EXCHANGE LISTING CHANGES: VOLATILITY AND LIQUIDITY EFFECTS IN TAIWAN

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Abstract

We examine the volatility, liquidity and returns effects on stocks that switch exchange listings from the ROSE to the TSE in Taiwan from 1992 to 2000. Switching firms earn statistically positive returns before the transfer day and earn statistically negative returns after that day. We find evidence of improved liquidity, ownership dispersion and actual trading volume for such firms. The relative volatility of trading volume, compared against the firms' own histories, and volatility of returns also increase after a listing change. We show that increased trading volume and liquidity are associated with the abnormal returns around the transfer date. We find no evidence that the past earnings of firms significantly affect the abnormal returns realized in the post-listing period.

Keyword: Volatility, Liquidity, Abnormal Returns, Taiwan, and Listing Transfer.

JEL Classification: *G15, G14*

1. Introduction

Several equity markets in the Asia-Pacific region have established specialized secondary markets to cater to the needs of different firms and investors. These secondary markets have undergone tremendous growth and change. Taiwan's stock markets are no exception and common stock trading now can occur on the two major stock markets - the Taiwan Stock Exchange (TSE) and the R.O.C. over-the-counter Securities Exchange (ROSE).

However, in recent years many corporate managers have decided to move the trading location of their company's stock from the ROSE to the TSE. For instance, more than 60 firms have changed their stock listings from the ROSE to the TSE in 2000 alone. We examine the impact of listing changes on the returns, volatility and liquidity of stocks that move from the ROSE to the TSE.

The reasons we choose Taiwan's stock markets are manifold: (i) stock trading volume in the Taiwanese market is the largest among the emerging market, (ii) its OTC market has just been re-established in 1994 and thus provides a new dataset to see if the common results usually observed in the U.S. market can also be seen in these less analyzed but important equity markets, (iii) market liberalization measures enacted by the TSE encourage the increased dispersion of stock ownership, a prerequisite for liquidity improvement.

Thus the primary purposes of this paper are to examine the value and liquidity changes of a stock listing switch and to determine how changes in return volatility and the volatility of trading volume possibly affect the post-listing behavior of stocks. The rest of this paper is as follows. Section II reviews the literature. Section III describes Taiwan's stock market and its trading system. The market characteristics of the Taiwanese stock market that differ from those of the U.S. stock market are highlighted. The empirical hypotheses and sample selection procedures are described in Section IV. Section V outlines our volatility and liquidity measures as well as the regressions specifications analyzed. The empirical results are evaluated. Section VI concludes the paper.

2. Literature Review

In general, prior research has found that the announcement of a listing switch from the OTC to a major organized exchange such as New York Stock Exchange (NYSE) or American Stock Exchange (AMEX), is

associated with an anomalous increase in the price of a stock. But such research also found an anomalous decrease in the price of a stock, immediately after the listing change is effective (see, for instance, McConnell and Sanger (1987), Baker and Edelman (1992), Kadlec and McConell (1994) Dharan and Ikenberry (1995)). These results are not specific to the U.S. market, since Hwang and Jayaraman (1993), Dubois and Ertur (1997), and Ariff, Lamba, and Mohamed (2000) report similar results for the stock exchanges in Japan, French, Singapore, and Malaysia.

Baker and Johnson (1990) and Baker and Meeks (1991) survey managers of firms who move their firms' listings from the NASDAQ or OTC to either the AMEX or NYSE. Such moves are geared to (a) enhance market visibility, (b) improve trading liquidity, (c) provide stable environment for their stocks, (d) signal managerial expectation, and (e) increased prestige after the transfer. Lamba and Khan (1999) suggest, inter alia, that the abnormal returns, associated with the change in listing, may be due an increase in trading volume.

Clyde, Schultz, and Zaman (1997) examine a group of stocks that switched from the AMEX to the NASDAQ from 1992 through 1995 and find that spreads increase by 100% after listing on the NASDAQ. This fits the findings of Christie and Huang (1994) who also report higher transactions costs on the NASDAQ relative to other US stock exchanges. Higher transactions costs may inhibit trading and switching listings to a lower cost exchange can actually help increase the volume of trade in a company's stock.

Baker (1993) and Baker, Powell, and Weaver (1999) provide some empirical support for the conventional notion that switching to a national exchange is related to an increase in visibility.[1] There is also evidence of increased investor interest, institutional ownership, and research coverage after the listing switch. Their results are in accord with the implications of the theoretical model developed by Merton (1987), who proposes that, all things equal, an increase in the size of a company's investor base will reduce investors' expected return and therefore raise the market price of the firm's stocks. One of the activities that can help expand the investor base or investor recognition, as Merton suggests, is to change the listing to a national exchange.[2]

Therefore, by listing their shares on a national exchange, managers not only can achieve visibility gains but also expand a company's investor base. Amihud, Mendelson, and Uno (1999) thus suggest that expanding the distribution of share ownership is one of the goals of many

corporate managers, stock exchanges, and policymakers. Many researchers such as Barry and Brown (1986) and Arbel and Strebel (1982, 1983) also show that neglected firms with lower visibility and limited information constitute a source of risk and thus investors demand a higher equilibrium expected rate of return.

Furthermore, listing on a national exchange can enhance the liquidity of a traded security. Amihud and Mendelson (1986) analyze the effect of the bid-ask spreads on asset pricing and predict that the required rate of return on a security is an increasing and a concave piecewise-linear function of the relative bid-ask spread. Based on their model, if liquidity really improves after a listing transfer, an investor would require a relatively lower compensation for transaction costs and a relatively lower required rate of return, and then we should be able to observe a rise in the market value of the firm's stock price.

Despite the many possible benefits of listing on a seemingly attractive organized exchange, the value and market impact of a listing transfer has been under question since many analysts have been reevaluating the traditional attitudes toward exchange listing. For instance Microsoft and Intel, corporations that easily qualify to be listed either on the NYSE or on the AMEX, choose to remain on the NASDAQ, despite meeting NYSE's or AMEX's higher listing requirements.[3]

3. Taiwan's Stock Markets

Having developed for more than 35 years, Taiwan's economy experienced a rapid growth and a great deal of wealth was accumulated. Much of this increased wealth was transferred into the Taiwanese stock market as Taiwan's economy grew, resulting in a huge rise in trading volume and value and making the Taiwanese stock market, in term of trading volume and value, the highest in the emerging capital markets. However, Taiwan's stock market has been under major structural changes in the past few years.

To further develop Taiwan's capital market, the OTC market was reopened and the government set up the R.O.C. Over-the-counter Security Exchange ROSE, on November 1, 1994. Under the new organizational structure, many procedures and clauses were modified and implemented to promote the less-seasoned public growth companies applying for listing and spurting the growth of this once-sluggish market. The ROSE, as differentiated from the TSE, would assume the responsibility of fostering a robust capital market for the less mature but perhaps faster growing small-size and mid-size firms in Taiwan.

Thus, firms can choose to have their stock traded either on the ROSE or on the TSE and Taiwan's OTC market has enjoyed a dynamic growth, with almost 300 listed firms and a trading value of almost NT$4.4 trillion by the end of 2000, compared with only 14 firms and NT$568 million in 1994. Moreover, the ROSE market has been generally considered as the primary listing market for many young technology companies in Taiwan.

To be listed on the ROSE, the following requirements must be met (a) the company must have at least NT$50 million paid-in capital, (b) must be established for at least 3 years, (c) must meet the requirements of audited operating profits and before-tax net profits, and (d) the share holding must be adequately dispersed enough.[4] Similar to its counterparts in the other countries, the TSE has a more stringent listing threshold compared with that of ROSE. In addition to these different listing criteria, there are also other differences between the TSE and ROSE.

Traders on the TSE can have short and long positions in the same security in the same day (i.e., day trading), but this trading strategy is not allowed in the ROSE. The margin ratios for trading in securities are different as well. The Taiwanese government has usually used these ratios as tools to stabilize the market and therefore adjusted the ratios from time to time based on the level of the stock index (i.e., the Taiwan Stock Exchange Weighted Index). During the Asian financial crisis in the period of 1997-98, for instance, the government relaxed the ratio for purchases and tightened the ratio for short selling in order to stimulate the market. The ROSE generally has a higher margin requirement regarding margin financing for purchases of securities, whereas the margin requirement for short selling is the same in both the TSE and ROSE markets. Furthermore, in the TSE, the disclosed bid-ask price is determined as the highest bid (lowest offer) price within the range of two up/down tick over and under the reference price, but the ROSE does not limit the price fluctuation when executing two continuous orders. Therefore, the price movement of the ROSE seems to be able to more adequately reflect market conditions than does the TSE.

Table 1 reports the descriptive statistics in these two markets and also shows the number of ROSE-to-TSE firm transfers in each year. Trading volume and dollar value of trading volume on the ROSE are only around 15% and 13% in 2000, respectively, of those on the TSE. The margin trades are close to 80% of total trading volume on the TSE, but only close to 35% on the ROSE in 2000. Margin trades were not allowed in the ROSE until 1999. So the market size of the ROSE either in term

of trading volume or trading value is apparently much smaller than that of the TSE. However, in the U.S.A, the trading volume of NASDAQ sometimes exceeds that of NYSE.

Therefore, the lack of liquidity on the ROSE seems to provide a reason to encourage some ROSE firms that qualify for the TSE's listing requirements to switch their listings. In Taiwan, 61 firms transferred their listings in 2000. The government instituted many new policies that helped to promote the movements.[5] For example, switching firms were permitted to continue their margin trades without any interruption,[6] and the OTC-type mutual funds also need not to sell those ROSE-to-TSE stocks immediately after the listing transfers take effect.[7] Except for these factors discussed above, the trading mechanism, trading rule, daily fluctuation limit, tick size, surveillance system, settlement procedure, and brokerage fee and transaction tax applied to either market, are not significantly different. The two exchanges even use the same computerized matching systems for transactions.

So unlike in the U.S.A, the difference in trading mechanism between the Taiwanese OTC market and the organized market, TSE, is not quite evident. As a result, many practitioners and researchers argue that the ROSE has now evolved to the point at which the benefits of a listing transfer to a major exchange, such as the TSE, have been mostly reduced and thus the market should not react to a listing transfer movement. So the results of the OTC-to-NYSE or OTC-to-AMXE stocks usually found in U.S. market is probably due to market-specific environment only unique to the U.S. capital market and cannot apply to the other countries. It is therefore interesting to see what are the microstructure effects on stocks that transfer their listings in an emerging market like Taiwan.

4. Sample Selection And Test Design

Firms in Taiwan issuing equity through IPO's now have two choices in the listing of their shares. Managers of those firms must evaluate the decisions whether to list their stocks or not. If listing is chosen as the appropriate strategy, then they must choose the appropriate stock exchange on which their stocks should be listed and traded. Consequently, management must not only determine if they should list their stocks but also must evaluate the costs and benefits of the two exchanges, i.e., the ROSE or the TSE.

Therefore, in this paper, we intend to examine the following important research questions. We believe these answers can help man-

agers to justify their listing-related decisions and have important policy implications.

1. What is the stock price reaction associated with the announcement of a listing switch and with the actual transfer day? That is, we want to know if there are any "market value" and wealth benefits associated with moving listings from the OTC market, i.e., the ROSE market, to the TSE. So even if switching trading location leaves unaffected the fundamentals of the underlying stock, the action itself conveys valuable information toward investors.
2. Does the Taiwanese stock market show any evidence supporting the Merton's *investor recognition* hypothesis? Therefore, we try to find answers to the following questions:

    a. Are there any changes in liquidity after the listing switch?
    b. Does an increase in the dispersion of the investor base after the listing transfer affect the price of the stock?
    c. How do changes in the volatility of stock returns and trading volumes affect the abnormal returns of listing stocks?
    d. Are past earnings significant explanatory variables in the analysis of the abnormal returns of switching firms?

Our initial sample includes 97 firms that have applied for and successfully transferred their stocks' listings from the ROSE to TSE in the 9-year period from January 1992 through December 2000. We are particularly interested in two event dates in this research: the date on which the transfer application is officially announced (i.e., the announcement date) and the first date on which the stock starts trading on the TSE (i.e., the listing date) if the exchange previously issued an approval of the listing application. Information regarding these dates are carefully examined and identified from the TSE's "Daily Market Information" and from individual firm's annual reports of individual firms.

To be included in the final sample, firms must have enough trading dates at the ROSE before making their transfer announcements. Among these 97 switching firms, 4 firms are deleted from the initial sample because they applied for TSE listing soon after having been initially listed on the ROSE and therefore did not stay long enough in the OTC market. So the final full sample consists of 93 firms that have sufficient trading date data available. From Table 1, we can see most of the transfers were concentrated in year 2000.

Of these 61 firms that successfully transferred their listings in 2000, 53 firms are concentrated on September 11 and these firms also have a special transferring process. Therefore, our research also focuses on these 53 transferring firms that start to trade on the TSE on the same day, i.e., September 11, 2000. Daily returns, volumes, and the corresponding market returns and volumes are collected from the R.O.C. Ministry of Education AREMOS database and the Taiwan Economic Journal (TEJ) database.

5. Empirical results

A. Announcement and listing effects:

This section reports the empirical evidence based on the 93 ROSE-to-TSE firms from 1992 to 2000 and also examines the 53 firms that officially changed their listings from the ROSE to TSE on September 11, 200. This study uses an event-study methodology based upon the market model to determine the magnitude and the timing of the effect a listing transfer might have on the price of a stock.

We estimate abnormal returns for each trading day as deviations from the market model and use Ordinary least squares (OLS) and general autoregressive conditional heteroskedasticity (GARCH) to calculate the coefficients of the market model. We use a Lagrange-multiplier test and Q-test to examine the validity of the GARCH (1,1) model specification. If a GARCH condition exists, the GARCH (1, 1) is used to estimate the market model; otherwise, the OLS method is used. So for each firm, we use the market model based on a 130-day period beginning 150 trading days before the announcement day and ending 21 trading days prior to the announcement day (-150, -21).

The Taiwan Stock Value-Weighted Index is employed as the market return proxy. The difference between the predicted return and actual return is labeled an abnormal return (AR) and is calculated over the event window between t=E-20 and t=E+20, where E is the announcement day or the listing date of the switch. The cumulative abnormal return (CAR) from date t1 to t2 for each security i is calculated as $CAR_i = \sum_{t1}^{t2} AR_{i,t}$. Cumulative abnormal returns and cumulative standardized abnormal returns are computed over various intervals.

In Figure 1 we plot the announcement effects on stock price for the 53 firms that successfully transferred their stock's listings on September

11, 2000 over the announcement period. These firms transferred their exchange listing on the same day. The announcement-day information for their application process is more easily obtained and thus more accurate than those of the other switching firms.

Column 2 of Table 2 reports the cumulative abnormal returns for the 53 firms around the announcement period. We find that significant abnormal returns only occur during the (-1, +1), (0, +1), and (0, +2) event windows but they are all negative. Given the open nature of this ROSE-to-TSE policy and the public attention paid to the decision making process, it is reasonable to expect that the information must have had slowly leaked to the market and therefore it did not bring a significant effect to the stock price before the switch announcement, but the significantly negative statistics during the event period is somewhat difficult to explain.

Figure 2 investigates the listing effects and illustrates the cumulative abnormal returns for firms that switched their listings from ROSE to TSE around their first effective day in the TSE, that is, September 11, 2000. The evidence in Column 3 of Table 2 reveals that pre-listing cumulated abnormal returns are generally positive and statistically significant and in the post-listing period the abnormal returns are significantly negative. The average cumulative excess returns over the (-10, 0) and (0, 10) intervals are 4.99% (t=3.89) and -7.53% (t=-5.83), respectively.

These results are consistent with those obtained by Kadlec and McDonnell (1994), Dubois and Ertur (1997), and Elyasiani, Hauser, and Lauterbach (2000). Column 4 of Table 2 also reports the effective listing effects for all the 93 ROSE-to-TSE firms and the findings are similar to the 9/11/2000 sample and the abnormal returns are shown in Figure 3. Our research reveals that the stock returns rise before listing, but appear to decline gradually soon after listing. This pattern of negative abnormal returns has been observed in every previous study of stock exchange listing and the Taiwanese stock market is no exception.[8] It appears that the returns of ROSE-to-TSE stocks enjoy no "honey-moon" effect usually observed in the returns of IPO stocks and the listing-transfer is followed by a return reversal period.

B. Robustness Checks

In order to check the validity of our empirical results we impose some control measures. We compute the CAR's of 53 ROSE firms that meet the TSE listing requirements but choose to remain listed on the ROSE and are also in the same industry category and similar paid-in-capital

with those switch firms around September 11, 2000. After controlling for the difference in industry and capital, the abnormal returns for this control group are depicted in Figure 4.

From Column 5 in Table 2, the control sub-sample shows no sign of abnormal stock price behavior before September 11, 2000, but like the 9/11/2000 sub-sample, there are significantly negative abnormal returns after that date. Table 3 reports the testing for the difference between the means of MCARs between the 9/11/200 sub-sample and the control sub-sample. We use t-statistics to test the hypothesis that the MCARs for these 2 groups are equal and sign-rank test statistics to test the hypothesis that the differences in MCARs are distributed symmetrically around zero.

We do observe a significant difference of abnormal returns between the two groups before the pre-listing period. Consistent with the findings in Table 2, the results in Table 3 indicate that the mean MCARs difference over the (-2, 0), (-3, 0), (-5, 0), and (-10, 0) event window as well as the (-10, 0) event window are significant but there is no significant difference for all the post-listing MCARs.

C. Liquidity analysis:

We next turn our attention to the hypothesis that the listing transfer is a liquidity-improvement mechanism. If firms choose to transfer their stock listings from OTC to TSE, then this action should be able to increase the public's awareness of these stocks and the investor base as well. Although not reported in this paper, we do observe that there are significant changes in the number of shareholders at the end of (fiscal) year before the listing transfer and at the end of the (fiscal) year of the listing transfer. This result does not surprise us since the Taiwanese government regulates the ownership dispersion as one of the requirements for firms wishing to change their listings from the OTC market to the TSE.

An important liquidity measure is the bid-ask spread. However, there is no designated specialist or market makers who post bid and ask quotes in either ROSE or TSE, and thus no bid and ask data are available. We, therefore, use two liquidity measures employed by Amihud, Mendelson, and Lauterbach (1997) and Amihud, Mendelson, and Uno (1999): the stock's "trading volume" and the stock's "liquidity ratio" to proxy for changes in Merton's investor recognition factor.

(a) Trading volume: The effects of a listing switch on the trading volume are measured by relative changes in the trading volume from the pre-listing to the post-listing period. For the change in the relative trading volume (RTV_i), it is defined as:

$$RTV_i = \log\ (V_i/V_{ci})_{AFTER} - \log\ (V_i/V_{ci})_{BEFORE} \qquad (1)$$

where V_i is the trading volume of stock i (in Taiwanese dollars) for the 53 firms that transferred their listings on 9/11/2000 and V_{ci} is the stock trading volume of the control group. The subscript *AFTER* denotes days +21 to +151, the post- listing period, and the subscript *BEFORE* denotes days -21 to -150, the pre-listing period. The mean of DV_i is 0.8072, which is statistically significant (t=5.71). We compare the relative trading volume changes of transferring stocks against the trading volume changes of the control group of stocks. The results show after transferring from the OTC to the TSE that there is a significant increase in the trading volume of such stocks.

(b) Liquidity Ratio: It is an estimate of how the volume of stock traded is associated with a percentage change in the price of the stock. This ratio measures the impact of listing transfers on trading volume relative to their absolute returns and is defined as:

$$LR_i = \sum_t V_{i,t} \Big/ \sum_t |R_{i,t}| \qquad (2)$$

where $V_{i,t}$ and $R_{i,t}$ are the trading volume and the return for firm i on day t, which are summed up, respectively, over the estimation period, i.e., *BEFORE* and *AFTER*. Theoretically, a higher *LR* implies greater market liquidity.

Next we try to determine the relative improvement in liquidity associated with the listing switch. The relative improvement in the liquidity ratio for firm i is used to compare the liquidity in two estimation periods (before and after the listing switch). This measure is computed by:

$$\partial LR_i = \log\ (LR_i/LR_{Ci})_{AFTER} - \log\ (LR_i/LR_{Ci})_{BEFORE} \qquad (3)$$

where LR_i is the liquidity ratio for the 53 ROSE-to-TSE stocks with effective transfer dates on 9/11/2000 and LR_{ci} is the liquidity ratio for the

control sample and *AFTER* and *BEFORE* denote the same estimation periods as before. Our results show that ∂LR_i has a mean of 0.7705 with a t-statistic of 5.47, which is significant at the 0.01 level. This finding again strongly supports the proposition that the listing transfer is associated with an increase in stock liquidity.

D. Volatility Effects

In this section we try to analyze whether there are any changes in the underlying stock return volatility and /or the trading volume for the stocks as they shift their listing base. Is the volume of trading in a company's stock more or less volatile after an exchange listing transfer? Are the stock returns of such stocks more or less volatile after the transfer? To answer the first question we estimate volatility prior to and after the listing switch. Those estimates are then used to identify relative volatility over the sample period.

For the change in the volatility of trading volume we create a variable ($RVTV_i$), which is defined as:

$$RVTV_i = log(\sigma_i^{TV} / \sigma_{ci}^{TV})_{AFTER} - log(\sigma_i^{TV} / \sigma_{ci}^{TV})_{BEFORE} \qquad (4)$$

where $\sigma = \sqrt{\frac{\sum_i (V_i - \overline{V})^2}{n-1}}$ is the variance of stock trading volume, V= stock-trading volume and σ_i^{TV} is the volatility of trading volume of stock i (in Taiwanese dollars) for the 53 firms that transferred their listings on 9/11/2000 and σ_{ci}^{TV} is the volatility of stock trading volume of the control group. The subscript *AFTER* denotes days +21 to +151, the post- listing period, and the subscript *BEFORE* denotes days -21 to -150, the pre-listing period. The mean of $RVTV_i$ is 0.8069, which is statistically significant (t=4.85). By comparing the relative volatility of trading volume of the transferring stocks with those of the stocks in the control group, we also find that the volatility of stock trading volume significantly increases for stocks transfer which from the OTC to the TSE.

In order to ascertain whether or not stock return volatility changes we compare return volatility before and after the listing event. These estimates are then used to create a measure of relative volatility over the sample period. The relative volatility of stock return (RVR_i), is defined as:

$$RVR_i = log\left(\sigma_i^{Return} / \sigma_{ci}^{Return}\right)_{AFTER} - log\left(\sigma_i^{Return} / \sigma_{ci}^{Return}\right)_{BEFORE} \quad (5)$$

$\sigma = \sqrt{\frac{\sum_i (r_i - \bar{r})^2}{n-1}}$ is the variance of return, r= rate of return on stock price.

σ_i^{Return} is the volatility of stock return i for the 53 firms that transferred their listings on 9/11/2000 and σ_{ci}^{Return} is the volatility of stock return of the controlled group. The subscript *AFTER* denotes days +21 to +151, the post- listing period, and the subscript *BEFORE* denotes days -21 to -150, the pre-listing period. The mean of RVR_i is 0.0364, which is statistically significant (t=1.32). By comparing the volatility of relative return changes against those of stocks in the control group, we find that there is not a significant increase of the volatility of stocks' return after transferring from the OTC to the TSE.

E. Cross-sectional analysis:

The previous empirical evidence indicates that we are unable to discover a positive price effect resulting from announcing a move to TSE. However, listing firms experience an increase of trading activities increased liquidity and trading volume. The latter findings are consistent with both the investor recognition and liquidity improvement hypotheses. We next check to see whether volatility, ownership dispersion and earnings variables have significant explanatory power relative to pre-listings and post-listing abnormal returns. We consider 4 alternative model specifications.

Model 1: $MCAR_i(t_1,t_2) = \beta_0 + \beta_1 RTV_i + \beta_2 RVTV_i + \beta_3 RVR_i + \varepsilon_i$ (6)

Model 2: $MCAR_i(t_1,t_2) = \beta_0 + \beta_1 \partial LR_i + \beta_2 RVTV_i + \beta_3 RVR_i + \varepsilon_i$ (7)

Model 3: $MCAR_i(t_1,t_2) = \beta_0 + \beta_1 RTV_i + \beta_2 EPS_i + \beta_3 \sigma_{Hold\,i} + \beta_4 RVTV_i + \beta_5 RVR_i + \varepsilon_i$ (8)

Model 4: $MCAR_i(t_1,t_2) = \beta_0 + \beta_1 \partial LR_i + \beta_2 EPS_i + \beta_3 \sigma_{Hold\,i} + \beta_4 RVTV_i + \beta_5 RVR_i + \varepsilon_i$ (9)

where $MCAR_j(t_1, t_2)$ is the mean cumulative abnormal return on stock j from day t_1 to t_2 relative to September 11, 2000 for these 53 firms. *RTVj* and ∂LR_j are as previously defined in Equation (1) and (2) respectively, EPS is firm's earning per share reported in the previous year's financial statement, and σ_{HOLD} is the measure of share ownership dispersion.

Panel A of Table 4 reports the results of regressing mean cumulated abnormal returns beginning t_1 days before listing and ending t_1 days after

the listing, against the 6 variables, i.e., RTV, ∂LR, EPS, RVTV, RVR and σ_{HOLD}. We find that the explanatory power of the regression increases with the length of event days and the two liquidity measures, RTV and ∂LR_j, are significantly positive over most sub-periods included in the (-5, +5) window, over all regression specifications, suggesting that trading activities are positively associated with abnormal returns around the listing days.

Relative volatility of trading volume is negatively associated with abnormal returns, significantly so in most specifications. The increase in relative volatility of trading volume after the listing switch is not beneficial from a shareholder's perspective. The relative volatility of returns does not have an unambiguous effect and in any case does not appear to be a significant variable in any of the regressions.

We find that there is low explanatory power associated with the earnings variable. This implies that a good earnings record is not necessarily associated with a higher excess returns. The estimated coefficient value of σ_{HOLD} is positive for 4 out of the 5 periods but is not significant in the period immediately before and after the listing date. It appears that the dispersion in the stock ownership does contribute to the listing period abnormal returns but its impact on listing day returns is not significant.

Panel B and Panel C of Table 4 report the regression results using the pre-listing and post-listing abnormal returns as the independent variable. In the pre-listing period (Panel B) results, we find that that the only variable that is significant in explaining returns is σ_{HOLD} which measures ownership dispersion. We conclude that increased ownership and the announcement of it, has a positive effect on the value of a stock that is switching exchanges. The EPS variable is not significant in most cases. We still find that the longer the event period, the better the explanatory power of the regression.

In Panel C, the RTV, RVTV and ∂LR variables are significant. Like in Panel A, RTV and $\partial LR$are positively associated with abnormal returns whereas the RVTV variable is negatively associated with abnormal returns. These variables are statistically significant at the usual confidence levels. However, unlike in Panel A the explanatory power of the models does not increase with the time interval. This suggests that some of the apparent explanatory power of the significant variables, in time intervals spanning the pre-listing and post-listing periods, is influenced by the post-listing strength of these explanatory variables.

For the post-listing period, the positive signs on the coefficients of RTV and ∂LR could possibly indicate that for profitable switching

firms excess abnormal returns would be accentuated by having greater liquidity and increased trading volume. RVTV is unambiguously negative across all specifications and time intervals in the post listing period. This suggests that significant increases in the relative volatility of trading volume may not help to improve the return performance of transferring stocks.

6. Summary and conclusions

This paper explores the impact on liquidity, volatility and market returns of selected stocks that moved their listings from the ROSE markets to the TSE in Taiwan, over the period of 1992 to 2000. We do not find any significant positive announcement effect but we observe a price reversal effect. Firms that switch to the TSE earn statistically positive abnormal returns before the transfer day and earn statistically negative abnormal returns after that day. The above normal returns in the pre-listing date announcement period are driven by the presumed benefits associated with increased ownership of shares in the transferring stocks.

The evidence shows that switching to the TSE results in increased market liquidity and stock price volatility. The increases in liquidity and trading volume are in line with the predictions of Merton's (1987) *investor-recognition* hypothesis. The cross-sectional regressions provide strong support for increasing trading volume and liquidity as possible sources of abnormal returns around switching dates. These variables contribute significantly, in a positive fashion, to the abnormal returns in the post-listing period.

On the other hand the beneficial effects of stock ownership dispersion seem to dissipate once the stock is listed on the new exchange. In addition, increased relative volatility of trading volume is not helpful for the returns of stocks that switch their listings. There is a significant increase in the volatility of trades in the stocks of the switching companies, as measured against their prior history. We find that the volatility of stock returns increases for stocks that do switch their listing exchange, over the sample period. However, when measured against the performance of the control group, there is no significant difference in volatility. Our results do not show that the returns to the switching firms react significantly in either the pre-listing or post listing period, to companies' past earnings.

Endnotes

1. Their studies use four proxies to estimate visibility, the number of analysts estimating the firm's next fiscal year's earning, the number of institutional investors, the percentage of shares held by institution, and the number of citations in the Wall Street Journal.
2. Amihud, Mendelson, and Uno (1999) also propose that a reduction in the minimum trading unit of shares can increase a firm's investor base and its liquidity.
3. Aggarwal and Angel (1999) examine why these large firms such as Microsoft and Intel elect not to list on NYSE or AMEX.
4. Stipulations for listing may be more relaxed for state-run enterprises, insurance companies, and marketable technology-based firm.
5. Of the 61 ROSE-to-TSE firms in 2000, 53 were concentrated on September 11, 2000.
6. The TSE require that newly listed firms can only start margin trading 2 months after IPO.
7. Prior September 11 2000, the OTC-type's fund holders who own these stocks need to sell them after OTC-firms transfer their stocks to the TSE trading.
8. McConnell and Sanger (1987) propose a number of possible explanations but no full explanation is discovered.

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Figure 1
Cumulative Abnormal Returns over the Announcement Period for the 53 firms transferring their listing on September 11, 2000

Plots of cumulative abnormal returns (CAR) over the announcement period for the 53 firms transferring their listings on September 11 2000. The CAR is calculated as $CAR_i = \sum_{t=t1}^{t2} AR_{i,t}$ which AR is defined as abnormal return and calculated from the market model. The CSAR is the cumulative standardized abnormal return and calculated as $CSAR_i = \sum_{t=t1}^{t2} CAR_i / \sqrt{V(CAR_i)}$ where $V(CAR) = \sigma^2 [1 + 1/n + (R_{mt} - \bar{R}_m)^2 / \sum (R_m - \bar{R}_m)^2]$. The market return ($R_m$) is based on the Taiwan Value-Weighted Stock index.

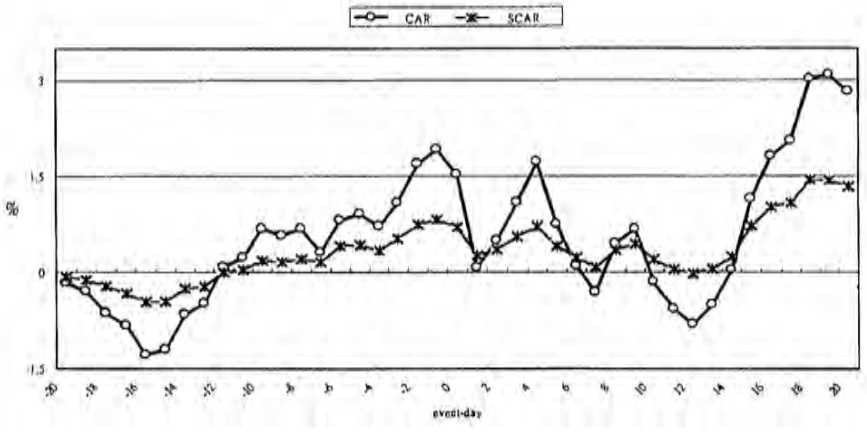

Figure 2
Cumulative Abnormal Returns over the Listing Period for the 53 firms transferring their listing on September 11, 2000

Plot of cumulative abnormal return around the actual listing day for the 53 firms changing their listing on September 11, 2000. The CAR is calculated as $CAR_i = \sum_{t=t1}^{t2} AR_{i,t}$ which AR is defined as abnormal return and calculated from the market model. The CSAR is the cumulative standardized abnormal return and calculated as $CSAR_t = \sum_{t=n}^{t2} CAR_t / \sqrt{V(CAR)}$ where $V(CAR) = \sigma^2 (1 + 1/n + (R_{mi} - \overline{R}_m)^2 / \sum (R_m - \overline{R}_m)^2)$. The market return ($R_m$) is based on the Taiwan Value-Weighted Stock index.

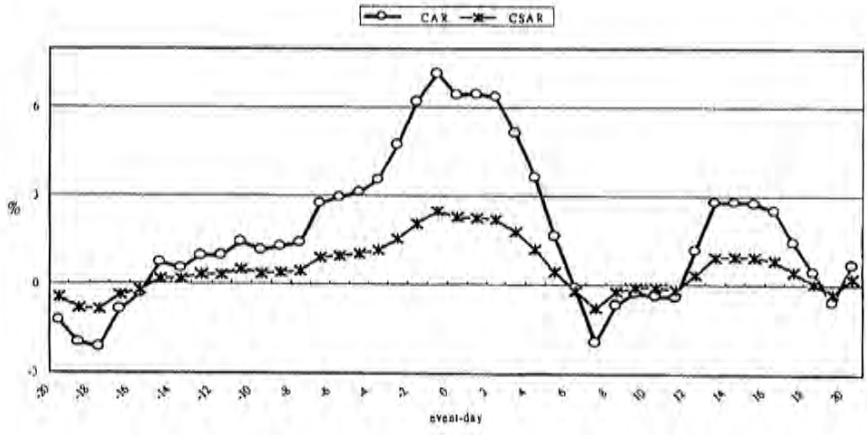

Figure 3
Cumulative Abnormal Returns of firms transferring their listings from ROSE to TSE around the First Listing Day in TSE.

Plot of CARs of all firms from 1992 to 2000 transferring their stock listings from ROSE to TSE around the first listing day at the TSE. The CAR is calculated as $CAR_i = \sum_{t=1}^{t2} AR_{it}$ which AR is defined as abnormal return and calculated from the market model. The CSAR is the cumulative standardized abnormal return and calculated as $CSAR_i = \sum_{t=1}^{t} CAR / \sqrt{V(CAR)}$ where
The market return (Rm) is based on the Taiwan Value-Weighted Stock index.

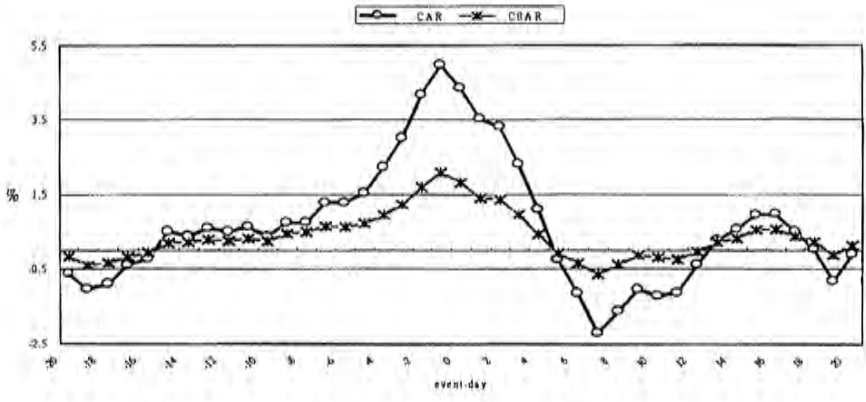

Figure 4
Cumulative Abnormal Returns of Control Sample Around the day, September 11, 2000

The sample consists of the CARs of control firms around the day, September 11 2000. The CAR is calculated as $CAR_t = \sum_{t=t1}^{t2} AR_{it}$ which AR is defined as abnormal return and calculated from the market model. The CSAR is the cumulative standardized abnormal return and calculated as $CSAR_t = \sum_{t=t1}^{t2} CAR_t / \sqrt{V(CAR_t)}$ where $V(CAR) = \sigma^2(1 + 1/n + (R_{mt} - \bar{R}_m)^2 / \Sigma(R_m - \bar{R}_m)^2)$. The market return (Rm) is based on the Taiwan Value-Weighted Stock index.

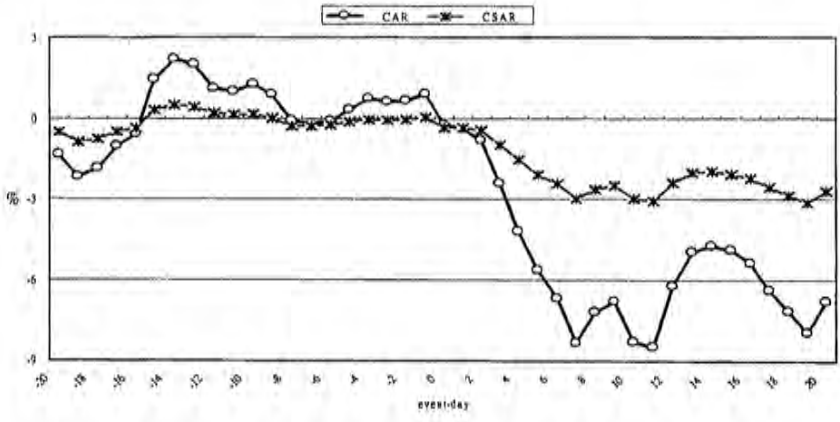

Table 1
Some Characteristics of Taiwanese Stock Market

This table shows the number of firms listed on the TSE and the ROSE, share trading volume and margin trading volume on each exchange, and the number of firms switching from the ROSE to TSE during the period of 1990 to 2000.

TSE				ROSE				
Number of firms	Trading Volume (100 Million shares)	Trading Value (NT$100 million)	Margin Volume (NT$100 million)	Number of firms	Trading Volume (Million shares)	Trading Value (NT$100 million)	Margin volume (NT$100 million)	Number of ROSE-to-TSE firms
199	2,323.1	190,312.9	56,589.4	4	7.5	11.8	0	0
221	1,759.4	96,827.4	49,914.5	9	13.9	4.6	0	0
256	1,075.9	59,170.8	37,839.2	11	20.0	6.7	0	1
285	2,046.8	90,567.2	80,417.8	11	20.0	6.5	0	3
313	3,512.4	188,121.1	145,915.4	14	19.4	5.7	0	0
347	2,673.0	101,515.4	92,070.8	41	171.0	27.9	0	2
382	3,507.4	129,075.6	118,149.8	79	16,958.7	4,535.1	0	0
404	6,542.0	372,411.5	315,824.0	114	43,115.0	23,106.6	0	5
437	6,120.1	296,189.7	271,696.0	176	30,680.7	11,981.6	0	12
462	6,780.6	292,915.2	260,109.6	264	49,052.0	18,999.0	6,161	14
531	6,308.7	305,265.7	247,084.3	300	88,392.7	44,783.6	16,546	61
								97

Table 2
Summary of Abnormal Returns on OTC-to-TSE Stocks Surrounding the Day of Announcement and Actual Listing Day.

We use ordinary least squares (OLS) and general autoregressive conditional heteroskedasticity (GARCH) to calculate the market model. Abnormal return is calculated over the event window between t=E-10 and t=E+10, where E is the listing-transferred announcement or the day the transfer actually takes effect. The cumulative abnormal return (CAR) from date t_1 to t_2 for each security i and it is calculated as $CAR_i = \sum_{t=t1}^{t2} AR_{i,t}$, which AR is defined as abnormal return. The mean cumulative abnormal return (MCAR) from date t_1 to t_2 for each security i and it is calculated as $MCAR_i = CAR_i/t2-t1$, Numbers in parentheses are T-test statistics.

Days Relative to Events	Announcement Effects	Listing Effects		
	-9/11/2000 Sub-Sample	-9/11/2000 Sub-Sample	- Total Sample	- Control Sub-Sample
(-1,+1)	-1.0251 (-2.18)**	0.25397 (0.38)	-0.65431 (-1.36)	-1.05884 (-1.52)
(-2,+2)	-0.59127 (-0.62)	1.61951 (1.86)*	0.29172 (0.46)	-1.44234 (-1.59)
(-3,+3)	0.37431 (0.33)	1.58662 (1.54)	0.08401 (0.11)	-3.14524 (-2.94)***
(-5,+5)	-0.06362 (-0.05)	-1.29879 (-1.01)	-1.52457 (-1.63)	-5.53593 (-4.08)***
(-10,+10)	-0.37862 (-0.20)	-1.80787 (-1.02)	-1.85931 (-1.45)	-9.26769 (-4.88)***
(-1,0)	-0.16922 (-0.28)	0.22553 (0.41)	0.18364 (0.47)	-0.9208 (-1.61)
(-2,0)	0.43988 (0.60)	1.68852 (2.48)**	1.3381 (2.80)***	-0.88686 (-1.26)
(-3,0)	0.80489 (0.95)	2.86219 (3.65)***	2.11985 (3.83)***	-0.99361 (-1.21)
(-5,0)	0.71496 (0.69)	3.47876 (3.67)***	3.06919 (4.56)***	-0.15521 (-0.16)
(-10,0)	1.29319 (0.94)	4.99165 (3.89)***	3.71671 (4.08)***	-1.25956 (-0.93)
(0,+1)	-1.85231 (-3.04)***	-0.70630 (-1.28)	-1.45872 (-3.72)***	-1.28846 (-2.26)**
(0,+2)	-1.42758 (-1.92)*	-0.80375 (-1.20)	-1.66715 (-3.39)***	-1.70589 (-2.45)**
(0,+3)	-0.82701 (-0.97)	-2.01031 (-2.61)***	-2.65661 (-4.68)***	-3.30204 (-4.13)***
(0,+5)	-1.17501 (-1.13)	-5.51229 (-5.80)***	-5.21453 (-7.43)***	-6.53114 (-6.51)***
(0,+10)	-2.06824 (-1.50)	-7.53426 (-5.83)***	-6.19679 (-6.60)***	-9.15855 (-6.61)***
No.of firms	53	53	93	53

Table 3
Testing for the Difference of CARs Between the 9/11/2000 Sub-sample and the Control Sub-sample

In this table, day 0 is the actual listing day on September 11 2000 and MCAR (t1,t2) is the means of cumulated abnormal return from date t1 to date t_2. To test the differences between the MCAR of 9/11/2000 sub-sample and the control sub-sample, we use T-test and the Wilcoxon rank-sum test. The difference is defined as the MCAR of 9/11 sub-sample minus the MCAR of control sub-sample.

Event Window	MCAR(-1,+1)	MCAR(-2,+2)	MCAR(-3,+3)	MCAR(-5,+5)	MCAR(-10,+10)
Difference	1.3128	3.0619	4.7319	4.2371	7.4598
t-statistic	(1.37)	(2.33)**	(2.60)**	(1.84)*	(2.33)**
Wilcoxon-z	(1.40)	(1.95)*	(2.45)**	(1.52)	(1.98)**
Event Window	MCAR(-1,0)	MCAR(-2,0)	MCAR(-3,0)	MCAR(-5,0)	MCAR(-10,0)
Difference	1.1463	2.5754	3.8558	3.634	6.2512
t-statistic	(1.50)	(2.87)***	(3.57)***	(2.70)***	(3.16)***
Wilcoxon-z	(1.64)	(2.70)***	(3.58)***	(2.53)**	(2.84)***
Event Window	MCAR(0,+1)	MCAR(0,+2)	MCAR(0,+3)	MCAR(0,+5)	MCAR(0,+10)
Difference	0.5822	0.9021	1.2917	1.0189	1.6243
t-statistic	(0.70)	(0.88)	(0.94)	(0.59)	(0.67)
Wilcoxon-z	(0.58)	(0.32)	(0.47)	(0.24)	(0.77)

***, **, * Significant at the 0.01, 0.05, and 0.1 levels, respectively. (two-tail test)

Table 4
Cross-Sectional Regression Analysis for MCAR

This table reports the coefficient estimates for the OLS regression in which the dependent variable is the abnormal return around the effective listing day (September 11, 2000). The independent variables RTV, ∂LR, RVR, RVTV, EPS and σ_{Hold} are relative trading volume, change of liquidity ratio, relative volatility of share return, relative volatility of trading volume, past earning per share, and share ownership dispersion. Numbers in parentheses are T-test statistics.

Panel A: MCAR(-1, +1) period before the listing date and after the actual listing day						
Model	Variable	Independent Variable				
		MCAR(-1,+1)	MCAR(-2,+2)	MCAR(-3,+3)	MCAR(-5,+5)	MCAR(-10,+10)
I	Intercept	-0.6458 (-0.87)	0.5688 (0.56)	-1.1606 (-0.85)	-5.6145 (-3.16) ***	-8.6547 (-3.14) ***
	RTV	3.8402 (2.33) **	4.1666 (1.84) *	7.0704 (2.33) **	8.9504 (2.28) **	9.2578 (1.52)
	RVTV	-2.8068 (-2.01) **	-2.8930 (-1.51)	-3.5922 (-1.40)	-3.5009 (-1.05)	-0.8626 (-0.17)
	RVR	1.7807 (0.60)	0.6020 (0.15)	-1.6801 (-0.31)	-2.3043 (-0.33)	-0.8626 (-0.17)
	F-value	2.14 *	1.30	3.52 **	4.98 ***	5.36 ***
	R-square	0.12	0.07	0.18	0.23	0.25
II	Intercept	-0.5673 (-0.76)	0.4647 (0.46)	-1.4747 (-1.14)	-6.0076 (-3.57) ***	-8.8736 (-3.28) ***
	∂ LR	3.4344 (2.14) **	4.9179 (2.28) **	9.2102 (3.29) ***	11.6313 (3.20) ***	10.8485 (1.86) *
	RVTV	-2.5259 (-1.82) *	-3.5487 (-1.91) *	-5.4019 (-2.24) **	-5.7692 (-1.84) *	-2.2560 (-0.45)
	RVR	5.8685 (1.71) *	6.3011 (1.37)	8.9080 (1.49)	11.0696 (1.43)	14.5138 (1.16)
	F-value	1.85	1.92	5.49 ***	6.97 ***	5.85 ***
	R-square	0.10	0.11	0.25	0.30	0.26
III	Intercept	-1.6966 (-1.01)	-2.2790 (-1.00)	-4.1748 (-1.37)	-7.4657 (-1.88) *	-15.1379 (-2.55) **
	RTV	3.8383 (2.31) **	4.6027 (2.04) **	7.6228 (2.53) **	9.5062 (2.43) **	10.6987 (1.83) *
	EPS	0.5504 (1.30)	-0.1032 (-0.18)	-0.4376 (-0.57)	-1.0511 (-1.06)	-1.8540 (-1.25)
	σ_{Hold}	-0.0004 (-0.07)	0.0160 (1.81) *	0.0205 (1.74) *	0.0210 (1.37)	0.0539 (2.35) **
	RVTV	-2.8353 (-2.02) **	-3.1587 (-1.66) *	-3.9122 (-1.54)	-3.7898 (-1.15)	-1.6585 (-0.34)
	RVR	0.9173 (0.30)	0.6027 (0.15)	-1.1976 (-0.22)	-0.8599 (-0.12)	4.3116 (0.40)
	F-value	1.62	1.47	2.83 **	3.64 ***	4.95
	R-square	0.15	0.14	0.23	0.28	0.35
IV	Intercept	-1.7689 (-1.04)	-2.5719 (-1.14)	-4.8941 (-1.67)	-8.3215 (-2.17) **	-15.5426 (-2.62) **
	∂ LR	3.7019 (2.29) **	5.1996 (2.42) **	9.4749 (3.40) ***	11.6635 (3.20) ***	11.0668 (1.96) *
	EPS	0.6581 (1.55)	0.0487 (0.09)	-1.1602 (-0.22)	-0.7096 (-0.74)	-1.5315 (-1.03)
	σ_{Hold}	-0.0011 (-0.16)	0.0155 (1.79) *	0.0199 (1.77) *	0.0202 (1.37)	0.0524 (2.30) **
	RVTV	-2.7800 (-2.00) *	-3.7053 (-2.00) *	-5.5137 (-2.29) **	-5.6641 (-1.80) *	-2.1075 (-0.43)
	RVR	5.1234 (1.48)	6.4156 (1.40)	9.3029 (1.56)	12.0808 (1.55)	16.7924 (1.39)
	F-value	1.60	1.82	4.01 ***	4.70 ***	5.09 ***
	R-square	0.15	0.16	0.30	0.33	0.35

***, **, * Significant at the 0.01, 0.05, and 0.1 levels, respectively. (two-tail test)

Table 4 (Continued)
Cross-Sectional Regression Analysis for MCAR

Panel B: MCAR(-t,0)- before the actual listing day						
Model	variable	Independent Variable				
		MCAR(-1,0)	MCAR(-2,0)	MCAR(-3,0)	MCAR(-5,0)	MCAR (-10,0)
I	Intercept	0.4868 (0.78)	2.2284 (3.22) ***	2.6654 (3.61) ***	3.0642 (3.01) ***	2.5906 (1.40)
	RTV	0.8969 (0.65)	0.0349 (0.02)	0.9193 (0.56)	0.7749 (0.34)	0.8418 (0.20)
	RVTV	-1.2895 (-1.10)	-0.7585 (-0.58)	-0.6566 (-0.47)	-0.3280 (-0.17)	2.1803 (0.63)
	RVR	1.5172 (0.61)	1.2075 (0.44)	-0.4237 (-0.14)	1.4766 (0.36)	-1.0313 (-0.14)
	F-value	0.85	0.87	0.11	0.18	1.87
	R-square	0.05	0.05	0.00	0.01	0.10
II	Intercept	0.6503 (1.04)	2.2074 (3.22) ***	2.4689 (3.42) ***	2.8452 (2.84) ***	2.1601 (1.18)
	∂ LR	-0.1121 (-0.08)	0.1675 (0.11)	2.1778 (1.40)	2.1718 (1.01)	3.5719 (0.91)
	RVTV	-0.4871 (-0.42)	-0.8657 (-0.68)	-1.6819 (-1.25)	-1.4631 (-0.79)	-0.0300 (-0.01)
	RVR	1.5024 (0.52)	1.3892 (0.44)	1.9927 (0.60)	3.8698 (0.84)	2.8546 (0.34)
	F-value	0.71	0.87	0.66	0.48	2.16
	R-square	0.04	0.05	0.04	0.03	0.12
III	Intercept	-0.7761 (-0.55)	0.3626 (0.24)	1.4416 (0.90)	2.3826 (1.07)	-0.6363 (-0.16)
	RTV	0.9427 (0.68)	0.3441 (0.23)	1.2552 (0.79)	1.1289 (0.51)	1.7053 (0.43)
	EPS	0.4876 (1.38)	-0.1523 (-0.40)	-0.5811 (-1.45)	-0.9263 (-1.66) *	-1.4517 (-1.44)
	σ_{Hold}	0.0014 (0.25)	0.0114 (1.93) *	0.0127 (2.04) **	0.0136 (1.57)	0.0325 (2.09) **
	RVTV	-1.3443 (-1.14)	-0.9425 (-0.74)	-0.8342 (-0.62)	-0.4981 (-0.27)	1.7217 (0.51)
	RVR	0.7349 (0.29)	1.3321 (0.48)	0.3642 (0.13)	2.7998 (0.70)	0.9281 (0.13)
	F-value	0.90	1.31	1.32	1.15	2.50 **
	R-square	0.09	0.12	0.12	0.11	0.21
IV	Intercept	-0.5791 (-0.41)	0.3658 (0.24)	1.1583 (0.73)	2.1072 (0.95)	-1.1823 (-0.30)
	∂ LR	0.1169 (0.09)	0.2960 (0.20)	2.1679 (1.44)	2.0256 (0.96)	3.5397 (0.93)
	EPS	0.4902 (1.37)	-0.1437 (-0.37)	-0.5172 (-1.03)	-0.8666 (-1.56)	-1.3470 (-1.34)
	σ_{Hold}	0.0009 (0.18)	0.0113 (1.92) *	0.0127 (2.09) **	0.0136 (1.60)	0.0328 (2.13) **
	RVTV	-0.6920 (-0.59)	-0.9087 (-0.72)	-1.5878 (-1.22)	-1.2371 (-0.68)	0.2186 (0.07)
	RVR	0.9666 (0.33)	1.6729 (0.53)	2.7079 (0.84)	4.9845 (1.10)	4.7135 (0.58)
	F-value	0.81	1.31	1.64	1.30	2.68 **
	R-square	0.08	0.12	0.15	0.12	0.22

***, **, * Significant at the 0.01, 0.05, and 0.1 levels, respectively. (two-tail test)

Table 4 (Continued)
Cross-Sectional Regression Analysis for MCAR

Panel C. MCAR(0,+t)- after the actual listing day						
Model	variable	Independent Variable				
		MCAR(0,+1)	MCAR(0,+2)	MCAR(0,+3)	MCAR(0,+5)	MCAR (0,+10)
I	Intercept	-1.8505 (-2.69) ***	-2.3774 (-2.83) ***	-4.5439 (-3.91) ***	-9.3966 (-6.66) ***	-11.9631 (-5.86) ***
	RTV	3.7239 (2.45) **	4.9123 (2.64) **	6.9317 (2.69) ***	8.9561 (2.87) ***	9.1967 (2.04) **
	RVTV	-2.4374 (-1.89) *	-3.0546 (-1.93) *	-3.8557 (-1.77)	-4.0929 (-1.55)	-3.9629 (-1.04)
	RVR	2.8871 (1.06)	2.0182 (0.60)	1.3672 (0.30)	-1.1572 (-0.21	5.5893 (0.69)
	F-value	3.16 **	3.49 **	4.25 ***	6.40 ***	4.04 ***
	R-square	0.16	0.18	0.21	0.28	0.20
II	Intercept	-1.7817 (-2.59)	-2.3068 (-2.75) ***	-4.5076 (-3.92) ***	-9.4169 (-6.81) ***	-11.5977 (-5.64)
	∂ LR	3.3759 (2.28) **	4.5799 (2.53) **	6.8618 (2.77) ***	9.2889 (3.12 ***	7.1059 (1.60)
	RVTV	-2.2018 (-1.72) *	-2.8459 (-1.82) *	-3.8829 (-1.82) *	-4.4691 (-1.74) *	-2.3889 (0.62)
	RVR	6.8995 (2.18) **	7.4452 (1.92)	9.4487 (1.78) *	9.7332 (1.53)	14.1926 (1.50)
	F-value	2.87 **	3.30 **	4.39 ***	6.99 ***	3.44 **
	R-square	0.15	0.17	0.21	0.30	0.17
III	Intercept	-2.0382 (-1.34)	-3.7593 (-1.97)	-6.7340 (-2.55) **	-10.9659 (-3.39) ***	-15.6194 (-3.35) **
	RTV	3.5992 (2.38) **	4.9323 (2.63) **	7.0413 (2.70) ***	9.0509 (2.83) ***	9.6671 (2.10) **
	EPS	0.6561 (1.72) *	0.6422 (1.35)	0.7366 (1.11)	0.4685 (0.58)	0.1909 (0.16)
	σ_{Hold}	-0.0061 (-1.04)	0.0003 (0.04)	0.0035 (0.34)	0.0032 (-0.25)	0.0171 (0.95)
	RVTV	-2.3766 (-1.88) *	-3.1018 (-1.95) *	-3.9636 (-1.80) *	-4.1773 (-1.55)	-4.2658 (-1.10)
	RVR	1.9144 (0.70)	1.0025 (0.29)	0.1702 (0.04)	-1.9278 (-0.33)	5.1155 (0.61)
	F-value	2.78 **	2.45 **	2.79 **	3.80 ***	2.56 **
	R-square	0.23	0.21	0.23	0.29	0.21
IV	Intercept	-2.1467 (-1.41)	-3.8945 (-2.04) **	-9.0092 (-2.67) ***	-11.3855 (-3.56) ***	-15.3169 (-3.22) ***
	∂ LR	3.5943 (2.48) **	4.9128 (2.17) ***	7.3162 (2.93) ***	9.6471 (3.17)	7.5363 (1.66)
	EPS	0.7608 (2.00) **	0.7852 (1.64)	0.9499 (1.44)	0.7499 (0.94)	0.4084 (0.34)
	σ_{Hold}	-0.0066 (-1.13)	-0.0004 (-0.06)	0.0026 (0.25)	0.0019 (0.16)	0.0151 (0.83)
	RVTV	-2.4476 (-1.96) *	-3.1563 (-2.02) **	-4.2855 (-1.99) **	-4.7866 (-1.83) *	-2.6857 (-0.69)
	RVR	5.9792 (1.93) *	6.5650 (1.69) *	8.4174 (1.58)	8.9187 (1.37)	13.9012 (1.43)
	F-value	2.89 **	2.55 **	3.07 **	4.28 ***	2.17 *
	R-square	0.24	0.21	0.25	0.31	0.19

***, **, * Significant at the 0.01, 0.05, and 0.1 levels, respectively. (two-tail test)