The Market Value of the Vote: A Contingent Claims Approach*

Avner Kalay
University of Utah and Tel Aviv University
finak@business.utah.edu

Shagun Pant
Texas A&M University
spant@mays.tamu.edu

First version: January 2008
This version: September 2009

ABSTRACT

The paper presents a new methodology to estimate the market value of the right to vote that is embedded in common stocks. The difference in the price of the stock and the synthetic stock (constructed with options) quantifies the value of the right to vote during the expected life of the synthetic stock. Consistent with the theory we find that the value of the vote is an increasing function of the expected life of the synthetic stock. As expected the value of the vote increases around special meetings and around M&A events. The evidence presented has implications for the option pricing literature as well. We point out that early exercise of Call options can be optimal even in the absence of dividends on the underlying security.

*We thank Yakov Amihud, Shmuel Baruch, Hank Bessembinder, Michael Halling, Michael Lemmon, participants at the finance seminar series at Boston University, Rutgers University, Tel Aviv University, Texas A&M University, University of Alberta, University of Iowa, University of Utah, the 2008 FMA doctoral consortium, the 2009 NYU-Penn Law and Finance Conference, the 2009 Drexel Corporate Governance Conference, the 2009 Banff Frontiers in Finance Conference, and participants at the conference held in the honor of Haim Levy for helpful comments.

The right to vote on corporate matters plays a central role in corporate governance (see, for example, Manne (1965), and Easterbrook and Fischel (1983)). Hence, the estimation of the market value of the right to vote embedded in common stocks has been a topic of continual interest to financial economists. However, the separation of the market value of the right to vote from the ownership of the cash flows generated by the firm is not trivial. In this paper we propose, develop, and test a new methodology to measure the market value of the vote. We quantify the value of the vote as the difference in the price of the stock and the price of the synthetic stock that is constructed using options.

Evidence on the market value of the vote thus far has been focused on two methods of estimation. The first method computes the market value of the right to vote by observing the difference between the prices of multiple classes of stocks having identical cash flow rights and differential voting rights.[1] Studies that employ this method, find that the shares with superior voting rights trade at a premium implying a positive market value to the right to vote. Although, as Table I reveals, there is considerable variation across countries and time periods in the documented value of the vote. It varies from a low of 2% of the value of the share for 39 firms listed for trade in the US to a high of 81.5% of the value of the share for 96 firms traded in Italy. By construction, however, application of this method of estimation is restricted to firms listed on exchanges as having dual class of shares. As a result, the samples studied are very small (typically less than 100). More importantly, these samples are potentially subject to selection biases – firms issuing dual classes of shares are likely to have their reasons to do so, and stockholders buying the shares with the inferior voting rights are likely to value the right to vote the least.

The second method focuses on privately negotiated block sales and measures the value of control as the difference between the price per share at which a block trades and the

[1] See, for example, Levy (1982), Lease, McConnell, and Mikkelson (1983), Rydqvist (1996), Zingales (1994), Zingales (1995) and Nenova (2003). Hauser and Lauterbach (2004) examine compensation paid to owners of superior voting rights during a process of unifications of dual classes of shares and find a positive value to the vote. Table I provides a quick summary of these studies.

price per share prevailing in the market right after the block sale.[2] The price paid for the controlling block consists of the ownership of the future cash flows that the block generates and the value of the private benefits of control. The difference between the price per share paid by the controlling blockholder and the market price per share right after the block trade can be used as a measure of the value of control. Dyck and Zingales (2004) find an average control value of 14% with estimates ranging from -4% in Japan to 65% in Brazil.[3]

Our technique of estimating the market value of the vote uses the existence of derivative markets. The derivative market enables the construction of synthetic stocks. An investor that buys a call option, sells a put option with the same strike price and time to expiration, and, invests in a risk free asset an amount equal to the present value of the strike price, creates a synthetic stock. These synthetic stocks replicate the cash flows that the stockholder is entitled to, but, do not give the holder the right to vote.[4] The existence of synthetic stocks provides a new way to disentangle the cash flow component from the vote component embedded in a common stock. More precisely, we quantify the value of the vote as the difference in the price of the stock and the price of the synthetic stock. The advantages of our technique are two fold. First, it enables the estimation of the market value of the vote for all stocks that have options traded on them. Thus it allows for the quantification of the market value of the vote for a large number of stocks. Second, the trading of options on the stock of a firm is primarily an exogenous event that is not under the control of the shareholders of the firm. Hence, the sample of stocks used does not suffer from selection bias issues.

[2]See, for example, Barclay and Holderness (1989) and Dyck and Zingales (2004). Table I provides a quick summary of these studies.

[3]An exception to the above mentioned methods is a recent study by Christoffersen, Geczy, Musto, and Reed (2006) that uses a proprietary database from a custodian bank and quantifies the market value of the vote as the incremental cost of borrowing stock around the record date. They conclude that the vote sells for zero.

[4]An adjustment needs to be made for the payments of cash dividends during the life of the options.

To begin with, let us consider European style options. At option expiration, the price of the synthetic stock and the stock converges. An investor that holds a synthetic stock forgoes the voting right only during the life of the synthetic stock. This means that the difference in the price of the stock and the synthetic stock gives a measure of the right to vote during the life of the synthetic stock. As a result, our measure gives us the value of the right to vote during the next T days, where T is the time to maturity of the options used to construct the synthetic stock. In order to get the entire value of the vote component embedded in the stock we would need infinitely lived options. If the right to vote has positive value, we expect our estimate of the market value of the right to vote during the life of the synthetic stock to be an increasing function of the time to maturity of the options used to construct the synthetic stock.

Our experiment compares prices of synthetic stocks and stocks of US equities. As is well known, the options on equities in the US are American style - i.e., the option holder has the right to exercise her option prior to the official expiration date. The possibility of early exercise has important implications on the estimation of the market value of the vote. First, one has to compute the early exercise premium embedded in the prices of American style calls and puts to compute the price of the synthetic stock. Second, the expected life of a synthetic stock constructed with American style options is almost always less than the official time to expiration, T. The owner of the synthetic stock owns a call option and writes a put option on the underlying stock. She can buy the stock by voluntarily early exercising her call option, or by being forced to buy the stock from the holder of the put option she sold. From that point on she owns a stock with the associated voting right. Hence, the difference in the price of the stock and the synthetic stock quantifies the value of the right to vote *during the expected life* of the synthetic stock.

Furthermore, recall that the synthetic stock is constructed by buying a call, selling a put, and investing in a risk free bond. When the call option used to construct the synthetic stock is very deep in the money and close to expiration the value lost by its early exercise is small. Thus, prior to an important voting event or the completion of an M&A activity, the holders of a deep in the money call option will exercise. For these option holders the loss due to forgone time value is minimal. In general, the lower the time value of the option, the more likely are the option holders to exercise in an attempt to capture the value of the vote. The relative ease with which holders of synthetic stocks can capture the value of the vote around important events should be priced. In other words the price of a synthetic stock constructed with deep in the money calls should contain a significant fraction of the value of the vote, resulting in a narrowing of the gap between the price of the stock and the price of the synthetic stock. Consequently, the estimate of the value of the vote is biased downwards unless the probability of early exercise is zero. We expect our measure to be a decreasing function of the moneyness of the call option used to construct the synthetic stock.[5]

We test these hypotheses using the IvyDB OptionMetrics database. Synthetic stocks are constructed from pairs of call and put options on the same underlying stock with 90 days or less to expiration during the period 1996 through 2005. The sample size employed is a set of $12,623,000$ synthetic stocks and covers 5019 stocks. Consistent with the theory we find that our measure (the difference between the price of the stock and the synthetic stock) is an increasing function of the official time to expiration of the options used to construct it. When options with no more than 10 days to expiration are used to construct the synthetic stock ($851,000$ observations), we find the value of the vote to be 0.06% of the price of the stock. Constructing synthetic stocks with options having between 81 to 90 days to expiration ($829,000$ observations), we find a significantly larger value of the right to vote at 0.26% of the price of the stock. As expected, the value of the right to vote for the next 81 to 90 days is dramatically larger than the value of the right to vote for less than 10 days.

We also find empirical evidence consistent with our hypothesis that the price of synthetic stocks constructed with deep in the money calls contains a significant fraction of the value of the vote. The estimated average value of the vote using call options that are far out of the

[5]We present these concepts more formally in Section I.

money is 1.36% of the stock price. Note that these options are all with time to maturity less than 90 days. Hence, we are estimating 1.36% of the value of the stock price as the right to vote up to the next 90 days. The estimate decreases monotonically as the call options used to construct the synthetic stock are more in the money.

The value of the right to vote is expected to display time series variation. In particular, during voting events that can significantly alter the cash flows of the firm, it is reasonable to expect an increase in the market value of the vote. If we are indeed measuring the market value of the vote, then our measure should display time series variation around events where the market value of the vote is expected to be high. We test this hypothesis by examining the time series variation of the average value of the right to vote around annual and special meetings. Data on record dates and meeting dates for the S&P 1500 firms from 1998 to 2002 is obtained from ISS. We find that for Annual meetings there is very little variation in the value of the vote. However, there is a substantial increase in the value of the vote around special meetings. The value of the vote starts to increase around 40 days prior to the record date, and remains high up to the meeting date.

A significant fraction of the special meetings are centered on M&A activity. To investigate the time series behavior of the value of the vote around M&A events we obtain data from SDC Platinum. Our data consists of M&A activity from 1996 to 2005. We keep only those deals for which the target has options traded and where a successful deal would have resulted in the acquirer owning at least a 50% stake in the target. The resulting sample consists of 1525 M&A events. We estimate the price of the synthetic stock on the target for every day starting from 200 days before the announcement to up to 200 days after the completion of the deal. The completion date is either the date the deal is effective or it is the date the deal is withdrawn. We find a significant jump in the value of the vote on the announcement date of the M&A activity. While the average value of the vote during days -20 to -1 is slightly negative, it jumps to 0.22% during days 0 to 19. We observe a significant drop in the value of the vote right after the merger completion date. The time series variation documented using both special meetings and M&A activity lend further support to our proposed measure of the market value of the vote.

The documented drop in the market value of the vote at the completion (or withdrawal) of the M&A deal, indicates that it can be optimal to exercise deep in the money call options prior to the official expiration, even if the underlying stock pays no dividends. Holders of deep in the money call options can capture the value of the vote by exercising their American style options prior to the drop in the value of the vote. In this case early exercise of call options can be optimal even in the absence of dividends. Thus, one cannot extend the Black and Scholes (1973) option pricing formula to the case of American style call options written on such stocks.[6]

Our measure of the market value of the vote seems to be a good estimate of the private benefits of control. In a related paper, Kalay and Pant (2008) model shareholders' choice of voting/cash flows mix in the presence of derivative market around control contests. In their model, where shareholders are risk neutral and markets are frictionless, the optimal use of synthetic stocks enables extraction of the entire private benefits of control from the winning team. In such a case, at the time of the control contest, the difference between the prices of the stock and the synthetic stock quantifies precisely the per share private benefits of control.

The actual estimate of the market value of the vote is unlikely to capture the entire private benefits of control. The idealized conditions for the extraction of the entire private

[6] Our theory also helps to explain the asymmetric violation of the put call parity documented in the literature. Klemkosky and Resnick (1979) document violations in the put call parity relationship for a sample of fifteen stocks during the first year of put trading on the CBOE. Fifty eight percent of the violations occur because the price of the stock was higher than the price of the synthetic stock. Ofek and Whitelaw (2004) find that 65% of put call parity violations are such that the price of the stock is higher than the synthetic stock. Both of these findings can be explained by a positive value of the right to vote. Interestingly, Battalio and Schultz (2006) use intraday option data where the option's maturity varies from 10 to 40 days and their exercise price is within 5% of the stock price to construct synthetic stocks and find symmetric violations. The synthetic stocks that they consider have relatively short expected lives (the official time to expiration is short and the options are very close to the money). As our theory demonstrates, the market value of the right to vote in their sample is expected to be very small.

benefits of control are unrealistic and as noted above the estimate of the market value of the vote is downward bias. Yet, Ehling, Kalay, and Pant (2009) present evidence indicating that firms with a larger percentage gap between the prices of their stock and their synthetic stocks exhibit a higher propensity to buy insurance. This is consistent with the agency rational for corporate purchase of insurance - managers are buying insurance to protect their rents. More importantly, the evidence indicates that our measure of the private benefits of control, while partial, works fairly well in the cross section.

The rest of the paper is organized as follows. In Section I we present the revised put call parity relations taking into account the value of the vote and the incentives for early exercise. We present the estimate of the value of the vote and the testable hypotheses. Section II describes the data. The results are presented in Section III. Conclusions and summary are contained in Section IV.

I. Market Value of the Vote: Put-Call parity revisited

The Put-Call parity relationship (see Stoll (1969)) for European style options on non-dividend paying stocks is stated as

$$S + P = C + PV(X), \tag{1}$$

where C is the price of the call option with strike X and time to expiration T, P is the price of the put option with strike X and time to expiration T, and, $PV(X)$ is the present value of investing in a bond with face value X that matures at time T. Investors can design a synthetic long position in the stock by buying a call option with strike X and time to maturity T, writing a put option with strike X and time to maturity T, and, investing in a bond with face value X for time T. Similarly, investors can design a synthetic short position in the underlying stock.

$$\hat{S}(T) = C - P + PV(X), \tag{2}$$

where $\hat{S}(T)$ represents a position in the synthetic stock. These synthetic stocks replicate the cash flows of the underlying stock, but, do not give the investors voting rights, i.e., the owner of the synthetic stock is not entitled to vote. Hence an adjustment to the Put-Call parity must be made that reflects the right to vote which is enjoyed only by the owner of the stock. The modified Put-Call parity relationship is now stated as:

$$S + P = C + PV(X) + PV(Vote^T), \tag{3}$$

where $PV(Vote^T)$ reflects the market value of the right to vote prior to option expiration. In other words, the synthetic stock is a function of T, or the time to expiration of the options that are used to construct it.[7] At option expiration the price of the synthetic stock and stock converge. Hence, the difference in the price of the stock and the synthetic stock gives the value of the right to vote in ***the next T days***.

$$PV(Vote^T) = S - \hat{S}(T) \tag{4}$$

A. American Style Options

When the options are American style, the option holder has the right to exercise the options prior to maturity. The Put-Call parity adjusted for the early exercise premium and for dividends is stated as:

$$S = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div) + PV(Vote^T). \tag{5}$$

The EEP_{call} in the above equations quantifies the value of the right to exercise the option anytime prior to option expiration. It is well known that American Call options might be

[7] We will show later that for American style options the synthetic stock is a function of both time to maturity and the strike price of the options.

exercised early if there is a large enough dividend prior to the expiration of the option. Since historical dividend information is readily available it is easy to calculate the part of the EEP_{call} due to dividends. However, if the vote component of the underlying stock is expected to decrease prior to option expiration (this could be the case if for instance there is an important voting event that takes place prior to option expiration after which the vote component of the stock is expected to decline) then it could be the case that early exercise of Call options is optimal even if the underlying stock pays no dividends. In this case, the only way an option holder can realize the value of the vote is by exercising the Call option on or before the last cum-vote day. The option holder will exercise only if the expected drop in the value of the vote is large enough relative to the time value of the option on the ex-vote day. The EEP_{call} of a Call option can then be decomposed as:

$$EEP_{call} = EEP_{call}^{div} + EEP_{call}^{vote}, \tag{6}$$

where EEP_{call}^{div} is the well known early exercise premium due to expected dividends prior to option expiration and EEP_{call}^{vote} is the component of the early exercise premium due to the expected drop in the vote component of the stock prior to option expiration. In order to calculate the value of the vote in the next T days, we need to construct the synthetic stock which requires an accurate quantification of the EEP_{call}. However, to calculate the EEP_{call} accurately we need to know the expected drop (if any) in the value of the vote. If the component of the EEP_{call} which is attributed to the drop in the value of the vote is ignored, we will overestimate the value of the synthetic stock and hence underestimate the value of the vote. The downward bias in the measurement of the value of the vote (due to the inability to measure the component of the EEP_{call} attributed to the drop in the value of the vote) will be a function of the moneyness of the Call option used to construct the synthetic stock. Call options that are out of the money will have a lower probability of early exercise than options that are at the money or in the money. As options get more in the money the value of the EEP_{call} due to the vote will be higher. Hence, the difference in the price of the stock and the synthetic stock will be a function of the moneyness of the options used to construct the synthetic stock. More formally, let v be the expected drop in the value of the vote. Consider two Call options with strike prices X_1 and X_2 where $X_1 < X_2$. The early exercise premium of these options is a function of (a) the probability that this option will be in the money on the last cum day and (b) the probability that it will be optimal to exercise early, given that the option is in the money on the last cum day . The probability of a call option being in the money on the last cum day decreases with increasing strike price, i.e., options with lower strike prices have a higher probability of being in the money on the last cum day. This implies that there is a strictly higher probability that the option with strike X_1 will be in the money on the last cum day. Additionally, we know that the time value of in the money call options is an increasing function of the strike price, i.e., conditional on two options being in the money the option with a lower strike price will have a lower time value. This is equivalent to $TV(X_1) < TV(X_2)$, where $TV(X)$ is the time value of a Call option with strike X. Shareholders will exercise the Call option early on a stock paying no dividends if $S - X > S - v - X + TV(X)$. This is equivalent to $v > TV(X)$. Since $TV(X_1) < TV(X_2)$, this implies that if both the options are in the money on the last cum day there is a strictly higher probability that the option with the lower strike X_1 will be exercised early. The preceding analysis implies that options with a lower strike price have a higher probability of being exercised early. Thus the EEP_{call}^{vote} will be higher for the option with a lower strike price, i.e., the EEP_{call}^{vote} is a decreasing function of the strike price. Since we are unable to measure the EEP_{call}^{vote} the synthetic stock is now constructed as:

$$\hat{S}(T) = C - EEP_{call}^{div} - P + EEP_{put} + PV(X) + PV(div). \tag{7}$$

For American options the difference between the price of the stock and the price of the synthetic stock then is the value of the right to vote ***less*** the early exercise premium due to the expected drop (if any) in the vote component of the underlying stock.

$$S - \hat{S}(T) = PV(Vote^T) - EEP_{call}^{vote} \tag{8}$$

Since EEP_{call}^{vote} is a function of the moneyness of the option, we note that the synthetic stock is also a function of the moneyness of the options used to construct it. For ease of notation we refer to the difference between the price of the stock and the price of the synthetic stock as the estimate of the present value of the right to vote in the next T days and note that this is a function of the strike price.

$$PV(Vote^T)(M) = PV(Vote^T) - EEP_{call}^{vote} = S - \hat{S}(T), \tag{9}$$

where M is the moneyness of the option and is measured as $ln(S/X)$. Since EEP_{call}^{vote} is an increasing function of the moneyness of the Call option, if the value of the vote is positive, then the difference between the price of the stock and the price of the synthetic stock will be a decreasing function of the moneyness of the options used to construct the synthetic stock.

B. Testable Hypotheses

The difference between the price of the stock and the price of the synthetic stock (constructed as illustrated above) provides a measure (possibly downward biased) of the value to vote in the next T days. This leads to the following testable empirical implications.

1. If control rights have value then the difference in the price of the stock and the synthetic stock should be non-negative.
2. If control rights have value then the difference in the price of the stock and the synthetic stock should be a non decreasing function of the time to maturity.
3. If control rights have value then the difference in the price of the stock and the synthetic stock should be a non decreasing function of the strike price.
4. If control rights have value then the difference in the price of the stock and the synthetic stock should increase when the expected value of the right to vote is important. The

right to vote for example is presumably important during special meetings of a firm or during important events like control contests.[8]

II. Data

We combine data from several sources. To construct synthetic stocks we use data on options from the IvyDB OptionMetrics database. This gives us end of day data on options. OptionMetrics gives us Bid and Ask quotes, option volume and open interest for Calls and Puts traded on the stocks. We have data for options with 90 days or less to expiration on stocks from 1996 through 2005. We form option pairs that are used to construct the synthetic stock. An option pair consists of a Call option on the underlying stock matched with a Put option with the same strike price X and time to maturity T. We discard option pairs where the quotes for either the Call or the Put option are locked or crossed. We keep only those option pairs for which the volume for the Call is greater than 0 and the implied volatility (calculated using the Binomial option pricing model) for the Call and Put is defined. Next, we match the data with CRSP to get information on distributions and the corresponding ex-dates. Since the options are all American style we compute the Early Exercise Premium for the Put and the Call using the Binomial option pricing model.[9] This information enables us to construct the synthetic stock using the following equation:

$$\hat{S}(T) = C - EEP_{call}^{div} - P + EEP_{put} + PV(X) + PV(div), \tag{10}$$

[8]In an independent undergraduate honors thesis, recently brought to our attention, Dixit (2003) uses synthetic stocks to value voting rights for the HP-Compaq merger and finds a voting premium of 0.4%. However, while constructing synthetic stocks the early exercise premium is ignored. The author fails to correct for the biases induced by using in the money calls while constructing the synthetic stock. Finally, the effect of the time to maturity of the options used to construct the synthetic stock on the value of the right to vote is not recognized.

[9]See Appendix for details.

where C and P are the mid-points of the closing bid and ask quotes for the call and put options respectively. Finally, the difference between the closing price of the stock and the synthetic stock normalized by the price of the stock is calculated as the normalized value of the right to vote in the next T days, $Vote^T_{norm}$.

$$Vote^T_{norm} = (S - \hat{S}(T))/S \tag{11}$$

We refer to this data set as the option universe. The option universe is used to test the variation of $Vote^T_{norm}$ with both time to maturity T and M.

Next, we select a subset of the option universe for which we have data on meeting record dates. Data on record dates and meeting dates is obtained from ISS. From ISS we have data on meetings for the S&P 1500 stocks from 1998 through 2002. The meetings are classified as either Annual or Special meetings. A large number of the meetings are Annual. Out of the 6074 meetings, 5451 are Annual and 623 are Special. Panel A of Table V describes the meeting data. We subset the option universe data set with the ISS data and get option pairs for 160 days (80 before the cum date and 80 after the cum date) surrounding each record date. Panel B of Table V describes the characteristics of the underlying stocks. For each of the days in the event window (80 days before the cum date and 80 days after the cum date) we select a unique option pair to characterize the time series variation in the value of the vote. The option that has the highest volume is selected. If there is more than one option with the highest volume then the one with the smallest moneyness is selected. Lastly, if we still do not have a unique option then we choose the one with the least time to maturity. Panel C of Table V illustrates the descriptive statistics for all the option pairs during the event window and also for the option pairs that we select. The option pairs that we select are close to the money and have on average around 35 days to maturity. Our selection criteria result in option pairs that are most liquid and hence suffer the least from stale quotes, and, also enable us to test the time series variation in the value of the vote while controlling for both T and M.

In order to test the time series variation in the value of the vote around merger and acquisition events, we subset the option universe data a second time using M&A data from SDC Platinum. From SDC we have data on M&A activity from 1996 through 2005. We keep only those deals for which the target has options traded and where a successful deal would have resulted in the acquirer owning at least a 50% stake in the target. This results in 1525 events. We subset the option universe data set and get option pairs on the targets starting 200 trading days before the announcement date and ending 200 trading days after the completion date of the deal. The completion date is either the date that the deal is effective or it is the date the deal is withdrawn. For each of the days in the event window (200 days before the announcement date until 200 days after the completion date) we select a unique option pair to characterize the time series variation in the value of the vote. The option that has the highest volume is selected. If there is more than one option with the highest volume then the one with the smallest moneyness is selected. Lastly, if we still do not have a unique option then we choose the one with the least time to maturity. The option pairs that we select are close to the money and have on average around 35 days to maturity. Our selection criteria result in option pairs that are most liquid and hence suffer the least from stale quotes, and also enable us to test the time series variation in the value of the vote while controlling for both T and M.

III. Results

A. Value of the Vote in the next T days

The owner of the synthetic stock is entitled to all the cash flows that would accrue to the owner of the stock but does not have the right to vote. At first glance it seems natural to conclude that the difference in the price of the stock and the price of the synthetic stock should provide a measure of the market value of the right to vote that is embedded in the stock. However, the synthetic stock is a function of T, or the time to maturity of the options that are used to construct the synthetic stock. At option expiration (or exercise) the price of the synthetic stock and stock converge. Hence, the difference in the price of the stock and the synthetic stock gives the value of the right to vote during the expected life of the synthetic stock. A natural experiment is then to construct synthetic stocks with varying T and characterize the market value of the right to vote as a function of T. We would expect to see a non-decreasing relation between $S - \hat{S}(T)$ and T.

In order to test this hypothesis, we first sort the synthetic stocks into three bins of 0 to 30 days to maturity, 31 to 60 days to maturity, and, 61 to 90 days to maturity. We find support for our hypothesis. The average market value of the right to vote is 0.09% for the 0 to 30 days bin, 0.14% for the 31 to 60 days bin, and, 0.22% for the 61 to 90 days bin. Panel A and Panel B of Table II show the relationship between the value of the vote and T for 30 day bins and 10 day bins respectively. We also look at the variation of the value of the vote with T at daily intervals. The results are in Figure 1. The figure plots the average normalized value of the vote for synthetic stocks with 2 days, 3 days,....., and, 89 days to maturity. It also plots the standard errors around the average. We find that the general trend in the data supports our hypothesis that the normalized difference between the stock and the synthetic stock measures the value of the right to vote in the next T days. The average value of the vote for options with 2 days to maturity is 0.04% and for options with 89 days to maturity is 0.28%.

As explained in Section 2, since we are unable to calculate the component of the early exercise premium of the call that is attributed to the expected drop (if any) in the vote component of the underlying stock, i.e. EEP_{call}^{vote}, if the value of the vote is positive, then the normalized difference between the stock and the synthetic stock is a function of the moneyness of the options. Moneyness is defined as $ln(S/X)$. Since EEP_{call}^{vote} is an increasing function of the moneyness, the difference between the price of the stock and the price of the synthetic stock is expected to be a decreasing function of the moneyness (M) of the options used to construct the synthetic stock. To test this hypothesis we first divide the synthetic stocks into 12 groups based on M. $M = 1$ has options with moneyness $M <= -1$, $M = 2$ corresponds to $-1 < M <= -0.8$,..., $M = 11$ corresponds to $0.8 < M <= 1$, and $M = 12$ corresponds to $1 < M$. Table III reports the average value of the vote for these 12 groups. The value of the vote for the lowest moneyness is 1.36% and for the one with the highest moneyness is -0.06%. Clearly, the data lends support to our hypothesis. As moneyness increases, the normalized difference between the stock and the synthetic stock decreases. Synthetic stocks that have call options that are very deep in the money, have a very high probability of early exercise. These options have a high likelihood of early exercise in an attempt to capture the drop in the value of the vote. As a result, the expected life of these options is small. Hence, the value of the vote inferred from these options is downward biased. Next, we also divide the synthetic stocks into 42 groups based on M. The results are plotted in Figure 2. We find that as moneyness increases the estimated value of the vote decreases.

As expected, we find that our measure of the value of the vote increases with increasing T and decreases with increasing moneyness. This is evidence in support of our technique to measure the market value of the vote. We further test the relation of the value of the vote with both T and M. Figure 3 describes the variation in the normalized difference between the stock and the synthetic stock as a function of both T and M. To plot this surface we divide the synthetic stocks into 8 groups based on T and then 42 groups based on M for a total of $8 * 42 = 336$ groups. $T = 1$ has options with time to maturity $2 <= T <= 12$, $T = 2$ corresponds to $13 <= T <= 23$,..., and $T = 8$ corresponds to $79 <= T <= 89$. Similarly, $M = 1$ has options with moneyness $M <= -1$, $M = 2$ corresponds to $-1 < M <= -0.95$,..., $M = 41$ corresponds to $0.95 < M <= 1$, and $M = 42$ corresponds to $1 < M$. In each of these 336 groups we use the average value of $Vote^T_{norm}$ to plot the surface. We observe that as we move to groups with longer time to maturity (groups with higher values of T) and lower moneyness (groups with lower values of M) $Vote^T_{norm}$ increases. Similar results are also shown in Table IV. For the group with $M <= -1$ and $60 < T <= 90$ average $Vote^T_{norm}$ is 1.56% and for the group with $1 < M$ and $0 < T <= 30$ average $Vote^T_{norm}$ is -0.13%.

The evidence so far establishes that the estimated value of the vote is a function of the expected life of the synthetic stock. We find that the estimated value of the vote increases as the time to expiration of the options increases, and the estimated value of the vote increases when the call options are far out of the money. In order to measure relatively unbiased estimates of the value of the vote, we need to use synthetic stocks where the expected life of the options is very close to the official time to expiration. This is the case for synthetic stocks that are constructed with far out of the money call options. For these synthetic stocks the probability of early exercise of the call options is very low, resulting in an expected life that is close to the official life of the option.

B. Value of the Vote around Voting Events

The value of the right to vote can be expected to display time series variation. In particular, when the probability of a voting event is high and the voting event is expected to significantly affect future cash flows the value of the vote component embedded in the stock should be more pronounced. We test this hypothesis by looking at the time series variation in the average value of the vote around Annual and Special meetings. For each of the days in the event window (80 days before the cum date and 80 days after the cum date) we select a unique option pair to characterize the time series variation in the value of the vote. The option that has the highest volume, smallest moneyness, and the least time to maturity is selected. Selecting options in this manner ensures that our results do not suffer from stale prices and also enables us to study the time series variation in $Vote_{norm}^{T}$ while controlling for both T and M. This is essential since we have documented above that $Vote_{norm}^{T}$ varies with both T and M. The average time to expiration of the options selected is 35 days and the average moneyness is 0.07 (see Panel C, Table V). However, it should be noted that by selecting the option pair with small expected life the value of the vote we document is downward biased (almost equally) during the period studied. Hence, this experiment is useful in documenting relative magnitudes (as opposed to absolute values) of the value of the vote around the voting events.

Table VI characterizes the time series variation in the average value of the vote. We find that for Annual meetings there is very little variation in the value of the vote. However, Special meetings exhibit an increase in the value of the vote around the voting event. There is a slight increase in the value of the vote approximately 40 days prior to the record date (Table VI, Panel A). The value of the vote remains high beyond the record date before finally settling back to the original level somewhere between 60 to 80 days after the record date. In order to get a better feel for the dynamics, we align our days relative to the meeting date. Table VI, Panel B shows that the value of the vote remains high up to the meeting date and then falls back to the original level somewhere between 20 to 40 days after the meeting date. Figure 4 tracks the weekly time series variation of the vote around Special and Annual meetings.

C. The gap between the prices of the stock and the synthetic stock is not bounded by exogenous transaction costs.

What if the difference between the price of the stock and the synthetic stock is wide - can arbitrageurs profit from this? Can they put an upper bound on the possible difference? The answer is No. If the synthetic stock is significantly lower than the stock, arbitrage activity to profit from the gap requires a short position in the stock and long in the synthetic stock. But around special voting events, shareholders will require substantial compensation for lending their stocks. Thus, the importance of the vote determines the effective transaction costs of the put-call parity arbitrage.

To test this proposition, we sort the synthetic stocks into 5 groups based on the trading volume of the underlying stocks. The time series of these 5 groups is plotted for both Annual meetings and Special meetings in Figure 5. If arbitrageurs are bounded by exogenous transaction costs the group of the most highly liquid stocks should exhibit the least variation in vote value around the voting events. It is evident that in general there is no relationship between liquidity and $Vote^T_{norm}$. Our evidence indicates that the value of the vote determines the effective transaction costs to arbitrage the put-call relationship. In addition, our theory and evidence help explain the asymmetric deviations from put-call parity relations estimated in past studies. Klemkosky and Resnick (1979) document violations in the put call parity relationship for a sample of fifteen stocks during the first year of put trading on the CBOE. Fifty eight percent of the violations occur because the price of the stock was higher than the price of the synthetic stock. Ofek and Whitelaw (2004) find that 65% of put call parity violations are such that the price of the stock is higher than the synthetic stock. Both of these findings can be explained by a positive value of the right to vote. Interestingly, Battalio and Schultz (2006) use intraday option data where the option's maturity varies from 10 to 40 days and their exercise price is within 5% of the stock price to construct synthetic stocks and find symmetric violations. The synthetic stocks that they consider have relatively short expected lives (the official time to expiration is short and the options are very close to the money). As our theory demonstrates, the market value of the right to vote in their sample is expected to be very small.

D. Value of the Vote around Merger and Acquisition Events

Control contests are arguably the most important events in the life cycle of a firm. The value of the voting right component embedded in the common stock must exhibit large increases during merger and acquisition events. To test this hypothesis we observe the time series of $Vote^T_{norm}$ for targets around the announcement dates and completion dates of M&A events.

Our sample consists of M&A deals where if successful, the acquirer would own at least a 50% stake in the target firm. For each of the days in the event window (200 days before the announcement date and 200 days after the completion date) we select a unique option pair to characterize the time series variation in the value of the vote. The option that has the highest volume, smallest moneyness, and the least time to maturity is selected. Selecting options in this manner ensures that our results do not suffer from stale prices and also lets us study the time series variation in $Vote^{T}_{norm}$ while controlling for both T and M. This is essential since we have documented above that $Vote^{T}_{norm}$ varies with both T and M. Here it should be mentioned that by selecting the option pair with the smallest moneyness the value of the vote we document is downward biased (almost equally) during the period studied.

The value of the vote exhibits a significant and large jump on the announcement date (Figure 6). The value continues to remain high after the announcement date. Table VII Panel A and Panel B describe the time series of $Vote^{T}_{norm}$ around announcement and completion dates respectively. We note that as we move further away from the announcement date the value of $Vote^{T}_{norm}$ continues to increase. The sample consists of deals that have still not been completed on a particular day, i.e. as we move further away from the announcement date the sample consists of deals that took longer to complete. The value of $Vote^{T}_{norm}$ remains high prior to the completion date and drops around the completion date. The drop however is not as large as the increase around the announcement date. The completion date consists of both the deal effective date and the deal withdrawn date. For deals where a merger was involved and was effective the firm would cease to exist after the effective date. Hence the sample of synthetic stocks after the completion date consists of deals that were either withdrawn or that were effective but did not consist of a 100% acquisition (we include all deals where at least 50% of the target firm is sought) of the target firm. The value of the $Vote^{T}_{norm}$ does not return to pre-deal levels after the completion date since a lot of the deals that are withdrawn usually have another bidder involved.

Figure 8 plots the Call and Put option open interest and volume around the deal announcement date. All the four measures exhibit an increase in values around the announcement date. As documented above, the value of the vote also increases around the deal announcement date. This is interesting since this further assures us that the difference between the stock and the synthetic stock is not a manifestation of reduced liquidity. In addition, this also lends support to the vote trading hypothesis (Kalay and Pant (2008)).

IV. Conclusions

This paper employs a new approach to estimate the market value of the right to vote embedded in the stock price. The difference between the prices of the stock and the synthetic stock quantifies the market value of the right to vote during the expected life of the synthetic stock. Holders of synthetic stocks with more time to expiration forgo the right to vote in longer periods. Consistent with the theory we document a positive market value of the vote that increases with the expected life of the synthetic stock. Call options that are deeper in the money have lower time value hence are more likely to be exercised early. Thus synthetic stocks constructed with deep in the money call options, other things equal, have a shorter expected life. Consistent with our theory, the value of the vote estimated decreases monotonically with moneyness. As expected, we find time series variation in the value of the right to vote (holding M and T fairly constant). It increases around special meetings and M&A events.

We document a significant drop in the value of the right to vote following the completion of M&A events. The expected drop in the value of the vote acts as a dividend creating incentives for holders of call options to exercise early even when the underlying stock pays no dividends. This study is the first to point out this incentive. The Black Scholes valuation formula cannot be extended to the case of American style call options. In this paper we modify the put-call parity of American style options incorporating this incentive. The modification of the put-call parity helps explain the asymmetric deviations from the traditional put-call relationship documented in past studies.

The difference between the prices of the stock and the synthetic stock is not bounded by exogenous transaction costs. If the synthetic stock is significantly lower than the stock, arbitrage activity to profit from the gap requires a short position in the stock and a long position in the synthetic stock. But, around special voting events stockholders will require substantial compensation for lending their stocks. Thus, the value of the vote determines the effective transaction costs of the put-call parity arbitrage. Consistent with this proposition we find no relationship between our estimate of the market value of the vote and liquidity around special meetings.

Our measure can also be used as a proxy for the private benefits of control of a firm. Kalay and Pant (2008) show that at the time of a control contest, shareholders optimally deviate from one share-one vote using derivative markets to extract the entire private benefits of control from the winning team. In their model, where shareholders are risk neutral and the markets are frictionless, the difference between the price of the stock and the synthetic stock quantifies the private benefits of control under the winning team. Since several stocks now have options traded on them, our methodology provides opportunities for incorporating a measure of private benefits of control in experiments that study agency issues.

Appendix

A. Early exercise premium

The early exercise premium for put options and call options with dividends is calculated using the Binomial option pricing model. We use the Cox, Ross, and Rubinstein (1979) method to generate the lattice. This implies that the up and down factors for the lattice are generated using the following equations:

$$u = e^{\sigma\sqrt{\Delta t}} \tag{12}$$

$$d = e^{-\sigma\sqrt{\Delta t}} \tag{13}$$

The inputs to the algorithm are the volatility, time to expiration, strike price, price of the underlying stock, risk free rate, array of dividends and ex-dates if applicable. We get the implied volatility, time to expiration, strike price and price of the underlying from the OptionMetrics database. OptionMetrics also provides risk free rate data for certain maturities. We interpolate the risk free rate data to get the risk free rate for the exact maturity of the option being considered. Data on dividends and ex-dates is obtained from CRSP.

We calculate the early exercise premium for the put options and the call options using 1000 steps. Over the course of each step the security price is assumed to move either "up" or "down". The size of this move is a function of the up and down factors that are in turn determined by the implied volatility and the size of the step. In order to determine the early exercise premium we start at the current security price S_0 and build a "tree" of all the possible security prices at the end of each sub-period, under the assumption that the security price can move only either up or down. Next, the option is priced at each node at expiration by setting the option expiration value equal to the exercise value: $C = max(S^i - X, 0)$ and $P = max(X - S^i, 0)$, where X is the strike price, and S^i is the projected price at expiration at node i. The option price at the beginning of each sub-period is determined by the option prices at the end of the sub-period. At each node we determine whether early exercise is optimal or not. Working backwards we estimate the price of the American option. In a similar fashion we determine the price of the equivalent European option (the only difference being that early exercise is not an option until the very end of the tree). The difference between the price of the American option and the European option gives us the early exercise premium.

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Table I. Value of the Vote: Summary of the literature.

The table reports a brief summary of the empirical literature that quantifies the value of the voting right. The value of the vote is expressed as a percentage of the market value of the firm.

Panel A: Studies that are based on dual class shares

Study	*Country*	*Period*	*n*	*Value of the vote*
Levy (1982)	Israel	1974-1980	25	45.5%
Lease et. al. (1983)	US	1948-1978	30	5.4%
Horner (1988)	Switzerland	1973-1983	45	20.0%
Megginson (1990)	UK	1955-1982	152	13.3%
Zingales (1994)	Italy	1987-1990	96	81.5%
Zingales (1995)	US	1984-1990	94	10.5%
Smith and Amoako-Adu (1995)	Canada	1981-1992	96	10.4%
Rydqvist (1996)	Sweden	1983-1990	65	12.0%
Chung and Kim (1999)	South Korea	1992-1993	119	10.0%
Nenova (2003)[a]	US	1997	39	2.0%
Hauser and Lauterbach (2004)	Israel	1990-2000	84	10.0%

Panel B: Studies that are based on block sales

Study	*Country*	*Period*	*n*	*Value of the vote*
Barclay and Holderness (1989)	US	1978-1982	63	20.0%
Dyck and Zingales (2004)[b]	US	1990-2000	46	1.0%

[a]Nenova (2003) conducts a cross country analysis of 661 dual class firms across 18 countries and finds average voting premia that vary from -5% in Finland to 36.5% in Mexico

[b]Dyck and Zingales (2004) use a sample of 393 control transactions across 39 countries from 1990 to 2000 and find an average control value of 14%, with estimates ranging from -4% in Japan to 65% in Brazil.

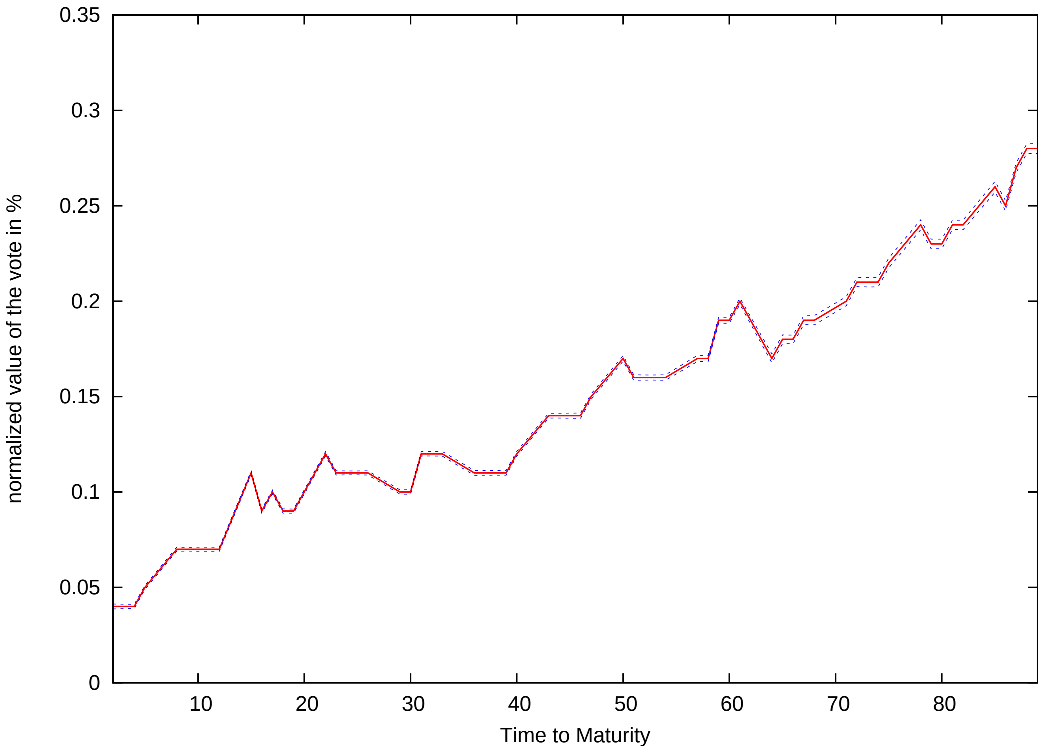


Figure 1. Value of the Vote as a function of T: This figure characterizes the normalized value of the vote as a function of time T. The value of the right to vote in the next T days is calculated as the difference between the price of the stock and the price of the synthetic stock, $PV(Vote^T) = S - \hat{S}(T)$. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps.

Table II. Market Value of the Right to Vote in the next T days.

The table reports the normalized market value of the right to vote in the next T days, $Vote^{T}_{norm}$, for stocks that have exchange traded options during the time period 1996 through 2005. $Vote^{T}_{norm}$ is the value of the voting right in the next T days, $PV(Vote^{T})$, normalized by the price of the stock. $PV(Vote^{T})$ is calculated as the difference between the price of the stock and the price of the synthetic stock. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps.

Panel A: Groups of 30 days

	$Vote^{T}_{norm}$ *in %*		
T (Days)	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*
0 to 30	0.0930	0.0935	0.0940
31 to 60	0.1403	0.1408	0.1414
61 to 90	0.2222	0.2233	0.2243

Panel B: Groups of 10 days

	$Vote^{T}_{norm}$ *in %*		
T (Days)	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*
0 to 10	0.0599	0.0607	0.0616
11 to 20	0.0890	0.0898	0.0906
21 to 30	0.1093	0.1101	0.1109
31 to 40	0.1145	0.1154	0.1162
41 to 50	0.1434	0.1444	0.1455
51 to 60	0.1693	0.1704	0.1714
61 to 70	0.1833	0.1851	0.1868
71 to 80	0.2180	0.2197	0.2215
81 to 90	0.2597	0.2616	0.2636

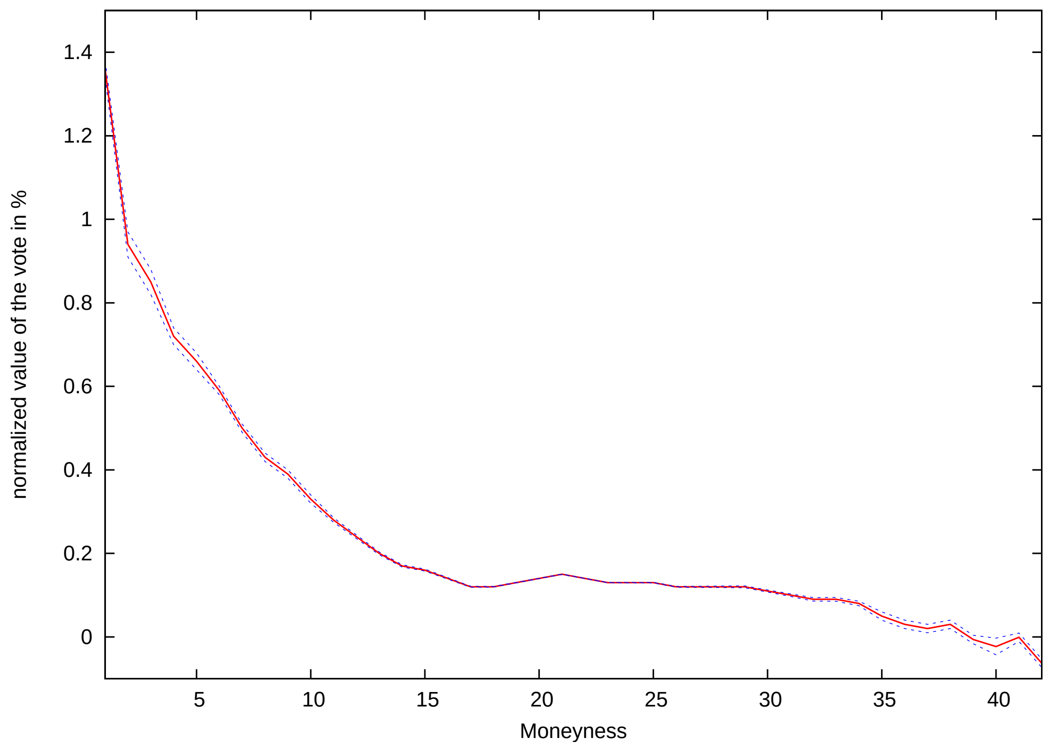


Figure 2. Value of the Vote as a function of M: This figure characterizes the normalized value of the vote as a function of moneyness M. The value of the right to vote in the next T days is calculated as the difference between the price of the stock and the price of the synthetic stock, $PV(Vote^T) = S - \hat{S}(T)$. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps. Moneyness is defined as $ln(S/X)$. The options are divided into 42 groups based on M. $M = 1$ has options with moneyness $M <= -1$, $M = 2$ corresponds to $-1 < M <= -0.95$,..., $M = 41$ corresponds to $0.95 < M <= 1$, and $M = 42$ corresponds to $1 < M$.

Table III. Market Value of the Right to Vote as a function of the moneyness of the synthetic stock.

The table reports the normalized market value of the right to vote in the next T days, $Vote^T_{norm}$, for stocks that have exchange traded options during the time period 1996 through 2005 as a function of the moneyness of the synthetic stock. Moneyness is defines as $ln(S/X)$, where S is the price of the underlying and X is the strike price of the options used to construct the synthetic stock. $Vote^T_{norm}$ is the value of the voting right in the next T days, $PV(Vote^T)$, normalized by the price of the stock. $PV(Vote^T)$ is calculated as the difference between the price of the stock and the price of the synthetic stock. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps. The options are divided into 12 groups based on M.

	$Vote^T_{norm}$ *in %*		
M ($ln(S/X)$)	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*
$M <= -1$	1.3194	1.3632	1.4070
$-1 < M <= -0.8$	0.7346	0.7563	0.7780
$-0.8 < M <= -0.6$	0.4408	0.4508	0.4607
$-0.6 < M <= -0.4$	0.2415	0.2459	0.2503
$-0.4 < M <= -0.2$	0.1375	0.1392	0.1409
$-0.2 < M <= 0$	0.1383	0.1389	0.1394
$0 < M <= 0.2$	0.1344	0.1350	0.1355
$0.2 < M <= 0.4$	0.1210	0.1224	0.1238
$0.4 < M <= 0.6$	0.0982	0.1014	0.1047
$0.6 < M <= 0.8$	0.0456	0.0521	0.0587
$0.8 < M <= 1$	-0.0080	0.0045	0.0171
$1 < M$	-0.0800	-0.0630	-0.0450

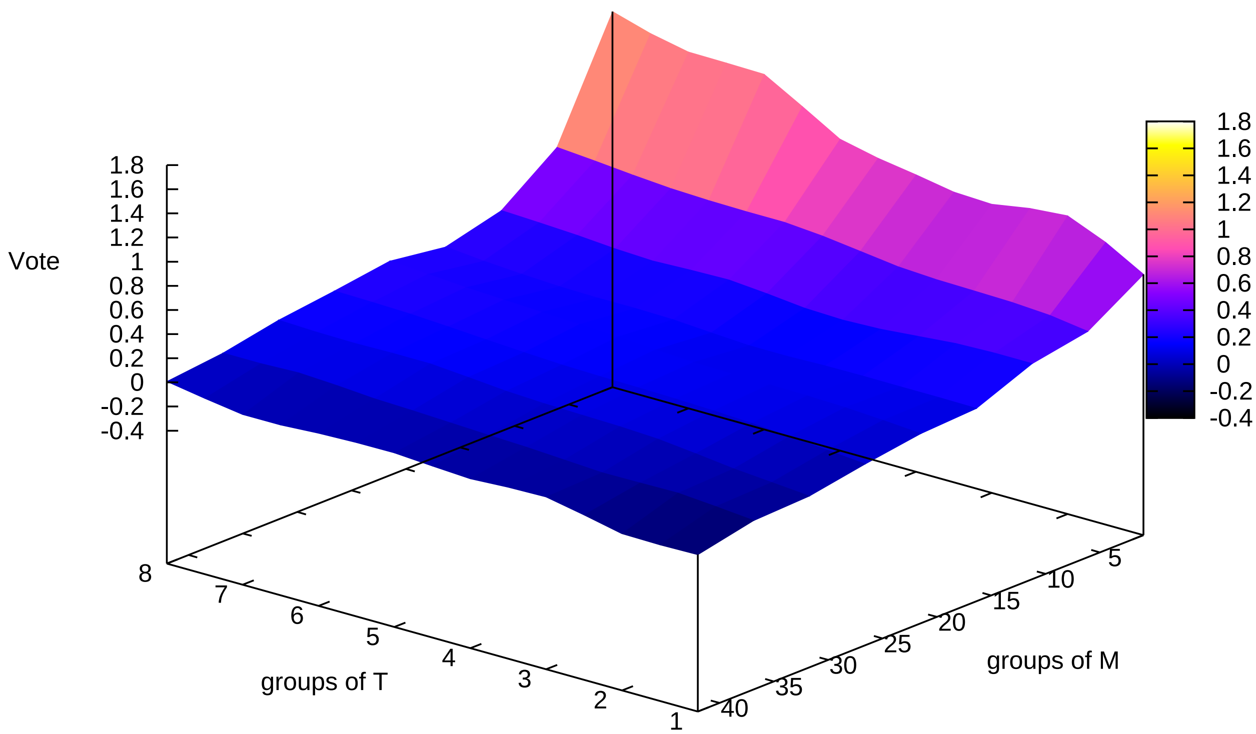


Figure 3. Value of the Vote as a function of T and M: This figure characterizes the normalized value of the vote as a function of the time to maturity T and moneyness M. Moneyness is defined as $ln(S/X)$. The options are divided into 8 groups based on T and 42 groups based on M. $T = 1$ has options with time to maturity $2 <= T <= 12$, $T = 2$ corresponds to $13 <= T <= 23$,..., and $T = 8$ corresponds to $79 <= T <= 89$. Similarly, $M = 1$ has options with moneyness $M <= -1$, $M = 2$ corresponds to $-1 < M <= -0.95$,..., $M = 41$ corresponds to $0.95 < M <= 1$, and $M = 42$ corresponds to $1 < M$. The value of the right to vote in the next T days is calculated as the difference between the price of the stock and the price of the synthetic stock, $PV(Vote^T) = S - \hat{S}(T)$. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps.

Table IV. Market Value of the Right to Vote as a function of the time to maturity and moneyness of the synthetic stock.

The table reports the normalized market value of the right to vote in the next T days, $Vote^T_{norm}$, for stocks that have exchange traded options during the time period 1996 through 2005 as a function of the time to maturity and moneyness of the synthetic stock. Moneyness is defines as $ln(S/X)$, where S is the price of the underlying and X is the strike price of the options used to construct the synthetic stock. $Vote^T_{norm}$ is the value of the voting right in the next T days, $PV(Vote^T)$, normalized by the price of the stock. $PV(Vote^T)$ is calculated as the difference between the price of the stock and the price of the synthetic stock. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps.

	$Vote^T_{norm}$ *in %*		
	$0 < T <= 30$	$30 < T <= 60$	$60 < T <= 90$
$M <= -1$	0.9038	1.0873	1.5583
$-1 < M <= -0.5$	0.3446	0.3562	0.4669
$-0.5 < M <= 0$	0.0881	0.1430	0.2211
$0 < M <= 0.5$	0.0981	0.1330	0.2098
$0.5 < M <= 1$	-0.0320	0.0467	0.1200
$1 < M$	-0.1320	-0.0730	-0.0380

Table V. Descriptive Statistics of Data used for Shareholder Meeting.

The table reports descriptive statistics. Panel A describes the data on meetings from ISS. The meetings are classified as either Annual or Special. The meetings are for the S&P 1500 from 1997 through 2002 that also have options traded. Panel B summarizes characteristics of the stocks for which the meeting data is available. Size, Book to Mkt, and Leverage are computed at the start of the event window, i.e., 80 trading days prior to the cum-date. Daily Volume and Spread are averages of the daily volume and daily percentage quoted spread (computed using closing bid and ask quotes from CRSP) for the 160 day window surrounding the cum-date. Panel C presents summary statistics for all options on the stocks during the event window (160 day window surrounding the cum-date) and for the subset of the options that are used to calculate the market value of the vote. We delete options that have locked or crossed quotes and have undefined implied volatilities. Call options with zero trading volume are deleted. Finally, for each day in the event window we select the option pair that has highest volume, is closest to the money and has the shortest time to maturity.

Panel A: Meeting Data from ISS

	Number of meetings					
Meeting Type	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*
Annual	885	937	974	914	866	875
Special	101	144	158	103	80	37

	Days between the Cum-date and the Meeting date				
Meeting Type	*Mean*	*Median*	*Stdev*	*Min*	*Max*
Annual	57.29	58	7.68	8	126
Special	47.16	46	9.52	6	119

Panel B: Characteristics of Stocks

	Mean	*Median*	*Stdev*	*Min*	*Max*
Size	7582	1780	23282	56	467093
Book to mkt	0.431	0.371	0.323	-0.668	3.992
Leverage	0.220	0.164	0.206	0	0.979
Daily Volume	1241746	443469	3536128	5500	82899524
Spread	0.012	0.009	0.013	0.0001	0.394

Panel C: Summary Statistics for Options

	All Options		Options Selected	
	Mean	*Stdev*	*Mean*	*Stdev*
Time to Maturity	43.70	21.99	35.28	20.58
Moneyness	0.16	0.15	0.07	0.07
Call Volume	56.56	427.16	330.81	1251
Put Volume	30.34	295.07	77.57	542.45
Call Spread	0.36	0.55	0.23	0.27
Put Spread	0.38	0.55	0.22	0.32
Call Open Interest	741.93	3440	1635.31	9123
Put Open Interest	461.22	2043	747.75	2830

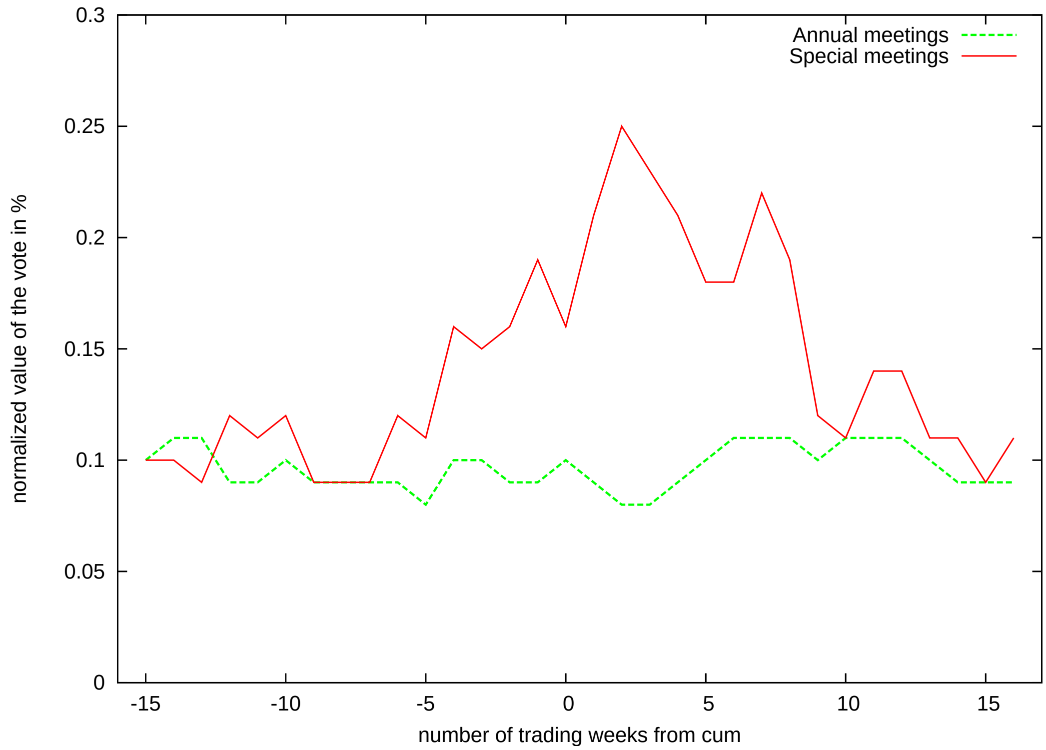


Figure 4. Value of the Vote around Voting Events: This figure characterizes the time series variation of the normalized market value of the right to vote around Annual and Special meetings for stocks in the S&P 1500 during the time period 1998 through 2002. The value of the vote is calculated as the difference between the price of the stock and the price of the synthetic stock normalized by the price of the stock. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps. The figure plots the average value of the vote for 16 trading weeks prior to the Record date and 16 trading weeks after the Record date for Special meetings and Annual meetings.

Table VI. Time Series Variation of the Right to Vote around Shareholder Meetings.

The table reports the time series variation of the normalized market value of the right to vote in the next T days, $Vote^T_{norm}$, around shareholder meetings for stocks in the S&P 1500 during the time period 1998 through 2002. $Vote^T_{norm}$ is the value of the voting right in the next T days, $PV(Vote^T)$, normalized by the price of the stock. $PV(Vote^T)$ is calculated as the difference between the price of the stock and the price of the synthetic stock. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps. Panel A reports the value of the vote for groups of 20 trading days relative to the Record date for Special meetings and Annual meetings. Panel B reports the value of the vote for groups of 20 trading days relative to the Meeting date for Special meetings and Annual meetings.

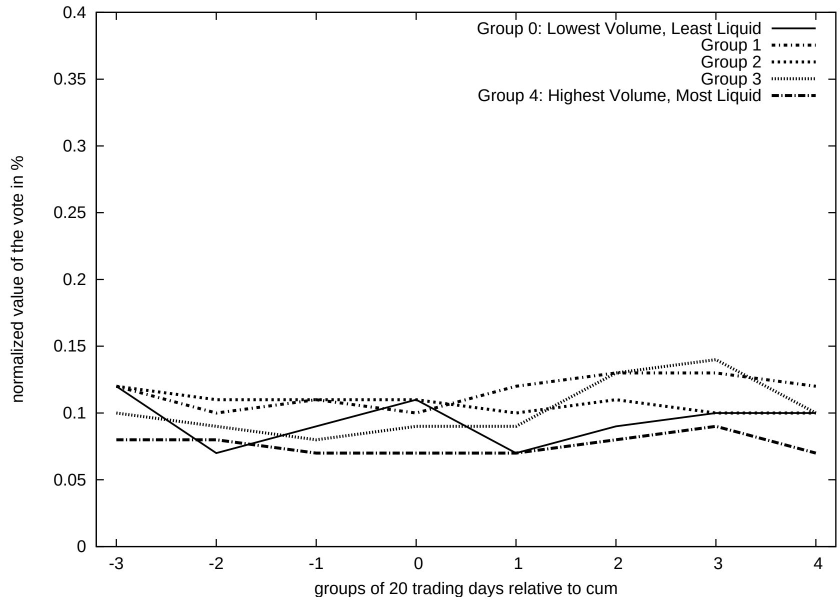
Panel A: Time Series Variation relative to Record Date

	$Vote^T_{norm}$ *in % for Special Meetings*			$Vote^T_{norm}$ *in % for Annual Meetings*		
Trading Days (from cum date)	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*
-79 to -60	0.09	0.10	0.12	0.10	0.10	0.11
-59 to -40	0.09	0.10	0.12	0.09	0.09	0.10
-39 to -20	0.10	0.12	0.14	0.08	0.09	0.09
-19 to 0	0.15	0.16	0.18	0.09	0.10	0.10
+1 to +20	0.20	0.22	0.25	0.08	0.09	0.09
+21 to +40	0.17	0.19	0.22	0.10	0.10	0.11
+41 to +60	0.11	0.13	0.15	0.10	0.11	0.11
+61 to +80	0.09	0.11	0.12	0.09	0.09	0.10

Panel B: Time Series Variation relative to Meeting Date

	$Vote^T_{norm}$ *in % for Special Meetings*			$Vote^T_{norm}$ *in % for Annual Meetings*		
Trading Days (from meeting date)	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*
-99 to -80	0.08	0.10	0.11	0.09	0.09	0.10
-79 to -60	0.09	0.11	0.12	0.09	0.09	0.10
-59 to -40	0.14	0.15	0.17	0.09	0.10	0.10
-39 to -20	0.18	0.20	0.22	0.08	0.08	0.09
-19 to 0	0.17	0.20	0.22	0.10	0.10	0.11
+1 to +20	0.13	0.16	0.18	0.11	0.11	0.12
+21 to +40	0.10	0.11	0.13	0.09	0.10	0.10

Effect of Liquidity on the value of the Vote for Annual Meetings



Effect of Liquidity on the value of the Vote for Special Meetings

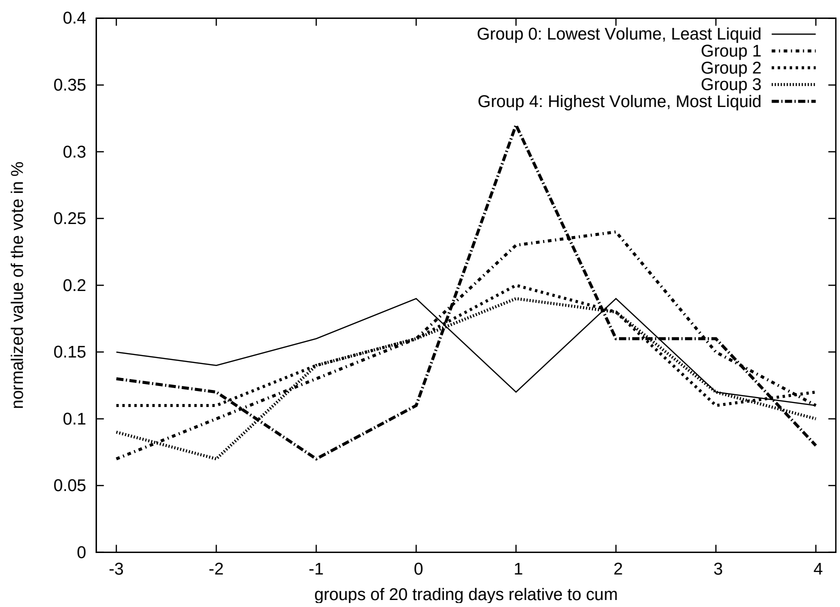


Figure 5. Liquidity Sorts: This figure characterizes the time series variation of the normalized market value of the right to vote around Annual and Special meetings for stocks in the S&P 1500 during the time period 1998 through 2002 for 5 groups sorted on the volume of the underlying stock. The value of the vote is calculated as the difference between the price of the stock and the price of the synthetic stock normalized by the price of the stock. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option.

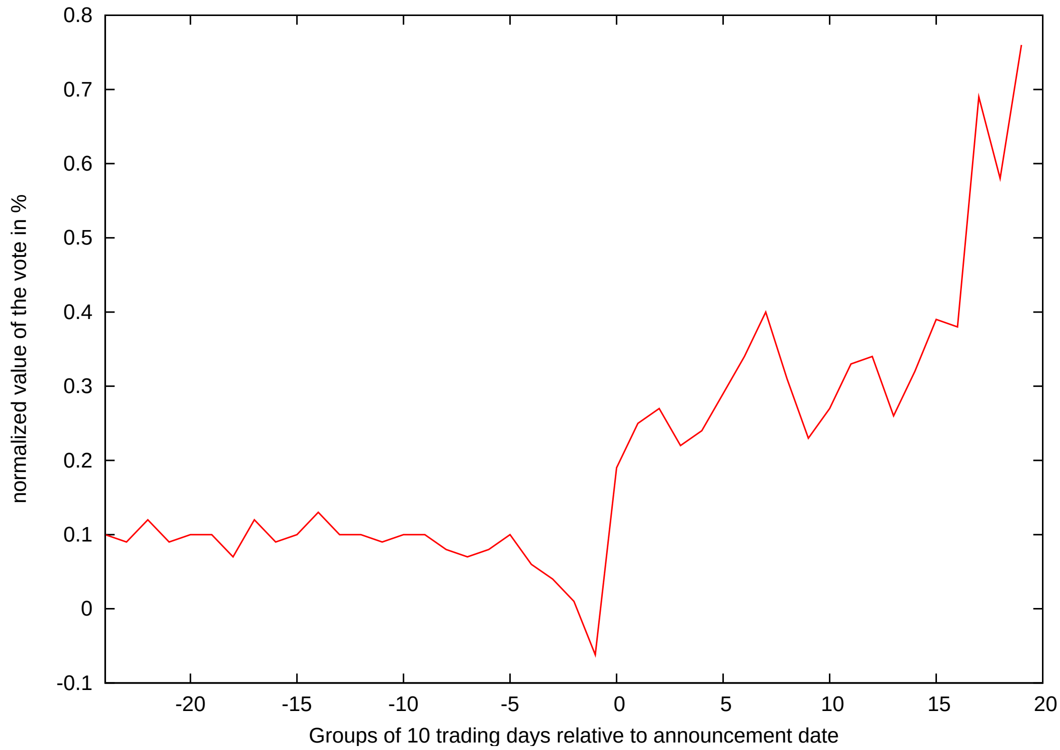


Figure 6. Value of the Vote around Merger and Acquisition announcements: This figure characterizes the time series variation of the normalized market value of the right to vote around merger and acquisition announcements. The value of the vote is averaged over groups of 10 trading days. The value of the right to vote in the next T days is calculated as the difference between the price of the stock and the price of the synthetic stock, $PV(Vote^T) = S - \hat{S}(T)$. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps.

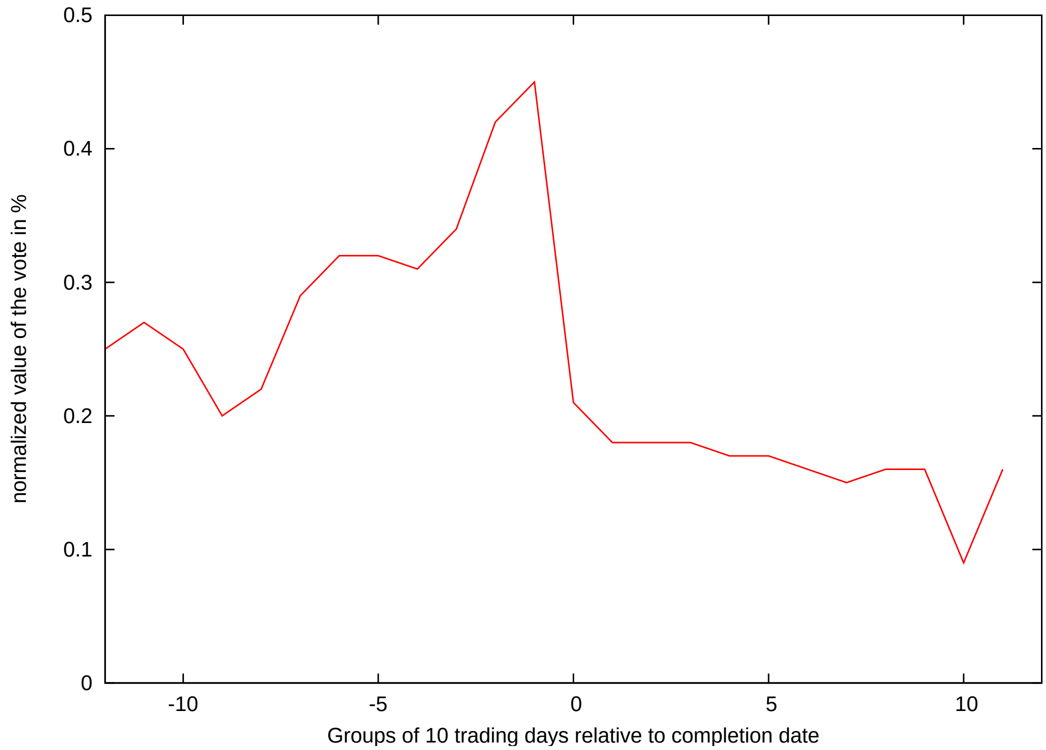


Figure 7. Value of the Vote around Merger and Acquisition completion dates: This figure characterizes the time series variation of the normalized market value of the right to vote around merger and acquisition completion dates. The value of the vote is averaged over groups of 10 trading days. The value of the right to vote in the next T days is calculated as the difference between the price of the stock and the price of the synthetic stock, $PV(Vote^T) = S - \hat{S}(T)$. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps.

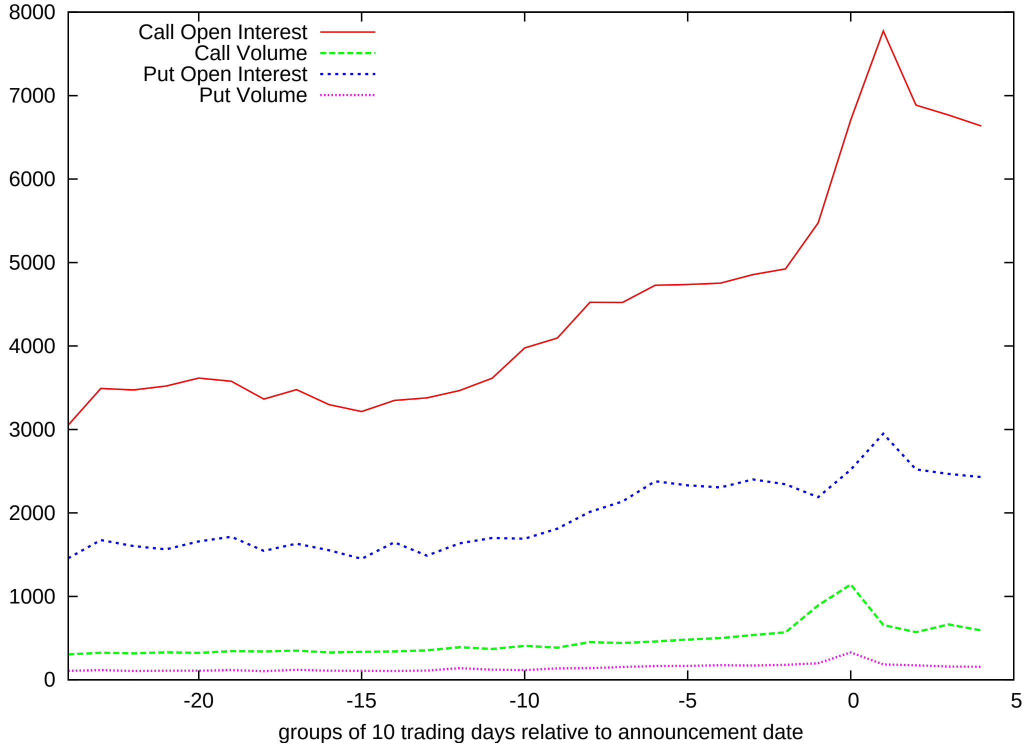


Figure 8. Option Volume and Open Interest around Merger and Acquisition announcement dates: This figure characterizes the time series variation of the Volume and Open Interest of options around merger and acquisition announcement dates. The variables are averaged over groups of 10 trading days.

Table VII. Time Series Variation of the Right to Vote around Merger and Acquisition Events.

The table reports the time series variation of the normalized market value of the right to vote in the next T days, $Vote^T_{norm}$, during merger and acquisition events for targets with options traded from 1996 through 2005. $Vote^T_{norm}$ is the value of the voting right in the next T days, $PV(Vote^T)$, normalized by the price of the stock. $PV(Vote^T)$ is calculated as the difference between the price of the stock and the price of the synthetic stock. The synthetic stock is constructed as $\hat{S}(T) = C - EEP_{call} - P + EEP_{put} + PV(X) + PV(div)$, where C is the price of the call option with strike X and T days to maturity, P is the price of the put option with strike X and T days to maturity, $PV(X)$ is the present value of investing in a bond with face value X, $PV(div)$ is the present value of the dividend stream prior to option expiration, EEP_{call} is the early exercise premium of the call option, and EEP_{put} is the early exercise premium of the put option. The early exercise premiums for the call and put options are calculated using the Binomial option pricing model with 1000 steps. For each date we select the option pair that has highest volume, is closest to the money and has the shortest time to maturity to construct the synthetic stock. Panel A reports the value of the vote for groups of 20 trading days relative to the announcement date for targets. Panel B reports the value of the vote for groups of 20 trading days relative to the completion date (date effective or date withdrawn) for targets.

Panel A: Time Series Variation relative to Announcement Date

	$Vote^T_{norm}$ *in % relative to announcement date*		
Trading Days (from announcement date)	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*
-200 to -181	0.0841	0.1021	0.1201
-180 to -161	0.0743	0.0970	0.1196
-160 to -141	0.0748	0.0924	0.1101
-140 to -121	0.0934	0.1125	0.1316
-120 to -101	0.0760	0.0946	0.1132
-100 to -81	0.0871	0.1042	0.1212
-80 to -61	0.0611	0.0758	0.0905
-60 to -41	0.0682	0.0862	0.1042
-40 to -21	0.0366	0.0528	0.0690
-20 to -1	-0.0410	-0.0260	-0.0100
0 to 19	0.1941	0.2153	0.2365
20 to 39	0.2200	0.2487	0.2773
40 to 59	0.2335	0.2598	0.2861
60 to 79	0.3091	0.3672	0.4253
80 to 99	0.2279	0.2693	0.3108
100 to 119	0.2535	0.2959	0.3383
120 to 139	0.2550	0.3039	0.3527
140 to 159	0.3056	0.3560	0.4063
160 to 179	0.4057	0.5156	0.6256
180 to 199	0.5333	0.6642	0.7950

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Table VII continued from previous page

Panel B: Time Series Variation relative to Completion Date

	$Vote^{T}_{norm}$ *in % relative to completion date*		
Trading Days (from completion date)	*Lower CI (95%)*	*Mean*	*Upper CI (95%)*
-200 to -181	0.2373	0.3151	0.3928
-180 to -161	0.2075	0.2436	0.2797
-160 to -141	0.2379	0.2837	0.3294
-140 to -121	0.189	0.2235	0.258
-120 to -101	0.2347	0.262	0.2894
-100 to -81	0.1995	0.225	0.2505
-80 to -61	0.234	0.2592	0.2843
-60 to -41	0.2872	0.3174	0.3475
-40 to -21	0.2907	0.3247	0.3586
-20 to -1	0.3823	0.4328	0.4834
0 to 19	0.169	0.1967	0.2244
20 to 39	0.1537	0.1823	0.2108
40 to 59	0.143	0.1708	0.1987
60 to 79	0.1279	0.1527	0.1775
80 to 99	0.1378	0.1616	0.1854
100 to 119	0.0997	0.1245	0.1493
120 to 139	0.213	0.2763	0.3396
140 to 159	0.2462	0.3122	0.3781
160 to 179	0.0934	0.1161	0.1387
180 to 199	0.1265	0.1511	0.1757