Firm-initiated and Exchange-initiated Transfers to Continuous Trading: Evidence from the Warsaw Stock Exchange

by

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September 2004

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We examine 59 transfers from call auctions to continuous trade on the Warsaw Stock Exchange. The transferred stocks experience an average excess return of about 13%, which can be partly explained by their significant liquidity improvements. Significant liquidity and value reactions are also found in a subsample of transfers initiated by the companies themselves. We are the first to study firm-initiated transfers to continuous trading, and our evidence suggests that exchanges should allow firms that desire so to move their stock to continuous trading.

JEL classification: G12; G14

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The comments of Yakov Amihud, Bruce Lehmann (the Editor) and an anonymous referee are gratefully acknowledged. All remaining errors are our own.

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Keywords: Market microstructure; Continuous trade; Liquidity; Eastern Europe stock markets

1. Introduction

Previous studies (e.g., Amihud, Mendelson and Lauterbach (1997), Muscarella and Piwowar (2001), and Kalay, Wei, and Wohl (2002)) establish that moving stocks from a single daily call auction to continuous trading increases stock value. The average excess return around the announcement and transfer to continuous trading is about 5%. In fact, given that these transfers are partly anticipated, the revaluation from transfer to continuous trading is probably larger, and may exceed 10% (see Amihud, Mendelson, and Lauterbach (1997) pages 374-375).

Existing evidence also demonstrates that transfer to continuous trading increases stock liquidity. After the transfer, stocks become more heavily traded and their market depth increases. These liquidity improvements are priced. Cross-sectional regressions find a significant positive relation between the transfer-associated excess return on the stock and its liquidity improvements.

We extend the research to the Warsaw Stock Exchange (WSE). Our purpose is twofold. First, to examine whether in a young Eastern European stock market such as the WSE there also exist material benefits to continuous trading. Kairys, Kruza and Kumpins (2000) report that transfer to continuous trading impeded the liquidity of most stocks on the Riga Stock Exchange. Did continuous trade hurt liquidity on the WSE as well?

Second, and more importantly, previous research was conducted on markets where the exchange itself decides on which stocks to transfer to continuous trading. In the Warsaw Stock Exchange a stock can be transferred to continuous trading *either* by the exchange *or* on its own initiative. That is, a company can move to continuous trade also by signing a contract with a market maker who commits to post bid and ask quotes for the stock on a regular basis. By studying firm-initiated transfers we shall examine two new

interesting questions: a) are moves to continuous trading beneficial even when they are not initiated by the exchange? And b) should the exchange have the exclusive right to decide on which stocks enter continuous trading?

During our sample period (2001-2003), there were 38 exchange-initiated and 23 firm-initiated transfers to continuous trading on the WSE. Both types of transfers lead to significant positive revaluations in stock value. Most important, firm-initiated moves to continuous trade are associated with liquidity improvements and a significantly positive excess return of about 5%. We conclude that transfers to continuous trade are beneficial per-se, and that exchanges should allow firms to move their own stock to continuous trade.

Section 2 describes the Warsaw Stock Exchange trading mechanisms and the data. Section 3 reports the results and section 4 concludes.

2. The trading environment and data

2.1. Trading mechanisms on the Warsaw Stock Exchange

The Warsaw Stock Exchange (WSE) is the only operating exchange in Poland. WSE is an order-driven market based on the trading platform of the Paris Bourse and Euronext. The WSE operates two trading systems: a call auction system with two auctions per day, and a continuous trading system.

According to the Warsaw Stock Exchange (2002), in the call auction system, the first call is at 11:15 and the second call at 15:00. Market participants submit orders to the auction that are stored in an order book. Fifteen minutes prior to each auction, the order book is closed and the market-clearing price is determined. The price should maximize turnover, minimize the imbalance between buy and sell orders, and minimize the price

change compared to the most recent call auction. The market clearing price is also subject to a price limit regulation and may not differ from the price determined in the most recent auction by more than ±10%. If the price is outside the allowed price variation limits, investors are encouraged to submit offsetting orders in the 15 minutes preceding the auction (called the "intervention phase") in an attempt to move the price back into the price brackets. All auctions are followed by 30 minutes of post-auction trading, where transactions can be executed at the price determined in the auction.

The continuous trading system consists of an electronic limit order book open to the public. The continuous trading session opens with an auction at 10:00, proceeds with continuous trading till 16:00, and closes with a call auction on 16:10. In the continuous trading stage, investors can submit market and limit buy and sell orders to the order book, including hidden limit orders. Price, then time prioritize all orders. By WSE regulation, during the continuous trading session, stock price may not vary by more than ±15% of the closing price of the previous session.

In both the call auction and continuous trading systems, market makers can provide liquidity by entering orders into the limit order book. The WSE can assign market makers to a stock in order to enhance its liquidity. Alternatively, a company may employ one or more market makers to improve its stock liquidity. At the end of 2002, more than 80% of the stocks traded in the continuous trading system and about 25% of the stocks traded in the call auction system had a market maker.

Transfers from the call auction to the continuous trading system and vice versa occur for two reasons. First, at the end of each calendar quarter the Exchange Management

Board of the WSE assesses the liquidity of all stocks.[1] Then, the Exchange Management Board decides: a) to transfer the most liquid stocks of the call auction system to continuous trading, and b) to transfer the thinnest trading stocks on the continuous trading system to the call auction system. All these transfers are exogenous to the issuing company.

There is, however, a second avenue for transfer into continuous trade. Companies can apply for such a transfer after signing a contract with a market maker who commits to maintain liquidity in the stock by submitting regular simultaneous buy and sell orders. The Exchange Management Board approves the transfer providing that: 1) the contract with the market maker is similar to existing contracts of other market makers on the WSE, and 2) a reasonable amount of company shares are free-floating, that is are not held by insiders.

2.2. Data

Our sample includes 59 transfers of stocks from the call auction system to continuous trading between April 18, 2001, and April 22, 2003.[2] The first transfer events in our sample are on April 2001 because the trading system described above was launched on November 2000, and the first regular transfers to it were in April 2001.

Data on stock prices, trading volumes, transfer dates, and announcement dates were obtained from the WSE. We define the announcement date as the day on which the WSE announced the transfer. Stock returns are continuously compounded and calculated from daily closing prices. Trading volume is measured as turnover in Polish zlotys.

[1] Warsaw Stock Exchange (2002) states that liquidity assessment is based on average stock turnover and on the average number of transactions in the stock. However, no explicit formula is offered.

[2] In fact, there were 61 transfers to continuous trade during the sample period. However, one stock that entered, exited and re-entered continuous trade within less than two years was excluded because its analysis is complex and may not be representative.

3. Empirical findings

3.1. Stock response to transfer to continuous trade

Table 1 presents average excess returns (AR) and cumulative excess returns (CAR) for 59 transfers to continuous trading, from 30 days before the transfer announcement (day A-30) to 30 days after the actual transfer (day T+30). Excess returns are computed using the market model methodology, with parameter estimation in days T+61 to T+220 and Scholes-Williams (1977) betas. The post-event parameter estimation is standard in transfer to continuous trade studies because of the concern that the pre-transfer period is non-representative – see Amihud, Mendelson and Lauterbach (1997). Scholes-Williams (1977) betas are preferred because some of the stocks trade infrequently within the day, generating non-synchronous stock return and market return data.

(Insert Table 1 about here)

In Table 1, CAR is close to zero up to day A-11, when it starts to increase steadily. The pre-announcement CAR(A-10, A-1) is 2.66%, the announcement through transfer CAR(A, T) is 5.79%, and the post-transfer CAR(T+1, T+10) is 4.33%. After day T+10 the CARs stabilize at a level of about 11%.

Given the above-depicted CAR behavior, we choose the (A-10, T+10) period as the window within which the stock reacted to its transfer. Our estimate of the average stock response to its transfer to continuous trade, CAR(A-10, T+10), is 12.79%, with a Z-statistic of 5.69, highly significant – see the bottom part of Table 1. Clearly, transfer to continuous trade tends to increase stock value considerably.

Interestingly, in each of the three subperiods (pre-announcement, announcement to transfer and post-transfer) the percentage of firms with positive CARs is only slightly

higher than 50%. However, in the full event window (A-10 to T+10) 76% of the stocks respond positively to the transfer, significantly higher than ½ - the proportion predicted by the null that transfers to continuous trade do not impact stock value. Apparently, some stocks reacted strongly in the pre-announcement period, some responded strongly in the announcement to transfer period, and some made their jump in the post-transfer period. Under such a response pattern, only when we sum up all three subperiod responses we can observe the clear tendency to respond positively to transfer into continuous trade.

The 13% average revaluation in stock price upon its transfer to continuous trade on the WSE is higher than the 5%-6% average response documented in other markets. However, the median CAR(A-10, T+10) in the WSE is only 6.3%, similar to previous findings in other markets. In any case, it appears that continuous trade is desirable and generates substantial value in young (Eastern Europe) markets as well.[3]

The conclusion that continuous trading generates value is supported by evidence on rejects from continuous trade. Seven of our transferred stocks were moved back by the WSE to the call auction system. The median CAR(A-10, T+10) of these 7 stocks is -4.8%, and 5 out of the 7 stocks experienced a negative excess return. Thus, exit from continuous trade appears to hurt stock value, presumably because it eliminates the continuous trade value premium.

Several robustness tests are conducted on our main sample of 59 transfers into continuous trade. First, we attempt an alternative window, the (A-5, T+30) window used by Amihud, Mendelson and Lauterbach (1997). CAR(A-5, T+30) is 11.09%, similar to our total response CAR of 12.79%. Second, we attempt the standard market model

[3] A remaining issue is whether all stocks should be moved to continuous trade. Kairys, Kruza and Kumpins (2000) document that in Latvia, transfer of low liquidity stocks to continuous trading sharply decreased their

methodology and estimate a CAR(A-10, T+10) of 13.00%, again similar to our Scholes-Williams (1977) based CAR. Third, we move the parameter estimation period to the pre-transfer period, and obtain a CAR(A-10, T+10) of 14.49%. Fourth, we exclude four stocks that the WSE decided to move back to the call auction system between day T+61 and day T+220. Without these stocks, CAR(A-10, T+10) is 13.06% with a Z-statistic of 5.38.

Last, we attempt a portfolio approach. Transfer to continuous trade was done in batches, which could have generated some dependence between the CARs of the stocks transferred on the same date. The portfolio approach minimizes the problem of cross-sectional correlation between individual stock CARs – see Amihud, Mendelson and Lauterbach (1997). Thus, for each of the 14 transfer dates in our sample we construct an equally weighted portfolio of the transferred stocks and estimate the portfolio's CAR(A-10, T+10) using our basic methodology (post-transfer parameter estimation and Scholes-Williams betas). The average CAR(A-10, T+10) of the 14 transfer-portfolios is 16.25% (median is 7.3%), and 12 out of the 14 portfolios have a positive CAR(A-10, T+10). Our positive stock revaluation evidence appears robust.

Some readers may worry about the gradual stock response, particularly the continued increase in CAR after the announcement and through ten days after the transfer. We propose that the gradual response reflects the gradual understanding of the market of the effects that the transfer is going to have on stock liquidity and other characteristics. Previous studies, in other markets, also document a gradual response ending well after the actual transfer to continuous trade. Hence, the difficulty in predicting the exact effects of the transfer to continuous trade does not appear unique to the Polish market.

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trading volume. In contrast, Kalay, Wei and Wohl (2002) show that transfer of small and thinly traded stocks to continuous trading promotes their value and trading activity.

3.2. Changes in liquidity and price efficiency

Table 2 compares average liquidity and other characteristics before and after transfer to continuous trade. Relative volume, defined as the average daily stock volume divided by the average daily market volume, increases from $2.17 \cdot 10^{-5}$ before the transfer to $3.84 \cdot 10^{-5}$ after the transfer. The average change in relative volume, DRVOL, is statistically significant (t-statistic = 3.14), and 65% of the transferred stocks experience increases in their relative volume. This proportion is significantly higher than ½, the proportion expected under the null that the transfer has no effect on trading activity.[4]

(Insert Table 2 about here)

The increase in relative volume suggests an improvement in stock liquidity following its transfer to continuous trade. To further explore this suggestion we examine a recently developed liquidity measure – Amihud (2002)'s relative illiquidity measure. Define stock i's illiquidity, $ILLIQ_i$, as

$$ILLIQ_i = 1/D_i \cdot \Sigma(|R_{it}| / Vol_{it}) , \qquad (1)$$

where $|R_{it}|$ is the absolute value of stock i's return on day t, Vol_{it} is stock i's volume (in zlotys) on day t, and D_i is the number of trading days in the period. ILLIQ is essentially the mean over some period of the daily price response associated with one zloty of trading volume in the stock. Thus, it (ILLIQ) may be described as a rough measure of the price impact.

[4] Another way to test the change in relative volume and in other liquidity measures is to run the regression: $Y=a+b \cdot Dum\_After+e$, where Y comprises the liquidity measure observations before and after the transfer and Dum_After equals 1 for the liquidity measure observations after the transfer. For all our liquidity measures (Y) the dummy variable regression yields identical conclusions as our change (DY) analysis. However, we prefer to present the DY analysis because most of our Y's are not Normally distributed, while all our DY's are Normally distributed. Moreover, for the DY's we also perform non-parametric tests which should strengthen inference.

Amihud (2002) shows that $ILLIQ_i$ is strongly positively correlated with the Brennan and Subrahmanyam (1996) estimates of Kyle (1985)'s λ, which attests that ILLIQ may serve as a price impact measure. Amihud (2002) does not claim that $ILLIQ_i$ is superior to other price impact measures. Rather, Amihud (2002) points out that $ILLIQ_i$ is the only price impact measure that does not require transaction by transaction data. Thus, $ILLIQ_i$ is conceived as a price impact measure for microstructure studies in markets (such as the WSE) where intra-daily data are unavailable.

For cross-sectional analysis Amihud (2002) proposes the relative illiquidity measure, Rel_ILLIQ_i, estimated as stock i's $ILLIQ_i$ divided by the contemporaneous average $ILLIQ_i$ of all stocks traded on the exchange. Table 2 presents the average relative illiquidity of our sample stocks before and after transfer to continuous trading. It appears that the relative illiquidity decreases dramatically after the transfer to continuous trade. The change in relative illiquidity, $DRILLIQ = Ln(Rel\_ILLIQ_{after} / Rel\_ILLIQ_{before})$, is –2.11 on average (t-statistic of –6.8), highly significant, and 87% of the stocks experience a decrease in relative illiquidity. Evidently, stock liquidity improved following transfer to continuous trade.

A third possible and perhaps the most well-known liquidity measure is the bid-ask spread. Unfortunately, bid-ask spread data are not available for the WSE. An alternative is to use Roll (1984)'s implicit bid-ask spread measure, defined as $SPREAD = 2 \cdot (-COV)^{1/2}$, where COV is the auto-covariance of daily stock returns, $COV(R_{i,t}, R_{i,t-1})$. Roll (1984) shows that: a) bounces between the bid and ask prices induce negative COVs, and b) the larger the bid ask spread the more negative is COV.

The problem with using Roll's implicit bid ask spreads is that for some stocks COV is positive.[5] When COV is positive SPREAD is not well defined – see the formula above, i.e., SPREAD cannot be calculated. Rather than omitting stocks with undefined SPREADs, recent studies such as Amihud, Lauterbach and Mendelson (2003) focus on DCOV = COV_{after} - COV_{before}. If the bid ask spreads shrink, the induced negative autocovariance in daily returns weakens, COV becomes less negative (or more positive), and DCOV is positive.

The average DCOV in our sample is positive and statistically significant, and 78% of the stocks exhibit positive DCOVs, significantly different from ½. Thus, Table 2 supports the proposition that bid-ask spreads decrease following stock transfer to continuous trade.

On reflection, a more relevant "change in spread" measure for our purposes is the relative DCOV, RDCOV, defined as stock i's DCOV minus the average DCOV of all stocks traded on the WSE. The idea is to correct our estimates for the market-wide change in DCOV. The average RDCOV of transferred stocks is 2.02 (t-statistic of 3.0), and 78% of the transferred stocks manifest positive RDCOVs (p-value less than 0.0001). This finding implies that transferred stocks improved (i.e., narrowed) their bid-ask spread relative to other stocks on the WSE. We can now conclude that all our liquidity indicators (relative volume, relative illiquidity, and relative implicit bid-ask spread) point at the same direction: transfer to continuous trading improves stock liquidity significantly.

Table 2 also examines estimates of the stock's price efficiency. In regressions of stock return on market return and one-day-lagged market return, the residual variance VAR(ε) measures the idiosyncratic variance of the stock, including the variance generated

[5] Amihud and Mendelson (1987) explain that when stock prices adjust only partially to new information

by price noises (or pricing errors). If price noises decrease following the transfer to continuous trading, residual variance in the period after the transfer should be lower than in the period preceding the transfer. We find that residual variance is indeed lower after the transfer to continuous trading. The mean DVAR = $Ln(\text{VAR}(\varepsilon)_{\text{after}} / \text{VAR}(\varepsilon)_{\text{before}})$ across the sample stocks is negative and statistically significant - see Table 2.

To further refine our analysis, we compute Rel_VAR(ε), defined as stock i's residual variance divided by the average residual variance of all WSE stocks. This relative measure adjusts inference for the possibility that the mean residual variance of a WSE has changed between the pre- and post-transfer periods. Table 2 documents that the average (median) relative residual variance of transferred stocks decreases from 1.01 (0.88) before the transfer to 0.59 (0.36) after the transfer. The average decrease in relative residual variance, DRVAR, is statistically significant (t-statistic = -6.8), and the percentage of stocks with a reduction in relative residual variance is 81%, significantly different from ½. Thus, our evidence suggests that the pricing errors of transferred stocks decrease.

3.3. Firm-initiated transfers to continuous trade

The main task of the study is to analyze firm-initiated transfers to continuous trade. Panel A of Table 3 summarizes the response of firm-initiated transfers to continuous trade. We find that the stock relative volume significantly increases and its relative illiquidity significantly decreases following the transfer to continuous trade. Likewise, RDCOV is significantly positive, and DRVAR is significantly negative, reinforcing the impression of considerable improvements in stock liquidity and price efficiency following firm-initiated transfers to continuous trade.

COV may become positive.

The stock value response to firm-initiated transfers, CAR(A-10,T+10), is 5.18%, statistically significant (t-statistic = 2.2). However, in only 13 of the 20 firm-initiated transfers stock response is positive, a proportion that is insignificantly different from ½ (p-value = 0.18). Thus, our evidence mildly indicates a stock appreciation following firm-initiated transfers to continuous trade.

(Insert Table 3 about here)

The fact that firm-initiated transfers are successful (increase stock liquidity and value) illustrates the logic behind allowing firm-initiated transfers. Amihud and Mendelson (1996) contend that firms may be in the best position to evaluate which trading arena suits their stock most. And, our evidence that, on average, firm-initiated transfers are successful shows that firms tend to make good decisions regarding their trading arena choice. Allowing firm-initiated transfers is, essentially, allowing firms to correct or undo exchange "mistakes" or "injustices". In sum, the exchange probably has a rather restricted scope and imperfect criteria for moving a stock into continuous trade. Thus, companies that feel confident enough to take the risk of failure in continuous trading (the WSE moves lower trading stocks back to the call auction system) should be allowed into continuous trading.

As a final caveat we note that by the end of our sample period only one (4.8%) of the 21 firm-initiated transferred stocks was moved back by the WSE to call auctions. In contrast, six (15.8%) out of the 38 exchange-initiated transfers were moved back to call auctions. The lower rejection rate of firm-initiated transfers suggests that survival on continuous trade is not hurt when firms decide on the transfer.

3.4. Comparing firm- and exchange-initiated transfers

Panel B of Table 3 presents evidence on exchange initiated transfers. Exchange-initiated transfers improve price precision, as evidenced by the statistically significant negative DRVAR. Liquidity also improves: stock illiquidity and bid-ask spreads decrease (DRILLIQ is significantly negative and RDCOV is significantly positive), while relative volume increases insignificantly (DRVOL is 0.45 with a t-statistic of 1.6).[6] Last, the exchange-initiated CAR(A-10, T+10) of 18% (t-statistic = 3.2) appears large.

In general, the response of stock liquidity and price efficiency to exchange-initiated transfers is similar to that of firm-initiated transfers. Using conventional t-tests we do not find any statistically significant difference between the mean DRVOL, DRILLIQ, DRVAR and RDCOV of firm- and exchange-initiated transfers. Non-parametric Kruskal-Wallis tests confirm these findings, failing to detect any significant difference between firm- and exchange-initiated liquidity and efficiency responses to transfer to continuous trade.

However, there appears a statistically significant difference in CAR between exchange- and firm-initiated transfers. The mean CAR(A-10,T+10) of exchange-initiated transfers is 18.01%, while the mean CAR(A-10,T+10) of firm-initiated transfers is 5.18% only. The larger CAR of exchange-initiated transfers may emanate from several sources.

First, we test whether differences in liquidity improvement can explain the differences in CAR. In the overall sample we run regressions of CAR on various liquidity improvement measures and a dummy variable for firm-initiated transfers. Table 4 presents

[6] The insignificant increase in relative volume of exchange-initiated transfers deserves further thought. It can be argued that the problem is in the pre-transfer statistics of exchange-initiated transfers. It is possible that in the pre-transfer period, trading volume was abnormally high, leading the exchange to transfer the stock to continuous trade. After the transfer stock reverted to a more "normal" trading activity. Thus, despite of the positive effect of the transfer to continuous trade on stock liquidity, its relative volume does not increase significantly because of the inflated (upward biased) pre-transfer volume figures.

the results of these regressions.[7] Consistent with previous research (see Amihud, Mendelson and Lauterbach (1997), for example) liquidity improvements do explain part of the positive response to stock transfer to continuous trading. As expected, the more the relative volume increases the more positive is the transfer CAR. Similarly, the more stock illiquidity declines and the more the bid-ask declines (the more positive is RDCOV) the more favorable is market response to transfer to continuous trade.

(Insert Table 4 about here)

In Table 4 the firm-initiated dummy variable has a negative and statistically significant coefficient. Thus, cross-sectional differences in liquidity improvement, albeit important in determining CAR, cannot explain the significantly lower CAR of firm-initiated transfers. This conclusion could be expected given our previous finding that firm- and exchange-initiated transfers experience about the same liquidity improvements.

A second possible explanation for the difference in CARs focuses on the small sample nature of the firm-initiated (20 cases) and exchange-initiated (34 cases) subsamples. Surprisingly, large outliers appear only in the exchange-initiated subsample. When three large outliers (with CARs of over 50% each) are omitted, the mean CAR (A-10, T+10) of exchange-initiated transfers becomes 10.23%, and the difference in CARs between exchange- and firm-initiated transfers become statistically insignificant. Further, when the event window is extended (and outliers are excluded) the mean CAR (A-10, T+30) becomes 11.27% for exchange-initiated transfers and 8.16% for firm-initiated transfers, and the difference in CARs is statistically insignificant. Thus, we cannot ascertain that the CAR of exchange-initiated transfers is significantly larger than that of

[7] We employ one liquidity improvement measure at a time in order to avoid multicollinearity problems – all our liquidity change measures are correlated. Using one liquidity change measure at a time is customary in previous research as well.

firm-initiated transfers. It must be noted though that our point estimates always indicate an economically significant larger response in the subsample of exchange-initiated transfers.

The third possible explanation for the lower CAR of firm-initiated transfers is that part of the positive response of firm-initiated transfers occurred when these firms appointed market makers. At the market-maker appointment, investors might have realized that the firm intends to move its stock to continuous trading. Nine of our firm-initiated transfers appointed a market maker within six months prior to the transfer announcement. The median CAR (App-10, App+10) for these 9 firms is 1.73%, where App is the market maker appointment day. Thus, while the "true" response to firm initiated transfers might be slightly higher than we report, this avenue cannot account for the large difference in CAR between firm- and exchange-initiated transfers.

Last, the larger response of exchange-initiated transfers may reflect a "prestige" effect. The exchange decision to promote a stock to continuous trade, hence include it in the most prominent list of the exchange, may enhance stock perceived quality. Investors, especially in an emerging market like the Warsaw Stock Exchange, may view the exchange decision as an official seal of firm maturity issued by the exchange. The fact that transfers by the exchange are made automatically based on some mechanic exchange criteria regarding stock's trading activity, may not discourage the enthusiastic investors. We do not know how to test the prestige explanation. Hence, this interpretation remains highly speculative.

To sum, we cannot ascertain any significant difference between firm- and exchange-initiated transfers in either the value or the liquidity response to the transfer. However, such differences, and in particular the difference in the value response (CAR), should be re-examined in future research.

3.5. Which firms apply for transfer into continuous trade?

An interesting question is what kind of companies initiate their own stock transfer into continuous trading. To examine this question we compare the pre-transfer attributes of 20 firm-initiated transfers to those of the 48 stocks that remained in the call auction system and did not ask for transfer into continuous trade.[8] We run a PROBIT analysis of Dum_Transfer, a dummy variable that equals 1 for firm-initiated transfers and 0 for non-transfer stocks. (Exchange-initiated transfers are excluded from the analysis.) Our set of explanatory variables comprises three liquidity attributes - the pre-transfer relative volume, relative illiquidity and auto-covariance of returns.

The fitted PROBIT model is:

$$\text{Prob(Dum\_Transfer=0)} = \Phi[\underset{(0.11)}{-0.76} + \underset{(0.87)}{409}\cdot\text{Rel\_Vol} + \underset{(0.01)}{0.81}\cdot\text{Rel\_ILLIQ} - \underset{(0.14)}{0.10}\cdot\text{COV}]$$

where *p*-values appear in parentheses below the coefficients, $\Phi[.]$ is the cumulative Normal distribution of the argument, Rel_Vol is the stock relative volume, Rel_ILLIQ is the stock relative illiquidity, and COV is the stock daily return auto-covariance (in $\%^2$).

The fitted PROBIT model demonstrates that stocks that stayed in the call auction system tend to have significantly higher relative illiquidity and (insignificantly) lower, i.e., more negative, return autocovariances than the firm-initiated transfers. Thus, according to two of our three liquidity measures, firm-initiated transfers have superior liquidity relative to non-transfer stocks. Only in the third liquidity dimension, Rel_Vol, firm-initiated transfers appear lacking. The PROBIT model above suggests that non-transfer stocks have about the same trading volumes as firm-initiated transfers do.

[8] By the end of our sample period (April 2003) only 57 stocks traded in the call auction system. However, only 48 of them were in the call auction system throughout the sample period. (Eight stocks were moved back from continuous trade to call auctions and one stock was newly listed.)

The findings that firm-initiated transfers are weak on the trading volume level, but strong in other liquidity attributes, may explain why these firms initiate their own stock transfer to continuous trading. Because of their relatively low trading volumes, these firms stand only a slight chance of being transferred to continuous trade by the exchange (which bases its transfer decisions primarily on the stock's trading activity). For these firms, the only open route to continuous trading is the firm's own initiative. Apparently, the firm-initiated transfers felt strong enough and ripe for continuous trade. Hence, they applied for transfer.

4. Summary and conclusions

We examine 59 stock transfers from a call auction system to continuous trading on the Warsaw Stock Exchange. These transfers are accompanied by a positive revaluation in stock prices, averaging about 13%. The positive response suggests that continuous trading is desirable and beneficial even in young and relatively small markets such as the Warsaw Stock Exchange.

Our most important subsample is that of firm-initiated transfers. All previous studies examine exchange-initiated transfers only. In exchange-initiated transfers stock response might also emanate from a "prestige" effect - investors may perceive transfers by the exchange as a positive signal (vote of confidence in the firm or matriculation note) issued by the exchange. Thus, our firm-initiated transfers appear to offer a cleaner view on the pure effect of transfer to continuous trade. We find that firm-initiated transfers are accompanied by positive stock price revaluations and by significant liquidity gains. This establishes that continuous trade per-se generates some value.

An interesting issue is what kind of companies asks for firm-initiated transfers into continuous trade. We find that these companies have a more liquid stock. Yet, their trading volume is a bit lower than that of non-transfer stocks. Thus, it appears that quality stocks that stood only a little chance of being transferred to continuous trading by the exchange (which emphasizes trading volume in its transfer criteria) took the initiative and asked for transfer to continuous trade.

The success of firm-initiated transfers, documented in this study, should convince stock exchanges to allow firm-initiated transfers into continuous trade. Our findings also suggest that a broader regulatory reform, first proposed by Amihud and Mendelson (1996), should be seriously debated. Amihud and Mendelson (1996) contend that firms should be given the *exclusive* right to determine on which markets their shares trade. The firm bears the price of any illiquidity or trading problems in its shares. Thus, firms should be granted the right to decide on which trading platforms their shares trade and (perhaps more importantly in today's fragmented markets) on which trading platforms their shares do not trade.

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Table 1: Stock response to transfer to continuous trade on the Warsaw Stock Exchange

The table reports average abnormal return (AR) and cumulative abnormal return (CAR) for 59 stocks transferred from the call auction system to the continuous trading system on the Warsaw Stock Exchange. The event window extends from day A-30 to day T+30, where T denotes the transfer day and A the announcement day. We use the market model methodology, with parameter estimation in days T+61 to T+220 and Scholes and Williams (1977) betas. The lower part of the table presents the mean and median CARs for selected subperiods, the *Z*-statistics of the CARs, the percentage of stocks with positive CARs, and the p-value of the null that negative and positive CARs are equally frequent.

Day	AR	CAR	Day	AR	CAR	Day	AR	CAR
A-30	-1.54%	-1.54%	A-9	0.02%	-0.96%	T+11	-0.98%	10.56%
A-29	0.96	-0.58	A-8	0.17	-0.79	T+12	-0.16	10.40
A-28	0.24	-0.35	A-7	0.21	-0.58	T+13	0.11	10.52
A-27	-0.18	-0.53	A-6	1.29	0.71	T+14	0.34	10.86
A-26	1.42	0.90	A-5	-0.03	0.68	T+15	0.48	11.34
A-25	-0.56	0.34	A-4	-0.03	0.65	T+16	0.38	11.71
A-24	-0.48	-0.14	A-3	1.05	1.70	T+17	-0.16	11.55
A-23	-1.14	-1.28	A-2	0.17	1.87	T+18	-0.56	10.99
A-22	-1.66	-2.95	A-1	-0.45	1.42	T+19	0.07	11.07
A-21	0.58	-2.37	A	0.59	2.00	T+20	0.21	11.28
A-20	-0.01	-2.38	T	5.21	7.21	T+21	-0.28	11.00
A-19	-0.35	-2.73	T+1	0.41	7.62	T+22	0.20	11.20
A-18	-0.37	-3.10	T+2	0.38	7.99	T+23	0.01	11.21
A-17	-0.69	-3.79	T+3	-0.82	7.17	T+24	-0.49	10.72
A-16	-0.56	-4.35	T+4	0.03	7.21	T+25	0.19	10.91
A-15	0.38	-3.97	T+5	1.43	8.64	T+26	0.52	11.43
A-14	-0.35	-4.32	T+6	0.23	8.87	T+27	0.04	11.47
A-13	2.14	-2.18	T+7	0.97	9.84	T+28	0.36	11.83
A-12	0.18	-2.00	T+8	1.33	11.17	T+29	-0.33	11.49
A-11	0.76	-1.25	T+9	1.10	12.27	T+30	-0.23	11.26
A-10	0.27	-0.97	T+10	-0.74	11.54			

Window	Mean CAR	Z-statistic	Median CAR	Proportion of positive CARs	p-value of proportion positive
A-10 to A-1	2.66%	1.93	0.08%	0.51	0.896
A to T[a]	5.79%	5.30	2.27%	0.59	0.152
T+1 to T+10	4.33%	2.71	0.72%	0.56	0.362
A-10 to T+10	12.79%	5.69	6.30%	0.76	< 0.0001

[a] The mean (median) interval between announcement (A) and transfer (T) dates is 9 (8) trading days. The minimum (maximum) interval is 5 (13) trading days.

Table 2: Changes in liquidity and price efficiency following the transfer to continuous trade

The table presents liquidity and price efficiency measures for 54 stocks transferred from the call auction system to the continuous trading system on the Warsaw Stock Exchange (WSE). Rel_Vol is the relative trading volume measured as the average daily trading volume of the stock divided by average daily market volume (both in Polish zlotys); DRVOL is $Ln(\text{Rel\_Vol}_{after} / \text{Rel\_Vol}_{before})$; ILLIQ is the daily ratio of absolute stock return to its zloty volume, averaged over some period, and Rel_ILLIQ is stock i's ILLIQ divided by the average ILLIQ of all stocks traded on the WSE; DRILLIQ is $Ln(\text{Rel\_ILLIQ}_{after} / \text{Rel\_ILLIQ}_{before})$; VAR(ε) is the residual variance in the regression of the daily stock return on market return and one-day-lagged market return, and Rel_VAR(ε) is stock i's VAR(ε) divided by the average VAR(ε) of all stocks traded on the WSE; DVAR is $Ln(\text{VAR}(\varepsilon)_{after} / \text{VAR}(\varepsilon)_{before})$, and DRVAR is $Ln(\text{Rel\_VAR}(\varepsilon)_{after} / \text{Rel\_VAR}(\varepsilon)_{before})$; DCOV is $\text{COV}_{after} - \text{COV}_{before}$, where COV is the first-order covariances of daily stock returns (in %), and RDCOV is stock i's DCOV minus the average DCOV of all stocks traded on the WSE. The subscript "after" indicates estimation over the period from T+61 to T+220, while the subscript "before" denotes the period from A-220 to A-61. Sample size is less than 59 (the number of transfers in our sample) because four stocks were moved back to the call auction system between day T+61 and day T+220, which precludes reliable estimation of the "after" attributes, and one stock was newly listed on the WSE on day A-95 (unreliable "before" attributes).

	Mean	t-statistic	Median	Fraction positive	p-value under the null: fraction positive = 1/2
Rel_VOL_{before} x 10000	2.17		1.48		
Rel_VOL_{after} x 10000	3.84		2.19		
$\text{Rel\_ILLIQ}_{before}$	0.553		0.175		
Rel_ILLIQ_{after}	0.103		0.023		
$\text{Rel\_VAR}(\varepsilon)_{before}$	1.01		0.88		
$\text{Rel\_VAR}(\varepsilon)_{after}$	0.59		0.36		
DRVOL	0.62	3.14	0.39	0.65	0.0295
DRILLIQ	-2.11	-6.80	-1.93	0.13	< 0.0001
DVAR	-0.25	-2.92	-0.18	0.35	0.0295
DRVAR	-0.64	-6.79	-0.55	0.19	< 0.0001
DCOV	1.71	2.39	0.62	0.78	< 0.0001
RDCOV	2.02	3.03	1.31	0.78	< 0.0001

Table 3: Firm-initiated and exchange-initiated transfers to continuous trading

The table compares 34 transfers to continuous trading initiated by the WSE (exchange-initiated) with 20 transfers to continuous trading initiated by the company itself (firm-initiated). Rel_Vol is the relative trading volume measured as the average daily trading volume of the stock divided by average daily market volume (both in Polish zlotys); DRVOL is $Ln(\text{Rel\_Vol}_{after} / \text{Rel\_Vol}_{before})$; ILLIQ is the daily ratio of absolute stock return to its zloty volume, averaged over some period, and Rel_ILLIQ is stock i's ILLIQ divided by the average ILLIQ of all stocks traded on the WSE; DRILLIQ is $Ln(\text{Rel\_ILLIQ}_{after} / \text{Rel\_ILLIQ}_{before})$; VAR(ε) is the residual variance in the regression of the daily stock return on market return and one-day-lagged market return, and Rel_VAR(ε) is stock i's VAR(ε) divided by the average VAR(ε) of all stocks traded on the WSE; DRVAR is $Ln(\text{Rel\_VAR}(\varepsilon)_{after} / \text{Rel\_VAR}(\varepsilon)_{before})$; DCOV is $\text{COV}_{after} - \text{COV}_{before}$, where COV is the first-order covariances of daily stock returns (in %), and RDCOV is stock i's DCOV minus the average DCOV of all stocks traded on the WSE. The subscript "after" indicates estimation over the period from T+61 to T+220, while the subscript "before" denotes the period from A-220 to A-61. CAR is the cumulative abnormal return on the stock in the period A-10 to T+10, where A and T denote the announcement and transfer to continuous trading days, respectively. CARs are estimated using the Scholes and Williams (1977) methodology, with a post-event (days T+61 to T+220) parameter estimation period. Sample size is less than 59 (the number of transfers in our sample) because four stocks were moved back to the call auction system between day T+61 and day T+220, which precludes reliable estimation of the "after" attributes, and one stock was newly listed on the WSE on day A-95 (unreliable "before" attributes).

	Mean	t-statistic	Median	Fraction positive	p-value under the null: fraction positive = 1/2
Panel A: Firm-initiated transfers					
DRVOL	0.91	3.74	1.08	0.75	0.025
DRILLIQ	-2.38	-6.09	-2.39	0.05	< 0.0001
DRVAR	-0.53	-3.03	-2.39	0.25	0.025
RDCOV	3.06	2.30	1.75	0.85	0.002
CAR(A-10,T+10)	5.18%	2.22	3.08%	0.65	0.178
Panel B: Exchange-initiated transfers					
DRVOL	0.45	1.62	0.28	0.59	0.304
DRILLIQ	-1.96	-4.46	-1.62	0.18	0.0002
DRVAR	-0.70	-6.44	-0.68	0.15	< 0.0001
RDCOV	1.41	1.98	1.17	0.74	0.006
CAR(A-10,T+10)	18.01%	3.23	9.09%	0.85	< 0.0001

Table 4: The relation of the transfer excess return to the liquidity changes

The table presents regressions of CAR(A-10, T+10), the cumulative excess return from 10 days before the transfer announcement to 10 days after the transfer to continuous trade (in %), on the changes in stock liquidity following the transfer. DRVOL is $Ln(\text{Rel\_Vol}_{after} / \text{Rel\_Vol}_{before})$, DRILLIQ is $Ln(\text{Rel\_ILLIQ}_{after} / \text{Rel\_ILLIQ}_{before})$, and RDCOV (whose units are $\%^2$) is stock i's $\text{COV}_{after} - \text{COV}_{before}$ minus the average $\text{COV}_{after} - \text{COV}_{before}$ of all stocks on the WSE. The subscript "after" indicates estimation over the period from T+61 to T+220 and the subscript "before" denotes the period from A-220 to A-61. The Firm-initiated dummy variable equals 1 for firm-initiated transfers and equals zero otherwise. *t*-statistics appear in parentheses below the coefficients.

Sample	Number of observations	DRVOL	DRILLIQ	RDCOV	Firm-initiated dummy variable	Adjusted R^2
All transfers	54	5.46 (2.2)			-15.33 (-2.1)	0.10
All transfers	54		-5.15 (-3.5)		-15.01 (-2.2)	0.21
All transfers	54			1.98 (2.8)	-16.10 (-2.3)	0.15