

Individual investor sentiment and IPO returns

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Abstract

This paper aims to construct the indicator of individual investor sentiment by referring to their investment behavior, and analyzes the correlation between individual investor sentiment and returns of initial public offerings (IPOs). After controlling variables, such as the market excess return, the size factor, the book-to-market factor and momentum factor, this paper finds that if the IPOs are more popular to individual investors when issuing, the short-term returns are higher. In Taiwan's stock market where individual investors are the dominant players, the investment behaviors of individual investors exhibit certain influences on IPO share prices. In addition, this paper divides the IPO samples into two groups, one group favored by individual investors and the other not at the time of issue. The result shows that IPOs favored by individual investors have significantly lower long-term returns after one year of their listings. As the two groups show no significant differences in average operational performances, this paper suggests that the price correction of the over-optimistic individual investors is the reason for the poorer long-term returns of the IPOs favored by individual investors.

I. Introduction

IPOs are characterized by high initial return (Ritter, 1984; Tinic, 1988; Huang, 1999) and low long-term return (Ritter, 1991; Loughran and Ritter, 1995). Ritter and Welch (2002) inferred that the irrational behaviors of investors may explain the long-term and short-term prices of IPOs. As compared to institutional investors, individual investors are disadvantaged in information (Chemmanur *et al.*, 2010) and are prone to overreact toward new events occurred in the market. Thus, individual investors are less rational among all investors. As IPOs are often issued under hot market, the high initial return easily attract investors' attention. Moreover, undertakers tend to promote IPOs for high profits, thus, the sentimental investors are likely to enter the IPOs market (Cook *et al.*, 2006; Coakley *et al.*, 2008). Individual investors tend to lose their ability to come up with reasonable judgment of the intrinsic value of IPOs. As a result, they trade irrationally. Falkenstein (1996) proved that mutual funds in the US reduce investments on IPOs in order to avoid the effects of irrational investment behavior. This implies that individual investors play a pivotal role in IPOs.

Derrien (2005) suggested that underwriters price IPOs at a range between the intrinsic value of the companies and the price that individual investors are willing to pay. IPOs would be over-valued compared to their long-term intrinsic value. In such instances, informed investors can sell IPO shares for short-term profits. Overly optimistic individual investors leave their money on the table by paying too much for IPO shares. Ljungqvist *et al.* (2006) indicated that underwriters price IPOs at a discount to attract individual investors whose sentiment is volatile. Derrien (2005) and Ljungqvist *et al.*

(2006) suggested that issuing companies and institutional investors profit from investor sentiment in the IPO market.

Cornelli *et al.* (2006), Derrien (2005) and Dorn (2009) conducted empirical studies by examining the gray markets in Europe. The gray markets allow the trading of pre-IPO shares and provide an opportunity to observe how individual investors observe the issuing companies. Cornelli *et al.* (2006) referred to the gray-market prices as the proxy variable for the evaluations by individual investors, and sampled 486 IPOs in 12 European countries from November 1995 to December 2000. The result indicated that high gray-market price (over-optimism of individual investors) is a great indicator to the price on the first trading day of IPO shares. Low gray-market prices (over-pessimism of individual investors) are not. Meanwhile, only when the gray-market prices are high, the long-term share prices can see an inflection point. The reason for this asymmetric phenomenon is that institutional investors only sell their holdings when individual investors are in optimism. However, institutional investors do not offload their shares when individual investors are too pessimistic. Therefore, individual investors are pushing the post-IPO share prices to a value not lower than the intrinsic value of the issuing companies. Derrien (2005) sampled the data of 62 IPOs in France in 1999~2001, and found that there is a high positive correlation between the initial returns of IPOs and demands from individual investors. However, there is a negative correlation between the long-term IPO share prices and demands from individual investors. In other words, when the IPOs are favored by individual investors at the time of issue, the share prices are more likely to be overvalued. Dorn (2009) sampled the data of 79 IPOs in Germany from August 1999 to May 2000, and suggested that IPO shares individual investors

actively pursue before listings or on listing dates have poorer and abnormal returns after one year. Contrary to researching the gray market in Europe, Chan (2010) investigated the data of the US stock markets in 1994~2000 by defining large trades as trades by institutional investors and small trades as trades by individual investors. The result indicated that there is a positive correlation between active trading of individual investors and the first-day returns of IPO shares.

However, the gray markets in Europe do not shed light to the overall picture of IPO performances and individual investors' behavior. For example, Cornelli *et al.* (2006) sampled the data of 12 European countries from November 1995 to December 2002. During this period, there were a total of 2723 IPO issues in these 12 countries but only 486 deals went to the gray markets before IPOs. The results based on the sampling of European gray markets may not be representative. This paper sources data in Taiwan and includes all the IPOs, to ensure the complete representation of samples. In addition, examining the trading data of individual investors in Taiwan has a much better presentation of samples compared to relying on the data provided by one or two brokers (Cornelli *et al.*, 2006; Dorn, 2009). Compared to differentiating institutional investors and individual investors by trading volumes (Chan, 2010), this paper samples trading data in Taiwan has more clear definitions of investor types.

This paper refers to the buy-sell imbalance (BSI) developed by Kumar and Lee (2006) as the indicator to the sentiment of individual investors to explore the role such sentiment plays in IPO prices. For the IPO shares individual investors aggressive pursue at the early days of listing, the BSI is positive. It shows excess optimism of individual investors. For the IPO shares that individual investors eager to sell at the early days of

listing, the BSI is negative. It shows excess pessimism of individual investors. By controlling the three factors emphasized by Fama and French (1992, 1993), namely the market excess return, the size factor and the book-to-market factor, and momentum factor described by Carhart (1997), this paper discusses the relationship between individual investor sentiment and IPO returns, in order to understand whether optimistic sentiment of individual investors leads to high initial returns and low long-term returns of IPO shares.

This paper finds that the IPO shares individual investors actively pursue at the early days of listing have significant and positive returns. Therefore, the trading behavior of individual investors has significant influence on the IPO share prices at the time of issue in Taiwan's stock market which is dominant by individual investors. The result is as what Kumar and Lee (2006) suggested: the systematic investments of individual investors affect share prices of the portfolios with a high concentration of individual investors. However, compared to IPOs that are not favored by individual investors at the time of issue, the popular IPOs have significantly worse performances after one year. Since there are no significant differences in average operating performances between the popular and unpopular IPOs, this paper suggests that the long-term share prices of these IPOs are the correction of the overly optimistic behavior of individual investors at the time of issue.

Traditional finance theories argue that investors invest in shares with rationality. Any irrational investment behavior will be cancelled out by arbitrages. There are only equilibrium returns to shares and the existence of irrational investors does not affect share prices. However, according to behavior finance, if irrational investors go for the

same direction, arbitrages cannot fully absorb the effect of such irrationality. The existence of irrational investors deviate share prices from their reasonable levels (Shleifer and Summers, 1990). Taiwan's stock market provides an opportunity to explore the impacts of irrational investments on share returns because individual investors are the dominant player and they are often considered irrational. Although individual investors account for nearly 80% of trading volumes in Taiwan, they suffer from heavy losses (Barber *et al.*, 2009). This paper examines the IPO market in Taiwan in order to understand whether overly optimistic individual sentiment can push shares to unreasonable highs, and put investors into great losses after their dreams have been shattered.

The remainder of this paper is organized as follows. Section 2 introduces the IPO market in Taiwan. Section 3 explains the samples and variables used by this study. Section 4 presents the empirical results, including an analysis of short-term and long-term IPO returns. Section 5 gives the conclusions and suggestions.

II. IPO Market in Taiwan

Taiwan Stock Exchange, established in 1962, listed only 7 companies in the beginning. By 2009, there were 741 listed companies. The IPO market in Taiwan grows at an average of 10% per year. In 2000~2002, there were the largest number of IPOs on the market, with 211 companies listing on the exchange. Individual investors have been the major players on the market, and institutional investors account for only a small percentage. In 2009, the market capitalization of Taiwan's stock market was

approximately 657 billion USD, ranking the 11th largest stock market in the world. It is a high-profile stock market among the emerging countries.

Some listed companies in Taiwan are trading on GreTai Securities Market, rather than Taiwan Stock Exchange; they are traded in a similar way. However, Taiwan Stock Exchange has a more robust set of requirements for capitalization, profitability, shareholder base diversification and company history. The requirements by GreTai Securities Market are less stringent so companies that eager to raise funds for expansions will go for GreTai Securities Market first. They will switch the mainboard when they are able to meet the listing criteria on Taiwan Stock Exchange. Since the establishment of GreTai Securities Market in 1990, a total of 260 companies have transferred to the mainboard by 2009. The switch from GreTai Securities Market to Taiwan Stock Exchange continues with the previous trading price.

There are 7% ceiling and floor restrictions on price changes of the same day on Taiwan's stock market. The IPO market used to be subject to the same restrictions. Since March 2005, the price restrictions were removed for the first five trading days of IPOs. The purpose is to enhance the quality of IPO issues and to connect the practices in Taiwan to the international standards.

III. Samples

Sample screening

This paper samples the IPOs listed on Taiwan Stock Exchange after December 2000

because Taiwan Stock Exchange has been providing daily trading volumes by foreign institutional investors and Chinese investors, investment trusts and dealers since December 2000. As Taiwan Stock Exchange removed the 7% ceiling and floor restrictions for the first five trading days of IPOs since March 1, 2005, this paper samples IPOs listed before March 2005, in order to ensure all samples are measured consistently. In other words, the sampling period starts from December 2000 and ends in February 2005. However, the research period starts from December 2000 and ends in February 2008 because this paper intends to examine the long-term returns and operating performances of IPOs after they have been listed for three years. There were a total of 235 IPOs during the sampling period. However, the companies transferring from GreTai Securities Market have the same share prices for their listings on the mainboard and their shareholder structures are also relatively stable. These companies are not subject to the sentiment of individual investors for new IPOs on Taiwan Stock Exchange. Therefore, 138 “transferred” IPOs are eliminated from the sample pool. Finally, this paper removes 1 company delisted within three years after IPO and 4 IPOs lacking in trading data from the sample pool, and samples the data of 92 IPOs from Taiwan Economic Journal and Taiwan Stock Exchange.

Sample distributions

Table 1 shows the distribution of the samples. The samples are divided according to the industry classifications defined by Taiwan Stock Exchange, and 61.96% of the samples are electronics shares (including semiconductor, computers & peripherals,

optoelectronics, telecommunications & internet, electronic components, electronic products distributions, other electronics and electrons). This reflects the industry portfolio of the listed companies in Taiwan. Most of the IPOs enter the market in 2002, accounting for 42.39% of the total.

[Insert Table 1]

Descriptive Statistics

Table 2 summarizes the descriptive statistics of the samples, such as BSI, returns on share prices and operating performances after IPOs.

This paper describes both short-term and long-term returns for IPOs. Some original shareholders are reluctant to sell and the trading volumes are mostly low at the time of issue, and there are still ceiling and floor restrictions on the Taiwanese IPO market during the research period, the calculation of returns on the first trading day cannot capture all the price/volume information at the early days of the issue. Therefore, this paper follows the approach of Chen (2001) by calculating the returns of the first five trading days of IPO shares. The calculation of short-term return is as follows:

$$SR_{iT} = \prod_{t=1}^{t=5} (1 + R_{it}) - 1 \quad (1)$$

where:

SR_{iT} = the short-term return of the i-th IPO,

R_{it} = the return on the t-th day of the i-th IPO.

This paper follows Ritter (1991) using the returns one month to three years after IPOs as the long-term returns. In order to avoid the noise of the returns at the time of issue to the long-term returns, this paper eliminates the short-term returns in the calculation of long-term returns. The calculation is based on 21 trading days in a month, as follows:

$$LR_{it} = \prod_{t=1}^{t=n} (1 + R_{it}) - SR_{iT} \quad (2)$$

where:

LR_{it} = the long-term returns of the i-th IPO,

R_{it} = the returns on the t-th day of the i-th IPO,

n = the number of days,

SR_{iT} = the short-term return of the i-th IPO as expressed in Equation 1.

Table 2 describes long-term returns, including 1 month (21 trading days), 6 months (126 trading days), 1 year (252 trading days), 2 years (504 trading days) and 3 years (756 trading days).

Table 2 shows that the mean and median of returns for the first week of IPO listing are both positive. The number of positive short-term returns (52) is also greater than the number of negative returns (38). This indicates that most IPOs experience a honeymoon period with share prices going up. The average/median returns start to turn into negative after six/one months of issue. Both returns decrease over time. The number of IPOs with negative long-term returns is larger than the number of IPOs with positive long-term returns. The finding of this paper is consistent with existing studies. The IPO share prices rise at the early days of the issue but deteriorate after a while.

This paper refers to BSI developed by Kumar and Lee (2006) as the indicator of

individual investor sentiment. In response to the calculation of IPO short-term returns, this paper computes the BSI value during the first five days of issue as the indicator of trading by individual investors. It is defined as follows:

$$BSI_{iT} = \frac{\sum_{t=1}^{t=5} (VB_{it} - VS_{it})}{\sum_{t=1}^{t=5} (VB_{it} + VS_{it})} \quad (3)$$

where:

BSI_{iT} = the BSI of the i-th IPO for the first five trading days,

VB_{it} = the purchasing volume by individual investors for the i-th IPO on the t-th day of listing,

VS_{it} = the selling volume by individual investors for the i-th IPO on the t-th day of listing.

A positive BSI value indicates a net purchase of the shares by individual investors for the first five days. This means that individual investors have been actively buying the shares of IPOs at the time of issue. On the contrary, a negative BSI value indicates a net sell of the shares by individual investors for the first five days. This means that individual investors have been actively selling the shares of IPOs at the time of issue. According to Table 2, the average BSI value is positive (16.74%), but the median is 0. The numbers of positive BSI (active purchases by individual investors) and the numbers of negative BSI (active sells by individual investors) are the same. Therefore, whilst individual investors are overall actively involved in IPOs, but not all new issues are well received by individual investors. Individual investors have their own preferences.

To evaluate the average operating performances of the IPOs after the issue, this paper

calculates the average return on assets (ROA), return on equity (ROE) and earnings per share (EPS) by sourcing financial data at the end of each year within the first three years of issue. ROA is expressed as after-tax income plus interest expenses as a percentage of average assets. ROE is expressed as after-tax income as a percentage of average equity, EPS is expressed as after-tax income minus preferred share dividends as a percentage of weighted average number of shares outstanding. According to Table 2, the mean and median of operating performances (ROA, ROE and EPS) within the first three years of the issue are both positive. This means that most of the IPOs are profitable companies. Approximately 85% of them have positive operating performances within the first three years of issue¹.

[Insert Table 2]

IV. Empirical Results

Short-term returns of IPOs

The second column of Table 3 shows the short-term returns of IPOs based on Capital Asset Pricing Model (CAPM). The regression model² is as follows:

$$SR_{iT} - R_{fT} = \alpha + \beta_1 RMRF_T + \varepsilon_{iT} \quad (4)$$

In Equation 4, $SR_{iT} - R_{fT}$ is the excess short-term return of the i-th IPO, that is, the

¹ Due to a lack of financial report for four companies in the sample pool, there are 88 samples for the analysis of operating performances.

² Before regression analyses, this paper performs collinearity tests for all the explanatory variables with Variation Inflation values, in order to ensure the absence of collinearity in regressions.

short-term returns (SR_{iT}) minus risk-free return (R_{fT})³. $RMRF_T$ is the market excess return, that is, Taiwan market index returns minus risk-free returns. The symbol ε_{iT} is the residual of the regression model. The coefficient of $RMRF_T$ is 0.95, close to 1. This means that the short-term share prices of IPOs trend is close to the overall market.

The third column of Table 3 expresses the regression equation established with three factors model developed by Fama and French (1992, 1993). The equation is as follows:

$$SR_{iT} - R_{fT} = \alpha + \beta_1 RMRF_T + \beta_2 SMB_T + \beta_3 HML_T + \varepsilon_{iT} \quad (5)$$

In Equation 5, $SR_{iT} - R_{fT}$ is the excess short-term return of the i-th IPO, $RMRF_T$ is the market excess return, SMB_T is the size factor (i.e. small-cap portfolio returns minus large-cap portfolio returns), HML_T is the book-to-market factor, that is, returns of portfolios with a high book-to-market ratio minus the returns of portfolios with a low book-to-market ratio. Book-to-price ratio is defined as the book value per share divided by market price per share. ε_{iT} is the residual of the regression model. According to three factor model, the coefficients are all significantly positive for the market excess return, the size factor, the book-to-market factor. This indicates that a bull market, small caps, and high book-to-market ratios contribute to the high short-term returns of IPOs.

The fourth column of Table 3 shows four factor model established on the basis of three factor model by Fama and French (1992, 1993) and the momentum factor described by Carhart (1997). The regression model is as follows:

$$SR_{iT} - R_{fT} = \alpha + \beta_1 RMRF_T + \beta_2 SMB_T + \beta_3 HML_T + \beta_4 UMD_T + \varepsilon_{iT} \quad (6)$$

In Equation 6, $SR_{iT} - R_{fT}$ is the excess short-term return of the i-th IPO, $RMRF_T$ is

³ R_{fT} is adjusted according to the 1-month fixed-term deposit quoted by First Commercial Bank.

the market excess return, SMB_T is the size factor, HML_T is the book-to-market factor, UMD_T is the momentum factor, that is, returns of high-performance portfolio minus the returns of low-performance portfolio, based on the accumulated returns of the previous six months, ε_{iT} is the residual of the regression model. The four factor model shows that a bull market, small caps, high book-to-price ratios and low returns of portfolios contribute to high short-term returns of IPOs.

The fifth column of Table 3 summarizes the regression equation established on the basis of four factor model and an additional variable---BSI. The regression model is as follows:

$$SR_{iT} - R_{fT} = \alpha + \beta_1 RMRF_T + \beta_2 SMB_T + \beta_3 HML_T + \beta_4 UMD_T + \beta_5 BSI_{iT} + \varepsilon_{iT} \quad (7)$$

In Equation 7, $SR_{iT} - R_{fT}$ is the excess short-term return of the i-th IPO, $RMRF_T$ is the market excess return, SMB_T is the size factor, HML_T is the book-to-market factor, UMD_T is the momentum factor, BSI_{iT} is the variable for individual investor sentiment, as defined in equation 3, ε_{iT} is the residual of the regression model. After BSI is incorporated into the equation, the coefficient directions of $RMRF_T$, SMB_T , HML_T and UMD_T remain the same. The coefficient of BSI is 0.05, reaching the 1% significance level of p -value. When BIS increases by one standard deviation, the short-term returns of IPOs go up by 6.32% ($126.41\% \times 0.05$). After controlling the variables such as the market excess return, size factor, book-to-market factor and momentum factor, this paper finds that the IPOs that the individual investors tend to buy, the higher their returns at the early days of issue. Meanwhile, the IPOs that the individual investors are keener to sell, the lower their returns are at the early days of

issue. Therefore, the investment behavior of individual investors has significant and positive influence on the short-term returns of IPOs. As a key player in the Taiwanese market, individual investors can move market prices systematically.

According to Table 3, the explanatory power of the regression model (adjusted R^2) is 3% if short-term returns are analyzed with CAPM. The explanatory power (adjusted R^2) is 12% if short-term returns are analyzed with the tree factor model. Adjusted R^2 increases to 13% if short-term returns are analyzed with four factor model. If BSI is incorporated as a variable into the four factor model, the explanatory power (adjusted R^2) rises to 21%, an improvement of 8% compared to the same model without BSI as a variable. Therefore, the addition of BSI as a variable can significantly increase the explanatory power of the regression model.

[Insert Table 3]

Long-term Returns of IPOs

Individual investor sentimental investment, namely active purchases and excess optimism, can significantly increase IPO returns. However, as individual investors calm down over time, will the prices go through corrections and eventually result in negative long-term returns?

This paper divides the samples into two groups, one group with positive BSI values (IPOs that the individual investors tend to buy) and the other with negative BSI values (IPOs that the individual investors are eager to sell). It then examines their returns for one month, six months, one year, two years and three years after the issue. The four

factor model is constructed as follows:

$$LR_{it} - R_{ft} = \alpha_i + \beta_1 RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \varepsilon_{it} \quad (8)$$

In equation 8, LR_{it} is the long-term returns of the i -th IPO, as defined in Equation 2, R_{ft} is the risk-free returns, $RMRF_t$ is the market excess return, SMB_t is the size factor, HML_t is the book-to-market factor, UMD_t is the momentum factor, ε_{it} is the residual of the regression model. This paper examines the intercept value α (i.e. Jensen's α). If Jensen's α value is significantly positive/negative, it means that IPOs have positive/negative long-term returns.

According to the second column of Table 4, the samples with positive BSI at the time of issue have insignificantly positive Jensen's α value after one month and six months of the issue. After one year of the issue, Jensen's α value turn negative. They remain negative after two years and three years of the issue and the numbers are statistically significant. In other words, Jensen's α values decrease over time for the IPOs with positive BSI at the time of issue. The IPOs that the individual investors tend to purchase at the time of the issue have deteriorating long-term returns over time. The third column of Table shows that the samples with negative BSI at the time of issue also see deteriorating long-term returns. Jensen's α values start to turn negative six months after the issue. Therefore, the long-term performances of IPOs that the individual investors are eager to offload are also poor.

Table 4 also indicates that the IPOs with positive BSI at the time of issue have better returns than those with negative BSIs in six months after issue. However, the IPOs with positive BSI at the time of issue see their returns lower than those with negative BSI since one year after issue. The gap in fact enlarges over time. In other words, the IPOs

supported by the over-optimistic individual investors at the time of issue have deteriorating long-term returns compared to the IPOs suffering from the pessimism of individual investors at the time of issue. Individual investors tend to bet on the IPOs with poor long-term share prices (Field and Lowry, 2009). Whether favored by individual investors, all IPOs have their long-term returns in the negative territory. However, IPOs favored by individual investors ($BSI > 0$) perform worse than those not favored by individual investors ($BSI < 0$) over the long run.

[Insert Table 4]

Why do the IPOs favored by individual investors end up being the worst performers? The long-term share prices may be subject to the influence of operating performances after listings (Loughran and Ritter, 1997), thus, perhaps individual investors are not professional enough to pick good stocks so they tend to fall for IPOs with poor long-term prospects. Another explanation is that the initial high returns pushed by the over-optimistic individual investors cause the rapid corrections to fundamentals.

Table 5 analyzes the variables for operating performances, including average ROA, ROE and EPS three years after IPOs. This paper divides the samples into the IPOs that the individual investors tend to buy ($BSIs > 0$) and the IPOs that the individual investors are eager to sell ($BSIs < 0$) at the time of issue. The results in Table 5 indicate that although the IPOs that the individual investors tend to buy at the time of issue have operating performances little worse than the IPOs that the individual investors are eager to sell, the differences are insignificant. Both *t*-stats tests on mean differences and Wilcoxon tests on median differences have no statistical significance. Since the operating performances of the IPOs favored by individual investors are not much poorer,

operating performances do not contribute to poor long-term share prices. Therefore, the corrections to the optimistic purchase by individual investors at the time of issue are the cause of the poor long-term share prices.

[Insert Table 5]

V. Robustness Tests

BSI adjusted for market factor

BSI is subject to the influence of market factor (Kumar and Lee, 2006), that is to say, individual investors may be attracted to the high returns of a bull market but not the essentials of IPOs. To avoid this problem, this paper adjusts BSI by eliminating the component related to market movements. The adjustments are as follows:

$$BSI_{it} = b_0 + b_1 RMRF_T + e_{it} \quad (9)$$

where, BSI_{it} is the variable indicating individual investor sentiment, $RMRF_T$ is the market return in excess of the risk-free rate, e_{it} is residuals and indicating individual investor sentiment after market factor eliminated. Using e_{it} as the new individual investor sentiment indicator, this paper re-analyzes the short-term and long-term returns of IPOs. The analysis (not shown in tables) indicates that after the adjustments of market factor for BSI, the IPOs that the individual investors tend to pursue at the time of issue still have higher short-term returns and lower long-term returns. The regression analysis shows similar results with the original empirical findings.

Short-term returns based on the returns on the listing day

Investors usually respond to IPOs on the first day of listing. Ritter (1984, 1991) refer to the returns on listing day as the short-term returns of IPOs. To ensure the robustness of the analysis, this paper also refers to the returns on listing day as the short-term returns of IPOs. Meanwhile, it re-analyzes the relationship between individual investor sentiment and short/long-term returns of IPOs. During the research period, the IPO market in Taiwan was still subject to the 7% ceiling and floor restrictions on a single day. The share prices hitting the 7% limit on the first trading day cannot fully reflect how the market sees these IPOs. Therefore, this paper eliminates the samples whose share prices hit the 7% limits on the first day. There are four of them so the total number of samples is 88.

The analysis (not shown in tables) indicates that the returns on the day of listing carry weaker explanatory power than the returns during the first week of listing. According to coefficients, the BSI calculated for the listing day has significant and positive influence on the returns of the first trading day. On the other hand, the IPOs that the individual investors buy aggressively at the time of issue show worse long-term share prices one year after listing, compared to the IPOs that the individual investors are eager to sell at the time of issue. The empirical results of this paper are robust, to a certain degree.

VI. Conclusions

This paper uses Taiwan's samples and constructs an indicator representing the

investment behavior of individual investors in order to analyze the short-term and long-term share price performances of IPOs. The results show that the active purchasing by individual investors has positive influence on the IPO share prices and the active selling by individual investors has negative influence on the IPO share prices in early days of issue. Since individual investors are the major players in Taiwan's stock market and their investment behavior has certain influence on IPO share prices. This finding is consistent with the perspective of behavior finance, that is, in a stock market where individual investors are the dominant players, their systematic trading is an important factor of share price changes. It cannot be dismissed as irrelevant noise.

The samples are then divided into two groups, one group favored by individual investors and the other not favored by individual investors. This paper observes the long-term share prices of IPOs and finds that the IPOs that the individual investors tend to buy perform worse in the long run, compared with the IPOs that the individual investors eager to sell at the time of issue. Since there are no significant differences in the operating performances of these two groups after listing, this paper suggests that the correction of the optimistic responses of individual investors at the time of issue are the reason for their weak long-term share prices.

Therefore, this paper suggests that the sentiment of individual investors can explain why IPOs usually have positive returns in the early days of issue, but long-term returns are negative.

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Table 1. The distribution of the samples

Industry	Numbers of Samples	Year	Numbers of Samples
Textiles	2	2000	1
Electric Machinery	5	2001	18
Chemical	1	2002	39
Biotechnology & Medicine Care	3	2003	23
Automobile	1	2004	9
Iron & Steel	1	2005	2
Semiconductor	12		
Computers & Peripherals	9		
Optoelectronics	12		
Communications & Internet	10		
Electronic Components	8		
Electronic Products Distribution	2		
Other Electronics	2		
Electrons	2		
Oil, Gas, and Electricity	1		
Building Material & Construction	1		
Financial & Insurance	14		
Others	2		
Taiwan Deposit Receipts	4		
Totals	92	Totals	92

Notes: The samples are divided according to the industry classifications defined by Taiwan Stock Exchange. The sampling period starts from December 2000 and ends in February 2005.

Table 2. The descriptive statistics

	BSI(%)	Returns on share prices after IPOs (%)						Operating performances after IPOs		
		1 week	1 month	6 months	1 year	2 years	3 years	ROA(%)	ROE(%)	EPS
Mean	16.74	9.06	4.18	-9.53	-14.69	-16.20	-16.60	6.85	10.03	2.78
Median	0.00	5.69	-2.36	-15.27	-16.46	-16.10	-23.94	6.38	12.01	1.86
Maximum	500.00	39.67	152.67	205.33	200.00	176.11	202.78	42.76	52.56	23.83
Minimum	-278.94	-29.64	-40.50	-86.53	-105.39	-126.09	-136.06	-30.24	-81.56	-6.90
SD	126.41	21.83	30.31	45.48	49.04	53.61	62.09	12.72	22.72	4.46
Numbers of positive	42	52	36	31	28	29	35	76	74	74
Numbers of negative	42	38	56	61	64	63	57	12	14	14
Numbers of zero	8	2	0	0	0	0	0	0	0	0

Notes: The buy-sell imbalance (BSI) is defined as $BSI_{it} = \frac{\sum_{t=1}^{t=5} (VB_{it} - VS_{it})}{\sum_{t=1}^{t=5} (VB_{it} + VS_{it})}$, where BSI_{it} is the BSI of the i-th IPO for the first five trading days, VB_{it} is the purchasing volume by individual investors for the i-th IPO on the t-th day of listing, VS_{it} is the selling volume by individual investors for the i-th IPO on the t-th day of listing. The calculation of return is defined as $\prod_{t=1}^{t=n} (1 + R_{it}) - 1$, where R_{it} is the returns on the t-th day of the i-th IPO, n is the number of days, The calculation is based on 5 trading days in a week, and 21 trading days in a month. The short-term returns would be eliminated in the calculation of long-term (one month to three years after IPOs) returns. To evaluate the average operating performances of the IPOs after the issue, this paper calculates the average return on assets (ROA), return on equity (ROE) and earnings per share (EPS) by sourcing financial data at the end of each year within the first three years of issue. ROA is expressed as after-tax income plus interest expenses as a percentage of average assets. ROE is expressed as after-tax income as a percentage of average equity, EPS is expressed as after-tax income minus preferred share dividends as a percentage of weighted average number of shares outstanding.

Table 3. Short-term returns of IPOs

	CAPM	Three factors model	Four factors model	Model used in this paper
Alpha	9.12*** (4.05)	9.16*** (4.30)	20.08*** (3.59)	20.18*** (3.48)
RMRF	0.95 (1.50)	1.88** (2.70)	1.73** (2.49)	1.32** (2.00)
SMB		7.20*** (4.30)	6.84*** (4.03)	5.15*** (3.02)
HML		3.45*** (3.16)	3.21*** (2.90)	2.44** (2.20)
UMD			-6.20** (-2.19)	-6.79** (-2.29)
BSI				0.05*** (4.42)
Adj.R ²	0.03	0.12	0.13	0.21
F-test	2.40	5.12***	4.31***	5.94***
Numbers of observations	92	92	92	92

Notes: The regression model: $SR_{it} - R_{ft} = \alpha + \beta_1 RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \beta_5 BSI_{it} + \varepsilon_{it}$, where, $SR_{it} - R_{ft}$ is the excess short-term return (i.e. the short-term returns SR_{it} minus risk-free return R_{ft}), $RMRF_t$ is the market excess return (i.e. Taiwan market index returns minus risk-free returns), SMB_t is the size factor (i.e. small-cap portfolio returns minus large-cap portfolio returns), HML_t is the book-to-market factor (i.e. returns of portfolios with a high book-to-market ratio minus the returns of portfolios with a low book-to-market ratio), UMD_t is the momentum factor (i.e. returns of high-performance portfolio minus the returns of low-performance portfolio, based on the accumulated returns of the previous six months), and ε_{it} is the residual of the regression model. The t -values of the coefficient estimates adjusted by White (1980) are reported in parentheses. Significance is denoted as follows: ***Significant at the 1% level under a two-tailed test. ** Significant at the 5% level under a two-tailed test. * Significant at the 10% level under a two-tailed test.

Table 4. Long-term returns of IPOs

	IPOs with positive BSI		IPOs with negative BSI	
1 month	40.09	(0.67)	2.32	(0.12)
6 months	10.67	(0.24)	-41.43	(-1.21)
1 year	-197.70	(-1.67)	-80.16	(-0.80)
2 years	-295.25*	(-1.83)	-152.83*	(-1.74)
3 years	-733.06**	(-2.49)	-203.66	(-1.16)

Notes: The regression model: $LR_{it} - R_{ft} = \alpha_i + \beta_1 RMR_{ft} + \beta_2 SMB_{ft} + \beta_3 HML_{ft} + \beta_4 UMD_{ft} + \varepsilon_{it}$, where, LR_{it} is the long-term returns of the i -th IPO, other variables definitions see *Notes* to Table 3. The intercept values α are reported in the table. The t -values of the coefficient estimates adjusted by White (1980) are reported in parentheses. Significance is denoted as follows: ***Significant at the 1% level under a two-tailed test. ** Significant at the 5% level under a two-tailed test. * Significant at the 10% level under a two-tailed test.

Table 5. Operating performance after IPOs

		IPOs with	POs with	Differences
		positive BSI	negative BSI	(<i>t</i> -value/ <i>z</i> -value)
ROA(%)	Mean	7.59	8.38	-0.79(-0.29)
	Median	6.38	8.15	-1.77(-0.53)
ROE(%)	Mean	10.73	13.51	-2.78(-0.58)
	Median	11.22	12.98	-1.76(-0.89)
EPS	Mean	2.68	3.54	-0.86(-0.85)
	Median	1.75	2.19	-0.45(-1.25)

Notes: Variable mnemonics as Table 2.