From these average trade sizes, we calculate our measure of the block trading activity in voting shares in four steps:

1. If the average trade size is missing for an observation (e.g., because there were no trades in this security on this day), this observation is deleted together with its voting or non-voting twin.
2. For each company-year, we pool the remaining daily average trade sizes of voting and non-voting shares and rank them. Due to the first step, exactly 50% of the observations in the pooled sample are trades in voting shares.
3. We delete all average trade size observations in the pooled sample except the 5% largest.
4. We count how many of the remaining average trades were in voting shares.

This gives us the "percentage of block trades in voting shares" PBV(0.05). By discarding all observations except the 2.5% largest in the third step, we obtain PBV(0.025), etc. Note that, by construction, PBV(1) = 50%, because then no observations are deleted in the third step.

When we use this measure in regressions, we need to calculate it for each company and each year. Therefore, the counting in the fourth step is done for each company-year. In order to arrive at meaningful numbers of PBV, we discard all company-year observations for which there are less than 100 pairs of average trade sizes. This ensures that we calculate PBV(0.05) from at least 5%*200=10 trade size observations. In this subsection, we want to describe PBV(x) across all companies and all years. Lest we unnecessarily discard any information, we therefore calculate PBV in the fourth step across all companies and all years.

Panel A of Table 3 displays PBV(x) for several values of x from 0.01 to 1 together with the p-value of the binomial test of the hypothesis "PBV(x) = 50%". Panel A demonstrates that PBV(0.05)=57%, i.e., 57% of the 5% largest trades were in voting shares and only 43% in non-voting shares. Hence, large trades occur significantly more often in voting shares than in non-voting shares. Under the null-hypothesis that our model is wrong, we would expect that 50% of all block trades occur in voting shares – if the two types of shares are equally liquid. If one type of shares is more liquid than the other, we would expect more block trades in the more liquid class. Hence, the result in Panel A could be entirely due to the fact that voting shares are, on average, more liquid than non-voting shares.

In order to distinguish between the two effects, we split the sample before calculating PBV, depending on whether the annual euro trading volume in a given company-year was higher in voting shares or in non-voting shares. Panel B of Table 3 shows PBV(x) calculated for all company-years for which the volume of voting shares was smaller than the volume of non-voting shares. Panel C displays the respective results for the remaining part of the sample. It indeed turns out that PBV(x) is larger than 50% if voting shares are more liquid and smaller than 50% if non-voting shares are more liquid. Note, however, that PBV(x) is not symmetric across the two panels B and C: If voting shares are more liquid, PBV(0.05) exceeds 50% by 24 percentage points, whereas, if non-voting shares are more liquid, PBV(0.05) is merely 8 percentage points lower than 50%. Therefore, Table 3 suggests that there is a higher block-trading activity in voting shares than in non-voting shares and that this effect cannot be attributed entirely to liquidity.

6.2 The price impact of block trades

Note that our measure of the block trading activity in voting shares, PBV(x), is not based on individual trades but rather on average daily trades. In order to show that PBV(x) is indeed a measure of *block* trades, we calculate the price impact of these largest average trades in our sample and compare them to standard results on the price impact of block trades in the literature.

To this end, we calculate two-day abnormal returns from day –1 to day 1 for each trading day in our sample. Here, abnormal returns are simply the difference between the security's return and the market return. We calculate two-day returns instead of one-day returns, because our returns are calculated from prices set in an auction about halfway during the trading period ("Kassakurs") whereas volume and number of trades refer to the full trading period. The second column of Table 4 displays the averages of these abnormal returns for voting and non-voting shares.

The method described in the previous subsection identifies 16,803 block trades from the total 324,750 daily observations in the combined sample of voting and non-voting shares. As usual in the literature (see, e.g., Holthausen, Leftwich and Mayers, 1990), we distinguish between buyer initiated block trades, i.e., block trades on days with positive abnormal return, and seller initiated block trades, i.e., block trades on days with negative abnormal return. Therefore, we decompose the 16,803 block trades into four subsamples: 5,027 buyer initiated block trades in voting shares, 3,808 buyer initiated trades in non-voting shares, 4,622 seller initiated block trades in voting shares, and 3,346 seller initiated block trades in non-voting shares. Panel A of Table 4 shows the price impact of these four types of block trades on voting shares and on non-voting shares. Panel B shows similar results for the case that only the largest 2.5% of all average daily trades are defined as block trades.

The first observation from Table 4 is that there are consistently more buyer initiated trades than seller initiated trades in our sample. This contrasts sharply with Holthausen, Leftwich and Mayers (1987) who find for different measures of trading activity that large seller initiated trades are more frequent than large buyer initiated trades. Note, however, that Holthausen, Leftwich and Mayers (1987) use tick data while we use 2-day abnormal returns. Many large trades occur on zero-ticks in Holthausen, Leftwich and Mayers (1987). As zero abnormal returns are extremely unlikely, our method will classify zero-tick trades either as buyer initiated block trades or as seller initiated block trades – depending on what else happened during the two-day window.

The second finding from Table 4 is that seller initiated trades move prices by -1.9% on average, whereas buyer initiated trades have an impact of +2.5%. In absolute terms, the impact of buyer initiated trades is significantly higher than the impact of seller initiated trades. This asymmetry between the impact of buyer and seller initiated trades is consistent with the literature (see, e.g., Holthausen, Leftwich, and Mayers, 1987, 1990). However, the permanent price effects found by Holthausen, Leftwich, and Mayers (1990) are much smaller than ours: -0.9% for seller initiated trades and +1.1% for buyer initiated sales. Again, the difference between these two sets of results might be due to the fact that we consider two-day abnormal returns whereas Holthausen, Leftwich and Mayers (1990) work with tick data.

Third, we observe from Table 4 that block trades in voting shares have a higher impact on voting share prices than on non-voting share prices. Likewise, block trades in non-voting shares have a higher impact on non-voting share prices than on voting share prices. This pattern appears sensible because an informed trader's block purchase of voting shares can be motivated by two types of information: First, the trader might have received positive information about the value of the firm. Such information should have the same impact on the share prices of voting and non-voting stock. Note that this is the situation modeled in Section 3. The model therefore predicts that the price effect of any block trade is identical for the two types of shares. Second, the trader might have private information about the future probability of an insider's block purchase or of a takeover. Such information is likely to have opposite effects on voting and non-voting share prices. Hence, on average, we would expect that a buyer-initiated block trade in voting shares has a stronger impact on voting shares than on non-voting shares.

To sum up, Table 4 demonstrates that the 5% (or 2.5%) largest average daily trades have all the properties of genuine block trades. Hence, PBV(x) appears to be a sensible measure of the block trading activity in voting shares. In the remainder of this paper, we concentrate on PBV(0.05), because Tables 3 and 4 indicate that there is no qualitative difference between the 5% largest trades and the 2.5% largest trades. PBV(0.05) has the advantage of being calculated from twice as many observations as PBV(0.025).[5]

6.3 Determinants of the block trading activity

We now turn to regressions of the block trading activity PBV(0.05) on a number of other variables. For this, we use the panel dataset described in Sections 5 and 6.1 which contains 717 country-year observations. Table 5 describes all variables we use in our regression analysis and displays their means and medians. The average market

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[5] We also constructed a measure of the block *purchase* activity in voting shares by looking at the 5% largest *buyer initiated* trades. Like PBV(0.025) it is calculated from roughly only half as many observations as PBV(0.05). We repeated the analysis summarized in Tables 5 to 8 with these two alternative measures and obtained qualitatively the same and quantitatively similar results. Generally, the standard errors are somewhat higher for these alternative measures – presumably due to the smaller number of observations they are based on. These additional results are available from the author upon request.

capitalization in our sample is € 1.6 bn, the average voting premium is 12.7% and the average size of the largest voting block is 51.4%.

In contrast to much of the literature, we define the voting premium as the price difference between voting and non-voting shares divided by the price of *voting* shares: $VP = (P^{v} - P^{nv}) / P^{v}$. We do not scale the price difference by the price of non-voting shares, because the price difference is an estimate of the block purchase premium π (see equation 1) which is an income to voting shareholders. Consequently, we divide it by the price of voting shares in order to obtain the voting shareholders' return from having the right to vote. Econometrically, this choice also makes sense, because the price of non-voting shares might be considerably lower than the price of voting shares. In this case, scaling by the price of voting shares prevents extremely high values of the voting premium. If we scale by the price of non-voting shares, the average voting premium would be 18.5% (where one percentage point is solely due to a single outlier with a 642% voting premium). We conjecture that the convention to scale with the price of non-voting shares is the reason for the high variation in the different estimates of the German voting premium which vary between 17.2% and 41.6% (see e.g. Daske and Ehrhardt, 2002, Fatemi and Krahnen, 2000, Hoffmann-Burchardi, 1999, Kruse, Berg and Weber, 1993).

From Table 3 we already know that the block trading activity in voting shares depends strongly on the liquidity differences between the two classes of shares. We use two alternative variables to control for differential liquidity. The first is LR, the ratio of the annual euro trading volume of voting shares to the annual euro trading volume of non-voting shares. The second is logLR, the natural logarithm of this liquidity ratio LR. Our data source does not contain bid or ask prices, so bid-ask spreads cannot be used. Table 6 shows our regression results with PBV(0.05) as dependent variable. Models 1 and 2 show that both liquidity variables have a highly significant effect on the block trading activity PBV(0.05).[6] In both models, the liquidity adjusted block trading activity (52.1% in model 1 and 56.2% in model 2) is significantly larger than 50%. This is direct evidence for our hypothesis no. 1 that

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[6] In all ordinary least squares regressions, we calculate heteroscedasticity consistent standard errors as proposed by Davidson and MacKinnon (1993, p. 554): We estimate the OLS estimates' covariance matrix by $(X'X)^{-1}\left(\sum_{i=1}^{n}\frac{\hat{u}_i^2}{(1-h_i)^2}x_i x_i'\right)(X'X)^{-1}$ where h_i is the i'th diagonal element of $X(X'X)^{-1}X'$.

large trades are more likely to occur in voting shares than in non-voting shares. Since logLR has the higher t-statistic and leads to a markedly higher R^2, we use logLR as liquidity control in the remaining regressions. in Table 3

Model 3 shows that the log of the firm's market capitalization (logMCap) has no significant impact on PBV(0.05), although the sign is negative as expected. The size of the largest voting block (BSize) has a highly significant negative effect on the block trading activity as models 4 and 5 demonstrate. The introduction of two-way fixed effects (models 6 to 10) renders BSize insignificant but does not change the other results. As the ownership structure varies only little within firms but a lot between firms, this result is not surprising. Altogether we conclude that there is some evidence that the size of the largest voting block has a negative effect on the block trading activity in voting shares as stated in hypothesis 2.

7. The empirical relationship between block trading activity and voting premium

In this section, we want to test hypothesis 3 which states that the block trading activity in voting shares, PBV(0.05), has significant explanatory power for the voting premium. Note that simple regressions of the voting premium on PBV(0.05) and further control variables potentially suffer from an endogeneity bias. The reason is that, in equity markets, prices and quantities are determined simultaneously and that the voting premium, PBV(0.05), as well as our liquidity and size controls all depend on prices or quantities. Even the ownership structure might be endogenous, because a high voting premium might signal high private benefits of control and therefore attract block investments. Standard methods to overcome such endogeneity problems are the use of lagged independent variables, fixed effects, and instrumental variables. We will apply all three methods in turn.

Table 7 displays the results of OLS and fixed effects regressions with the voting premium as dependent variable. Models 1 and 2 regress the voting premium on the lagged values of the ownership structure, the market value and the liquidity difference. Such regressions are typical in the empirical literature on the voting premium. We find that the size of the largest voting block, BSize, has a significant negative effect on the voting premium and that both liquidity ratios have a positive impact on the voting premium. The log of the market capitalization is insignificant.

The introduction of two-way fixed effects (models 5 and 6) wipes out the significance of BSize, which is not surprising, because the ownership structure varies much more between firms than within firms.[7] In models 3, 4, 7 and 8, we additionally introduce the lagged value of the block trading activity PBV(0.05) as independent variable. PBV(0.05) turns out to be highly significant in all specifications. Moreover, the introduction of lagged PBV(0.05) renders the size of the largest voting block insignificant and also changes the estimates of the liquidity controls markedly. The reason is that PBV(0.05) is strongly correlated with BSize (correlation: -0.35), LR (correlation: 0.43) and logLR (correlation: 0.68).

We also tackle the endogeneity problem of PBV(0.05) by running instrumental variable regressions, using two different sets of instrumental variables. In the first set of regressions, the lagged values of LR, BSize and logMCap are the instruments and PBV(0.05) is treated as endogenous variable. So effectively, we regress PBV(0.05) on the lagged values of LR, BSize and logMCap, calculate the fitted values from this regression, and finally regress the voting premium on these fitted values. The results of these IV regressions are shown in Panel A of Table 8. Panel B presents the corresponding results if the lagged values of logLR, BSize and logMCap are used as instruments.

Like in all the previous regressions, there is overwhelming evidence that PBV(0.05) has a positive impact on the voting premium. Note also that the regression R^2 are much higher here than in the corresponding regressions on the instruments only (models 1 and 2 in Table 7). Furthermore, the exogenous variables themselves (LR,

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[7] In the empirical literature, such regressions of the voting premium usually include additional right-hand-side variables, that do not appear in our tables. Additional variables that describe the ownership structure are, e.g., the Shapley value or the size of the second-largest voting block. In simple regressions of the voting premium or of PBV(0.05), the second largest voting block is insignificant and the Shapley value has less explanatory power than the size of the largest voting block BSize. Another popular right-hand side variable is the proportion of voting shares among all outstanding shares. This variable is not significant in any of our regressions once we control for liquidity. Besides it is strongly correlated with our liquidity controls, so that collinearity problems could arise if we included it. Finally, we do not introduce dividend controls, because these variables have been shown to be endogenous in regressions of the voting premium. Dittmann (2003) presents evidence that German firms with high voting premium *choose* to pay higher dividends on non-voting shares. The introduction of dividend controls into our regressions would not change the results, but we would have to discuss and solve another endogeneity problem that is unrelated to the main point of this paper.

logLR, BSize and logMCap) are clearly insignificant once the fitted values of PBV(0.05) are introduced in the regression. Hence, we conclude that there is substantial evidence that the block trading activity in voting shares has a positive effect on the voting premium. Moreover, the voting premium depends on the ownership structure and the liquidity difference between voting and non-voting shares mainly through the block trading activity. Once we control for the block trading activity in voting shares, the ownership structure has no significant effect on the voting premium. These results confirm hypothesis 3.

8. Conclusions and Further Notes

This paper puts forward a new explanation as to how private benefits of control are reflected in share prices. We argue that existing or future blockholders might want to acquire a small block of voting shares in the market in order to improve their chances to obtain private benefits of control in the future. For a comprehensive sample of German voting and non-voting shares, we find that large trades are indeed more often executed in voting shares than in non-voting shares, even when we control for differences in liquidity between the two types of shares. Moreover, we show that the trading activity in voting shares depends significantly on the ownership structure of the firm.

The microstructure model in Section 3 shows that expected future block share purchases lead to a spread between the prices of voting and non-voting shares. As a consequence, voting shares trade above the present value of their expected future cash-flows, a result that also holds for the shares of single-class companies. In a numerical example, we show that, under plausible assumptions, our model can generate voting premia in the typically observed range between 5% and 15%.

In our empirical analysis of German dual-class companies, we find substantial evidence for our theory. The block trading activity in voting shares has a highly significant impact on the voting premium. Using instrumental variables regressions, we further show that the well-known dependence of the voting premium on the ownership structure is only indirect: The ownership structure affects the block trading activity in voting shares which in turn affects the voting premium. Once we control for the block trading activity in voting shares, there is no significant correlation between ownership structure and voting premium.

Although the empirical results are for Germany only, we conjecture that our theory can also explain the voting premium (or a part of it) for most other countries. There is a sizeable empirical literature that documents a positive voting premium for various countries, but only few studies are able to explain the premium by observed takeover bids alone. A combination of our block purchase theory and the takeover theory appears to be a convincing explanation for the observed voting premium worldwide.

Our results are relevant for at least two important fields of corporate governance. First, they establish a basis for estimating private benefits of control from stock market data and for comparing these estimates across countries (see Nenova, 2003 and Dittmann, 2003). The takeover theory alone is clearly not able to explain the cross-country variation in the voting premium, because the voting premium is typically *lower* in countries with higher takeover activity as Table 1 suggests. In contrast, the block purchase theory put forward in this paper is potentially capable of explaining this variation. It might also help to identify necessary control variables for performing cross-country comparisons of private benefits of control.

Secondly, our results might help to explain the relationship between a firm's ownership structure and its market value. Given that firms differ in the amount of private benefits a coalition of controlling shareholders can extract from the company, our argument predicts a curvilinear relationship between inside ownership and firm value as it has been found by, among others, Morck, Shleifer and Vishny (1988) and McConnell and Servaes (1990). If private benefits of control are small, inside ownership and the probability of block purchases by insiders will both be small. The low probability of block purchases results in a small voting premium, i.e. a comparatively low market value. If, on the other hand, private benefits are large, inside ownership will be large and the probability of block purchases will be small, because the ruling coalition is stable. For medium levels of private benefits we would expect medium levels of inside ownership and large voting premia, as the probability of block purchases by insiders becomes large. Hence, the market value of firms would increase in inside ownership for small levels of inside ownership and decrease for large levels of inside ownership.[8] This argument is consistent with the results of

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[8] We do not find a curvilinear (but only a linear) relationship between voting premium and inside ownership in our dataset. The reason is that we consider dual class companies which presumably have

Demsetz and Lehn (1985) who find no significant relationship between ownership structure and operating performance. It is also consistent with Loderer and Martin (1997) and Himmelberg, Hubbard and Palia (1999) who both conclude that the ownership structure has no significant effect on the market value once we allow for endogeneity.

Appendix

List of variables used

b	number of shares the blockholder might potentially want to acquire (constant)
$\widetilde{B}$	blockholder's private benefit of owning an additional block b of voting shares with realizations 0 and $\overline{B} > 0$.
$\widetilde{L}$	random liquidation payment with realizations $\overline{L}$ and $\underline{L}$ with $\underline{L} < \overline{L}$.
M	number of voting shares in the free-float
m	number of blocks of size $b/2$ in the free-float (i.e., $m = 2\,M\,/\,b$)
N	number of potentially informed investors
n	number of years until the dual-class structure is terminated
p	probability that blockholder orders b shares after observing $B = \overline{B}$
$\widetilde{P}_t$	price at the end of period t of voting share ($\widetilde{P}_t^v$) or non-voting share ($\widetilde{P}_t^{nv}$)
$\widetilde{r}_t^{\,v}$	*true* return of voting shares over period t
$\widetilde{r}_t^{\,nv}$	*true* return of non-voting shares over period t
$\widetilde{r}_t^{\,v*}$	*observed* return of voting shares over period t (net of block purchase premia)
u_v, u_{nv}	blockholder's order of voting shares and non-voting shares, respectively
y_v, y_{nv}	informed trader's order of voting shares and non-voting shares, respectively
α	probability that $\widetilde{B} = \overline{B}$
δ	probability that informed investor owns $b/2$ voting shares
π	block purchase premium

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a comparatively high level of extractable private benefits of control. Firms with low private benefits of control do not have dual-class structures and are therefore not included in our sample.

Proof of Proposition 1

We will first calculate the equilibrium price for voting shares at time t = 2 under the assumption that the two players stick to the strategies described in the proposition. After that we will show that deviating from these strategies is not optimal.

Let δ be the probability that the informed trader owns b/2 voting shares at time t = 2. Note that there are m blocks of size b/2 in the free-float. As voting shares trade above their liquidation value at time t = 1 (as we will shortly see), owning more than b/2 voting shares has no benefits but only costs. Therefore, $\delta = m/N$.

Depending on the realizations of $\widetilde{B}$ and $\widetilde{L}$ and on whether the informed trader owns voting shares, there are six different pairs of orders (u_v, y_v). The table below displays these six outcomes and the total order flow $u_v + y_v$ that is observed by the market maker together with the probabilities of these outcomes. The right column shows the realization of $\widetilde{L}$ which the market maker will try to deduce from the total order flow.

informed investor's order	blockholder's order: $u_v = 0$ (prob = $1 - \alpha$)	blockholder's order: $u_v = b$ (prob = α)	Realization of $\widetilde{L}$
$y_v = -b/2$ prob = $\delta/2$	$u_v + y_v = -b/2$ prob = ½ $(1 - \alpha)\delta$	$u_v + y_v = b/2$ prob = ½ $\alpha\delta$	$\underline{L}$
$y_v = 0$ prob = $(1 - \delta)/2$	$u_v + y_v = 0$ prob = ½$(1 - \alpha)(1 - \delta)$	$u_v + y_v = b$ prob = ½ $\alpha(1 - \delta)$	$\underline{L}$
$y_v = b/2$ prob = ½	$u_v + y_v = b/2$ prob = ½$(1 - \alpha)$	$u_v + y_v = 3b/2$ prob = ½ α	$\overline{L}$

In four of these six potential outcomes, the market maker immediately knows the signal $\widetilde{L}$ and therefore chooses the respective prices: $P_2^v(-b/2) = P_2^v(0) = P_2^v(b) = \underline{L}$ and $P_2^v(3b/2) = \overline{L}$. Only if $u_v + y_v = b/2$, the market maker does not know the value of $\widetilde{L}$. According to the probabilities in the table, he will set:

$$P_2^v(b/2) = E(\widetilde{L} \mid u_v + y_v = b/2) = \frac{1-\alpha}{1-\alpha+\delta\alpha}\overline{L} + \frac{\delta\alpha}{1-\alpha+\delta\alpha}\underline{L} \qquad (2)$$

If the blockholder observes $B = \overline{B}$, she buys a block if the benefit $\overline{B}$ is larger than the expected cost of buying the block b, i.e., if:

$$\overline{B} \geq b\frac{\delta}{2}(P_2^v(b/2) - \underline{L}) = \frac{(\overline{L} - \underline{L})}{2} b \frac{1-\alpha}{1-\alpha+\delta\alpha}\delta \tag{3}$$

Under the maintained assumption that $\overline{B} \geq (\overline{L} - \underline{L})b/2$, condition (3) holds and the blockholder will buy a block whenever she observes $B = \overline{B}$.

Given the blockholder's trading strategy, it is straightforward to verify the optimality of the informed trader's strategy.

Proof of Proposition 2

A potentially informed investor who owns *b*/2 voting shares just after time *t* = 1 expects the following revenues from selling these shares at time *t* = 2 or liquidating them at time *t* = 3:

$$\left[\frac{N-1}{N}E(\tilde{L}) + \frac{1}{N}\left(\frac{1}{2}\overline{L} + \frac{(1-\alpha)}{2}\underline{L} + \frac{\alpha}{2}P_2^v(b/2)\right)\right]\frac{b}{2} = \left[E(\tilde{L}) + \frac{\alpha}{2N}\left(P_2^v(b/2) - \underline{L}\right)\right]\frac{b}{2}$$

$$= \left[E(\tilde{L}) + \frac{\alpha(1-\alpha)}{(1-\alpha)N + \alpha m}\frac{\overline{L} - \underline{L}}{2}\right]\frac{b}{2}$$

This proves equation (1). It remains to show that P_1^v increases in α. Taking the first derivative of P_1^v with respect to α and equating this to zero yields the solution $\alpha = z - \sqrt{z^2 - z}$ with $z = N/(N-m)$. For $\alpha < z - \sqrt{z^2 - z}$, P_1^v strictly increases in α. As $z - \sqrt{z^2 - z} > 0.5$, P_1^v strictly increases in α if $\alpha < 0.5$.

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Table 1:

Empirical literature on differential tender offers and the voting premium

This table summarizes 12 empirical papers that include information on the voting premium *and* on the frequency of tender offers with differential bids. The ex-ante voting premium is the average relative price difference between voting and non-voting shares (or superior and inferior-voting shares), i.e., $(P^v - P^{nv})/P^{nv}$. The average tender offer premium is $(TO^v - TO^{nv})/TO^{nv}$, where TO^v is the tender offer (in money or stocks) on voting shares and TO^{nv} on non-voting shares. The ex-post voting premium is the average tender offer premium multiplied by the number of differential tender offers and divided by the number of firms in the sample.

Country	Sample period	Number of firms in the sample	Ex-ante voting premium	Number of differential tender offers	Average tender offer premium	Ex-post voting premium	Source
USA	1940-1978	26	5.4%	0	N/A	0%	Lease, McConnell and Mikkelson (1983)
USA	1984-1990	94	10.5%	2	81.5%	1.7%	Zingales (1995)
USA	1960-1980	144	N/A	4	130.9%	3.6%	DeAngelo and DeAngelo (1985)
UK	1955-1982	152	13.3%	37	32.1%	7.8%	Megginson (1990)
Canada	1981-1992	98	10.4%	20	57.2%	11.7%	Smith and Amoako-Adu (1995)
Israel	1981	25	45.5%	0	N/A	0%	Levy (1982)
Sweden	1980-1990	65	15.2%	9	27%	3.7%	Bergström and Rydqvist (1992)
Germany	1988-1997	84	26.3%	0	N/A	0%	Hoffmann-Burchardi (1999)
Germany	1956-1998	101	17.2%	0	N/A	0%	Daske and Ehrhardt (2002)
Switzerland	1973-1983	45	22.4%	0	N/A	0%	Horner (1988)
Switzerland	1990-1991	29	18%	0	N/A	0%	Kunz and Angel (1996)
Italy	1987-1990	96	81.5%	0	N/A	0%	Zingales (1994)

Table 2:

Block purchase premium and relative price difference

This table displays values for the (daily) block purchase premium π from equation (1) depending on the probability α of a block purchase and the size of insider information $\overline{L}-\underline{L}$. The value of the firm is normalized to one: $(\overline{L}+\underline{L})/2\equiv 1$. The number of potentially informed traders, *N*, is 50, the voting share free float is 40%, and the block size, *b*, is 2%. The annual block purchase premium is equal to the daily premium multiplied by 250. The relative price difference is equal to the annual block purchase premium divided by the risk-free rate of 5.5%.

α	$\overline{L}-\underline{L}$	Block purchase premium		Relative price difference
		Daily	Annual	
1%	10%	0.0010%	0.248%	4.51%
2%	10%	0.0020%	0.492%	8.94%
3%	10%	0.0029%	0.732%	13.31%
1%	20%	0.0020%	0.496%	9.02%
2%	20%	0.0039%	0.984%	17.89%
3%	20%	0.0059%	1.464%	26.61%

Table 3:

Block trading activity in voting shares

This table displays the percentage of block trades in voting shares, PBV(*x*), for several values of *x* together with the p-value of the binomial test of "PBV(*x*)=50%". *x* denotes the relative size of the blocks considered. For example, PBV(0.05) is the proportion of the 5% largest block trades that occurred in voting shares. Panel A shows PBV(*x*) for the complete sample, Panel B for the subsample with those company-years in which the total euro trading volume was higher for non-voting shares than for voting shares, and Panel C for the complementary subsample.

	Panel A		Panel B		Panel C	
	All observations		More liquid non-voting shares		More liquid voting shares	
x	PBV(x)	p-value	PBV(x)	p-value	PBV(x)	p-value
0.010	58.90%	0.0000	45.32%	0.0004	73.36%	0.0000
0.025	58.40%	0.0000	43.54%	0.0000	74.30%	0.0000
0.050	57.32%	0.0000	41.93%	0.0000	73.72%	0.0000
0.100	56.80%	0.0000	40.31%	0.0000	74.32%	0.0000
0.150	56.29%	0.0000	39.89%	0.0000	73.72%	0.0000
0.250	55.47%	0.0000	39.69%	0.0000	72.22%	0.0000
0.500	54.02%	0.0000	41.45%	0.0000	67.36%	0.0000
0.750	51.30%	0.0000	44.58%	0.0000	58.44%	0.0000
1.000	50.00%	1.0000	50.00%	1.0000	50.00%	1.0000

Table 4:

Block trades and average market-adjusted returns

This table displays average market-adjusted returns from day –1 to day 1 of voting and non-voting shares for different subsamples. Block trades are defined as follows: For each security and each day, the average daily trade size is calculated as the ratio of the daily euro trading volume and the number of transactions. For each company-year, we pool these average daily trade sizes of voting and non-voting shares. Block trades are then defined as the 5% (respectively, 2.5%) largest average daily trade sizes in these combined samples. Buyer initiated block trades are defined as block trades on days with positive abnormal return. Seller initiated block trades are defined as block trades on days with negative abnormal return. Standard errors are given in parentheses.

Panel A: Block trades are defined as the 5% largest average daily trades

	All trading days	Buyer initiated block trades in		Seller initiated block trades in	
		Voting shares	Non-voting shares	Voting shares	Non-voting shares
Voting shares	0.0036%	2.4871%	1.5566%	-1.9177%	-1.0653%
	(0.0085%)	(0.0663%)	(0.0591%)	(0.0312%)	(0.0488%)
Non-voting shares	0.0182%	1.6296%	2.5375%	-1.0226%	-1.9243%
	(0.0080%)	(0.0811%)	(0.0538%)	(0.0440%)	(0.0367%)
Observations	162,375	5,027	3,808	4,622	3,346

Panel B: Block trades are defined as the 2.5% largest average daily trades

	All trading days	Buyer initiated block trades in		Seller initiated block trades in	
		Voting shares	Non-voting shares	Voting shares	Non-voting shares
Voting shares	0.0036%	2.5937%	1.5540%	-1.9093%	-1.0448%
	(0.0085%)	(0.1153%)	(0.0804%)	(0.0429%)	(0.0669%)
Non-voting shares	0.0182%	1.6909%	2.5254%	-1.0546%	-1.9210%
	(0.0080%)	(0.1388%)	(0.0741%)	(0.0627%)	(0.0519%)
Observations	162,375	2,637	1,907	2,417	1,715

Table 5:

Description of the variables used in the regression analysis

Acronym	Description	Mean	Median	Minimum	Maximum
VP	Voting Premium: $(P^{v} - P^{nv}) / P^{v}$	12.73%	12.09%	-40.43%	86.52%
PBV(0.05)	**P**ercentage of **B**lock trades in **V**oting shares, where block trades are defined as the 5% largest trades (in voting and non-voting shares) per company-year.	57.09%	57.14%	0%	100%
BSize	Percentage of voting shares held by the largest blockholder	51.42%	51.00%	0%	100%
LR	Liquidity Ratio: annual euro trading volume of voting shares divided by annual euro trading volume of non-voting shares	3.168	0.862	0.046	67.549
log_LR	natural logarithm of LR	0.0705	-0.1491	-3.077	4.213
MCap	Market Capitalization (in million euro)	1,569.04	283.08	3.40	61,318.20
log_MCap	natural logarithm of MCap	19.67	19.46	15.04	24.84

Table 6:

Determinants of the block trading activity in voting shares

This table displays the results of 10 ordinary least squares regressions in which the percentage of the 5% largest block trades in voting shares, PBV(0.05), is the dependent variable. The liquidity ratio LR is the annual euro trading volume in voting shares divided by the annual euro trading volume in non-voting shares. logLR is the log of LR. logMCap is the log of the market capitalization. BSize is the size of the largest block of voting shares. Models 1 to 5 include no fixed effects; models 6 to 10 include firm and year fixed effects. Heteroscedasticity consistent standard errors are given in parentheses.

Model	Intercept	LR	logLR	logMCap	BSize	fixed effects	R^2
1	0.5212 (0.0115)	0.0157 (0.0026)				no	0.1696
2	0.5616 (0.0077)		0.1320 (0.0054)			no	0.4466
3	0.6732 (0.0970)		0.1371 (0.0063)	-0.0058 (0.0049)		no	0.4581
4	0.6180 (0.0212)		0.1261 (0.0060)		-0.1145 (0.0377)	no	0.4610
5	0.7142 (0.0982)		0.1303 (0.0071)	-0.0048 (0.0050)	-0.1205 (0.0401)	no	0.4673
6	N/A	0.0092 (0.0021)				yes	0.6201
7	N/A		0.1701 (0.0109)			yes	0.7081
8	N/A		0.1763 (0.0112)	-0.0100 (0.0144)		yes	0.7158
9	N/A		0.1676 (0.0112)		-0.0805 (0.0551)	yes	0.7131
10	N/A		0.1754 (0.0112)	-0.0109 (0.0147)	-0.0778 (0.0545)	yes	0.7228

Table 7:

Determinants of the voting premium

This table displays the results of 8 ordinary least squares regressions in which the voting premium $VP = (P^v - P^{nv}) / P^v$ is the dependent variable. All independent variables have been lagged by one year. The liquidity ratio LR is the annual euro trading volume in voting shares divided by the annual euro trading volume in non-voting shares. logLR is the log of LR. logMCap is the log of the market capitalization. BSize is the size of the largest block of voting shares. PBV(0.05) is the percentage of the 5% largest average daily trades that occurred in voting shares. Models 1 to 4 include no fixed effects; models 5 to 8 include firm and year fixed effects. The p-values of the t-test for zero slope or intercept using heteroscedasticity consistent standard errors are given in parentheses.

Model	Intercept	LR	logLR	BSize	logMCap	PBV(0.05)	fixed effects	R^2
1	0.0360 (0.6969)	0.0028 (0.0029)		-0.0658 (0.0201)	0.0057 (0.2084)		no	0.0468
2	0.0222 (0.8235)		0.0115 (0.0674)	-0.0582 (0.0435)	0.0067 (0.1882)		no	0.0393
3	-0.0243 (0.7777)	0.0009 (0.3349)		-0.0094 (0.7571)	0.0034 (0.4322)	0.1487 (<0.0001)	no	0.1114
4	-0.1053 (0.2865)		-0.0151 (0.0728)	-0.0296 (0.3032)	0.0068 (0.1526)	0.1999 (<0.0001)	no	0.1200
5	N/A	-0.0020 (0.0468)		0.0538 (0.1951)	0.0053 (0.6221)		yes	0.6691
6	N/A		0.0027 (0.7087)	0.0618 (0.1624)	0.0067 (0.5320)		yes	0.6669
7	N/A	-0.0026 (0.0089)		0.0695 (0.1076)	0.0065 (0.5357)	0.0632 (0.0020)	yes	0.6747
8	N/A		-0.0099 (0.2438)	0.0669 (0.1315)	0.0068 (0.5233)	0.0069 (0.0036)	yes	0.6719

Table 8:

Instrumental variables regressions of the voting premium

This table displays the results of 8 instrumental variables regressions in which the voting premium $VP = (P^v - P^{nv}) / P^v$ is the dependent variable. The liquidity ratio LR is the annual euro trading volume in voting shares divided by the annual euro trading volume in non-voting shares. logLR is the log of LR. logMCap is the log of the market capitalization. BSize is the size of the largest block of voting shares. PBV(0.05) is the percentage of the 5% largest average daily trades that occurred in voting shares. Panel A and B display similar results for two different sets of instrumental variables. The p-values of the t-test for zero slope or intercept using heteroscedasticity consistent standard errors are given in parentheses.

Panel A: IV regressions with lagged LR, lagged BSize and lagged logMCap as instruments

Model	Intercept	lagged LR	lagged BSize	lagged logMCap	PBV(0.05)	R^2
1	0.0018 (0.9375)				0.2168 (<0.0001)	0.1103
2	0.0221 (0.4687)	0.0010 (0.3651)			0.1749 (0.0024)	0.1203
3	-0.0455 (0.4028)		0.0417 (0.3380)		0.2626 (0.0025)	0.0903
4	-0.0307 (0.6954)			0.0020 (0.6739)	0.2057 (0.0002)	0.1140

Panel B: IV regressions with lagged logLR, lagged BSize and lagged logMCap as instruments

Model	Intercept	lagged logLR	lagged BSize	lagged logMCap	PBV(0.05)	R^2
1	0.0431 (0.0349)				0.1433 (<0.0001)	0.1140
2	-0.0596 (0.4457)	-0.0251 (0.1948)			0.3282 (0.0193)	0.0840
3	0.0670 (0.0592)		-0.0274 (0.3884)		0.1259 (0.0022)	0.1102
4	-0.0482 (0.5533)			0.0051 (0.2920)	0.1267 (0.0025)	0.1125