

**BLOCK TRADES AND ASSOCIATED PRICE IMPACT:
INTERNATIONAL EVIDENCE ON THE TWO ASYMMETRIES**

ALEX FRINO^{a,*}, DIONIGI GERACE^b and ANDREW LEPONE^a

^a *Finance Discipline, Faculty of Economics and Business, University of Sydney,
NSW, 2006, Australia.*

^b *School of Accounting and Finance, Faculty of Commerce, University of Wollongong,
NSW, 2522, Australia*

Abstract

Previous literature has documented two interesting findings related to block trades, predominantly in the US. The first is a directional asymmetry following block trades, whereby continuations follow purchases, and reversals follow sales. The second is a permanent price impact asymmetry, with block purchases having greater impact on stock prices. This paper examines if these two asymmetries are robust across international stock exchanges employing various trading mechanisms. We are able to confirm the existence of the directional asymmetry in four markets, and a permanent price impact asymmetry in all five markets. Transition to quote data resolves the directional asymmetry, but the permanent price impact asymmetry remains.

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* Corresponding Author. Finance Discipline, School of Business, University of Sydney, NSW, 2006, Australia. Tel: +61 2 9227 0889 Fax: +61 2 9351 6461 Email: afri1432@usyd.edu.au. This research has been funded by the Cooperative Research Centre for Technology Enabled Capital Markets. The authors thank SIRCA for the provision of data and Joel Fabre, Vito Mollica, Teddy Oetomo, Joel Grant and Zaffar Subedar for useful comments.

1. Introduction

The price impact of block trades has been an extensively studied area in extant literature. The ever increasing participation by institutional investors in stock markets worldwide has primarily lead to this research.¹ The explosion of institutionally managed investments, especially pension-fund related, is demanding an implicit understanding of the impact that their trades have. In this paper, we aim to gain this greater understanding of the impact that these institutional trades have in an international setting.

The overwhelming majority of past research has reached a consensus that block trades impact stock prices. Going as far back as Kraus and Stoll (1972), when a large parcel of stock is either purchased or sold, the underlying stock price has been shown to experience some form of price adjustment. The degree of price adjustment, however, has varied. Holthausen, Leftwich and Mayers (1987) show that the impact to a block purchase on the NYSE was 161 basis points. Chan and Lakonishok (1993) find the corresponding impact to be only 34 basis points. Gemmill (1996), on the London Stock Exchange, find an impact of approximately 13 basis points, while Aitken and Frino (1996) find an impact of 51 basis points. The degree of price adjustment to block trades still remains a point of contention in the literature.

Although the concept of block trades impacting on the stock price is accepted, the exact nature of this impact is far from settled. There are two main issues that have arisen in the literature. The first, and perhaps most perplexing, is the directional asymmetry following block transactions. Stock prices continue to rise after block purchases, whilst there is a partial reversal following block sales.² The second, and

¹ Over 70 percent of trading on stock markets worldwide is institutionally based (Jain, 2003).

² See Holthausen et al. (1987, 1990), Choe, McInish and Wood (1992), Chan and Lakonishok (1993, 1995), Keim and Madhavan (1995), Aitken and Frino (1996) and Bonser-Neal, Linnan and Neal (1999).

arguably most important issue, is that of the permanent price impact asymmetry. The overall impact to block purchases is greater than for block sales.³ It is these two issues that form the basis for this paper.

The directional asymmetry has been described as both “intriguing” (Holthausen et al. 1987, p90 and Chan and Lakonishok, 1993, p175) and a “key puzzle” (Chan and Lakonishok, 1993, p197). The apparent price continuation following block purchases, and partial reversal following block sales, suggests that block sellers pay a liquidity premium, while block buyers do not. The literature has suggested several possible explanations for this asymmetric behaviour. Information effects may be stronger for purchases than sales; specialists are more willing to accommodate sales rather than purchases; and short-term imbalances in supply and demand (see Chan & Lakonishok, 1993 and Saar, 2001). To date, none of these explanations has been exclusively accepted.

The permanent price impact asymmetry has also received considerable attention. While it has been consistently shown that block buys move prices up, and block sales move prices down, the degree of price movement, together with the continuation / reversal just described, has led to a disparity in measured price effects, with purchases having a greater impact than sales. Saar (2001) argues that the history of the price performance of the stock has significant influence. He finds that a long price run-up prior to a block transaction can actually lead to a negative asymmetry (sales move more than buys). Chiyachantana, Jain, Jiang and Wood (2004) find that the performance of the market in which the stock trades is most important. During a bull period, block purchases will have greater price impact, whilst bearish periods will lead to sales having greater price impact.

³ See Holthausen et al. (1987, 1990), Chan and Lakonishok (1993, 1995 and 1997), Keim and Madhavan (1995, 1996 and 1997), Aitken and Frino (1996), Gemmill (1996) and Bonser-Neal et al. (1999).

The documentation of these two asymmetries has predominantly been based on data captured from the NYSE. Studies including Tinic and West (1974), Neal (1992), Pagano and Roell (1996) and Nimalendran and Petrella (2003) demonstrate that depth, liquidity and execution costs vary considerably across specialist based, auction based and dealer based trading systems. If the measurement of price impact is affected by the trading system employed, then the existence and nature of the two asymmetries is also likely to vary.

The few studies conducted outside of the NYSE already exhibit this variation. Gemmill (1996) on the London Stock Exchange finds little to no permanent price impact for block sales, and reversals following both purchases and sales. Aitken and Frino (1996) on the ASX find that the continuation and reversal pattern following block purchases and sales exists even in an event-study methodology. As the NYSE employs a specialist market structure, the asymmetrical stock price responses may be attributable to some specialist specific reaction.

The aim of paper is to explore if these two asymmetries are robust across international markets employing various trading mechanisms. By analysing the price impact of block trades from five of the largest exchanges, covering the three major trading regions (North America, Europe and Asia-Pacific), we are able to determine if (i) the directional asymmetry exists in a range of markets, and (ii) the existence and nature of any permanent price impact asymmetry in these same markets. Going beyond this, by making a microstructural adjustment for the five international markets, we investigate the role of bid-ask effects in a range of trading environments.

The remainder of this paper is organised as follows. Section 2 describes the dataset and subsequent sample used. Section 3 sets out the research design, Section 4

presents the empirical results, while Section 5 presents several additional tests.

Section 6 summarises the paper.

2. Data and Sample

In order to analyse block trades in an international setting, the sample is drawn from trades executed in the following markets - New York Stock Exchange (NYSE) in the US, the London Stock Exchange (LSE), Xetra (from Germany) and Euronext in Europe and the Tokyo Stock Exchange (TSE) in the Asia-Pacific Region.⁴ These markets are selected as they constitute the largest markets, based on market turnover, within each of the three major trading regions.

Sample trades are limited to the largest 200 stocks, by total turnover, in each calendar year in the sample. As there is no standard definition across exchanges, to ensure consistency block trades are defined as the largest one percent of on-market transactions for each stock, by volume, in each calendar year, over the sample period. The data used in this paper is sourced from a Reuter's database for the period January 1, 1999 to December 31, 2002. In order to convert all monetary values into US dollars, daily exchange rate data is sourced from DataStream over the relevant sample period.

An integral part of this analysis is the classification of trade direction. Trades are classified as being buyer or seller initiated using the trade direction algorithm set out in Ellis, Michaely and O'Hara (2000). Trades which execute at the ask quote are classified as buyer initiated. Similarly, trades which execute at the bid quote are classified as seller initiated. Trades which execute at neither the ask or the bid are

⁴ Euronext is a conglomeration of the Paris, Brussels, Amsterdam and Lisbon Stock Exchanges.

classified using the tick test.⁵ If the last price change was an uptick, the trade is buyer initiated; if the last price change was a downtick, the trade is seller initiated. If the last price change was a zero tick, then the block price is compared to the price two (and then three) trades before. If the third trade price does not result in a classification, the trade is then removed from the sample. Bid and ask quotes at the time the trade was executed are used as both Bessembinder (2003) and Peterson and Sirri (2003) demonstrate the accuracy of trade classification rules are improved as the time difference between trades and quotes decreases.

To assist in the comparability of results, all trade values are converted into US Dollars using day-average exchange rates. Within several tables throughout the remainder of this paper, results are presented across sub-divisions of the sample. The largest 200 stocks (by turnover) are further segregated into 4 equal groups of 50 stocks, for each calendar year, again based on turnover. For example, columns 2 and 3 in Table 1 represent the descriptive statistics for the least liquid quartile of stocks in the sample, for buyer- and seller- initiated transactions respectively. The final two columns represent results for the entire sample of 200 stocks (again, buyer- and seller-initiated, respectively).

Table 1 presents descriptive statistics for block trades for all of the five markets included in the sample. Looking at the number of trades analysed, the NYSE has approximately 967,000 purchase and 675,000 sale transactions over the four year period. The LSE has approximately 530,000 purchases and 535,000 sales, Xetra has 374,000 purchases and 330,000 sales, while Euronext has 501,000 purchase and 481,000 sale transactions. The volume of trading in the Asia-Pacific region is much more subdued, with the TSE having only 69,000 purchase and 58,000 sale

⁵ Lee and Ready (1991) report a high degree of correlation in trade direction classified by the tick rule and quote based methods.

transactions, although only two years of data (from January 1, 2001 to December 31, 2002) are available for analysis.

Looking across the four sample sub-divisions, an overwhelming amount of the volume of block trading is concentrated in the largest quartile. For all exchanges, apart from the NYSE, approximately 50 percent of trading occurs in the largest quartile of the sample. Still looking at the number of trades, apart from the NYSE (in which there are approximately 290,000 more purchase transactions), there is a strong parity in the number of buyer- and seller- initiated transactions within each market.

Turning to the average size of block trades, the average trade value for NYSE trades is approximately \$2.6 million. Looking at the European markets, the average trade values for the LSE are approximately \$1.8 million, for Xetra \$1.6 million and \$1.25 million for Euronext. In the Asia-Pacific region, the TSE has average trade values of approximately \$1.7 million, which is larger than for both Xetra and Euronext.

Finally, the spreads immediately prior to each block transaction indicates that Xetra has the tightest spreads, with averages around the 0.19 percent level. Euronext has average spreads of approximately 0.22 percent. The average spread on the NYSE measures approximately 0.25 percent. The average spreads for both the LSE and TSE are over 0.3 percent. Looking across the size sub-divisions, the most liquid stocks have tighter spreads, with sales in the most liquid group on Xetra having an average spread of 0.1271 percent.

Overall, it can be seen that the NYSE is the dominant exchange, both in terms of trade frequency and trade size. The three European markets are relatively similar in terms of their trading activities. The TSE, whilst having significantly fewer transactions, has trade sizes directly comparable to the European markets. Although

the largest 200 stocks within each of the markets are not in general affected by liquidity concerns, the largest 50 stocks within each market clearly dominate all other stocks, both in terms of trading frequency and trade size. Most importantly, buyer- and seller- initiated transactions, across all size sub-divisions, and across all markets, are relatively similar. Any differences between these types of transactions are not likely to drive any differences in results.

3. Research Design

To ensure consistency and comparability with prior research, the price behaviour surrounding block transactions is calculated using three price impact. In calculating the price effects, the pre-execution benchmark is taken to be the opening transaction price on the day of the block trade. The post-execution benchmark is taken to be the closing transaction price on the day of the block trade.

With these pre- and post- execution benchmarks, the price impacts are calculated as follows.

$$\text{Total Effect} = \frac{\text{Block Price} - \text{Open Price}}{\text{Open Price}} \quad (1)$$

$$\text{Temporary Effect} = \frac{\text{Close Price} - \text{Block Price}}{\text{Block Price}} \quad (2)$$

$$\text{Permanent Effect} = \frac{\text{Close Price} - \text{Open Price}}{\text{Open Price}} \quad (3)$$

In order to test whether bid-ask effects influence price behaviour following block trades, the analysis based on transaction prices is repeated using prevailing quotes associated with each transaction, as follows. As block purchases generally occur at

the ask quote, and block sales at the bid quote, the quotes in the above three equations represent either the opening ask (bid) or closing ask (bid) for block purchases (sales). Reliance on quote returns should eliminate any potential bid-ask effects in transaction price data.

4. Empirical Results

4.1 Transaction Price Results

Panel A of Table 2 presents the results for the total effect calculated using transaction price data for the largest 200 stocks in each exchange. For the NYSE, the total effect indicates significantly positive returns for buyer initiated transactions, and significantly negative returns for seller initiated transactions. The reaction to sales appears to be greater than for purchases (-0.5488 percent versus 0.1803 percent), and this pattern holds across the four size sub-divisions.

The results for the European markets are quite similar to the NYSE. Purchases are associated with significantly positive returns, sales with significantly negative returns. Seller initiated transactions again appear to have larger impacts, and this is most evident in Xetra (0.3357 percent for buys and -0.6650 percent for sales). This pattern holds in all but the smallest size sub-division of the samples. Moving on to the TSE, as with the other four markets, the significantly positive / negative reaction to buyer- / seller- initiated transactions is evident. Unlike with the other markets, the TSE indicates similar reactions for both purchases and sales, and this holds across all size sub-divisions.

One of the main aims of this paper is to explore the directional asymmetry that has been documented previously. Panel B of Table 2 presents these results, again for

the largest 200 stocks. Starting with the NYSE, there are continuations in the stock price following buyer initiated transactions (significantly positive returns), and partial reversals in the stock price following seller initiated transactions (again, significantly positive returns). This continuation / reversal pattern is consistent across the four size sub-divisions. This confirms that the NYSE exhibits the asymmetric behaviour.

The results for two of the three European markets have a strong resemblance with the NYSE results. For Xetra and Euronext, the continuation following purchases, and partial reversal following sales is evident (although the continuation following purchases is insignificantly different from in the largest size sub-division on Euronext). The LSE results indicate significant reversals following both buyer- and seller- initiated transactions, which hold in each of the four size sub-divisions. This was expected, however, as Gemmill (1996) found very similar results when analysing the London market. Finally, for the TSE, the continuation following purchases and partial reversal following sales is evident in the aggregated results, although some of the four size sub-groups indicate that these continuations / reversals are insignificantly different from zero.

Another major objective of this paper is to calculate the permanent price impact, and explore if any asymmetries exist, as well as the direction they occur. Panel C of Table 2 presents the results for the permanent effect. The difference figure with the permanent effect in Table 2 is calculated by subtracting the absolute value of the permanent effect for sales from the absolute value of the permanent effect for purchases. A positive difference thus indicates that purchases have larger permanent effects, whilst a negative difference indicates that sales have larger permanent effects. Commencing with the NYSE, purchases are associated with a permanent effect of 0.2471 percent, while sales have a -0.4633 percent impact. The difference of -0.2162

percent is significantly different from zero, indicating that block sales have larger permanent effects. This pattern holds across all size sub-divisions.

Turning to the European trading region, results indicate some form of asymmetry for all markets. The results for the LSE indicate that the mean permanent effect for buyer initiated transactions is significantly negative, while the mean permanent effect for seller initiated transactions is significantly positive. Even with this unusual finding, the test of the difference indicates that block sales have significantly larger permanent effects.⁶ With the other two European markets, both Xetra and Euronext indicate a permanent price impact asymmetry, with seller initiated transactions having greater impact. This holds across all size sub-divisions, except for the smallest group on Euronext which has an asymmetry favouring block purchases.

Moving on to the Asia-Pacific region, the TSE has significantly positive and negative permanent effects for block purchases and sales, respectively. Unlike with the other four markets, the reaction to purchases is significantly larger than the reaction to sales. This holds in all but the second size sub-division (which has a difference insignificantly different from zero).

To summarise, the directional asymmetry that has been previously documented is clearly evident in four of the five markets analysed. With the market that does not conform, the LSE provides results which are consistent with previous findings. The permanent price impact asymmetry is clearly evident in some form (either favouring buys or sells) in all five stock exchanges. The asymmetries are robust across international stock exchanges.

⁶ Effectively, the positive impact for block sales is smaller than the negative impact for block purchases.

4.2 Quote Data Results

To control for any microstructural biases in the transaction data, the same three price effects are recalculated using ask quotes for purchases, and bid quotes for sales. These results, calculated for the largest 200 stocks in each exchange, are presented in Table 3. The total effect in Panel A is significantly positive for block purchases, and significantly negative for block sales, in each of the five markets. This holds across the four size sub-divisions, and is consistent with the transaction price results presented in Table 2.

More importantly, the temporary effect experiences significant changes when moving to quote data. For the NYSE, the continuations following purchases remain with quote data, although the magnitude of the continuation is now greater. However, the reversals following block sales have transformed into continuations. The continuation following purchases measures 0.1479 percent, while it is -0.0608 percent for sales. These continuations are robust across the four size sub-divisions. There are now symmetrical stock price reactions following block purchases and sales on the NYSE.

The three European markets are remarkably similar to the NYSE. For Xetra and Euronext, the reversals following sales have turned into continuations measuring -0.1837 percent and -0.1411 percent, respectively. The continuations following purchases remain, as with transaction prices. The reversals following buys and sells on the LSE are now significant continuations, measuring 0.1051 percent for purchases, and -0.0581 percent for sales. These continuations hold across all four size sub-divisions. Finally, the reversals following block sales on the TSE have transformed into continuations measuring -0.1759 percent and this holds in all four

size groups. Overall, when quote data is used, the stock price continues to rise after block purchases, and fall after block sales, for all five exchanges.

As the temporary effect has changed considerably, the permanent effect (and associated asymmetry) may also have changed. The results are presented in Panel C of Table 3. The difference between buys and sells is as discussed previously. For the NYSE, the asymmetry favours block sales, consistent with the transaction price results, and holds across all four size sub-divisions. Both Xetra and Euronext, as with transaction prices, indicate that block sales have larger permanent effects.

The permanent effect for block purchases on the LSE now show significantly positive returns (0.4037 percent), while block sales have significantly negative returns (-0.4740 percent), leading to an asymmetry which favours block sales. The size sub-division results for the three European markets are consistent. The TSE, in contrast to the transaction price results, now shows that block sales are associated with significantly larger permanent effects, which holds in all but the smallest size group.

To summarise, the transition to quote data has impacted on the results. All of the five markets now indicate that stock price continuations follow both block purchases and block sales. The directional asymmetry is now redundant. However, the permanent price impact asymmetry still remains. In all five markets, block sales are associated with significantly larger permanent price effects. The removal of microstructural biases from return measurement has lead to significant changes in the price impact of block trades from international stock exchanges.

5. Additional Tests

5.1 Bull and Bear Markets

A study by Chiyachantana, Jain, Jiang and Wood (2004) shows how the behaviour of the underlying market affects the price impact of block trades. Effectively they showed that during bull markets, block purchases will have larger permanent price effects, whilst during bear markets, block sales will have larger permanent effects. To explore if the trades included in the current sample react in similar ways, we collected market return data (using relevant MSCI indexes on DataStream) for each of the five exchanges. We then calculate 48 monthly returns, and place block trades executed in months which experienced positive returns in one sample, and block trades executed in months which experienced negative returns in the other sample. The total, temporary and permanent effects are then calculated using bid and ask quotes for the bull and bear market samples separately. The aggregated results are presented in Table 4.

Simple summary statistics (number of transactions, average volume and average value) are presented in the first few columns, and are consistent with the original summary statistics presented in Table 1. Panel A presents the results for bull market months. The total effects are all positive for purchases and negative for sales. There are stock price continuations following purchases and sales, although the continuation following sales on the NYSE is not significantly different from zero. For the NYSE and the three European markets, the permanent effect for block purchases is significantly greater than the permanent effect for block sales.

While the TSE still indicates that sales have larger permanent effects, the magnitude of the difference (-0.0283 percent) is much smaller than the original results

(-0.0951 percent) in Table 3. Panel B presents the results for bear market months. In each of the five markets analysed, block sales have significantly larger permanent price effects. Consistent with Chiyachantana, Jain, Jiang and Wood (2004), block purchases have larger and block sales have smaller price impact during bull markets, while block sales have larger and block purchases have smaller price impact during bear markets.⁷

5.2 Alternative Block Trade Definition

While there is no standard block trade definition across exchanges, the selection of the largest one percent of trades (by volume) can be considered a somewhat arbitrary choice. To explore whether this definition of block trading unduly impacts on results, we reselect block trades using an alternative definition. On each trading day in the sample, the average daily turnover over the previous three months is calculated. Each trade value is then compared to this average daily turnover, and if the trade represents at least 2.5 percent of average daily turnover, it is classified a block trade. The three price effects are then calculated for this new sample. The aggregated results are presented in Table 5.

The number of transactions analysed under this alternative definition is greatly reduced (for example, the NYSE originally had 1,643,155 block trades, and now has 338,350 block trades). Accordingly, the average volumes and values have increased considerably (for example, the average sell value on Xetra is now approximately \$7.1 million, up from \$1.6 million). The total effects are still positive for purchases and negative for sales. There are still significantly positive continuations following purchases, and significantly negative continuations following sales. However, the

⁷ The continuations following both block purchases and sales when quote data is used is consistent during bull and bear markets.

permanent price impact asymmetry has changed, with the LSE now indicating that block purchases have larger permanent price effects (the NYSE, Xetra and Euronext still have an asymmetry favouring block sales). There also appears to be no difference between the permanent effect for block purchases and sales on the TSE. Overall, the results seem relatively robust with the alternative block trade definition.

5.3 Alternative Pre- and Post- Block Trade Benchmarks

All price impacts are calculated using either the opening or closing quotes. It may be that in the time between the open and the trade, or between the trade and the close, other market activities are also affecting the stock price. To isolate the impact of each trade, we narrow the event window around each order. We substitute the opening quotes with the quotes in existence five trades and ten trades before the block trade, and the closing quotes with the quotes in existence five trades and ten trades after the block trade.⁸ We then recalculate all price impacts using these ‘new’ pre- and post- execution benchmarks. The results are presented in Table 6.

The five trade results are presented in Panel A. As the sample is identical to that used in Table 1 through Table 3, no summary statistics are reported. The total effect, as with all cases, is significantly positive for purchases and significantly negative for sales. There are significantly positive continuations following purchases and significantly negative continuations following sales. The permanent effect is larger for sales, although the difference is insignificantly different from zero for both Euronext and the TSE. The ten trade results (in Panel B) are very similar, except that the difference between the permanent effect for purchases and sales is significantly

⁸ If the order is placed in the first five or ten trades of the day, or executes in the final five or ten trades of the day, the opening and closing quotes are left in place.

negative for all five markets. The choice of pre- and post- execution benchmarks is not significantly affecting results.

5.4 Quote Midpoints

The classification of trades into buys and sells noted the possibility of trades not occurring at the bid or ask quote. Thus, some of the block trades may have executed within the quotes. Calculating the price effects using the ask quote for purchases and the bid quote for sales may not always be accurate. To make a more general microstructural adjustment, the three price effects are recalculated using the midpoint of the opening, block and closing quotes. The results are presented in Table 7. The results are very similar to the earlier findings. The total effect is positive (negative) for buys (sells). There are continuations following both buys and sells. The permanent price impact asymmetry favours block sales for each of the five markets. The use of quote midpoints leads to the same conclusions as with bid and ask quotes.

6. Summary

Much of the previous literature analysing the price impact of block trades has utilised data sourced from trading on the NYSE, which operates predominantly as a specialist market. Several previous studies demonstrate how depth, liquidity and execution costs vary considerably across specialist based, auction based and dealer based trading systems. To explore how these factors affect the price impact of block trades, data encompassing five of the largest stock exchanges, from the three major trading regions around the world - North America, Europe and Asia-Pacific, is used to calculate a series of price effects associated with block trades.

The overall findings in this paper support the directional asymmetry in four of the five markets. In the other market, the LSE indicates that a partial reversal in the stock price follows both block purchase and sale transactions. The permanent price impact asymmetry exists in all five exchanges. When a microstructural adjustment is made to price impact measurement, the directional asymmetry disappears in all markets. The stock price continues to rise after purchases and fall after sales. Even with continuations following both purchases and sales, the permanent price impact asymmetry still remains, favouring block sales in all five markets. These findings are robust across several alternative sample definitions and methods of analysis.

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Table 1
Summary Statistics

This table reports the number of observations, mean and median share volume, trade values and proportional spreads prior to each trade for the block trades analysed in this paper. Statistics are presented for both buyer- and seller- initiated transactions for the largest 200 stocks, by turnover, for each year, in each of the five largest stock exchanges covering the three major trading regions around the world - North America, Europe and Asia-Pacific. The largest 200 stocks in each calendar year are further divided into quartiles, again based on turnover. Group 1 (smallest) represents stocks ranked 151 to 200, Group 2 stocks 101 to 150, Group 3 stocks 51 to 100 and Group 4 (largest) stocks 1 to 50. The final two columns represent the results for all 200 stocks combined. Block trades are defined as the largest one percent of on-market transactions, by volume, in each of the largest 200 stocks, in each calendar year, for each market, for the period January 1, 1999 to December 31, 2002. All monetary values have been converted to US dollars using day-average exchange rates.

	1 (Smallest)		2		3		4 (Largest)		All	
	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells
NYSE										
<i>No. Trades</i>	144,503	99,173	194,502	131,277	220,811	152,313	407,599	292,977	967,415	675,740
<i>Avg. Volume</i>	35,854	40,245	46,183	48,343	55,382	55,362	76,428	66,191	59,483	56,475
<i>Med. Volume</i>	24,500	25,000	30,000	30,000	37,000	39,000	47,000	47,000	36,000	38,000
<i>Avg. Value</i>	1,554,797	1,718,009	1,856,951	1,887,010	2,397,391	2,306,649	3,832,204	3,157,288	2,767,402	2,507,542
<i>Med. Value</i>	1,073,200	1,107,000	1,260,552	1,287,500	1,593,750	1,570,000	2,184,500	2,125,500	1,679,100	1,686,825
<i>Avg. Spread</i>	0.2734	0.2557	0.2793	0.2573	0.2742	0.2555	0.2425	0.2290	0.2617	0.2444
<i>Med. Spread</i>	0.1702	0.1796	0.1792	0.1871	0.1837	0.1898	0.1674	0.1720	0.1735	0.1793
LSE										
<i>No. Trades</i>	92,895	97,224	78,728	80,838	112,854	115,003	245,498	242,710	529,975	535,775
<i>Avg. Volume</i>	474,360	507,925	605,445	652,275	524,892	533,530	733,991	768,959	624,861	653,451
<i>Med. Volume</i>	250,000	250,000	318,400	330,729	250,000	250,000	287,139	292,214	270,000	275,000
<i>Avg. Value</i>	1,262,530	1,267,553	1,318,752	1,380,342	1,547,252	1,445,834	2,273,529	2,276,917	1,799,832	1,780,087
<i>Med. Value</i>	760,230	769,140	784,361	810,030	828,033	832,433	1,300,973	1,303,014	1,007,930	1,009,737
<i>Avg. Spread</i>	0.5000	0.5035	0.4154	0.4143	0.3817	0.3828	0.2613	0.2611	0.3517	0.3543
<i>Med. Spread</i>	0.3711	0.3738	0.3063	0.3063	0.2797	0.2769	0.1889	0.1902	0.2421	0.2436

Table 1, continued

Xetra (German)										
<i>No. Trades</i>	12,446	11,915	25,706	22,588	73,986	62,620	262,152	233,615	374,290	330,738
<i>Avg. Volume</i>	7,434	8,071	10,306	11,874	20,156	27,186	27,362	31,221	24,104	28,301
<i>Med. Volume</i>	4,395	4,628	6,406	6,442	11,515	11,500	10,900	10,400	10,167	10,000
<i>Avg. Value</i>	229,279	240,671	364,752	398,321	792,490	1,025,893	1,908,933	1,977,341	1,526,340	1,626,795
<i>Med. Value</i>	155,431	150,443	218,621	210,191	403,826	384,266	724,718	685,030	595,493	570,980
<i>Avg. Spread</i>	0.6595	0.6328	0.4372	0.4296	0.2535	0.2416	0.1371	0.1272	0.1981	0.1877
<i>Med. Spread</i>	0.5526	0.5115	0.3231	0.3150	0.1698	0.1668	0.0892	0.0869	0.1128	0.1095
Euronext										
<i>No. Trades</i>	19,931	19,251	51,119	48,068	119,872	114,846	310,911	299,141	501,833	481,306
<i>Avg. Volume</i>	18,685	20,867	13,008	12,685	17,887	18,190	24,295	25,424	21,392	22,244
<i>Med. Volume</i>	3,427	3,867	5,000	5,000	8,442	8,591	10,000	10,000	9,607	9,827
<i>Avg. Value</i>	355,244	401,025	409,432	426,063	774,856	791,172	1,627,288	1,635,200	1,249,092	1,263,683
<i>Med. Value</i>	148,005	156,101	180,076	176,955	344,521	342,163	660,773	650,617	491,212	487,534
<i>Avg. Spread</i>	0.6022	0.6005	0.3664	0.3779	0.2356	0.2415	0.1569	0.1614	0.2147	0.2197
<i>Med. Spread</i>	0.4357	0.4382	0.2601	0.2699	0.1658	0.1709	0.1115	0.1174	0.1371	0.1416
TSE										
<i>No. Trades</i>	11,453	9,325	13,131	10,708	14,831	11,995	29,303	25,906	68,718	57,934
<i>Avg. Volume</i>	134,136	134,091	125,091	137,501	123,121	125,816	128,853	120,855	127,777	127,089
<i>Med. Volume</i>	80,000	77,000	49,000	50,000	64,000	64,400	58,000	56,100	60,150	60,000
<i>Avg. Value</i>	756,426	710,831	949,336	936,974	1,272,381	1,204,570	2,610,829	2,488,695	1,695,406	1,649,853
<i>Med. Value</i>	519,056	486,852	648,411	617,847	845,325	796,867	1,446,024	1,393,273	897,260	864,320
<i>Avg. Spread</i>	0.3561	0.3011	0.3554	0.2955	0.3293	0.2796	0.3226	0.2871	0.3359	0.2894
<i>Med. Spread</i>	0.2350	0.2210	0.2090	0.1889	0.2099	0.1982	0.2153	0.2094	0.2167	0.2055

Table 2
Price Effects Surrounding Block Trades Calculated Using Transaction Prices

This table reports the total effect (Panel A), temporary effect (Panel B) and the permanent effect (Panel C), all in percentage, calculated using transaction prices. Results are presented for both buyer- and seller- initiated transactions for the largest 200 stocks, by turnover, for each year, in each of the five largest stock exchanges covering the three major trading regions around the world - North America, Europe and Asia-Pacific. The largest 200 stocks in each calendar year are further divided into quartiles, again based on turnover. Group 1 (smallest) represents stocks ranked 151 to 200, Group 2 stocks 101 to 150, Group 3 stocks 51 to 100 and Group 4 (largest) stocks 1 to 50. The final two columns represent the results for all 200 stocks combined. Statistical significance emanates from the test of whether the price effect (and difference) is significantly different from zero. Block trades are defined as the largest one percent of on-market transactions, by volume, in each of the largest 200 stocks, in each calendar year, for each market, for the period January 1, 1999 to December 31, 2002.

	1 (Smallest)		2		3		4 (Largest)		All	
	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells
Panel A: Total Effect										
NYSE	0.1235**	-0.4458**	0.1474**	-0.5306**	0.1382**	-0.5396**	0.2390**	-0.5966**	0.1803**	-0.5488**
LSE	0.2298**	-0.1870**	0.1129**	-0.2364**	0.0919**	-0.1997**	0.0647**	-0.2340**	0.1066**	-0.2185**
Xetra	0.5850**	-0.9185**	0.4643**	-0.9962**	0.3869**	-0.6546**	0.2968**	-0.6229**	0.3357**	-0.6650**
Euronext	0.5547**	-0.2402**	0.3337**	-0.5703**	0.2800**	-0.4300**	0.1747**	-0.4197**	0.2312**	-0.4300**
TSE	0.4717**	-0.4232**	0.3906**	-0.4469**	0.4115**	-0.4311**	0.6436**	-0.5957**	0.5166**	-0.5063**

Table 2, continued

Panel B: Temporary Effect										
NYSE	0.0728**	0.0875**	0.0677**	0.0981**	0.0671**	0.0828**	0.0639**	0.0804**	0.0667**	0.0854**
LSE	-0.2459**	0.3071**	-0.2522**	0.3168**	-0.2727**	0.3434**	-0.2731**	0.3073**	-0.2651**	0.3165**
Xetra	0.0590**	0.1480**	0.1263**	0.2408**	0.0352**	0.0800**	0.0397**	0.0730**	0.0454**	0.0885**
Euronext	0.1239**	0.1787**	0.0309	0.0322*	0.0457**	0.0412**	0.0008	0.0116*	0.0184**	0.0209**
TSE	0.0067	0.0689**	0.0281	0.0221	0.0438**	0.0185	0.0038*	0.0696**	0.0153**	0.0521**
Panel C: Permanent Effect										
NYSE										
Mean Return	0.1965**	-0.3583**	0.2151**	-0.4325**	0.2054**	-0.4567**	0.3029**	-0.5161**	0.2471**	-0.4633**
Difference	-0.1618**		-0.2174**		-0.2513**		-0.2132**		-0.2162**	
LSE										
Mean Return	-0.0161	0.1200**	-0.1392**	0.0804**	-0.1807**	0.1436**	-0.2083**	0.0733**	-0.1585**	0.0979**
Difference	0.1361**		-0.0588**		-0.0371**		-0.1350**		-0.0686**	
Xetra										
Mean Return	0.6441**	-0.7704**	0.5906**	-0.7554**	0.4222**	-0.5745**	0.3366**	-0.5498**	0.3812**	-0.5765**
Difference	-0.1263**		-0.1648**		-0.1523**		-0.2132**		-0.1953**	
Euronext										
Mean Return	0.6786**	-0.0615*	0.3646**	-0.6026**	0.3258**	-0.3888**	0.1739**	-0.4081**	0.2496**	-0.4090**
Difference	0.6171**		-0.2380**		-0.063*		-0.2342**		-0.1594**	
TSE										
Mean Return	0.4784**	-0.3543**	0.4187**	-0.4247**	0.4553**	-0.4127**	0.6474**	-0.5261**	0.5318**	-0.4915**
Difference	0.1241**		-0.0060		0.0426*		0.1213**		0.0403**	

** Indicates statistical significance at the 0.001 level

* Indicates statistical significance at the 0.01 level

Table 3
Price Effects Surrounding Block Trades Calculated Using Bid and Ask Quotes

This table reports the total effect (Panel A), temporary effect (Panel B) and the permanent effect (Panel C), all in percentage, calculated using ask quotes for purchases and bid quotes for sales. Results are presented for the largest 200 stocks, by turnover, for each year, in each of the five largest stock exchanges covering the three major trading regions around the world - North America, Europe and Asia-Pacific. The largest 200 stocks in each calendar year are further divided into quartiles, again based on turnover. Group 1 (smallest) represents stocks ranked 151 to 200, Group 2 stocks 101 to 150, Group 3 stocks 51 to 100 and Group 4 (largest) stocks 1 to 50. The final two columns represent the results for all 200 stocks combined. Statistical significance emanates from the test of whether the price effect (and difference) is significantly different from zero. Block trades are defined as the largest one percent of on-market transactions, by volume, in each of the largest 200 stocks, in each calendar year, for each market, for the period January 1, 1999 to December 31, 2002.

	1 (Smallest)		2		3		4 (Largest)		All	
	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells
Panel A: Total Effect										
NYSE	0.1769**	-0.2554**	0.1617**	-0.3415**	0.1588**	-0.3696**	0.2110**	-0.4492**	0.1566**	-0.3819**
LSE	0.4251**	-0.3955**	0.3038**	-0.4351**	0.2797**	-0.3955**	0.2576**	-0.4271**	0.2985**	-0.4158**
Xetra	0.5059**	-0.3873**	0.4114**	-0.5421**	0.2804**	-0.2883**	0.1799**	-0.3420**	0.2255**	-0.3417**
Euronext	0.4230**	-0.1426**	0.1990**	-0.4414**	0.2014**	-0.3232**	0.1622**	-0.3152**	0.1808**	-0.3228**
TSE	0.3506**	-0.2988**	0.2633**	-0.2997**	0.2526**	-0.2866**	0.4251**	-0.4053**	0.3445**	-0.3441**

Table 3, continued

Panel B: Temporary Effect										
NYSE	0.1070**	-0.0761**	0.1088**	-0.0572**	0.0928**	-0.0707**	0.1460**	-0.0521**	0.1479**	-0.0608**
LSE	0.1898**	-0.1543**	0.1387**	-0.0860**	0.1391**	-0.0777**	0.0467**	-0.0013	0.1051**	-0.0581**
Xetra	0.3770**	-0.2368**	0.2178**	-0.2399**	0.2297**	-0.2156**	0.1784**	-0.1593**	0.1989**	-0.1837**
Euronext	0.3001**	-0.0072	0.1860**	-0.2066**	0.1557**	-0.1162**	0.0655**	-0.1488**	0.1135**	-0.1411**
TSE	0.1037**	-0.1373**	0.0776**	-0.1702**	0.0358*	-0.1667**	0.0950**	-0.1964**	0.0804**	-0.1759**
Panel C: Permanent Effect										
NYSE										
Mean Return	0.2840**	-0.3316**	0.2705**	-0.3988**	0.2513**	-0.4404**	0.3571**	-0.5013**	0.3046**	-0.4428**
Difference		-0.0476**		-0.1283**		-0.1891**		-0.1442**		-0.1382**
LSE										
Mean Return	0.6150**	-0.5499**	0.4425**	-0.5211**	0.4189**	-0.4733**	0.3043**	-0.4282**	0.4037**	-0.4740**
Difference		0.0651**		-0.0786**		-0.0544**		-0.1239**		-0.0703**
Xetra										
Mean Return	0.8829**	-0.6242**	0.6292**	-0.7821**	0.5102**	-0.5040**	0.3584**	-0.5013**	0.4244**	-0.5254**
Difference		0.2587**		-0.1529**		0.0062		-0.1429**		-0.1010**
Euronext										
Mean Return	0.7231**	-0.1499**	0.3850**	-0.6480**	0.3571**	-0.4395**	0.2278**	-0.4640**	0.2944**	-0.4640**
Difference		0.5732**		-0.2630**		-0.0824**		-0.2362**		-0.1696**
TSE										
Mean Return	0.4544**	-0.4361**	0.3410**	-0.4700**	0.2884**	-0.4533**	0.5201**	-0.6017**	0.4249**	-0.5200**
Difference		0.0183		-0.1290**		-0.1649**		-0.0816**		-0.0951**

** Indicates statistical significance at the 0.001 level

* Indicates statistical significance at the 0.01 level

Table 4
Price Effects Surrounding Block Trades During Bull and Bear Markets

This table reports the number of transactions, average volume, average value, total effect, temporary effect and permanent effect, all in percentage, calculated using ask quotes for purchases and bid quotes for sales. Results are presented for the largest 200 stocks, by turnover, for each year, in each of the five largest stock exchanges covering the three major trading regions around the world - North America, Europe and Asia-Pacific. Trades executed in months where the relevant MSCI index experienced positive returns are placed in the bull-market sample (Panel A), whilst trades executed in months where the MSCI Index experienced negative returns are placed in the bear-market sample (Panel B). Statistical significance emanates from the test of whether the price effect (and difference) is significantly different from zero. Block trades are defined as the largest one percent of on-market transactions, by volume, in each of the largest 200 stocks, in each calendar year, for each market, for the period January 1, 1999 to December 31, 2002.

	No. Transactions		Average Volume (Average Value, \$)		Total Effect		Temporary Effect		Permanent Effect (Difference)	
	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells
Panel A: Bull Markets										
NYSE	402,067	278,703	60,436 (2,917,084)	55,811 (2,574,883)	0.3245**	-0.2353**	0.2392**	-0.0046	0.5637**	-0.2399** (0.3274**)
LSE	202,281	208,348	604,489 (1,775,416)	644,457 (1,715,468)	0.5564**	-0.1858**	0.1206**	-0.0598**	0.6771**	-0.2456** (0.4315**)
Xetra	158,591	134,968	25,330 (1,928,274)	28,781 (1,805,972)	0.4153**	-0.0297**	0.3189**	-0.0391**	0.7342**	-0.0689** (0.6653**)
Euronext	191,496	175,283	22,429 (1,494,044)	22,913 (1,508,626)	0.3509**	-0.0818**	0.2975**	-0.0454**	0.6483**	-0.1272** (0.5211**)
TSE	26,881	21,922	126,881 (1,691,018)	131,451 (1,626,244)	0.3316**	-0.3881**	0.0727**	-0.2067**	0.4044**	-0.5949** (-0.1905**)

Table 4, continued

Panel B: Bear Markets										
NYSE	565,348	397,073	58,805 (2,660,950)	56,490 (2,460,272)	0.0979**	-0.4848**	0.0224**	-0.1003**	0.1203**	-0.5851** (-0.4648**)
LSE	315,908	315,904	639,047 (1,834,129)	661,495 (1,844,128)	0.1363**	-0.5683**	0.0936**	-0.0539**	0.2299**	-0.6223** (-0.3924**)
Xetra	208,884	189,330	23,482 (1,240,520)	28,438 (1,528,616)	0.1573**	-0.5480**	0.0447**	-0.2778**	0.2020**	-0.8258** (-0.6238**)
Euronext	297,961	294,114	20,830 (1,102,048)	21,933 (1,127,800)	0.1066**	-0.4703**	0.0477**	-0.1937**	0.1543**	-0.6641** (-0.5098**)
TSE	39,268	33,892	126,814 (1,685,182)	123,178 (1,644,456)	0.3573**	-0.3147**	0.0864**	-0.1571**	0.4436**	-0.4719** (-0.0283**)

** Indicates statistical significance at the 0.001 level

* Indicates statistical significance at the 0.01 level

Table 5
Price Effects Surrounding an Alternative Sample of Block Trades

This table reports the number of transactions, average volume, average value, total effect, temporary effect and permanent effect, all in percentage, calculated using ask quotes for purchases and bid quotes for sales. Results are presented for the largest 200 stocks, by turnover, for each year, in each of the five largest stock exchanges covering the three major trading regions around the world - North America, Europe and Asia-Pacific. Statistical significance emanates from the test of whether the price effect (and difference) is significantly different from zero. Block trades are selected if they represent at least 2.5 percent of average daily trading value calculated over the previous three months, in each of the largest 200 stocks, in each calendar year, for each market, for the period January 1, 1999 to December 31, 2002.

	No. Transactions		Average Volume (Average Value, \$)		Total Effect		Temporary Effect		Permanent Effect (Difference)	
	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells	Buys	Sells
NYSE	204,674	133,676	131,849 (6,475,510)	118,443 (5,426,847)	0.2145**	-0.2247**	0.1139**	-0.1172**	0.3285**	-0.3417**
									(-0.0132*)	
LSE	181,114	189,296	992,883 (3,081,248)	925,767 (2,901,987)	0.4361**	-0.3592**	0.1256**	-0.1235**	0.5618**	-0.4826**
									(0.0792**)	
Xetra	52,191	43,365	72,028 (5,779,690)	109,014 (7,150,811)	0.3089**	-0.3188**	0.0228**	-0.2296**	0.3317**	-0.5481**
									(-0.2164**)	
Euronext	124,888	119,613	45,731 (3,024,973)	48,886 (3,121,178)	0.2646**	-0.3457**	0.1658**	-0.1606**	0.4304**	-0.5063**
									(-0.0759**)	
TSE	36,828	28,693	181,138 (2,894,186)	187,748 (2,916,190)	0.6305**	-0.5739**	0.0657**	-0.1064**	0.6963**	-0.6803**
									(0.0160)	

** Indicates statistical significance at the 0.001 level

* Indicates statistical significance at the 0.01 level

Table 6
Price Effects Surrounding Block Trades Using Alternative
Pre- and Post-Trade Benchmarks

This table reports the total effect, temporary effect and permanent effect, all in percentage, calculated using ask quotes for purchases and bid quotes for sales. Results are presented for the largest 200 stocks, by turnover, for each year, in each of the five largest stock exchanges covering the three major trading regions around the world - North America, Europe and Asia-Pacific. In Panel A, the pre- and post execution benchmarks are taken to be the quotes in existence five trades before and after the block, while in Panel B they are the quotes in existence ten trades before and after the block. Statistical significance emanates from the test of whether the price effect (and difference) is significantly different from zero. Block trades are defined as the largest one percent of on-market transactions, by volume, in each of the largest 200 stocks, in each calendar year, for each market, for the period January 1, 1999 to December 31, 2002.

	Total Effect		Temporary Effect		Permanent Effect (Difference)	
	Buys	Sells	Buys	Sells	Buys	Sells
Panel A: Five Trades						
NYSE	0.0750**	-0.1511**	0.0449**	-0.0200**	0.1199**	-0.1711** (-0.0512**)
LSE	0.3895**	-0.4677**	0.0096**	-0.0109**	0.3992**	-0.4786** (-0.0794**)
Xetra	0.1241**	-0.1689**	0.0447**	-0.0579**	0.1689**	-0.2268** (-0.0579**)
Euronext	0.1210**	-0.1195**	0.0446**	-0.0507**	0.1656**	-0.1703** (-0.0047)
TSE	0.1489**	-0.1215**	0.0307**	-0.0667**	0.1796**	-0.1882** (-0.0086)
Panel B: Ten Trades						
NYSE	0.0814**	-0.2122**	0.0597**	-0.0289**	0.1412**	-0.2411** (-0.0990**)
LSE	0.4083**	-0.5146**	0.0568**	-0.0296**	0.4651**	-0.5442** (-0.0791**)
Xetra	0.1219**	-0.2306**	0.0898**	-0.0684**	0.2118**	-0.2991** (-0.0873**)
Euronext	0.1374**	-0.1841**	0.0935**	-0.0717**	0.2310**	-0.2558** (-0.0248*)
TSE	0.1653**	-0.1798**	0.0409**	-0.0885**	0.2062**	-0.2684** (-0.0622**)

** Indicates statistical significance at the 0.001 level

* Indicates statistical significance at the 0.01 level

Table 7
Price Effects Surrounding Block Trades Calculated Using Quote Midpoints

This table reports the total effect, temporary effect and permanent effect, all in percentage, calculated using quote midpoints. Results are presented for the largest 200 stocks, by turnover, for each year, in each of the five largest stock exchanges covering the three major trading regions around the world - North America, Europe and Asia-Pacific. Statistical significance emanates from the test of whether the price effect (and difference) is significantly different from zero. Block trades are defined as the largest one percent of on-market transactions, by volume, in each of the largest 200 stocks, in each calendar year, for each market, for the period January 1, 1999 to December 31, 2002.

	Total Effect		Temporary Effect		Permanent Effect (Difference)	
	Buys	Sells	Buys	Sells	Buys	Sells
NYSE	0.1789**	-0.4235**	0.1258**	-0.0228**	0.3074**	-0.4463** (-0.1388**)
LSE	0.1200**	-0.2212**	0.1041**	-0.0726**	0.2241**	-0.2938** (-0.0697**)
Xetra	0.3185**	-0.4689**	0.1252**	-0.0752**	0.4437**	-0.5441** (-0.1004**)
Euronext	0.1373**	-0.3268**	0.1197**	-0.1002**	0.2571**	-0.4270** (-0.1698**)
TSE	0.3957**	-0.3971**	0.0819**	-0.1551**	0.4777**	-0.5528** (-0.0745**)

** Indicates statistical significance at the 0.001 level

* Indicates statistical significance at the 0.01 level