Estimating the private benefits of control from partial control transfers: methodology and evidence

Ronen Barak and Beni Lauterbach*

School of Business Administration,
Bar-Ilan University,
Ramat Gan 52900, Israel
Fax: 972-35353182
E-mail: barakro@mail.biu.ac.il
E-mail: lauteb@mail.biu.ac.il
*Corresponding author

Abstract: We elaborate the Barclay and Holderness (1989) methodology commonly used for estimating the private benefits of control from block trades. Despite the recent methodological advance in the area, i.e., Albuquerque and Schroth (2010), the Barclay and Holderness methodology remains the only applicable methodology in many if not most of the cases. The empirical work identifies a large impact of our revised methodology in cases of partial control transfers; in many cases our methodological improvement appears crucial.

Keywords: block trades; concentrated ownership; partial control transfers; private benefits estimation; PBs.

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Biographical notes: Ronen Barak is an Assistant Professor of Finance at Bar-Ilan University, Graduate School of Business Administration. His main research interests are corporate governance, corporate control and portfolio selection

Beni Lauterbach is the Chairman of the Bar-Ilan University, Graduate School of Business Administration and the Raymond Ackerman Family Chair Professor in Israeli Corporate Governance. His research focus is corporate governance.

1 Introduction

It is widely recognised that the group that controls the firm extracts from it some private benefits (PBs), i.e., some extra benefits that do not accrue to small ordinary shareholders from the public. PBs appear in many forms – from explicit 'self-dealing' (i.e., diverting funds from the firm into the control-holder's pockets by means of an 'innocuous' business transaction between the control-holder and the firm), to indirect subtle actions (such as generous contributions by the firm to the community) which essentially serve to promote control-holder's social prestige.

The magnitude of the PBs of control is non-trivial, as evidenced most directly by the prices of large control-transfer block trades. In control-transfer block trades, the buyer usually pays a large premium over the shares' market price. This price premium compensates the seller for the lost PBs, and the buyer is willing to pay it in view of her or his own future PB consumption.

The purpose of the paper is to elaborate the standard existing methodology for estimating PBs from large block trades (Barclay and Holderness, 1989), by adapting it to partial control transfer block trades. Partial control transfers constitute a significant fraction of large block trades (over 40% in our sample). Hence, extending existing methodology to these cases appears useful for academics and practitioners alike. In an empirical examination of 54 large block trades, we compute the PB estimates generated by our improved methodology and find them to be quite reasonable, which lends our methodology some credence.

This paper is organised as follows. Section 2 presents our improved model for estimating PBs from block transactions. Section 3 describes the sample and data. Section 4 documents our empirical results, and Section 5 offers a brief summary and conclusions.

2 PBs of control estimation

2.1 Existing methodologies for estimating the PBs

Extant literature offers two methods for estimating the PBs of control:

1 based on the price premium of superior- over inferior-vote shares

2 based on the price premium paid for a control-transferring block of shares.

The first method requires the existence (and active trading) of dual class shares, and argues that the price premium of superior vote shares is justified in view of prospective future control contests. When a control contest develops, the price of the superior-vote share soars (see Zingales, 1995) because the contestants need the vote for gaining control. Hence, the current price premium of superior vote shares depends on two factors:

a the probability of an imminent control contest

b the price premium in case of a control contest.

Both these factors depend critically on the strategic power of public-held (i.e., non-control-holders) shares, which can be represented by public shares' combined Shapley value.[1] Empirical studies such as Zingales (1994), and Chung and Kim (1999) confirm existence of a positive correlation between public shares' Shapley's value and the price premium on superior-vote shares.

The weakness of the above methodology is that the relation between the price premium of superior vote shares and PBs is complex and depends on many intermediate variables such as the probability of future takeovers and public shareholders' power. Thus, the estimation method yields at best an estimate of the average PBs across sample firms – see Chung and Kim (1999) regression method, for example. The estimation also ignores much of the cross-sectional and time-series variation in the probability of a future control contest. [It assumes that the probability of a control contest depends on the Shapley value of public-held shares only – see Nenova (2003)]. Last, as Benos and

Weisbach (2004) point out, the dual class-based approach is likely to overstate the level of PBs because higher PBs firms are more likely to issue dual class shares (DeAngelo and DeAngelo, 1985). Thus, the dual class methodology appears somewhat tenuous, and recent research prefers predominantly its alternative (presented below).

The second methodology for estimating the PBs of control, on which we focus in this study, is more straight-forward and it can be employed to credibly assess firm by firm PBs. When control over the firm is transferred, the buyer pays (and the seller receives compensation) also for the PBs that they plan to (used to) consume. Barclay and Holderness (1989) were the first to suggest that the premium (over market price) paid for a control-transfer block of shares reflects the value of PBs. According to Barclay and Holderness:

$$\$PB = N_b \left(P_b - P_M \right), \tag{1}$$

where $\$PB$ is the value of PBs (in dollars), N_b is the number of shares in the block, P_b is the per-share block price, and P_M is the market price of the share one day after the block transaction is announced. In equation (1), Barclay and Holderness simply calculate the 'overpayment' of block buyers. If we assume block buyers' rationality, then this 'overpayment' approximates the minimum PBs that the block buyer plans to extract from the firm.

Dyck and Zingales (2004) extend the Barclay and Holderness PBs estimation formula by allowing a continuous distribution of negotiating power, from maximum power to block seller to maximum power to block buyer. However, the most important recent extension is Albuquerque and Schroth (2010) that is based on a theoretical model of Burkart et al. (2000).

The Burkart et al. (2000) model formulates the block trade premium as a function of potential block seller's ability to thwart a hostile takeover tender offer (by a potential block buyer). This ability depends on buyer's and seller's relative valuation of the firm, the level of PBs that can be extracted, and deal characteristics (such as block size). Albuquerque and Schroth (2010) overcome some estimation problems in the Burkart et al. (2000) model, mainly endogeneity, and, using a sample of 120 US block trades in 1990 to 2006, assess US average PBs at 3.2% to 3.7% of firm's equity value, very close to the 4% average PB estimated by Barclay and Holderness (1989).

Burkart et al. (2000) and Albuquerque and Schroth (2010) methodology has some serious limitations. First, it can be applied only when public tender offers can serve to gain control – see Albuquerque and Schroth (2010, p.37). In many cases, especially outside the USA, family or/and business partners (voting coalitions) control more than 50% of firm's vote, effectively eliminating the public tender offer option. Second, relying on the tender offer mechanism is less realistic in less developed capital markets where tender offers are rare or non-existing. Last, the Albuquerque and Schroth (2010) two-stage structural model empirical estimation is econometrically complex and may be model dependent. Hence, the simple Barclay and Holderness (1989) methodology remains a pertinent alternative. The Barclay and Holderness methodology is less binding, applicable to any ownership structure and economy, and much easier to use.

In this study, we extend the Barclay and Holderness estimation methodology to partial control-transfer block trades. This is important because the standard Barclay and Holderness procedure severely errs when it is unconsciously applied to partial control transfers. Consider, for example, a firm jointly controlled by two partners (each owning,

for example, 30% of outstanding shares). If one partner sells his stake to an external person, then, the PBs transferred in this transaction are *half* of the total firm PBs. A simple unconscious application of the Barclay and Holderness formula, ignores the fact that only a fraction of total PBs are being sold, and assumes that the PBs transferred in this block transaction amount to the *entire* firm PBs. This creates a major (50%) downward bias in the estimated PBs, which should be corrected.[2] We are not sure that all those who employ the BH methodology are careful enough not to apply it to partial control transfers. Hence, highlighting the issue and warning 'innocuous' users of the BH formula is important. Further, we find that a considerable proportion of the large block trades in our sample are partial control-transfers. Hence, the extension we develop in this paper is necessary in many cases, and should prove helpful in future estimation and examination of PBs.

Another (smaller) extension we develop relates to the block buyers' previous holdings in the company. These holdings are ignored by Barclay and Holderness. We introduce them into the analysis.

2.2 The revised methodology for estimating the PBs of control

2.2.1 An estimation method based on buyer's rationality

Before the transaction, the value of the block buyer investment in the firm is:

$$w_0 \cdot Y_0 \cdot (1 - B_0) + \pi_0^P \cdot Y_0 \cdot B_0 \tag{2}$$

where w_0 is block buyer's initial holdings as a proportion of firm equity, Y_0 is firm's equity value (before PBs are consumed), B_0 is firm's total PBs consumption as a proportion of firm's equity value in the period before the block sale, and π_0^P is block buyer's initial share in PBs.

The post-transaction value of block buyer's investment in the firm is:

$$(w0 + w) \cdot Y_1 \cdot (1 - B_1) + \pi_1^P \cdot Y_1 \cdot B_1 \tag{3}$$

where w is the block purchased as a proportion of firm's equity, and the index 1 denotes the post-transaction situation.

Last, the buyer's block payment, BP, may be expressed as:

$$BP = w \cdot Y_1 \cdot [1 - B_1][1 + prem] \tag{4}$$

where *prem* is the premium that the buyer paid relative to the *post-trade* market price, i.e., 1 + *prem* equals the ratio of block price per share to market post-trade price.

Now, if the block buyer is rational, the buyer's gain must exceed BP, which implies (based on the above equations) that

$$\underbrace{(w_0 + w) Y_1 [1 - B_1] + \pi_1^P Y_1 B_1}_{\text{buyer's post-trade value}} - \underbrace{w_0 Y_0 [1 - B_0] - \pi_0^P Y_0 B_0}_{\text{buyer's pre-trade value}}$$

$$\geq \underbrace{w Y_1 [1 - B_1] \left(1 + \underbrace{prem}_{\text{block premium paid}}\right)}_{\text{total block price}} \tag{5}$$

Equation (5) is our basic buyer rationality model. It is essentially a generalisation of Barclay and Holderness' (1989) implicit model. If we restrict ourselves to cases where the buyer has no previous holdings $(w_0 = 0, \pi_0^P = 0)$ and full control afterwards $(\pi_1^P = 1)$, we obtain the Barclay and Holderness formula for *b*: $b = w \cdot prem$.[3] However, if either of these assumptions is incorrect then the Barclay and Holderness formula is improper.

Practical estimation based on equation (5) usually assumes that the block buyer has no previous holdings. In such a case, equation (5) becomes:

$$b_1 \geq \frac{w \cdot prem}{\pi_1^P} \tag{6}$$

where $b_1 = B_1 / (1 - B_1)$ is total PBs consumption as a proportion of the market value of firm's equity, in the period after the block sale.

Equation (6) illustrates the huge pitfall of using the simple 'intuitive' Barclay Holderness formula: $b = w \cdot prem$. For partial control transfers the Barclay Holderness formula should be divided by π_1^P, the percentage of firm's PBs, transferred by the block. Given that for partial control transfers $\pi_1^P < 1$, in these cases there is a non-trivial downward bias in the PBs estimates calculated by the Barclay and Holderness formula.

Moreover, even equation (6) may be imprecise when the block buyer has prior holdings. Thus, we offer a further (smaller) extension of Barclay and Holderness formula for the case of a block buyer that has prior holdings in the firm. In such circumstances, an effective way to progress is to assume that PBs do not change ($B_0 = B_1$). Equation (5) becomes:

$$b \geq \frac{w \cdot y_1 \cdot prem - w_0 \cdot (y_1 - y_0)}{\pi_1^P y_1 - \pi_0^p y_0} \tag{7.1}$$

where *y* is the market value of firm's equity and b is as defined above.

Dividing equation (7.1) by y_0 we get:

$$b \geq \frac{w \cdot (1 + r_i) \cdot prem - w_0 \cdot r_i}{\pi_1^P \cdot (1 + r_i) - \pi_0^P} \tag{7.2}$$

where $r_i = (y_1 - y_0) / y_0$ is firm's stock return in response to the transaction. This return can be approximated by the stock cumulative abnormal return (CAR) around the block trade announcement. Note that equation (7.2) reduces to equation (6) when the buyer has no previous holdings $(w_0 = 0, \pi_0^P = 0)$. More important, Barclay and Holderness' (1989) formula does not consider previous holdings; hence its estimates are biased – different than those of equation (7.2).

Two further comments before we proceed. First, if block sellers possess full bargaining power, the block premium paid by the buyer exhausts all of the buyer's expected future PBs. In such a case all our inequalities, i.e., equations (5) through (7) become equalities. Second, in our empirical work, we employ equation (6) for cases that fit it (buyer has no initial holdings) and equation (7.2) for the rest of the cases. Notably,

estimates based on cases that fit equation (6) appear more reliable than those based on (7.2). This is because estimates based on equation (7.2) require the additional assumption of unchanged PBs.

2.2.2 An estimation method based on seller's rationality

The derivation in the Appendix A follows the same logical steps as the previous ('buyer rationality') one and yields two equations. For a seller that sells all her holdings we obtain:

$$b_0 \leq \frac{\alpha \cdot PREM}{\pi_0^S} = \frac{w \cdot PREM}{\pi_0^S} \tag{8}$$

where $b_0 = B_0 / (1 - B_0)$ is firm's total PBs as a proportion of the market value of firm's equity, in the period before the block sale.

And, when the block seller retains some holdings in the firm we obtain:

$$b \leq \frac{w \cdot PREM + (\alpha - w) \cdot r_i}{\pi_0^S - (1 + r_i) \cdot \pi_1^S} \tag{9}$$

where $r_i = (y_1 - y_0) / y_0$ is firm's stock return in response to the transaction, which can be approximated by the stock CAR around the block trade announcement.

The practical estimation of block seller's PBs further assumes that block buyers possess full bargaining power. Hence, the block premium paid by the buyer is minimal, i.e., equals seller's PBs. In such a case, the inequalities in equations (8) and (9) become equalities.

Equations (8) and (9), with an equal sign replacing the ≤ sign, serve to estimate PBs in our study. There is a clear difference between them. Equation (8) does not require the additional assumption of unchanged PBs. Thus, estimates based on cases that fit equation (8) (seller sells all her holdings) may be more accurate than estimates based on cases that fit equation (9).

In the rest of the paper, we will examine our improved methodology empirically and test its effectiveness. Are the PBs estimates it generates for the problematic case of partial control transfers sensible? If the mean PB estimate for partial control transfers generated by our methodology resembles the mean PBs estimates obtained for full control transfers, then our methodology appears palatable.

We base our empirical tests on Israeli data. This is because of the relatively accurate data we found in Israel and because PBs in Israel are sizable [above median relative to other developed economies in the world – see Dyck and Zingales (2004)]. Sizable PBs are important for our tests because they tend to magnify any bias or distortion introduced by our improved methodology.

3 Sample and data

3.1 Sample construction

Every block transaction in Israel has to be reported to the Tel-Aviv Stock Exchange (TASE) and the Israeli Securities Authority, which immediately publish this news to the

public.[4] The sample block trades are extracted from two databases. We use IFAT (a private vendor) for block trades in 1993 to 1999 and Maya (the TASE free of charge database which starts on year 2000) for 2000 to 2005.

We employed numerous screening criteria, most of which have been suggested by Dyck and Zingales (2004). First, we exclude block trades of less than 10% of firm's vote and trades where the assembled buyer power is less than 20%. Such small blocks do not really confer control. Second, we exclude trades where the block buyer does not enter the control group. We conclude that the block buyer enters the control group if she appoints at least one director and/or signs a voting agreement with other members of the control group. In Israeli firms, the control group appoints all non-external directors. External directors are appointed by law, are a minority on the board, and serve to defend public's interests. Third, we exclude trades where the announcement does not include full details about the terms of the deal, identifying the seller and buyer, the size of the block and the cash proceeds. Non-cash deals that include payment in stocks or bonds are omitted because of difficulties in assessing the true value of the involved securities. Fourth, block transactions between a mother firm and its subsidiary or between subsidiaries are omitted because it is difficult to judge the objectivity of these deals. Fifth, we exclude block trades in stocks that did not trade on the TASE (had zero volume) from one week before to one week after the block trade announcement. This is because our estimation methodology requires some reliable market price data in that event window. Last, we exclude five block transactions with negative block premiums, i.e., with block prices below market prices. These transactions imply negative PBs or negative costs, and are typical of firms in financial distress – see Barclay and Holderness (1989).[5]

The final sample comprises 54 block trades with full details on the terms of the deal.

3.2 Variable construction

For the 54 block trades in our sample, we collected data on the pre- and post-transaction ownership structure of each company involved from 'Article 24' of the company's Annual Report (available electronically from IFAT). The information disclosed in Article 24 is quite extensive. It specifies the exact holdings of every member in the control group and identifies the person (ultimate owner) of each company that belongs in the control group. Using Article 24, we compute the percent in vote and percent in equity of the ultimate owners. Our calculations apply the by now standard methodology (see Claessens et al., 2000; Faccio and Lang, 2002, for example), which takes into account pyramids and cross-holdings. It is noteworthy that relative to previous studies our percent vote and percent equity data are accurate, as we do not have any mysterious unlisted firms in the control group that we do not know who hides behind them.

Article 24 also discloses any family ties between the control-holders, which serves to classify our firms as either family- or non-family-controlled firms. Information about family ties is also provided in Article 26 that presents personal data on all firm's directors. Article 26 helps us verify that the block seller and buyer are part of the control group (i.e., appoint at least one director). Article 24 is also useful for this purpose, as it reports on any voting agreement between large shareholders.

Stock price and return data are from PRAEDICTA (a commercial database). We use these data for two proposes:

1 to calculate the block price premiums – prem and PREM of equations (6), (7.2), (8), and (9)

2 to calculate the CAR around the block trade announcement.

CAR is our estimate of r_i in equations (7.2) and (9), and it is designed to measure the stock price response to the block transaction.

Practically, CAR is calculated using the net of market approach with Tel-Aviv 100 index as the market index. The methodology assumes that $\tilde{R}_{it}$, the return of stock i on day t, is given by $\tilde{R}_{it} = \tilde{R}_{mt} + \tilde{\varepsilon}_{it}$, where $\tilde{R}_{mt}$ is the return of the market index on day t, and $\tilde{\varepsilon}_{it}$ is an idiosyncratic stochastic error term (reflecting the effect of firm-specific news on stock i return). Accordingly, $CAR_i(-T_b, T_e)$, the excess return in the window $(-T_b, T_e)$ straddling the block transaction announcement, can be computed as $CAR_i\left(-T_b, T_e\right) = \prod_{t=-T_b}^{T_e}\left(1+\tilde{\varepsilon}_{it}\right)$.[6]

We compute CAR for two windows: CAR(–1, 1), a short window, assuming the stock price response is concentrated in the period from one day before to one day after the announcement; and CAR(–5, 5), which assumes that the response is concentrated in the two weeks period straddling the announcement. CAR(–1, 1) is more appropriate when there are no information leaks about the block trade beforehand and full understanding of the trade repercussions within one day afterwards. CAR(–5, 5) is more comprehensive but also more noisy because most likely other events besides the block trade also contribute to it. We do not know in advance which CAR is preferred, and hope results are robust to the CAR window choice.

Last, a methodological point. In order to estimate the buyer and seller PBs [see equations (6), (7.2), (8) and (9)] we need measures for π^P and π^S, the buyer and seller share (respectively) in total PBs. We assume that PBs are divided among the control group members in proportion to each member percentage holdings *within* the control group. This approach suggests that since PBs are 'illegal' their extraction requires cooperation within the control group, and such cooperation is best achieved and maintained by a 'fair', i.e., proportional, division of PBs across control group members.

For the interested reader, we have further compiled a manual for computing the PBs of control from large block transaction. This manual appears in Appendix B.

4 Empirical results

4.1 Descriptive statistics

Table 1 presents some descriptive statistics for our 54 firms' sample. The mean total assets are over 2 billion New Israeli Shekels (NIS), about 500 million US dollars, but the median is only 88 million NIS. On average, the firms are poor performers with a return on assets of less than 1%. The average debt to equity ratio is close to 2, which is higher than the typical ratio for Israeli firms. However, diversity exists, as some of our firms have a ROA as high as 23% and a debt equity ratio as low as 0.03.

Table 1 Descriptive statistics of our sample of 54 block trades in Israel: 1993–2005

Variable	*Obs.*	*Mean*	*Median*	*Median*	*Standard deviation*	*Maximum*	*Minimum*
Firm characteristics							
SIZE (million NIS)	54	2,247	88	88	7,792	49,727	6
STD (in %)	52[a]	3.47	3.28	3.28	1.75	13.86	1.9
ROA (in %)	54	0.58	1	1	8.61	23	–23
LEV	54	1.97	0.7	0.7	3.67	19.9	0.03
CVOTE (in %)	54	67.71	69.62	69.62	11.13	87	49
Block description							
Block size (in %)	54	51.78	53.47	53.47	19.3	87.4	20.33
prem_1	54	46.27	35.93	35.93	36.27	180.4	1.6
prem_5	54	46.96	33.13	33.13	38.13	175.09	2.32
CAR_1 (in %)	54	1.7	1.83	1.83	7.7	26.5	–14.94
CAR_5 (in %)	54	2.4	1.72	1.72	13.45	40.49	–24.9

Notes: The table presents information on the sample firms' characteristics, their ownership structure and the block trades. All variables (except the block trade description) are collected from the firms' annual reports for the year-end preceding the block trade. SIZE is total assets in millions of NIS (adjusted for June 2003 prices); STD is the standard deviation of the stock's daily returns in the three years preceding the block trade announcement day; ROA is the ratio of earnings before interest and taxes (EBIT) to total assets; LEV is firm's debt to equity ratio; CVOTE is control group's voting power; CAR_1 (CAR_5) is the CAR from one (five) trading day(s) before to one (five) trading day(s) after the block trade announcement, calculated using the net of market methodology; Block_size is percentage of equity ownership purchased in the trade; and prem_1 (prem_5) is the premium of block price per share over the market price per one (five) days after the block trade announcement date.
[a]Two observations are missing because two firms had less than three years of return data prior to the block trade announcement day.

By construction, our sample comprises closely held firms. The mean (median) vote held by the firm's control group is about 68% (70%). About half (48%) of the firms are family controlled, while the rest are controlled by a few (usually two) business partners.

The block trades in our sample are relatively large. The mean and median block traded is over 50% of firm's equity and it is sold at a premium of close to 50%. The stock price response to the block trade is on average positive, with a CAR of about 2%, similar to the CAR of about 2.7% found by Barclay and Holderness (1989).

4.2 Testing the importance of our extension of the Barclay and Holderness formula

4.2.1 The impact of the correction for partial control transfers

For each firm, we compute three sorts of PBs (b) estimates: based on Barclay and Holderness ($b = w \cdot prem$), based on block buyer rationality [equations (6) or (7.2)], and based on block seller rationality [equation (8) or (9)]. In addition, within each sort, we attempt two stock price response windows: (–1, 1) relative to the transaction

announcement and (–5, 5). Table 2 reports the mean and median of our PBs estimates after truncating two observations (the highest and lowest PB estimates).[7]

Panel A summarises the overall sample results. The mean ratio of PBs to market value of equity is about 0.25 when we use the Barclay and Holderness (BH) methodology, and about 0.32 when we use our buyer rationality formulae. These means are not surprising. They are similar to the corresponding mean value of 0.27, estimated by Dyck and Zingales (2004) (see their Table 2 on p.551) based on a sample of nine Israeli block trades.

Comparing our and BH estimates of PBs we find that for partial control transfers the BH methodology generates significantly lower estimates of PBs – see Panel C. In partial control transfers the mean PBs is 0.31 when we use our revised methodology and 0.16 only according to the BH methodology. Given that the mean PBs for the rest of the firms is about 0.32 (see Panel B), the estimates created by our revised buyer rationality model appear more credible.

The findings on partial control transfers (Panel C) are the most important findings of our study. The main lesson of the findings in Panel C is that the Barclay and Holderness formula does not be fit cases of partial control transfers – it generates severely downward biased estimates of PBs in these cases. The reason for the failure of the BH methodology is that it perceives every block to confer (transfer) full control. In partial control transfers this BH assumption is wrong; only part of the control (and PBs) is transferred, hence the block premium paid covers the value of only part of firm's PBs. Our revised model takes this fact into account, and amends the calculations. Thus, our revised methodology appears as an important extension of Barclay and Holderness (1989). Without our elaboration, estimated PBs (from partial control transfers) and consequently also rankings of PBs across firms are biased. With our model it is possible to credibly handle all kinds of block transactions.

Also encouraging for our model is the fact that the assumption of seller rationality (see the last columns in Table 2) generates almost identical average PBs estimates as buyer rationality (the first columns in Table 2). This reinforces our confidence in our estimate of average PBs.

4.2.2 The impact of the correction for initial holdings

The second modification to the BH formula proposed by us is an adjustment for buyer's initial (pre-block trade) holdings – see equation (7.2), and an adjustment for seller residual (post-block trade) holdings – see equation (9). These are corrections that are basically intended to improve the performance of our main correction (the correction for partial control transfers).

Consider, for example, cases where buyer had holdings and was part of the control group before the block transaction.[8] If we apply our equation (6), $b = w \cdot prem \,/\, \pi_1$, bluntly, we will err, because π_1, the block buyer's share in firm's PBs after the transaction, comprises also π_0, the buyer's share in PBs before the transaction. The block premium is paid for the addition in buyer's PBs and not for the already existing (prior share in) PBs.

Table 2 PBs as a proportion of the market value of equity: the impact of our correction for partial control transfers

	Buyer rationality						*Seller rationality*	
	Our model		*BH version*		*t-test of difference*		*Our model*	
	Mean PB[a]	*Median PB*	*Mean PB*[a]	*Median PB*	*t value*	*p value*	*Mean PB*[a]	*Median PB*
Panel A: Overall sample (52 block trades)								
Using (–1, +1) stock price data	0.315	0.235	0.250	0.225	1.45	0.15	0.324	0.235
Using (–5, +5) stock price data	0.318	0.247	0.252	0.218	1.48	0.14	0.344	0.244
Panel B: Full control transfers (30 block trades)								
Using (–1, +1) stock price data	0.314	0.244	0.314	0.244	0.00		0.327	0.239
Using (–5, +5) stock price data	0.323	0.247	0.323	0.247	0.00		0.368	0.277
Panel C: Partial control transfers (22 block trades)								
Using (–1, +1) stock price data	0.315	0.197	0.162	0.078	2.01	0.05	0.323	0.214
Using (–5, +5) stock price data	0.312	0.234	0.157	0.073	2.10	0.04	0.318	0.223

Notes: [a]PB is estimated private benefits divided by the market value of firm equity. All mean values are significantly different from zero at the 1% level.

Table 3 PBs as a proportion of the market value of equity: the impact of our correction for buyer's initial holdings

	Our mode		*Our model ignoring initial holdings*[b]		*t-test of difference*		*Our model with an intuitive correction for initial holdings*[c]		*t-test of difference*	
	Mean PB[a]	*Median PB*	*Mean PB*[a]	*Median PB*	*t value*	*p value*	*Mean PB*[a]	*Median PB*	*t value*	*p value*
Panel A: Overall sample (52 block trades)										
Using (–1, +1) stock price data	0.315	0.235	0.290	0.227	0.50	0.61	0.311	0.235	0.07	0.94
Using (–5, +5) stock price data	0.318	0.247	0.290	0.225	0.58	0.56	0.311	0.239	0.15	0.88
Panel B: Block trades where buyer had no initial holdings (40 block trades)										
Using (–1, +1) stock price data	0.336	0.244	0.336	0.244	0.00		0.336	0.224	0.00	
Using (–5, +5) stock price data	0.337	0.247	0.337	0.247	0.00		0.337	0.247	0.00	
Panel C: Block trades where buyer had initial holdings (12 block trades)										
Using (–1, +1) stock price data	0.242	0.159	0.135	0.094	1.74	0.106	0.227	0.184	0.20	0.84
Using (–5, +5) stock price data	0.254	0.217	0.134	0.111	2.03	0.058	0.224	0.183	0.44	0.66

Notes: [a]PB is estimated private benefits divided by the market value of firm equity. All mean values are significantly different from zero at the 1% level.

[b] $b_1 = \frac{w \cdot prem}{\pi_1^P}$ where w is block's size in percentage of firm equity, *prem* is block's price premium and π_1^P is buyer's share in total private benefits after the block trade.

[c] $b_1 = \frac{w \cdot prem}{\pi_1^P - \pi_0^P}$ where $\pi_1^P - \pi_0^P$ is the increase in buyer's share in total private benefits due to the block purchase, and the rest of the variables are as above.

In fact, the intuitive correction, $b = w \cdot prem / (\pi_1 - \pi_0)$, may also be insufficient, because part of the buyer's gains from the block transaction stems from the upward revaluation of his or her prior stock holdings. (Block trades are typically accompanied by a positive stock price response). Only the more elaborate formally-derived equation (7.2) takes full account of the various operating factors.

Table 3 examines the effect of our correction for buyer's initial holdings. The most important results are summarised in Panel C – cases where the buyer had initial holdings. Three different PB estimates are presented: those generated by our model [equation (7.2)], generated by our model without a correction for initial holdings [equation (6)], and generated by our model with an intuitive correction for initial holdings ($b = w \cdot prem / (\pi_1 - \pi_0)$).

As Panel C shows, in cases where buyer has initial holdings, carelessly estimating PBs by equation (6) can lead to a large bias. The mean estimated PBs in cases where buyer has initial holdings is about 0.25 using our corrected-for-initial-holdings model, and 0.135 only when we do not correct for initial holdings (i.e., when we use equation (6) for these cases). The difference in means between the corrected and non-corrected estimates is statistically significant (or marginally statistically significant) at the 10% level – see the t-test of difference in Panel C. In essence, PBs estimates obtained by applying equation (6) to cases where buyer has initial holdings appear too low – they are lower than other mean PB estimates in our sample (that are about 0.3). Thus, for cases with initial holdings, the application of our corrected formula [equation (7.2)] appears crucial.

Panel C also demonstrates that an intuitive correction for buyer's initial holdings, dividing the block premium (as a percentage of firm equity) by the net increase in buyer's share in PBs, might be able to provide reasonable estimates of PBs. The mean estimated PBs using the intuitive correction, 0.225, appears close enough to the about 0.25 mean estimate obtained by using our more formal and exact model. (The differences between these means are statistically insignificant – see Panel C.) Perhaps the intuitive correction method may be used for quick 'back of the envelope' approximations.

5 Summary and conclusions

The study makes several contributions. First and foremost, we extend and elaborate the Barclay and Holderness (1989) methodology for estimating the PBs of control from large block trades. The revised Barclay and Holderness-type methodology we develop, provides reasonable estimates of PBs even in cases, such as partial control transfers, where the traditional Barclay and Holderness methodology fails (generates severely downward biased estimates). In short, we offer an improved and more complete Barclay and Holderness type procedure for estimating PBs of control. Also noteworthy, we claim that the Barclay and Holderness methodology and our extensions remain central in the area, even when more sophisticated econometric methodologies (such as Albuquerque and Schroth, 2010) are developed. This is because the Barclay and Holderness type models are more robust (less model dependent), easier to use, and most importantly more relevant to the real world situation. [Albuquerque and Schroth (2010) methodology assumes public tender offers can be employed to gain control, which is far from the reality in many closely held firms and many outside of the US economies.]

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Appendix A

Estimation based on seller's rationality

Before the transaction, the value of the block seller investment in the firm is:

$$\alpha \cdot Y_0 \cdot \left[1 - B_0\right] + \pi_0^S \cdot Y_0 \cdot B_0 \tag{A1}$$

where α is seller's holdings as a proportion of firm equity, Y_0 is firm's equity value (before PBs are consumed), B_0 is firm's total PBs' consumption as a proportion of firm's equity value, and π_0^s is seller's share in PBs.

The post-transaction value of block seller's investment in the firm is:

$$(\alpha - w) \cdot Y_1 \cdot \left(1 - B_1\right) + \pi_1^S \cdot Y_1 \cdot B_1 \tag{A2}$$

where w is the block sold as a proportion of firm's equity, and the index 1 denotes the post-transaction situation.

To complete the picture, seller's post-transaction wealth also includes the block proceeds, BP, expressed as:

$$BP = w \cdot Y_0 \cdot \left[1 - B_0\right]\left[1 + PREM\right] \tag{A3}$$

where *PREM* is the premium that the buyer paid relative to the *pre-trade* market price, i.e., 1 + *PREM* equals the ratio of block price per share to market pre-trade price.

We now assume that the seller is rational, hence BP must be equal or exceed the seller's wealth loss, and

$$\underbrace{\alpha Y_0\left[1 - B_0\right] + \pi_0^S Y_0 B_0}_{\text{seller's pre-trade value}} - \underbrace{(\alpha - w) Y_1\left(1 - B_1\right) - \pi_1^s Y_1 B_1}_{\text{seller's post-trade value}} \leq \underbrace{\alpha Y_0\left[1 - B_0\right](1 + PREM)}_{\text{total block proceeds received by the seller}} \tag{A4}$$

Practical estimation based on equation (A4) distinguishes between the following two cases:

1 Seller sells all her holdings.

In such a case equation (A4) becomes:

$$b_0 \leq \frac{\alpha \cdot PREM}{\pi_0^S} = \frac{w \cdot PREM}{\pi_0^S} \tag{A5}$$

where $b_0 = B_0 / (1 - B_0)$ is firm's total PBs as a proportion of the market value of firm's equity, in the period before the block sale.

2 Block seller does not sell all her holdings.

In such a case, an effective way to progress is to assume that total PBs' consumption does not change ($B_0 = B_1$). Equation (A4) becomes:

$$b \le \frac{w \cdot y_0 \cdot PREM + (\alpha - w)\left(y_1 - y_0\right)}{y_0 \cdot \pi_0^S - y_1 \cdot \pi_1^S} \tag{A6}$$

where b is as defined above.

Dividing equation (A6) by y_0 we get:

$$b \le \frac{w \cdot PREM + (\alpha - w) \cdot r_i}{\pi_0^S - \left(1 + r_i\right) \cdot \pi_1^S} \tag{A7}$$

where $r_i = (y_1 - y_0) / y_0$ is firm's stock return in response to the transaction, which can be approximated by the stock CAR around the block trade announcement.

Appendix B

A manual for PBs' estimation

Buyer's perspective

Step 1 Calculate block premium – *prem*, relative to *post* trade stock price (the price one and/or five days after the trade has been announced). In cases where the computed premium is negative, stop and quit. Negative block premiums lead to negative PBs estimates. This unintuitive result can emerge in cases of financially distressed firm undergoing a restructuring process (see Barclay and Holderness, 1989); and/or in a situation where the incumbent management (current controllers) is too weak to properly oppose the buyer in a control contest (see Albuquerqe and Scroth, 2010). Thus, negative block premiums estimates should be handled with care, and, in general, cannot serve to reliably estimate PBs.

Step 2 Estimate firm's pre- and post-trade ultimate ownership structure (taking into account pyramids and cross holdings). This will allow the identification of firm's control group – w_0, π_0^P as well as π_1^P. If w_0 does not equal 0, skip to Step 3a.

Step 3 Estimate PB as percentage of equity value using equation (6):

$$b = \frac{w \cdot prem}{\pi_1^P}$$

Step 3a Estimate the CAR around trade announcement day. We use CAR(–5, 5) and CAR(–1, 1). Then, estimate PB as a percentage of equity value based on equation (7.2):

$$b = \frac{w \cdot \left(1 + CAR_i\right) \cdot prem - w_0 \cdot CAR_i}{\pi_1^P \cdot \left(1 + CAR_i\right) - \pi_0^P}$$

Seller's perspective

Step 1 Calculate block premium – PREM, relative to *pre-trade* stock price (the price one and/or five days before the trade has been announced). In cases where the computed premium is negative, stop and quit. These cases are problematic for extracting reliable estimates of PBs – see above.

Step 2 Estimate firm's pre- and post-trade ultimate ownership structure (taking into account pyramids and cross holdings). This will allow the identification of firm's control group – π_0^S as well as π_1^S. If π_1^S does not equal 0, skip to Step 3a.

Step 3 Estimate PB as percentage of equity value based on equation (8):

$$b = \frac{w \cdot PREM}{\pi_0^S}$$

Step 3a Estimate the CAR around trade announcement day. We use CAR(–5, 5) and CAR(–1, 1). Then, estimate PB as a percentage of equity value based on equation (9):

$$b = \frac{w \cdot PREM + (\alpha - w) \cdot CAR_i}{\pi_0^S - \left(1 + CAR_i\right) \cdot \pi_1^S}$$

Notes

1 The Shapley value of Milnor and Shapley (1978) measures the strategic power of a player (say the public), by calculating how pivotal are the player (i.e., public) shares for building a majority vote block.

2 Interestingly, Dyck and Zingales (2004) omitted partial control transfers from their sample, noting that the BH methodology is applicable only for full-control transfers.

3 To obtain Barclay and Holderness formula for *b* divide their estimated PBs [see our equation (1)] by N·PM (the total market value of firm equity after the block announcement).

4 Notably, block purchasers in Israel are not committed to a mandatory bid rule, as long as their post-trade total holdings do not exceed 90% of firm's shares.

5 We checked and verified that indeed in these five firms the block transactions were part of a major restructuring process.

6 We did not use the market model methodology because the block transaction is commonly a significant ownership structure change. Thus, the period before and/or after the block transaction, which serves in the market model methodology for parameter estimation, may be non-representative – may involve some extraordinary successes, difficulties or structural changes that triggered or followed the block trade. Dyck and Zingales (2004) also use the net of market approach.

7 Truncating outliers is customary in PBs research – see Laporta et al. (2002), for example.

8 Analogous qualitative conclusions are drawn when we analyse the impact of the correction required for residual seller holdings [equation (9)]. We prefer to present and discuss the impact of buyer's initial holdings because it is a larger sample.