The High-Volume Return Premium: Evidence from Chinese Stock Markets

1. Introduction

If price and quantity are two fundamental elements in any market interaction, then the importance of trading volume in modeling asset price is obvious. Although most models of asset pricing have focused on the relationship between stock returns and return variability, recently the information content contained in trading volume has received more attention. Lo and Wang (2000) examine the implication of portfolio theory for the cross-sectional behavior of equity trading volume and find that the average trading turnover is related to firms' characters, such as stock return and market capitalization. Using the daily data for stocks traded in the New York Stock Exchange (NYSE) over the period 1963 to 1996, Gervais, Kaniel, and Mingelgrin (2001) find that extreme trading activity contains significant information about the future evolution of stock prices. In particular, they find that stocks experiencing unusually high (low) trading volume over a day or a week tend to appreciate (depreciate) over the course of the following month. A high-volume return premium seems to exist in the U.S. equity market. They attribute the high-volume return premium to the stock's publicity (or visibility) that is supported by earlier and recent studies, such as Miller (1977), Mayshar (1983), Merton (1987), Cooper (1999), and Lee and Swaminathan (2000).

This paper focuses on the relationship between stock return and trading volume in Chinese stock markets that have received less attention in the past. China has been one of the fastest growing countries in the world over the last decade. Its stock markets, established in late 1990 and early 1991, have been growing at a rapid pace. There are less than 20 stocks listed for trading at the end of 1991 with a total trading volume of 0.63

billion shares for the entire year. By the end of 2001, there are 1,137 stocks listed in the exchanges with a total trading volume of more than 300 billion shares for the year.[1] More and more Chinese companies have successfully listed their stocks on the Hong Kong Stock Exchange and several foreign exchanges, including NYSE and NASDAQ. Chinese stock markets have become an important part of the global financial system.

In this paper, I examine whether a high-volume return premium also exists in Chinese stock markets. I use both trading volume and share turnover to classify stocks, which provides an opportunity to compare the patterns of price evolution for stocks grouped under different criteria after initial volume shocks.[2] I form six portfolios, three based on trading volume and three based on share turnover. In particular, I form two zero-investment portfolios by buying either all the high-volume or all the high share-turnover stocks and selling either all the low-volume or all the low share-turnover stocks, two volume-size portfolios by buying either all the high-volume or all the high share-turnover and small-size stocks and selling either all the low-volume or all the low share-turnover and large-size stocks, and two momentum portfolios by buying either all the high-volume or all the high share-turnover stocks with positive returns on the formation days (winners) and selling either all the high-volume or all the high share-turnover stocks

[1] There are two stock exchanges in China. The Shanghai Stock Exchange was established in December 1990 and the Shenzhen Stock Exchange was found in April 1991.

[2] In general, there are three major groups of shareholders in Chinese stock markets: the government and its agency, other legal entities that include institutional investors, and individual investors. Each group holds about one third of total outstanding shares. However, only shares issued to individual investors are floating in the market. Therefore, it is more interesting to examine and compare the patterns of price evolution for stocks grouped on extreme trading volume and share turnover.

with negative returns on the formation days (losers). I then test whether any of these portfolios yields abnormal average net returns over the consequent 1, 5, 10, 20, and 30 trading days after initial volume shocks.

The main results of this paper are shown in Figures 1-4. First, I find that stocks with unusually high trading volumes earn significantly higher average cumulative returns after initial volume shocks as shown in Figure 1. The average cumulative return over the period of 30 trading days after initial volume shocks is 4.14% for all the high-volume stocks, compared to 1.69% for all the normal-volume stocks, and only 1.06% for all the low-volume stocks. Similar to the patterns for stocks classified by trading volumes, stocks with unusually high share-turnovers also earn significantly higher average cumulative returns after initial share-turnover shocks as shown in Figure 2. The average cumulative return for all the high share-turnover stocks over the period of 30 trading days is 4.47%, compared to 1.65% for all the normal share-turnover stocks, and only 1.13% for all the low share-turnover stocks.

Figure 3 illustrates and compares the performance of three portfolios constructed on extraordinary trading volumes. The zero-investment portfolio earns a significantly positive average net return of 3.08% over the period of 30 trading days after initial volume shocks, suggesting existence of a high-volume return premium in Chinese stock markets. The volume-size portfolio earns a much higher average net return of 8.97% over the next 30 trading day period, indicating that Chinese investors prefer chasing high-volume and small-size stocks. The momentum portfolio, however, yields a -2.65% of average net return over the next 30 trading day period after initial volume shocks, suggesting that Chinese stocks exhibit a short-term reversal, which contradicts the

patterns of a weak short-term momentum and a strong long-term reversal in the U.S. stock market. Figure 4 provides a similar picture for other three portfolios based on extraordinary share turnovers. The zero-investment portfolio earns 3.34%, the share-turnover and size portfolio earns 8.84%, and the momentum portfolio earns -1.58% of average net returns over the period of 30 trading days after initial share-turnover shocks. Although the magnitude of the high-volume return premium varies with firm size but the premium exists across all firm sizes. The way to group portfolios doesn't seem to change the results.

The rest of the paper is organized as follows. Section 2 discusses the data set. Section 3 describes the main hypotheses and test procedure. Section 4 provides the empirical results and discusses the implications. Section 5 concludes the paper.

2. Data Set

I use the daily data that covers the period 1997 to 2001 from the CSMAR data set.[3] All the stocks listed in the Shanghai and Shenzhen Stock Exchanges are included. Following a similar approach of Gervais, Kaniel, and Mingelgrin (2001), I divide the entire sample into 39 non-overlapping intervals with 30 trading days in each interval. I skip one trading day between two consecutive intervals to avoid the day-of-the-week effect.[4] For all the

[3] The CSMAR data set contains daily data of individual stocks from 1991. Since there were many changes in security rules and regulations in Chinese stock markets prior to 1997, which causes additional volatility, and because this study requires enough sample size to classify stocks into portfolios, I use the data starting from 1997.

[4] Previous research shows that average stock returns exhibit certain patterns within a week. For instance, the average return on Monday is lower than the average returns on the other days of a week.

initial public offerings (IPOs) during the period 1997 to 2001, I not only skip the time interval during which the IPOs are initiated but also the entire next trading interval since new IPOs often generate unusually high trading volumes during their initial stage of issuance. For example, if an IPO is initiated on May 10, 1997, which falls into the 3rd trading interval in this study, I begin to include that stock in the 5th trading interval when I analyze the relationship between its return and trading volume.

The number of stocks in the first trading interval is 540, based on the number of stocks traded at the Shanghai and Shenzhen Stock Exchanges on February 26, 1997, the last trading day (the formation day) in the first trading interval. The number of stocks on December 28, 2001, the last trading day in the last trading interval is 1,137. That represents about 16% increase every year in the number of stocks listed for trading in Chinese stock markets over the period under investigation.

3. Methodology

The contemporaneous relationship between trading volume and stock price is well documented in financial literature. In earlier studies, Epps (1976), Copeland (1976), Tauchen and Pitts (1983), and Karpoff (1986) all show that bull markets are associated with high trading volumes. Harris and Raviv (1993) and Shalen (1993) find that high trading volume tends to lead large subsequent absolute price changes, or high volatility. Recent work by Cooper (1999) and Lee and Swaminathan (2000) focus on return autocorrelation to determine the motive of high trading volumes. Gervais, Kaniel, and Mingelgrin (2001) study the information content contained in trading volume and use it to predict the directional changes in stock prices. In this study, I follow the work of

Gervais, Kaniel, and Mingelgrin (2001) by hypothesizing that extreme trading volume contains valuable information about the future evolution of stock prices in Chinese stock markets. I construct portfolios based on extreme trading volume and develop a test procedure similar to the one used in Gervais, Kaniel, and Mingelgrin (2001). To investigate whether there exist a high-volume return premium and whether portfolios constructed based extreme trading volumes yield abnormal returns, I consider three strategies. I form a zero investment portfolio by buying a position in all the high-volume stocks and selling a position in all the low-volume stocks. I then check whether the strategy exploits abnormal profit by calculating the portfolio's average net returns over the period of 1, 5, 10, 20, and 30 trading days after initial volume shocks for all the stocks, the large-, medium-, and small-size stocks respectively.[5] Large-, medium-, and small-size stocks are determined by firms' market capitalizations at the end of each year. The largest 30% of firms are characterized in the large-size category, while middle 40% of firms in the medium-size category, and smallest 30% of firms in the small-size category.

Next, I form a volume-size portfolio by buying a portion of all the high-volume and small-size stocks and selling a portion of all the low-volume and large-size stocks to examine whether firm size plays any important role in causing a high-volume return premium. I calculate the portfolio's average net returns over the period of 1, 5, 10, 20, and 30 trading days after initial volume shocks and test whether the average net returns are significantly different from zero.

[5] Since short sale is not allowed in China I cannot take a short position directly. Therefore, I assume to sell a portion of all the low-volume stocks. The same logic applies when I form other portfolios.

Since volume shocks usually reveal new information and the information can be good or bad, I further form a momentum portfolio by buying a portion of all the high-volume stocks with positive returns on the formation days and selling a portion of all the high-volume stocks with negative returns on the formation days. Jegadeesh and Titman (1993) use an intermediate momentum strategy to profit 1% per month with a self-financing strategy that buys the top 10% and sells the bottom 10% of stocks ranked by returns over the past six months, and holds the positions for next six months. In this study, I test whether a short-term momentum strategy provides abnormal profits in Chinese stock markets by calculating the portfolio's average net returns over the period of 1, 5, 10, 20, and 30 trading days after initial volume shocks for all the stocks, the large-, medium-, and small-size stocks respectively and testing whether the average net returns are significantly different from zero.

To examine whether portfolio construction affects the high-volume return premium, I repeat the same analysis for all the stocks, the large-, medium-, and small-size stocks classified on extreme share turnovers and compare the results with those from volume classifications.

3.1. The Main Hypotheses

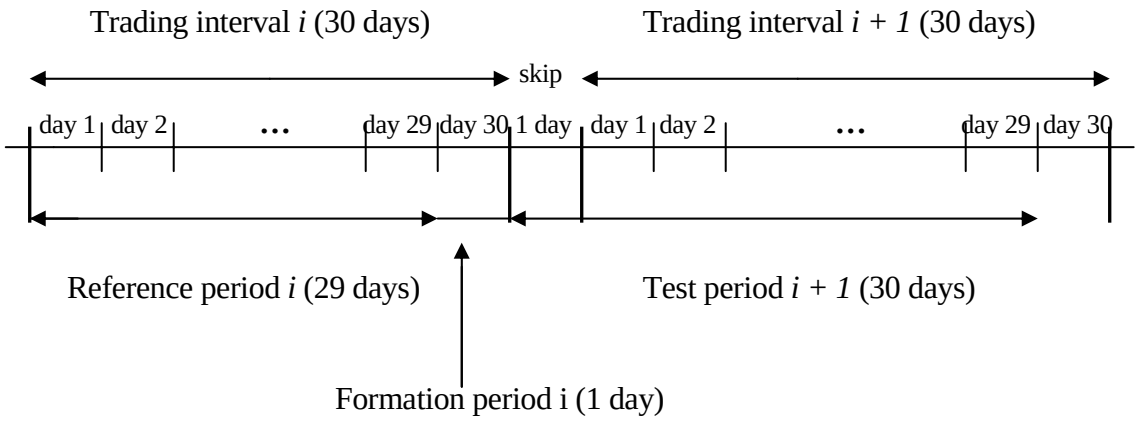
The objective of this paper is to examine whether extreme trading activity plays any informational role in predicting directional stock returns in Chinese stock markets. In particular, I am interested in studying how an extraordinary trading activity in an individual stock in one day is related to the future price evolution of that stock over the next 30 trading days and how a portfolio constructed on those individual stocks will behave over the next 30

trading days after initial volume shocks. Therefore, the first hypothesis examines whether there exists a high-volume return premium in Chinese stock markets. The second hypothesis tests whether portfolios constructed on extraordinary trading activity yield abnormal profits. The third hypothesis tests whether firm size plays any important role in causing the high-volume return premium. And the last hypothesis examines whether portfolios constructed on extreme trading volume and share turnover provide similar results.

3.2 Test Procedure

Following the procedure of Gervais, Kaniel, and Mingelgrin (2001), I construct the daily sample by splitting the entire sample into 39 non-overlapping trading intervals of 30 trading days each, yielding a total of 38 testing intervals. Suggested by Gervais, Kaniel, and Mingelgrin (2001), I try to avoid using the same day of the week as the last day in every trading interval by skipping a day in between two consecutive intervals. Each trading interval is split into reference period (29 trading days) and a formation period (the last trading day of the interval). The reference period is used to determine how unusually high or low the trading volume is for a given stock during the formation period. I then form three portfolios based on each stock's trading classification for the next testing period, the high-, normal-, and low-volume portfolios. Specifically, if the trading volume for a stock in the formation period is higher than top 10% of trading volumes in the reference period (top three highest volumes compared to the previous 29 daily trading volumes), it will be placed in the high-volume portfolio for the next testing period. In this way, each stock is classified as a high- (low-) or normal-volume stock in each testing interval. I than calculate the average cumulative returns for each portfolio over the

subsequent 1, 5, 10, 20, and 30 trading days after initial volume shocks. Similarly, I construct three high- (low-), or normal-share-turnover portfolios. Share turnover is defined as the trading value of a stock divided by the total floating market value of the stock. This is supposed to be a better way to measure volume shocks as suggested by Low and Wang (2000), especially after considering the fact that on average, only about one third of total shares outstanding in Chinese stock markets are floating. The detailed design of the test procedure is shown below.



To examine whether firm size plays any important role in causing a high-volume return premium, I further calculate the average cumulative returns for all the high-volume and low-volume stocks according to firm size, from large-, midterm-, to small-size over the subsequent 1, 5, 10, 20, and 30 days. I repeat the same analysis for all the stocks, large-, medium-, and small-size stocks grouped on extraordinary share-turnovers.

3.3. Zero Investment, Momentum, and Volume-size Portfolios

I follow a similar approach of Gervais, Kaniel, and Mingelgrin (2001) to form a zero investment portfolio. On each formation day, I buy a total of one Yuan in all the high-volume stocks and sell a total of one Yuan in all the low-volume stocks. Each stock

in the high- (low) volume category receives the same weight and this position is not rebalanced for the entire testing period.[6] At the end of interval *i*, I denote the next testing period (*i+1*) cumulative return on day t of buying a total of one Yuan in all the high-volume stocks as $R^h_{i+1,t}$ and of selling a total of one Yuan in all the low-volume stocks as $R^l_{i+1,t}$, then the net returns of the combined position are $NR^{ZI}_{i+1,t} = R^h_{i+1,t} - R^l_{i+1,t}$ for t = 1, 5, 10, 20, and 30, and i = 1, 2, …, 38. I then calculate the average net cumulative return of this strategy over all 38 non-overlapping testing intervals $1/38 \sum_{i=1}^{38} NR^{ZI}_{i+1,t}$ and test whether the average net cumulative return is significantly different from zero over the subsequent 1, 5, 10, 20, and 30 trading days. It should be clear that the main hypothesis is not to test whether the average cumulative returns from buying all the high-volume stocks or selling all the low-volume stocks are significantly positive or negative. Given the usual positive or negative drifts in stock prices, I expect that the average cumulative performance of buying and selling positions will be positive or negative. Therefore, I only concentrate on the performance of the zero-investment portfolio, which considers the average net cumulative returns, to test whether there exists a high-volume return premium in Chinese stock markets. I repeat the analysis for large-, medium-, and small-size stocks classified in high- and low-volume categories to examine whether average net cumulative returns behave differently across different firm sizes.

I then construct a volume-size portfolio by buying a total of one Yuan in all the high-volume and small-size stocks and selling a total of one Yuan in all the low-volume and large-size stocks. Similarly, each stock receives the same weight and the position is not

[6] For detailed construction of the portfolio, see the Appendix of Gervais, Kaniel, and Mingelgrin (2001).

rebalanced for the next entire testing period. At the end of interval *i*, I denote the next testing period cumulative returns on day t of buying positions as $R^{hs}_{i+1,t}$ and selling positions as $R^{ll}_{i+1,t}$ then the net returns of the combined position are $NR^{VS}_{i+1,t} = R^{hs}_{i+1,t} - R^{ll}_{i+1,t}$ for t = 1, 5, 10, 20, and 30, and *i* = 1, 2, …, 38. I then calculate the average net cumulative returns of this strategy over all 38 non-overlapping testing intervals $1/38 \sum_{i=1}^{38} NR^{VS}_{i+1,t}$ over the subsequent 1, 5, 10, 20, and 30 trading days and test whether this strategy earns abnormal returns.

Finally, I construct a momentum portfolio by buying a total of one Yuan in all the high-volume stocks with positive returns on the formation days and selling a total of one Yuan in all the high-volume stocks with negative returns on the formation days. Each stock carries the same weight and the position is not rebalanced for the next entire testing period. At the end of interval *i*, I denote the next testing period cumulative returns on day t of buying positions as $R^{h+}_{i+1,t}$ and selling positions as $R^{h-}_{i+1,t}$ then the net returns of the combined position are $NR^{MO}_{i+1,t} = R^{h+}_{i+1,t} - R^{h-}_{i+1,t}$ for t = 1, 5, 10, 20, and 30, and *i* = 1, 2, …38. I then calculate the average net cumulative returns of the strategy over all 38 non-overlapping testing intervals $1/38 \sum_{i=1}^{38} NR^{MO}_{i+1,t}$ and test whether this strategy earns abnormal returns over the consequent 1, 5, 10, 20, and 30 days. To further examine whether firm size affects the average net cumulative returns I repeat the analysis according to firm size for all the stocks classified in the high-volume category with positive or negative returns on the formation days.

To examine whether portfolio construction plays any important role to affect the high-volume return premium in Chinese stock markets I reconstruct the zero-investment, volume-size, and momentum portfolios based on extraordinary share turnovers. I repeat the

same analysis for all the stocks, all the large-, medium-, and small-size stocks classified on unusually high and low share turnovers and compare the results from those obtained from volume classifications.

4. Empirical Results

Table 1 reports the summary statistics for all the stocks, large-, medium-, and small-size stocks over the entire sample period. I find that the average stock price for all the stocks is 13.45 Yuan and the average daily trading volume for each stock is around 1.36 million shares. The average total market capitalization for each firm is about 3.48 billion Yuan and the average floating market capitalization of each firm is about 30% of the average total market capitalization, or about 1.01 billion Yuan. The average daily share turnover for each stock is 1.68%, which indicates that the average holding period is around 60 trading days for Chinese investors.

I also find from Table 1 that the average stock price for large-size stocks is 14.88 Yuan, which is higher than the average price of medium-size stocks of 12.96 Yuan. The average price of medium-size stocks, in turn, is higher than 11.52 Yuan, the average price of small-size stocks. The average daily trading volume for large-size stocks is also higher than that of the medium-size stocks, which in turn is higher than that of small-size stocks. The average total market capitalization for large-size firms is about 6.75 billion Yuan. It is around 2.47 billion Yuan for medium-size firms and it is only 1.45 billion Yuan for small-size firms. However, the average share turnover for small-size stocks is 1.89% (equivalent to an average holding period of 53 trading days), which is higher than the average share turnover of 1.58% (equivalent to an average holding period of 63 trading

days) for medium-size stocks. The average share turnover for large-size stocks is 1.35% (equivalent to an average holding period of 74 trading days). This evidence suggests that Chinese investors favor small-size stocks and trade them more frequently than large- or medium-size stocks.

Table 2 reports the number of all the high- and low-volume (high- and low-share-turnover) stocks in the entire sample and the average of them in each testing interval for all the stocks, large-, medium-, and small-size stocks. The total number of observations for all the high-volume stocks during the entire sample period is 2,345 (an average of 61.71 in each testing interval), with large-size stocks of 708 (an average of 18.63 in each testing interval), medium-size stocks of 876 (an average of 23.05 in each testing interval), and small-size stocks of 761 (an average of 20.03 in each testing interval). The number of observations for high-share-turnover stocks in the entire sample period for all the stocks, large-, medium-, and small-size stocks, and their averages in each testing interval is similar to those under volume classifications. The number of observations for all the high-volume stocks with positive returns on the formation days is 1,619 (an average of 42.61 in each testing interval), with large-size stocks of 500 (an average of 13.16 in each testing interval), medium-size stocks of 613 (an average of 16.13 in each testing interval), and small-size stocks of 506 (an average of 13.32 in each testing interval). The number of observations for all the high-share-turnover stocks with positive returns on the formation days for all the stocks, large-, medium-, and small-size stocks, and the average in each testing interval is comparable to those classified by high-volume and positive return stocks on the formation days.

The total number of observations for all the low-volume stocks during the entire sample period is 3,113 (an average of 81.92 in each testing interval), with large-size stocks of 1,055 (an average of 27.76 in each testing interval), medium-size stocks of 1,212 (an average of 31.89 in each testing interval), and small-size stocks of 846 (an average of 22.26 in each testing interval). The number of observations for all the low-share-turnover stocks in the entire sample for all the stocks, large-, medium-, and small-size stocks, and the average in each testing interval is comparable to those stocks under classification of low trading volumes.

Table 3 provides the average return on the formation days and the average cumulative and net returns for all the high- and low-volume stocks over the period of 1, 5, 10, 20, and 30 trading days after initial volume shocks for all the stocks, large-, medium-, and small-size stocks. As shown in Figure 1, I find a highly significant high-volume return premium for all the stocks as well as for the large-, medium-, and small-size stocks. From Panel A in Table 4, I find that the average return on the formation days is 1.21% and the 1, 5, 10, 20, and 30 day average cumulative returns are 0.23%, 1.17%, 2.02%, 3.25%, and 4.14% respectively for all the high-volume stocks, compared to the average return on the formation days of -0.27% and the average cumulative returns of 0.03%, 0.18%, 0.20%, 0.56%, and 1.06% for all the low-volume stocks. The net returns defined as the differences in returns between all the high-volume and low-volume stocks are 0.20%, 0.99%, 1.82%, 2.69%, and 3.08% over the period of 1, 5, 10, 20, and 30 trading days after the initial volume shocks. Except for the 1-day net return, the net returns over the 5, 10, 20, and 30 days are significantly positive, suggesting existence of a high-volume return premium in Chinese stock markets.

To further examine whether firm size plays any important role in causing the high-volume return premium I look at the net returns for all the large-, medium-, and small-size stocks respectively. From Panels B-D in Table 3, I find that the most net returns over the 5, 10, 20, and 30 trading days after the initial volume shocks are positive and statistically different from zero for all size portfolios except for the 1-day and 5-day net returns for large- and medium-size stocks. In particular, the 30-day average net returns are 3.57%, 2.65%, and 2.12% for large-, medium-, and small-size stocks. This evidence suggests that the high-volume return premium is not caused by firm size since the premium still exists for stocks grouped by different firm sizes.

Another interesting finding from Table 4 is that the average cumulative returns vary with firm size. For example, for all the high-volume and small-firm stocks the average cumulative return is 7.08% over the 30 trading days, compared to 3.57% for all the high-volume and medium-firm stocks and only 1.68% for all the high-volume and large-firm stocks. For all the low-volume stocks, I find a similar and more pronounced pattern. The average cumulative returns for all the low-volume and large-firm stocks are consistently negative for the 1, 5, 10, 20, and 30 trading days with an average cumulative return of -1.89% over the 30 trading days after initial volume shocks. By contrast, the low-volume and small-firm stocks exhibit a quick recovery with the 30 day average cumulative return of 4.96%. This evidence suggests a strong size effect after initial volume shocks; small-size stocks recover much faster than large-size stocks.

Also from Table 3, I find consistent results for all the stocks, the large-, medium-, and small-size stocks classified by share turnovers. Except for the 1-day net returns, all the average net returns are positive and significant over the 5, 10, 20, and 30 trading days,

supporting existence of a high-share-turnover return premium. Firm size is not a factor in causing the high-share-turnover return premium since the premium exists across all size stocks. Once again, small-size stocks recover much faster than large-size stocks after initial low share-turnover shocks. These results suggest that portfolio construction doesn't change the high-volume return premium.

Table 4 provides the results for volume-size portfolios. I find that this strategy works the best. The 1, 5, 10, 20, and 30 day average net returns are all positive and significantly different from zero. In particular, they are 0.57%, 2.19%, 3.99%, 6.41% and 8.97% for all the stocks classified by trading volumes and 0.47%, 1.98%, 3.80%, 6.27%, and 8.84% for all the stock classified by share turnovers. This result indicates that there exists a small-size effect in the high-volume return premium. Therefore, the best trading strategy is to take the advantage of the high-volume or high-share-turnover stocks along with the small-size effect.

Table 5 provides the results for momentum portfolios. From Panel A in Table 5, I find that the average return on the formation days for all the winners is 3.02%. However, this momentum doesn't seem to carry over into the next testing period. The 1, 5, 10, 20, and 30 day average cumulative returns are 0.01%, 0.74%, 1.56%, 2.92%, and 3.32% respectively. The average return on the formation days for all the losers is -2.84%. However, the average cumulate returns for those losers rebound quickly and reach 0.73%, 2.14%, 3.06%, 4.00%, and 5.97% over the 1, 5, 10, 20, and 30 trading days, almost recovering all the losses from the formation days, compared to the winners over the same testing intervals. The average net returns over the1, 5, 10, 20, and 30 days are all negative and some of them are significantly different from zero. Also from Table 5, I

find that stocks classified by share turnovers behave in a similar manner. The evidence strongly suggests that the momentum strategy doesn't explain the high-volume return premium in Chinese stock markets. Instead, Chinese stocks seem to exhibit a short-term reversal that is consistent with the trading pattern in Chinese stock markets, a quick profit taking.[7]

Panels B-D in Table 5 report the average cumulative and net returns for all the large-, medium-, and small-size stocks over the 1, 5, 10, 20, and 30 trading days. The results point to the same conclusion that the momentum strategy doesn't work for stocks grouped by firm sizes because all the net returns are negative and some of them are statistically significant. Actually, a reverse strategy by selling all the winners and buying all the losers seems to work better in the short-run, especially for the small-size stocks over the 30 trading day period. The average 30-day net return is 5.58% and it is significant. This evidence suggests that Chinese investors prefer chasing small-size stocks, causing a quick rebound in returns for those stocks. For stocks classified by share turnovers, I find similar results.

6. Conclusions

This paper examines the relationship between stock returns and trading volume in Chinese stock markets. I use two different criteria to construct portfolios, one based on trading volume and the other on share turnover. I find that the average share turnover over the sample period 1997 to 2001 is 1.68%, which indicates that the average holding

[7] Unlike the situation in the U.S stock market where institutional investors trade very often, institutional investors cannot trade in the open market in China. The only participants in daily trading in Chinese stock markets are individual investors who tend to take a quick profit since there is no difference in taxes for the short- or long-term capital gains.

period is around 60 trading days for Chinese investors. The average ratio of the floating market capitalization to the total market capitalization during the sample period is around 30%, which is considerably lower than that in the U.S. Large firms tend to have higher stock prices, higher trading volumes, but lower share turnovers, compared to small firms that tend to have lower stock prices, lower trading volumes, and higher share turnovers.

I also find that stocks with unusually high trading volumes or share turnovers earn high average cumulative returns in the following 30 trading days after initial volume shocks. A zero investment portfolio based on buying all the high-volume or high-share-turnover stocks and selling all the low-volume or low-share-turnover stocks yields significantly positive net returns of 3.08% and 3.34% respectively over the period of 30 trading days after initial volume shocks, indicating that there exists a high-volume return premium in Chinese stock markets.

A volume-size portfolio by buying all the high-volume or high-share-turnover and small-size stocks and selling all the low-volume or low-share-turnover and large-firm stocks earns the average net returns of 8.97% and 8.84% respectively over the period of 30 trading days after initial volume shocks, suggesting that the high-volume return premium varies with firm size. To take advantage of that, investors should combine the high-volume return premium with small size effect by buying the high-volume and small-size stocks. A momentum portfolio based on buying all the high-volume stocks or high-share-turnover stocks with positive returns on the formation days and selling all the high-volume or high-share-turnover stocks with negative returns on the formation days yields negative average net returns of -2.65% and -1.58% respectively over the period of 30 trading days after initial volume or share turnover shocks, indicating that a short-term

momentum strategy doesn't work in Chinese stock markets. Instead, Chinese stocks exhibit a short-term reversal resulting from the fact that Chinese investors prefer to take a quick profit.

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Table 1
Descriptive Statistics for the Daily CSMAR Sample, 1997 to 2001

This table reports the average stock price (in Yuan), average daily trading volume (in million of shares), average market capitalization (in million of Yuan), average floating market capitalization (in million of Yuan), and average daily turnover defined as the ratio of average daily trading value and average floating market capitalization for all the stocks, large-, medium-, and small-size stocks traded in the Shanghai and Shenzhen Stock Exchanges over the period 1997 to 2001. Large-size stocks are classified as the top 30% in the market capitalization, medium-size stocks are classified as the middle 40% in the market capitalization, and small-size stocks are classified as the bottom 30% in the market capitalization based on each firm's market capitalization at the year of each year.

	All firms	Large firms (Top 30%)	Medium firms (Middle 40%)	Small firms (Bottom 30%)
Average stock price	13.45	14.88	12.96	11.52
Average trading volume	1,358	1,502	1,357	965
Average capitalization (total)	3,483	6,748	2,469	1,453
Average capitalization (float)	1,014	2,343	835	497
Average daily turnover ratio	1.68	1.35	1.58	1.89

Table 2

Number of High- and Low-volume (share-turnover) Stocks in 38 Testing Intervals

I form 39 non-overlapping intervals of 30 trading days each from January 1, 1997 to December 31, 2001 by skipping one trading day between two consecutive intervals, yielding a total of 38 testing intervals. This table reports the number of high- and low-volume (high- and low-share turnover) stocks, the number of high-volume (high-share-turnover) stocks with positive and negative returns on the formation days, and their average numbers for the entire sample for all the firms, large-, medium- and small-size firms respectively.

	All firms	All average	Large Size	Large average	Medium Size	Medium average	Small Size	Small average
High-volume	2,345	61.71	708	18.63	876	23.05	761	20.03
High-turnover	2,365	62.24	705	18.55	887	23.32	773	20.34
Positive high-volume	1,619	42.61	500	13.16	613	16.13	506	13.32
Negative high-volume	726	19.10	208	5.47	263	6.92	255	6.71
Positive high-turnover	1,597	42.03	481	12.66	610	16.05	506	13.32
Negative high-turnover	768	20.21	224	5.89	277	7.29	267	7.03
Low-volume	3,113	81.92	1,055	27.76	1,212	31.89	846	22.26
Low-turnover	3,126	82.26	1,056	27.79	1,214	31.95	856	22.52

Table 3
Average and Net Returns of the Zero Investment Portfolio

I form a zero-investment portfolio by buying a total of one Yuan in all the high-volume (high-share-turnover) stocks and selling a total of one Yuan in all the low-volume (low-share-turnover) stocks. This table reports the average returns on the formation days, the average cumulative and net returns for all the high- and low-volume (high- and low-share-turnover) stocks over the period of 1, 5, 10, 20, and 30 trading days after initial volume shocks for all the firms, large-, medium-, and small-size firms over the sample period 1997 to 2001. All the returns are measured in percentages with the t-values in parentheses.

	High volume	Low volume	Net return on volume	High turnover	Low turnover	Net return on turnover
Panel A: All firms						
Formation	1.21 (n/a)	- 0.27 (n/a)	n/a	1.17 (n/a)	- 0.26 (n/a)	n/a
1 day	0.23 (n/a)	0.03 (n/a)	0.20 (1.44)	0.26 (n/a)	0.06 (n/a)	0.20 (1.25)
5 days	1.17 (n/a)	0.18 (n/a)	0.99 (1.94)	1.17 (n/a)	0.19 (n/a)	0.98 (1.89)
10 days	2.02 (n/a)	0.20 (n/a)	1.82 (2.16)	2.08 (n/a)	- 0.01 (n/a)	2.09 (2.18)
20 days	3.25 (n/a)	0.56 (n/a)	2.69 (2.87)	3.41 (n/a)	0.60 (n/a)	2.81 (3.21)
30 days	4.14 (n/a)	1.06 (n/a)	3.08 (3.56)	4.47 (n/a)	1.13 (n/a)	3.34 (3.98)
Panel B: Large-size firms						
Formation	1.20 (n/a)	- 0.33 (n/a)	n/a	1.15 (n/a)	- 0.30 (n/a)	n/a
1 day	0.06 (n/a)	- 0.04 (n/a)	0.10 (1.02)	0.06 (n/a)	0.02 (n/a)	0.04 (0.87)
5 days	0.67 (n/a)	- 0.26 (n/a)	0.93 (1.76)	0.61 (n/a)	- 0.15 (n/a)	0.76 (1.45)
10 days	1.04 (n/a)	- 0.90 (n/a)	1.94 (1.98)	0.93 (n/a)	- 0.73 (n/a)	1.66 (2.23)
20 days	1.47 (n/a)	- 1.29 (n/a)	2.76 (2.53)	1.45 (n/a)	- 0.98 (n/a)	2.43 (3.14)
30 days	1.68 (n/a)	- 1.89 (n/a)	3.57 (3.21)	1.85 (n/a)	- 1.64 (n/a)	3.49 (4.21)
Panel C: Medium-size firms						
Formation	1.26 (n/a)	- 0.27 (n/a)	n/a	1.23 (n/a)	- 0.27 (n/a)	n/a
1 day	0.11 (n/a)	- 0.01 (n/a)	0.12 (1.54)	0.22 (n/a)	0.07 (n/a)	0.15 (1.78)
5 days	0.92 (n/a)	0.26 (n/a)	0.66 (1.65)	1.05 (n/a)	0.27 (n/a)	0.78 (2.13)
10 days	1.89 (n/a)	0.05 (n/a)	1.84 (1.99)	2.13 (n/a)	- 0.01 (n/a)	2.14 (2.49)
20 days	2.96 (n/a)	0.23 (n/a)	2.73 (2.44)	3.43 (n/a)	0.22 (n/a)	3.21 (4.18)
30 days	3.57 (n/a)	0.92 (n/a)	2.65 (2.73)	4.17 (n/a)	1.07 (n/a)	3.10 (3.87)
Panel D: Small-size firms						
Formation	1.15 (n/a)	- 0.20 (n/a)	n/a	1.11 (n/a)	- 0.20 (n/a)	n/a
1 day	0.53 (n/a)	0.18 (n/a)	0.35 (1.75)	0.49 (n/a)	0.12 (n/a)	0.37 (2.10)
5 days	1.93 (n/a)	0.61 (n/a)	1.32 (2.12)	1.83 (n/a)	0.48 (n/a)	1.35 (2.47)
10 days	3.09 (n/a)	1.12 (n/a)	1.97 (2.43)	3.07 (n/a)	0.88 (n/a)	2.19 (2.76)
20 days	5.12 (n/a)	3.35 (n/a)	1.77 (2.11)	5.29 (n/a)	3.11 (n/a)	2.18 (3.29)
30 days	7.08 (n/a)	4.96 (n/a)	2.12 (2.85)	7.20 (n/a)	4.63 (n/a)	2.57 (3.67)

Table 4
Average and Net Returns of the Volume-size Portfolio

I form a volume-size portfolio by buying a total of one Yuan in all the high-volume (high-share turnover) and small-size stocks and selling a total of one Yuan in all the low-volume (low-share turnover) and large-size stocks. This table reports the average returns on the formation days, the average cumulative and net returns over the period of 1, 5, 10, 20, and 30 trading days for all the stocks classified by extraordinary trading volume and share turnover over the period 1997 to 2001. All the returns are measured in percentages with the t-values in parentheses.

	High volume small firms	Low volume large firms	Net return based on volume	High turnover small firms	Low turnover large firms	Net return based on turnover
Formation	1.15 (n/a)	- 0.33 (n/a)	n/a	1.11 (n/a)	- 0.30 (n/a)	n/a
1 day	0.53 (n/a)	- 0.04 (n/a)	0.57 (2.32)	0.49 (n/a)	0.02 (n/a)	0.47 (1.87)
5 days	1.93 (n/a)	- 0.26 (n/a)	2.19 (2.96)	1.83 (n/a)	- 0.15 (n/a)	1.98 (2.39)
10 days	3.09 (n/a)	- 0.90 (n/a)	3.99 (3.57)	3.07 (n/a)	- 0.73 (n/a)	3.80 (3.25)
20 days	5.12 (n/a)	- 1.29 (n/a)	6.41 (5.41)	5.29 (n/a)	- 0.98 (n/a)	6.27 (4.65)
30 days	7.08 (n/a)	- 1.89 (n/a)	8.97 (6.19)	7.20 (n/a)	- 1.64 (n/a)	8.84 (5.84)

Table 5
Average and Net Returns of the Momentum Portfolio

I form a momentum portfolio by buying a total of one Yuan in all the high-volume (high-share turnover) stocks with positive returns on the formation days and selling a total of one Yuan in all the high-volume (high-share-turnover) stocks with negative returns on the formation days. This table reports the average returns on the formation days and the average cumulative and net returns over the period of 1, 5, 10, 20, and 30 trading days after initial volume shocks for all the high-volume (high-share-turnover) stocks over the sample period 1997 to 2001 for all the firms, large-, medium-, and small-size firms. All the returns are measured in percentages with the t-values in parentheses.

	Volume Positive	Volume negative	Net return volume	Turnover positive	Turnover negative	Net return turnover
Panel A: All firms						
Formation	3.02 (n/a)	-2.83 (n/a)	n/a	3.07 (n/a)	-2.77 (n/a)	n/a
1 day	0.01 (n/a)	0.73 (n/a)	-0.72 (-1.76)	0.15 (n/a)	0.49 (n/a)	-0.34 (-1.03)
5 days	0.74 (n/a)	2.14 (n/a)	-1.40 (-2.10)	0.92 (n/a)	1.70 (n/a)	-0.78 (-1.56)
10 days	1.56 (n/a)	3.06 (n/a)	-1.50 (-1.89)	1.78 (n/a)	2.71 (n/a)	-0.93 (-1.77)
20 days	2.92 (n/a)	4.00 (n/a)	-1.08 (-1.65)	3.27 (n/a)	3.69 (n/a)	-0.42 (-1.28)
30 days	3.32 (n/a)	5.97 (n/a)	-2.65 (-2.35)	3.95 (n/a)	5.53 (n/a)	-1.58 (-1.97)
Panel B: Large firms						
Formation	2.97 (n/a)	-3.06 (n/a)	n/a	2.96 (n/a)	-2.69 (n/a)	n/a
1 day	-0.10 (n/a)	0.45 (n/a)	-0.55 (-1.34)	-0.11 (n/a)	0.44 (n/a)	-0.55 (-1.86)
5 days	0.51 (n/a)	1.04 (n/a)	-0.53 (-1.29)	0.37 (n/a)	1.12 (n/a)	-0.75 (-1.78)
10 days	0.97 (n/a)	1.21 (n/a)	-0.24 (-0.98)	0.82 (n/a)	1.17 (n/a)	-0.35 (-1.25)
20 days	1.80 (n/a)	0.68 (n/a)	1.12 (1.65)	1.62 (n/a)	1.08 (n/a)	0.54 (-1.34)
30 days	1.67 (n/a)	1.71 (n/a)	-0.04 (-0.26)	1.72 (n/a)	2.12 (n/a)	-0.40 (-0.98)
Panel C: Medium firms						
Formation	3.03 (n/a)	-2.87 (n/a)	n/a	3.02 (n/a)	-2.72 (n/a)	n/a
1 day	-0.13 (n/a)	0.67 (n/a)	-0.80 (-2.16)	0.01 (n/a)	0.67 (n/a)	-0.66 (-1.65)
5 days	0.52 (n/a)	1.86 (n/a)	-1.34 (-1.51)	0.69 (n/a)	1.84 (n/a)	-1.15 (-1.89)
10 days	1.48 (n/a)	2.84 (n/a)	-1.36 (-1.64)	1.92 (n/a)	2.59 (n/a)	-0.67 (-1.07)
20 days	2.84 (n/a)	3.25 (n/a)	-0.41 (-0.95)	3.34 (n/a)	3.27 (n/a)	0.07 (-0.40)
30 days	3.10 (n/a)	4.68 (n/a)	-1.58 (-1.73)	3.91 (n/a)	4.74 (n/a)	-0.83 (-1.23)
Panel D: Small firms						
Formation	3.04 (n/a)	-2.61 (n/a)	n/a	3.22 (n/a)	-2.89 (n/a)	n/a
1 day	0.28 (n/a)	1.02 (n/a)	-0.74 (-2.01)	0.57 (n/a)	0.33 (n/a)	0.24 (0.89)
5 days	1.22 (n/a)	3.33 (n/a)	-2.11 (-2.15)	1.73 (n/a)	2.03 (n/a)	-0.30 (-0.95)
10 days	2.24 (n/a)	4.78 (n/a)	-2.54 (-2.34)	2.51 (n/a)	4.13 (n/a)	-1.62 (-1.67)
20 days	4.12 (n/a)	7.48 (n/a)	-3.35 (-3.21)	4.75 (n/a)	6.30 (n/a)	-1.55 (-1.78)
30 days	5.21 (n/a)	10.79(n/a)	-5.58 (-4.93)	6.13 (n/a)	9.22 (n/a)	-3.09 (-3.20)

Figure 1
Cumulative Portfolio Returns for High-, Normal-, and Low-volume Stocks based on Trading Volume

I form 39 non-overlapping intervals of 30 trading days each from January 1, 1997 to December 31, 2001. At the end of each interval, I classify each stock into one of three portfolios, the high-, normal-, and low-volume portfolios for the next testing period. I then calculate the average cumulative returns for all three portfolios over the next 30 trading days.

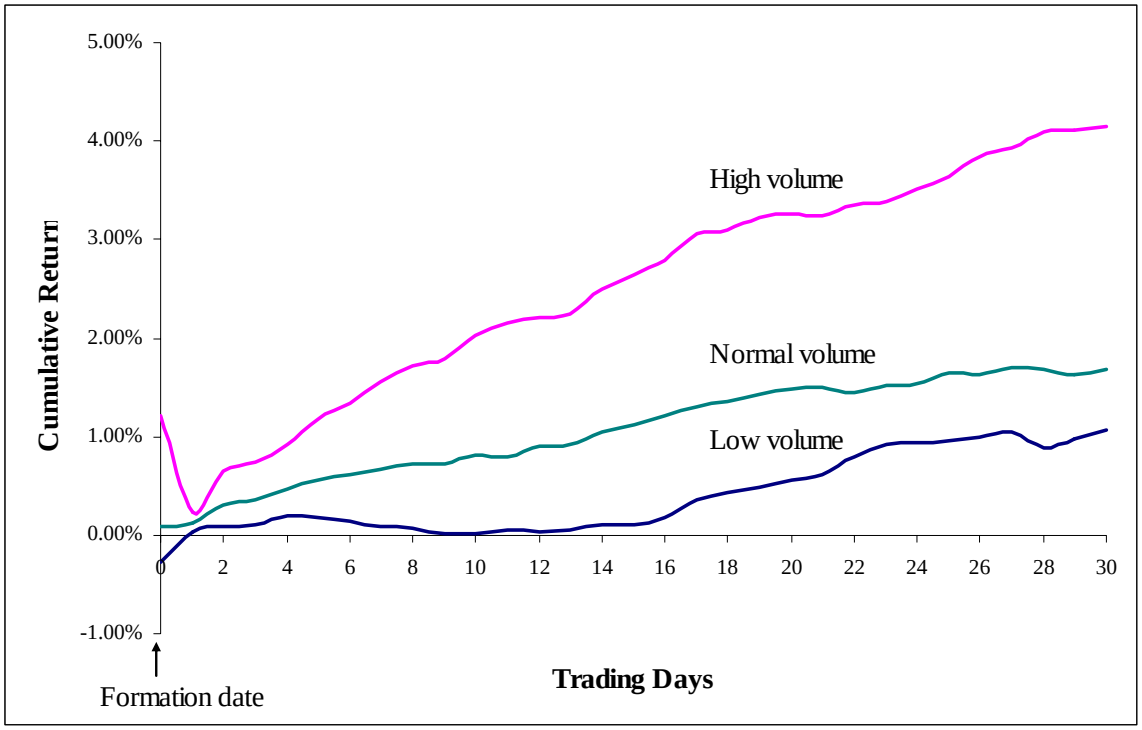

Figure 2
Cumulative Portfolio Returns for High-, Normal-, and Low-volume Stocks based on Share Turnover

I form 39 non-overlapping intervals of 30 trading days each from January 1, 1997 to December 31, 2001. At the end of each interval, I classify each stock into one of three portfolios, the high-, normal-, and low-share-turnover portfolios for the next testing period. I then calculate the average cumulative returns for all three portfolios over the next 30 trading days.

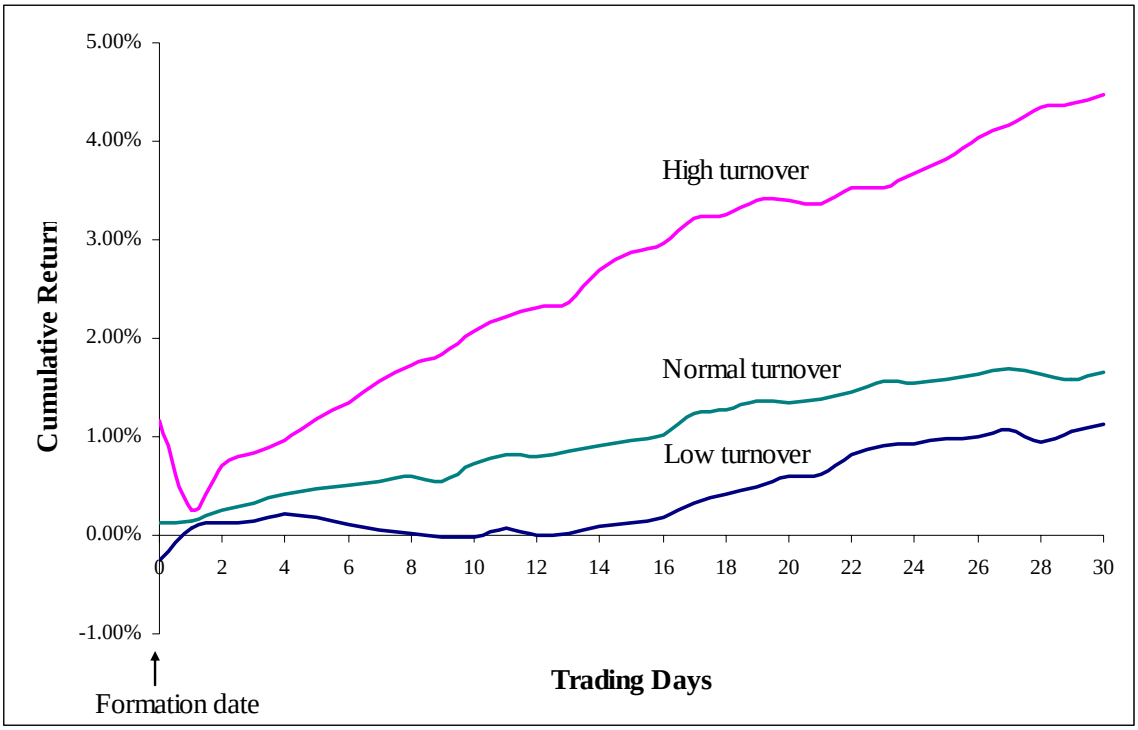

Figure 3
Average Cumulative Net Returns for Zero Investment, Volume-size, and Momentum Portfolios based on Trading Volume

I form 39 non-overlapping intervals of 30 trading days each from January 1, 1997 to December 31, 2001. At the end of each interval, I form three portfolios: a zero investment portfolio by buying a total of one Yuan in all the high-volume stocks and sell a total of one Yuan in all the low-volume stocks, a volume-size portfolio by buying a total of one Yuan in all the high-volume and small-size stocks and selling a total of one Yuan in all the low-volume and large-size stocks, and a momentum portfolio by buying a total of one Yuan in all the high-volume stocks with positive returns on the formation days (winners) and selling a total of one Yuan in all the high-volume stocks with negative returns on the formation days (losers). Each stock in the high- (low-) volume category receives the same weight and this position is not rebalanced for the entire testing period of next 30 trading days.

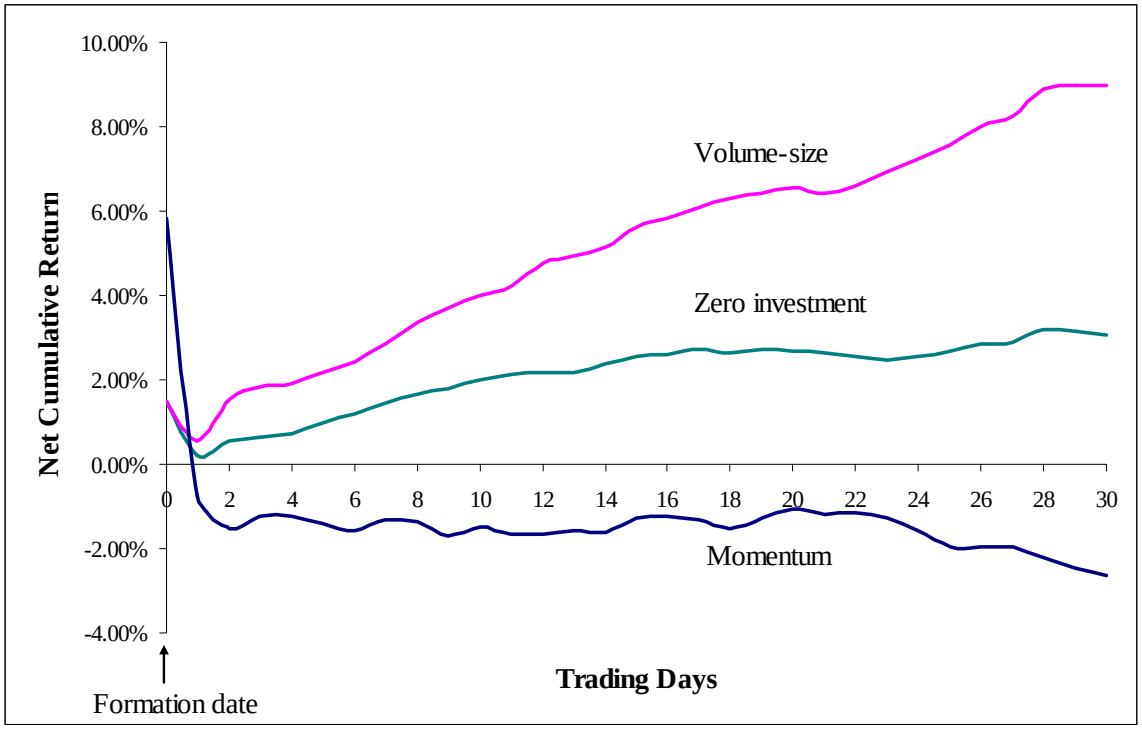

Figure 4
Average Cumulative Net Returns for Zero Investment, Volume-size, and Momentum Portfolios based on Share Turnover

I form 39 non-overlapping intervals of 30 trading days each from January 1, 1997 to December 31, 2001. At the end of each interval, I form three portfolios: a zero investment portfolio by buying a total of one Yuan in all the high-share-turnover stocks and sell a total of one Yuan in all the low-share-turnover stocks, a volume-size portfolio by buying a total of one Yuan in all the high-share-turnover and small-size stocks and selling a total of one Yuan in all the low-share-turnover and large-size stocks, and a momentum portfolio by buying a total of one Yuan in all the high-share-turnover stocks with positive returns on the formation days (winners) and selling a total of one Yuan in all the high-share-turnover stocks with negative returns on the formation days (losers). Each stock in the high- (low-) share-turnover category receives the same weight and this position is not rebalanced for the entire testing period of next 30 trading days.