

# **The High-Volume Return Premium: Evidence from the Australian Equity Market**

**Tiantian Tang**  
**Massey University**

**Liping Zou**  
**Massey University**

**Jing Li**  
**Jiangxi University of Finance and Economics**

*The relationship between the trading volume and changes in expected return is investigated in this research. Daily and weekly data are used to examine if trading volumes have predictive power for stock prices in the following days/weeks. Results suggested that stocks experiencing extreme higher (low) volumes are usually followed by relatively higher (low) returns for large firms in Australian market only for a short horizon. However, the volume-return premium cannot be found for small firms during the same time period. Possible explanations for this high volume return premium include: return autocorrelation, systematic risk and outliers.*

## **INTRODUCTION**

Market participants have been investigating various trading strategies to gain high returns throughout the global market. Osborne(1959), first examined the price-volume relationship and since then this issue has been attracting considerable interests from economists. The strong connection between future stock prices and trading activity is generally accepted by many scholars. The high-volume return premium is defined as the phenomenon that stocks accompanied with high (low) trading volume which measures the trading activity over a day or a week are likely to appreciate (depreciate) in the following time period. This premium is found in US stock market (Simon Gervais, Ron Kaniel, & Mingelgrin, 2001) and it also exists in other 41 different countries including both developed and emerging markets (Kaniel, Ozoguz, & Starks, 2011).

Based on previous study in the US stock market, whether the heavily traded stocks are followed by higher prices in the subsequent days/weeks in other stock markets is worthy of more academic attentions. As a developed country, Australian stock market is explored in this research and the existence of this return premium is analysed for different firm sizes. It is expected to generate the similar results for Australian market compared to the US market, which will enable investors to take advantages of purchasing stocks with large trading volume and selling low trading volume stocks at the same time. Regarding to investment benefits, trading activity that is measured by the trading volume should be further investigated in Australian stock market. These consistent findings of Australian stocks will verify

that the future evolution of stock prices can be forecasted by trading volumes. The potential explanations contribute a lot to generate a better understanding about the essence of the role played by trading activity in predicting future stock price movements, which should be taken into consideration in this research. It is also possible that the effect of return premium varies from different firm size in Australian stock market and it requires that equity traders connect the high volume return premium with different firm characteristics.

The objective of this report is to examine whether the trading activity has the predictable power about the future evolution of stock price in Australian stock market. For stocks with relative high trading volumes a day or a week in a trading interval, returns tend to appreciate (depreciate) in the subsequent time period. Compared to stock with average trading volumes, the extreme high (low) trading volume stocks usually outperform (underperform) others in the subsequent test period. The expected result is that the average cumulative returns for high trading volume (low trading volume) stocks are greater (smaller) than average volume stocks, that is to investigate whether the high-volume return premium phenomenon is prevalent in Australian stock market.

Motivated by Gervai, Kaniel, and Mingelgrin (2001), portfolio of stocks are formed according to their trading volume. There are two different portfolio strategies for the examination of net return generated by extremely traded stocks: zero investment portfolios of which each trading interval is equally weighted and reference return portfolio with size-adjustments in line with the numbers of extremely traded stocks. The net returns for each portfolio with different testing period are explored and to examine whether the cumulative net returns in the following testing days are significantly positive determine the existence in Australian market. Using daily sample, results suggest that the volume premium is greater for large firms than for small firms in Australian stock market, for both portfolio formation strategies. In contrast, negative cumulative returns are found for small firms, which indicate that there is no high volume premiums exist for small firms. The weekly sample, however, exhibits positive excess return for short testing horizon and the magnitude is also greater. This result indicate that the return premium effect only persists in relatively short term consisting of the following 1, 10 and 20 days and the excess return from the high volume stocks seems to become less significant for longer horizon, i.e. after 50 trading days. Therefore, traders who take a long (short) position of high (low) volume stocks for large firms, holding them for short horizon, i.e. no more than 20 days, may benefit from the above transaction.

Possible reasons to explain this phenomenon are also investigated in the research. First, the short-term autocorrelation of return and its interaction with trading volume is examined. The return autocorrelation impact is eliminated by cutting off the stocks with unusual high and low past return of its own return distribution. The slightly change results on cumulative average return illustrate that interaction between trading volume and stocks return play a limited role in explaining the high volume return premium in Australian stock market. Second, the systematic risk is also considered as higher systematic risk requires higher expected stock returns. The stock beta is analyzed as the proxy of systematic risk in this research. Using a linear regression model, the slope of the high/low trading volume stock returns on the Australian market index (ASXAORD) is developed, it is found that there is no distinct difference between the betas from high and low trading volume stocks when the daily sample is applied. Therefore, systematic risk cannot explain the return premium effect in Australia. In addition, there is also the possibility that the extreme observations generating the positive net average return. the return distribution is examined and that there are changes in mean distributions for large firms, which indicates that the bias generated from outliers. Therefore, outliers may have some explanatory power for the high volume return premium for large firms in Australian stock market.

## **LITERATURE REVIEW**

The relation between stock price and trading volume is not evident from the early studies. Granger and Morgenstern (1963) conclude that “no volume- price correlation exists” which attracts more economists’ discussions and re-examinations for this issue. It is suggested that a small (large) volume is normally followed by a fall (rise) in stock price and the price will increase (decrease) substantially if the

volume raise (drop) greatly (Ying, 1966). These results suggest that there is a positive correlation between the trading volume and price changes. Ying (1966) suggested that stock price and trading volume are resulted from a single market mechanism; these two cannot be isolated from each other with any other hypothesis and model. Incomplete results otherwise generate from these isolation attempts.

Many previous studies found statistical significant positive correlation between equity price and volume, i.e. Crouch (1970), Tauchen and Pitts (1983), and Westerfield (1977). The price-volume relation has drawn lots of attentions to academics and practitioners as to its implication for financial markets structure, distribution of speculative pricing and special features for futures markets (Karpoff, 1987). Gallant, Rossi, and Tauchen (1992) recommended that study in joint dynamics of stock returns and trading volumes is more helpful rather than focusing only on the variation in stock prices. The investor recognition hypothesis is proposed by Merton (1987), which demonstrates that security price changes result from the incomplete information and trading activity. Merton (1987) developed the stock visibility hypothesis based on the previous study of Miller (1977) and Mayshar and Joram (1983), who postulate that high returns come from the investors' certain interest on stocks. They claim that the price will subsequently increase for a given stock as it attracts the investors' attention caused by any shock.

Further discussion of recent studies suggested that past trading volume may offer valuable information about price changes. The information content of price changes is also examined by Brown, David, and Jennings (1989). They conclude that the price pattern is a result due to a sequence of changes and a single price does not reveal any information about the expectation model. A model is presented for traders to learn from the value of a security by analysing the past price and trading volume for the aggregate demand of liquidity traders (Campbell, Grossman, & Wang, 1993). This theoretical paper only discusses the short-term volume shock in a day or week duration and makes no comments on long predictable returns. Consistent with the new equilibrium model developed by Blume, Lawrence, Easley, and O'Hara (1994), it is shown that the volume has an informational role for the sequence of price changing in the applicability for technical analysis with the fixed aggregate supply.

In particular, the price movement pattern is only observed for the heavily traded stocks and the stocks with much smaller trading frequency in short-horizon (Conrad, Hameed, & Niden, 1994). It is found that there is a strong evidence of trading activity and subsequent autocorrelation in weekly returns. For the individual securities, the pervasive information of trading activity tends to be an indicator of the return variation. However, related to another study, Datar, Vinay, Naik, and Radcliffe (1998) generate different conclusion that stocks with low turnover has relatively higher returns compared with high turnovers. The turnover is analysed as a measurement for liquidity. The liquidity hypothesis, which is put forward by Amihud, Yakov, and Mendelson (1986), presenting that there is a higher expected return for the low trading volume stocks by examining the cross-sectional returns.

Since 1990s, extended discussions and studies are carried to evaluate the theoretical prediction for price patterns by adding the return volatility in equity price and trading volume relation. It is documented that the future behaviour of stock returns are described by past price with the presence of "feedback traders", especially the volatility (Sentana & Wadwani, 1992). It is observed that the trading volume and return volatility serve as an measure of the information flow and the future changes in equity price and reflect this new information (Andersen, 1996). The relationship between return volatility and trading volume is discussed at a microstructure framework and it document that the trade is motivated by the informational asymmetries and liquidity needs when the new information is released. The "Mixture of Distribution Hypothesis" is modified with the support of the standard ARCH specification. MDH is first put forward by Clark (1973) to make a clear-cut consensus regarding the prediction stock prices and analyses on the important characteristics. It rapidly becomes to one of the predominant theoretical justifications and further developed by other researchers, as in Tauchen and Pitts (1983). It is documented that the conditional heteroscedasticity in stock returns can be interpreted by a serially correlated mixing variables that can measure the rate of transmitting information to the market (Lamoureux & Lastrappe, 1990).

More recent researches investigate the plausibility of MDH in different equity markets and the trading volume is measured as a proxy to stand for bulk and rate of information flow arrival to stock markets.

Brailsford (1994) concludes that the volatility persistence decreases significantly if the trading volume is accounted as a proxy for the rate of information arrival. In addition to Brailsford (1994), similar results are observed in various countries, for example, Gallo and Pacini (2000) in the US, and Pyun, Lee, and Nam (2000) in Korea, Bohl and Henke (2003) in Poland.

All empirical work vary from different aspects in term of the measuring frequencies, the geographical area of stock markets, the direction of price-volume relation, the level of analysis and the underlying asset. Firstly, the frequency of data used, which is ranging from minute to one year. Some short-term horizon data is employed in the article written by other scholars. Such as one-hour interval (Join & Joh, 1988), four-day interval (Morgan, 1976), and one-month interval (Rogalski, 1978). Normally, the interval is one-day or one-week, which appears to be a popular choice in recent studies. Previously, some economists (Richardson, Sefcik, & Thompson, 1986) ranks the “win and lose portfolios” by weekly return. In line with them, both Simon (2001) and Ron (2011) take the average cumulative returns in the daily and weekly data sample.

Secondly, the measurement standard of stock price changes is varying from different studies. In the early studies from 1970’s to 1990’s, the return and volume relation is investigated with different representations of stock prices. The most intuitive measurement is using the absolute price change, which is applied in the research conducted by Copeland (1974), Smirlock and Starks (1984). Others (Epps, 1976) use the variance of price changes associated with corresponding trading activity. The squared price changes are employed in the researches to magnify the relatively small amplitude of returns (Clark, 1973; Harris, 1986).

Thirdly, the high-volume return premium is discussed through different stock markets. The daily and weekly returns in US stock markets and other developed market are explored to identify the interaction of volatility and serial correlation in equity returns. The author investigates the profitability of contrarian strategies on a weekly sample constructed according to the high and low trading volume stocks (Conrad et al., 1994). The phenomenon is also studied in emerging markets. As for the cross-market causal relationship in China’s stock markets, it is concluded that a feedback relationship in returns between Shanghai A and Shenzhen B stocks, and between Shanghai B and Shenzhen B stocks (C. Lee & Rui, 2000). In Asia-Pacific stock markets, it is illustrated that there is a statistically significant relationship between trading volume and the absolute value of stock price (Deo, Srinivasan, & Devanadhen, 2008). Therefore, the trading volume contributes some information to the return and volatility for determining contemporaneous and lagged volume effect. Guner and Onder (2002) find that the relationship between the volatility and the trading volume is also significant in the Turkish stock market. The cross-country evidence is found both in the developed and emerging market through 41 different countries and explain potential reasons by the demographic at the country level (Kaniel et al., 2011).

There are also researches documented that the lagged trading volume has a negative impact on the serial correlation of stock market returns for the US market on a daily basis (Campbell et al., 1993). However, results concluded that the low volume stocks tend to generate momentum and there is a positive relationship between the magnitude of momentum and the lagged turnover (Chan, Harneed, & Tong, 2000). More recently, (Huang, Liu, Rhee, & Zhang, 2009) assert that the idiosyncratic risk has a positive (negative) with lagged stock returns when they are negative (positive). The positive relationship between the trading volume and return volatility on the US, UK and Japanese stock markets are reported by Lee and Rui (2002). It is suggested that large trading volumes tend to be followed by large subsequent absolute price changes with high volatility (M. Harris & Raviv, 1993).

Several potential explanations and possible hypotheses are explored and developed in the relevant literatures. One of the popular explanations is the stock’s visibility hypothesis. Stock’s visibility is defined as the trader’s interest in a given stock. It is postulated that the stock price only reflect optimistic opinions of stockholders (Mayshar & Joram, 1983; Miller, 1977). The essence of visibility hypotheses is that the high volume cannot indicate the increasing future price and the large volumes are mostly caused by heavy selling. Specifically, optimistic traders will hold stocks but pessimistic ones are not incorporated into stock price, increasing the attention and visibility of potential buyers but potential sellers remain the

same. Moreover, visibility should be particularly important for stocks that Arbel (1985) refer to as “generic stocks”.

The second potential explanation is the interaction between the stock return and the trading volume. Many researchers consider that stock returns and trading volume is generally correlated and the relationship is contemporaneous. The earliest relevant article reports that the bull (bear) market are associated with large (small) trading volume (Epps & Thomas, 1975), which is confirmed by Harris (1986,1987). This interaction is persistent during the entire reference period (Simon Gervais et al., 2001). The medium-term (three-month) momentum gives the possible explanation in terms of return autocorrelation (Jegadeesh & Sheridan, 1993). It is then complemented that the momentum strategies can bring more benefits for high-volume stocks (Lee, Charles, & Swaminathan, 2000). Similar results are found in the China’s stock market which also displays the interaction between the past returns and past trading volume (Wang & Chin, 2004).

There are also several empirical facts about the firm announcements on trading volume and stock returns to explain the existence of the high-volume return premium. The trading volumes react to earnings announcements (Bernard & Jacob, 1989). Prior researches acknowledge significant changes in trading volume but little variation in prices. It is shown that the earning announcements are usually accompanied by large trading volume and thus the price goes up (Bamber & Youngsoon, 1995). The same direction for price and volume reaction associated with announcement-specific characteristics provides additional advice for investors. However, this explanation for high-volume return premium is rejected by removing all the stocks that had either dividend or earnings announcements either the day before, on the day, or the day after the formation period (Simon et al, 2001).

The liquidity-based explanation for the high-volume premium is explored by many financial economists. There are lots of previous studies that present that stocks can carry a liquidity premium, which conceivably result in the change of return (Pastor & Stambaugh, 2003). It is shown that the expected stock returns are cross-sectional and correlated to the sensitivities and aggregate liquidity. The average return for stocks that are highly sensitive to liquidity is much greater than low sensitivities, i.e. by 7.5 percent annually. A positive relation between return and volume arise under the circumstance that returns decrease liquidity (Bernardo & Welch, 2004). The liquidity and transaction costs are related to the firm characteristic in the process of testing the trading volume (Karolyi, Lee, & VanDijk, 2009). By testing the existence of differences in liquidity between the high and low volume stocks, it is documented that the high-volume premium cannot be explained by this way in the cross-country evidence (Kaniel et al., 2011). The liquidity premium explanation is also denied in the US market (Gervais, Kaniel, & Mingelgrin, 2001).

Alternative explanations are also put forward with the increasingly more complex in the stocks’ market. The increased accessibility of information and investors searching for arbitrage opportunities caused many price “anomalies” to disappear or to lose their economic significance (Schwert, 2002). It is generalized by allowing for information asymmetry among investors, the non-informational trading lead to a different dynamic relationship between the trading volume and stock returns (J. Wang, 1994). The systematic risk is usually thought as the source of higher expected return with large positive trading volume shocks. The joint market model of zero investment portfolio is tested with a stock betas and results show that the systematic risk does not have the explanatory power (Simon et al, 2001).

## METHODOLOGY

The main objective of this research is to investigate whether the trading volume can be applied as an indicator for future stock returns and examine whether the high volume return premium holds in Australian market. The stock’s visibility hypothesis proposed by Miller (1997) concluded that only the optimistic investors’ interests can be explored from the stock price fluctuations and the positive opinions will ultimately attract more potential buyers’ attentions for this particular stock.

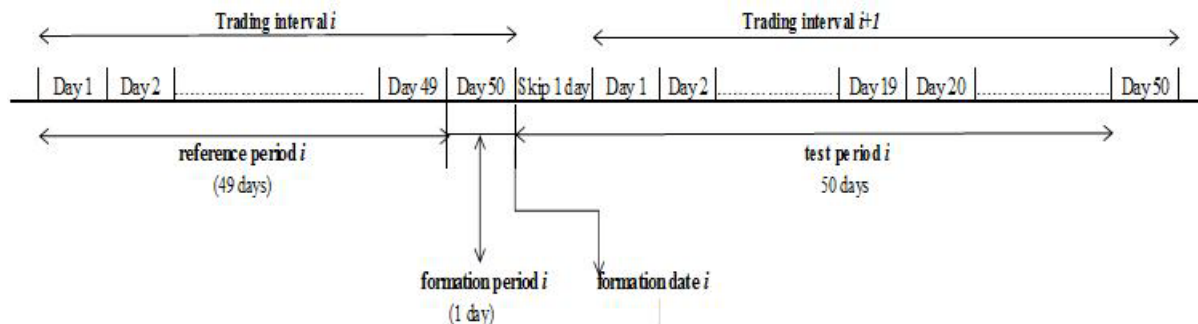
Merton (1987) put forward the investor recognition hypothesis and argues that the reading behaviour is influenced by incomplete information due to the inadequate diversification, which consequently causes

the changes in stock prices. Consequently, most scholars reach the consensus that the release of optimistic information or positive news can stimulate the interests of traders and subsequently raises the value of securities. However, the trading volume is supposed to have no predictive power with the applicable calculation of risks in the efficient market. Therefore, our primary hypothesis is that the trading volume has informational role in forecasting the stock returns in Australian stock market. In addition, we will analyse both the direction and magnitude of existence of high volume return premium in Australian market.

Data employed in this research, including daily and weekly price, trading volume, market capitalization of ASX stocks, are from the Data Stream database, for the period between January 1, 1997 to July 30, 2012, which contains 4045 trading days. Both the daily and weekly sample are constructed, for the daily sample, we divide 4045 days of this period into 79 non-overlapping trading intervals and each trading interval consists of 50 trading days. Figure1 below illustrates the construction of the reference period, the formation period and the testing period. For each interval, the reference period is from day 1 to day 49, the formation period is day 50 and the testing period is the following 50 trading days starting from day 52. We skip one trading day between each interval to eliminate the possibility that the last day in each interval falls into the same date. For terms of weekly sample, there are 10 weeks with correspondent 50 trading days in each trading interval.

**FIGURE1**  
**TIME SEQUENCE FOR DAILY SAMPLE**

There are 79 non-overlapping trading intervals, each one has 50 trading days. The first 49 days are defined as the reference period to measure whether the trading volume in formation period (the last day of each trading interval) is having extremely high or low (top-ranking 5% and bottom-ranking 5% out of daily volume) volume compared to previous 49-day trading volume. Portfolios are formed at the end of the formation date, their performance is then evaluated over the subsequent 1, 10, 20, 50 days.



There are two components for each 50-day trading interval: the reference period and formation period. The reference period is the preceding 49 days which is constructed to evaluate whether the trading volume of formation period is extremely high or low. The formation period is the last day in each trading interval. The trading volume data for each stock in Australia market comes from Data stream. In particular, we rank the trading volume of each day in each interval and assign the stock as high (low) volume stock on the condition that its trading volume on formation date is ranked in the top or bottom 10<sup>th</sup> percentile. With the comparison of its own 49 historical trading volumes, the stock is formed as normal stock if its volume of formation period is not among the top or bottom 5 out of 50 daily volumes.

As for the weekly sample, the daily data is aggregated into weekly data. Thus, there are 10 weeks in each trading interval. Similar as the daily sample, the preceding 9 weeks are assigned as the referenced period and the following one week is the formation period on which day our portfolio is built up. The total amount of trading interval change to 73 as one week has been skipped after each interval. Correspondingly, if the trading volume of the formation period (last week in trading interval) is relatively large or small (represents top-ranking and bottom-ranking 10 percentile respectively) in this 10-week

interval, this stock will be defined as the high or low volume stock. Other volume stocks are classified as normal volume stocks. For both the daily and weekly sample, we use two different portfolio formation procedures: zero investment portfolio and reference return portfolios. These portfolios are held without rebalancing over the subsequent testing periods.

All stocks listed on Australian equity markets are included in our sample. For each interval, stocks with missing data are eliminated. Every stock in each interval is assigned to one of three size groups based on the firm's year end market capitalization decile. Firms with deciles eight and nine is defined as large firm group, medium firm group having deciles five to seven, and small firm group having deciles one to four. It is noted that for a given firm, it can be assigned as medium firm in a particular year and then change to a large firm because of the market capitalization increased during the subsequent year and there is also an equivalent probability of declining to a small firm. Therefore, the classification of these three size groups is dynamic from one year to year another. This criterion is applied as the same way for both daily and weekly sample.

To test the existence and persistence of the high volume return premium for both samples, two approaches have been employed to construction the portfolios on the formation date: *zero investment portfolio* and *reference return portfolio*. We set up the portfolios the same way as Gervai, Kaniel, and Mingelgrin (2001). This allows us to verify the null hypothesis that there is no informative role for trading volume in the prediction of future stock price change. In particular, the stocks with extreme (large or small) trading volume during the formation period are not supposed to obtain relatively high or low returns in the following days (test period).

The *zero investment portfolios* is formed under the same size group by taking a long position with a total value of one Australia dollar for all the high-volume stocks and take a short position with a total value of one Australia dollar for all low-volume stocks. Each stock in the long or short position is equally weighted and the portfolio is held without any rebalancing along the subsequent test period days (1,10,20,50 days) of the test period. Therefore, the net return with these two positions conjunct position for a certain trading interval  $i$  can be simply the sum of the return from extremely high and low trading volume stocks in that interval.

$$NR_i = R_{i,h} + R_{i,l}$$

Where  $R_{i,h}$  represents the return for high volume stocks on the long position in interval  $i$  and  $R_{i,l}$  stands for return from the short position taken in the low volume stocks.

For zero investment portfolios, the average net return is simply equal to the total net return amount divided by the total number of intervals 79 (73 total intervals for weekly sample). Therefore, the formulas of the average net return for high and low volume stocks are expressed below:

$$\overline{NR} = \frac{1}{79} \sum_{i=1}^{79} R_{i,h} \qquad \overline{NR} = \frac{1}{79} \sum_{i=1}^{79} R_{i,l}$$

In accordance with the formation of zero investment portfolios and the definition of net return, it assumed that if the high volume return premium exists in Australian market, then the average net return for zero investment portfolio should be significantly positive. On the the other hand, the null hypothesis that the trading volume has no predictive information for future return changes will results to a zero or negative net average return.

The second approach is to use the *reference return portfolio*, which a size-adjusted portfolio compared with the equal weighted zero investment portfolio. For the reference return portfolio, the weight is adjusted on the basis of the number of stocks classified into high or low trading volume in the interval. Consequently, the more the high trading volume stocks in an interval, the more weight will be given. That is realized by taking the long investment of one dollar worth into the stock with high volume and offsetting the position by shorting one dollar of low volume stock in the same interval at the same time,

which keeps the net investment always zero and there is no need to rebalance the portfolio in the testing period. The specific calculation of the adjusted weight (for daily data) is:

$$W_h = \frac{1}{79} \cdot [1 + (M_{i,h} - \bar{M}_h) / M_h]$$

$$W_l = \frac{1}{79} \cdot [1 + (M_{i,l} - \bar{M}_l) / M_l]$$

Where  $W_h$  or  $W_l$  stands for the size-adjusted weight for high or low volume stocks,  $1/79$  is the equal weight assigned to each interval which is applied in the zero investment portfolio. The formula in bracket is the adjustment coefficient.  $M_{i,h}$  or  $M_{i,l}$  represents the number of high or low volume stocks in interval  $i$  and  $\bar{M}_h$  or  $\bar{M}_l$  denotes the average number of high or low volume stocks for each interval (equal to the total number of extreme volume stocks divided by the total number of intervals 79).  $M_h$  or  $M_l$  denotes the total number of high or low volume stocks. This coefficient enables us to give the corresponding weights for each interval based the usual volume in that interval and ensures the sum of the coefficient equal to 1 at the same time.

On the basis of size-adjusted weight, the return for the high or low volume stock is represented by the following equation:

$$\bar{R}_h = \frac{\sum_{i=1}^{79} \sum_{j=1}^{M_{i,h}} R_{ij,h}}{\sum_{i=1}^{79} M_{i,h}} \quad \bar{R}_l = \frac{\sum_{i=1}^{79} \sum_{j=1}^{M_{i,l}} R_{ij,l}}{\sum_{i=1}^{79} M_{i,l}}$$

Where  $R_{ij,h}$  or  $R_{ij,l}$  represents the return during the testing period for interval  $i$  of the long (short) position of reference portfolio. The subscript  $j=1, \dots, M_{i,h}$  ( $M_{i,l}$ ) is the number of stocks experiencing the high or low volume return. And the average net return is:

$$\overline{NR} = \frac{\sum_{i=1}^{79} (\sum_{j=1}^{M_{i,h}} R_{ij,h} + \sum_{j=1}^{M_{i,l}} R_{ij,l})}{\sum_{i=1}^{79} (M_{i,h} + M_{i,l})}$$

The hypothesis by verifying whether  $\overline{NR}$  is significantly positive for the reference portfolio.

## EMPIRICAL RESULTS AND ANALYSIS

### The Overview of Stock Price and Trading Volume

Table 1 below provides the descriptive statistics of stock price and security trading volume. Panel A illustrates the mean and median stock prices and trading volume for the entire 79 trading intervals. The mean stock price for small firms is \$2.35, which is much lower than prices for large firms. Similar findings are observed for trading volume using and median volumes. The median trading volume for large firms is approximately 52 times greater than that for small firms. These results are due to the fact that firms with greater market capitalization seem to be more reliable and more attractive to investors compare to small firms. On the other hand, it is possible that the higher trading volume for large firm stocks results from the greater liquidity provided from the institutional and individual traders.

Panels B and C present descriptive statistics for the first and the last trading intervals over the sample period. Results indicate a big deviation in terms of prices and volumes between the first and the last interval. For numbers of stocks classified as the small and medium firms, they both decline in sequent 15 years. Moreover, their prices also decrease more than 50% in the last trading interval compared to the first one. However, for large firms, both prices and volumes have increased over the sample period. For medium firms, there is an increase in average volumes for 122,160 to 757,800. However, this increase is much smaller compared to large firms, with volume increase from 2,030,610 to 3,748,650.

Panel D presents the number of high and low trading volume stocks in each of the 79 intervals for sample period, for small, medium and large firms respectively. At each interval, a stock is classified as



high volume stock is its trading volume is in the top 10 percent among all stocks on the formation date. Similarly, a stock is classified as a low volume stock is its trading volume is in the bottom 10 percent among all stocks on the formation date. At the bottom of Panel D, the correlation between the numbers of high and low volume stocks within each size group is presented. These correlations between the number of high and low trading volume stocks exhibit differently with regarding values and signs. The negative correlation between high and low volume stocks for large firms indicates that trading volume have impact on stocks performance to a certain extent, which is consistent with the result from Gervai, Kaniel, and Mingelgrin (2001).

**TABLE 1**  
**STOCK PRICE AND TRADING VOLUME FOR DAILY SAMPLE**

There are 79 nonintersecting trading intervals with 50 days for the reference period and the formation period. The stock is classified into three size group in each trading interval by the comparison of market capitalization deciles prior to the formation date in the December of each year. The small firms are the firms with one to four deciles in market capitalization, the firms with five to seven market capitalization deciles are defined as medium-size group and firms are assigned into large firms on the condition that the market capitalization deciles reach from eight to nine.

	Small Firms	Medium Firms	Large Firms			
Panel A: Overall Sample--79 Trading Intervals						
Average stock price	\$2.35	\$3.07	\$11.38			
Median stock price	\$1.20	\$1.68	\$7.10			
Average share volume	128.25	364.84	3,124.09			
Median share volume	29.00	46.00	1,503.90			
Panel B: First Trading Interval (Formation Period--01/03/1997)						
# stocks in subsample	315	134	36			
Average stock price	\$1.94	\$3.40	\$6.66			
Median stock price	\$1.01	\$1.86	\$5.23			
Average share volume	65.24	122.16	2,010.61			
Median share volume	26.00	32.00	1,206.20			
Panel C: Last Trading Interval (Formation Period--08/06/2012)						
# stocks in subsample	31	50	85			
Average stock price	\$0.75	\$1.93	\$12.02			
Median stock price	\$0.75	\$0.94	\$7.52			
Average share volume	42.28	757.80	3748.65			
Median share volume	42.28	190.84	2314.36			
Panel D: Number of High-and Low-volume Stocks In the 79 Trading Intervals						
	Volume Classification					
	High	Low	High	Low	High	Low
Average	11.9	11.8	9.1	8.9	6.6	6.3
Median	10	10	8	9	6	4
Standard Deviation	8.4	8.1	4.8	4.4	4.5	7.0
Minimum	1	3	2	2	1	3
Maximum	31	30	24	19	21	41
Correlation	0.827		0.142		-0.272	

## The Cumulative Net Returns for Zero Investment and Reference Return Portfolios

Table 2 below illustrates main findings of net return on a daily base. The cumulative average daily net return is calculated for the test periods that consists of 1, 10, 20, and 50 trading days following the last day in each interval. This cumulative average return represents the abnormal return for each size group and whether the abnormal return is statistically significant positive determinates the existence of high volume return premium. In particular, as for the zero investment portfolios, the net return for the small and medium size groups and different test period horizons are negative with relatively weak statistical significance. In terms of the average returns of these firms with small market value, the high trading volume stocks range from -1.31% to -9.30% and the net returns for small firms stocks are from -8.68% to 2.54% for different testing horizons after the portfolio formation dates. However, it is remarkable that for small firms, the abnormal return (cumulative net return) of the one day test period is -5.82% with a statistical significance at 1% level, which implies that the null hypothesis can be accepted for small firms. Therefore, the high volume return premium does not exist for small firms in Australian equity market for short testing period (i.e. 1 day period), on a daily base.

**TABLE 2**  
**AVERAGE RETURN FOR DAILY SAMPLE**

There are two different portfolio formation strategies refer to the test of average return of high (low) trading volume return  $\bar{R}_h$  ( $\bar{R}_l$ ): zero investment portfolio and the reference return portfolio. Since each stock assigned into high or low trading volume category is equally weighted on formation date for each trading interval, the average returns for high or low volume stocks and the net return are simply calculated by taking the corresponding average value of the total return respectively. As for the size-adjustment for the reference return portfolio specified in the portfolio formation section, the weight is modified according to the number of stocks categorised as high or low volume stock in a given stock. The trading volume is classified as high (low) according to whether the stock volume on the formation period is within the top-ranking (bottom-ranking) 10% in each interval. The average cumulative return of test period shown in the table is 1, 10, 20, and 50 days. The symbols, \*, \*\*, \*\*\* denote statistical significance at 10%, 5%, 1%, respectively.

Test period in days	Zero Inversment				Reference Returns			
	1	10	20	50	1	10	20	50
<b>Pannel A: Small Firms</b>								
High volume $\bar{R}_h$	-1.31%	-3.75%	-4.91%	-9.30%	-0.02%	-0.06%	-0.07%	0.14%
	n/a	n/a	n/a	n/a	-0.85	-0.77	-0.72	-1.11
Low volume $\bar{R}_l$	-4.51%	-3.67%	-3.77%	11.83%	-0.07%	-0.05%	-0.06%	0.18%
	n/a	n/a	n/a	n/a	-3.27***	-0.93	-0.63	1.10
Net Return $\bar{NR}$	-5.82%	-7.42%	-8.68%	2.54%	-6.36%	-2.99%	-9.70%	2.80%
	-2.78***	-1.15	-0.92	0.18	-2.80***	-0.60	0.96	0.19
<b>Pannel B: Medium Firms</b>								
High volume $\bar{R}_h$	0.81%	-2.09%	-0.98%	6.78%	0.01%	-0.03%	-0.01%	0.09%
	n/a	n/a	n/a	n/a	0.57	-0.55	-0.16	0.76
Low volume $\bar{R}_l$	-1.73%	-4.21%	-8.55%	-4.09%	-0.02%	-0.05%	-0.11%	-0.05%
	n/a	n/a	n/a	n/a	-1.51	-1.21	-1.59	-0.45
Net Return $\bar{NR}$	-0.92%	-6.30%	-9.54%	2.69%	-0.96%	-6.43%	-6.30%	2.79%
	-0.51	-1.09	-1.05	0.19	-0.52	-1.23	-1.20	0.21
<b>Pannel C: Large Firms</b>								
High volume $\bar{R}_h$	-0.89%	-2.41%	3.77%	4.08%	-0.01%	-0.06%	-0.05%	0.05%
	n/a	n/a	n/a	n/a	-1.19	-0.77	-0.69	0.35
Low volume $\bar{R}_l$	1.03%	-0.42%	1.74%	6.97%	0.02%	-0.05%	-0.03%	0.12%
	n/a	n/a	n/a	n/a	1.04	-0.93	-0.37	0.96
Net Return $\bar{NR}$	4.13%	-2.83%	5.51%	11.05%	0.29%	-8.06%	-5.84%	12.16%
	2.11**	-0.54	2.67***	0.76	0.20	-1.18	-0.77	0.84

For medium size firms, the average return of high volume stocks in each interval for the 50 testing day increases to 6.78%, pushing up the average net return to positive value at 2.69%. But it is not statistically significant, which indicates that the previous trading volume is not able to predict the subsequent price movements for medium firms for a raise up to 4.13% and 5.51% for the 1-day test horizon and 20-day test period, and the t-statistics are become much greater. Thus, this indicates that high volume stocks are followed by a return premium or positive cumulative return for large firms, with a 1-day testing period and 20-day test period.

With regard to the reference return portfolio, average net return of high and low trading volume stocks exhibit similar return pattern with the zero investment portfolio. For the large proportion of the extreme volume stocks especially for the bottom-ranking 10 percentiles stocks in each interval, average return and net returns are mostly negative for both high and low trading volume stocks. It is remarkable that in the 1-day testing horizon, the abnormal return is -6.36%, which is statistically significant at 1% level, for small firms. It indicates that high volume stocks are not followed with high future returns in a short horizon for small firms in Australia. Similar to the zero investment portfolio, the net return increase with large firms compared to medium and small firms for a given test period. For the one day horizon in the test period, it is found that the average net return for small firms is -6.36% and the large firms is 0.29%. This indicates that the high volume return premium exists for the large firms in Australian market.

Now the weekly sample is applied to investigate whether results are same as for daily sample. Table 3 presents results from the weekly sample. For weekly sample, returns become positive, particularly for medium and large firms. As for the zero investment portfolio, for large firms, the average net return of ten-day test period from high volume stock is positive at 6.26%, which statistically significant at 1% level, compared to -2.83% for daily sample. Moreover, for the one day testing period, it is a positive 4.02% return, which is statistically significant at the 10% level. All net returns for large firms are positive for weekly sample, for both zero investment and reference return portfolios.

**TABLE 3**  
**AVERAGE RETURN FOR WEEKLY SAMPLE**

Test period in days	Zero Inversment				Reference Returns			
	1	10	20	50	1	10	20	50
<b>Pannel A: Small Firms</b>								
High volume $\bar{R}_h$	2.27%	-3.02%	-5.86%	-12.97%	0.04%	-0.05%	0.10%	-0.22%
	n/a	n/a	n/a	n/a	0.74	-0.48	-0.91	-0.93
Low volume $\bar{R}_l$	0.39%	1.18%	1.29%	7.93%	0.01%	0.02%	0.02%	0.13%
	n/a	n/a	n/a	n/a	0.25	0.27	0.21	0.88
Net Return $\overline{NR}$	2.64%	-1.84%	-4.57%	-5.04%	3.04%	-9.50%	-0.51%	-5.53%
	0.77	-0.44	-0.52	-0.27	0.77	0.23	-0.52	-0.30
<b>Pannel B: Medium Firms</b>								
High volume $\bar{R}_h$	2.13%	5.69%	10.79%	2.39%	0.03%	0.08%	0.15%	0.03%
	n/a	n/a	n/a	n/a	0.86	1.09131	1.75	0.22
Low volume $\bar{R}_l$	-0.96%	-2.95%	-3.35%	-7.47%	-0.01%	-0.04%	-0.47%	-0.10%
	n/a	n/a	n/a	n/a	-0.92	-0.6372	-0.47	-0.83
Net Return $\overline{NR}$	1.17%	2.74%	7.44%	-5.07%	1.24%	2.81%	7.58%	-5.15%
	0.43	0.32	0.93	-0.34	0.44	-0.40	0.94	-0.37
<b>Pannel C: Large Firms</b>								
High volume $\bar{R}_h$	3.37%	3.43%	4.25%	6.85%	0.05%	0.05%	0.07%	0.11%
	n/a	n/a	n/a	n/a	1.91*	0.76	1.02	0.79
Low volume $\bar{R}_l$	0.65%	2.83%	-2.38%	-5.80%	0.01%	0.05%	-0.04%	-0.11%
	n/a	n/a	n/a	n/a	0.44	1.0442	-0.47	-0.48
Net Return $\overline{NR}$	4.02%	6.26%	1.87%	0.96%	4.50%	6.92%	1.71%	0.32%
	1.69*	10.52***	2.28**	-0.06	0.68	1.21	0.22	0.18

Overall, from previous discussion, it is obvious that the high trading volume effect on the future return prediction is not a long-term phenomenon, particularly for large firms in the weekly sample. This is inconsistent with results suggested by Gervai, Kaniel, and Mingelgrin (2001) for the US stock market. They find that net returns of different size firms for both daily and weekly sample are all significantly positive. Further, it is demonstrated that the average profits increase with the increasing days of test period and this return premium is not a short effect in US market for period from August 1963 to December 1996. However, they also find the improvement of abnormal returns for the weekly data, which is consistent with our findings. In terms of other previous literatures, some researches draw similar conclusions as this study. From daily sample, the average net return for small firms are significantly negative and it implies that high volume stocks lead to a relatively lower return in the future. With the consideration of risk-based asset pricing model, Bernan (1998) put forward the support that the large trading volume stocks are always expected with lower returns and the stocks with less transactions are considered to have a higher profit by many investors.

Although some returns are negative for small firms in the daily sample, the weekly sample does exhibit the existence that high volume stocks are followed by a greater return premium in the subsequent short testing period. Therefore, reasonable explanations and potential analysis of the high volume return premium are examined in the following section.

## DISCUSSION

### Return and Volume Interaction

As suggested by Gervai, Kaniel, and Mingelgrin (2001), the following potential explanations may help to understand the high volume return premium in Australian market: short term interaction between stock returns and trading volumes, systematic risk, and outliers. The interaction between stocks returns and trading volumes during the reference period in each interval is documented first. We investigate the average net return for the stocks with “normal” returns and illustrate that the premium in return from the heavily traded stocks cannot be explained by the short-term interaction between the trading volume and returns.

To examine the effect of the autocorrelation in returns and volume in the short horizon, the concept of “normal return” is introduced for both daily and weekly sample. A stock in a specific interval is defined as “normal” if the return on the formation date is not extremely high or low compared to the return of its own previous 49 days for the daily sample and 9 weeks for the weekly sample. Therefore, two normal return subsamples are created: *the middle 40 percent* and *the middle 20 percent*. We rank the returns for each stock in each interval and abandon the top or bottom-ranked stocks in that interval.

For the middle 40 percent, we compare the return from each stock on the formation date, using the similar approach to classify high and low trading volume stocks in each interval and construct the middle 40 percent sample by retaining the stocks are not assigned to the highest and lowest 30 percent for that interval. This method allows to remove the impact generated by the extreme returns of high and low trading volume stocks on net returns for the sample. A narrower range (20%) for “normal stocks” is then used to perform the same test as for the 40% sample. The middle 20 percent is formed more restrictively and only the stocks of which return on formation period is in the middle 20 percent in the return distribution of the 50-days interval are taken into account, results are presented in Table 4 below.

From Table 2 and Table 3, it is found that the high volume return premium does not exist for small firms in Australia with daily data, but the trading volume contain the predictive information for the return in following test period in each interval for large firms for the short testing horizon. In panel A from Table 4, the sign of net return for each size group remain unchanged compare with Table 2. Moreover, for small firms, the net profit for middle 40% subsample is significantly negative at -2.66% and middle 20% subsample remain significantly negative as well. Therefore, it demonstrates that the net returns are rarely impacted by the extreme high or low returns in the preceding time for small firms stocks. Thus, the short term autocorrelation between return between return and volume does not have any explanation power for non-existence of high volume return premium in Australia. In addition, it is apparent that majority of net

returns from medium firms are also negative. However, in panel B (weekly sample), for large firms net returns slightly reduce from 4.02% to 1.03% for middle 40% subsample and to 0.91% for middle 20% subsample with one-day test period, which are positive and statistically significant at 1% level and 5%. It illustrates that the average net return for large firms are changed obviously by cutting off the stocks with unusual large or low return in the weekly sample. With regard to the 10 and 20- day test period for large firms of zero investment portfolio, the net returns reported in (Table 3) also decline from the 6.26% and 1.87% to 2.49% and to -2.3% respectively for the middle 40% subsample after the autocorrelation impact is removed. Therefore, results suggested that the interaction between trading volume and stocks return can be part of the possible reason for the high volume return premium of large firms in Australian market.

**TABLE 4**  
**NET RETURN FOR NORMAL STOCKS USING DAILY AND WEEKLY SAMPLE**

The specific criterion is the same as we discussed in Tables 2 and 3. Another condition is added for the existing high and low volume stocks in each size group: choose the stocks of which return on formation date are not unusual high or low in each interval to construct the “normal stocks subsample”. There are two alternative subsamples: the middle 40 percent subsample and middle 20 per cent subsample. The symbols, \*, \*\*, \*\*\* denote statistical significance at 10%, 5%, 1%, respectively. Daily results are exhibited in Panel A and the comparable weekly data are in Panel B.

Test Period (in days):	Zero Return			Reference Returns		
	1	10	20	1	10	20
<b>Panel A: Daily Sample</b>						
Small firms						
Middle 40%	-2.66%	-4.51%	-3.97%	-3.20%	-5.72%	-4.86%
	-2.33**	-0.85	-0.47	-2.31**	-1.32	-0.73
Middle 20%	-0.13%	-1.35%	-3.68%	-1.66%	-1.68%	-4.86%
	-1.71*	-0.34	-0.60	-1.23	-0.38	-0.71
Medium firms						
Middle 40%	-0.52%	-3.31%	-3.87%	-5.70%	-3.60%	-4.05%
	-0.55	-0.97	-0.48	-0.55	-1.17	-0.84
Middle 20%	-0.23%	-2.09%	-2.69%	-0.30%	-2.61%	-3.24%
	-0.33	-0.67	-0.49	-0.35	-1.14	-0.87
Large firms						
Middle 40%	0.47%	-0.19%	-1.22%	0.67%	-0.33%	-1.45%
	0.60	-0.85	-3.31	0.60	-0.11	-0.40
Middle 20%	0.47%	0.42%	0.68%	0.90%	0.82%	1.30%
	1.05	0.27	0.95	1.07	0.29	0.45
<b>Panel B: Weekly Sample</b>						
Small firms						
Middle 40%	-0.58%	-0.60%	0.95%	-0.67%	-5.72%	-4.60%
	-0.50	-0.12	0.29	-0.48	-1.32	-0.73
Middle 20%	-0.14%	0.09%	0.93%	-0.03%	-0.08%	1.55%
	-0.15	0.08	0.23	-0.02	-0.02	0.25
Medium firms						
Middle 40%	-0.21%	0.17%	-0.12%	-0.23%	-3.60%	-4.05%
	-0.31	0.12	-1.73	-0.32	-1.17	-0.84
Middle 20%	-0.25%	0.58%	-0.50%	-0.32%	0.76%	0.63%
	-0.45	0.30	-0.44	-0.45	0.25	-0.16
Large firms						
Middle 40%	1.03%	2.49%	-2.30%	1.48%	-0.32%	-1.45%
	1.93*	1.72	-2.78	0.91	-0.11	-0.40
Middle 20%	0.91%	0.37%	-1.81%	1.92%	0.25%	-4.23%
	2.06**	2.14**	-0.42	1.04	0.11	-0.77

## Systematic Risk

It is widely known that the stocks with higher expectation on their returns are normally accompanied with a higher systematic risk. Therefore, whether higher trading volume stocks are associated with higher systematic risks than lower trading volume stocks are investigated in this section. The stock's systematic risk beta is used as the proxy for zero investment portfolio of 20-day testing period after the formation date for each interval, employing the daily data in Table 5.

The linear regression of net returns for high and low volume stocks with the market index used is the ASXAORD (Australia Stocks Exchange All Ordinaries). The joint market model formations for a given interval  $i$  are expressed by these two regression equation below:

$$R_{i,h} = \alpha_h + \beta_h R_{i,m} + \varepsilon_{i,h}$$

$$R_{i,l} = \alpha_l + \beta_l R_{i,m} + \varepsilon_{i,l}$$

Where  $R_{i,h}$  ( $R_{i,l}$ ) represents the high (low) trading volume stock for interval  $i$  across all 79 trading intervals and  $R_{i,m}$  represents for the Australian market index (ASXAORD) return in that interval. Table 5 presents the estimated coefficient of market return of these two regressions and the difference of the regression slope for high and low volume stocks. If the difference between high volume stocks beta and low volume stocks is greater than zero, that is  $\beta_h - \beta_l > 0$ , then high volume return premium may be resulted from the higher systematic risk for actively traded stocks. By contrast, if the value of  $\beta_h$  is similar to  $\beta_l$ , it is supposed then the positive net return of high volume stocks is a production of systematic risk.

**TABLE 5**  
**SYSTEMATIC RISK OF THE ZERO INVESTMENT PORTFOLIO FOR DAILY SAMPLE**

All the stocks tested in this section are classified into three size group and high or low trading volume stocks in each interval for the zero investment with 1, 10 and 20 test days after the formation date. We take the linear regression of the joint market model, which can be expressed by these two equations as followed:

$$R_{i,h} = \alpha_h + \beta_h R_{i,m} + \varepsilon_{i,h}$$

$$R_{i,l} = \alpha_l + \beta_l R_{i,m} + \varepsilon_{i,l}$$

$R_{i,h}$  ( $R_{i,l}$ ) denotes the return of high (low) trading volume stocks in interval  $i$ ;  $\beta_h$  ( $\beta_l$ ) is the regression slope of high (low) trading volume for each size group, which can represent the systematic risk for each stock.

	Test period (in days)		
	1	10	20
<b>Panel A: Small Firm</b>			
$\beta^h$	0.822	1.307	1.473
$\beta^l$	1.120	1.173	1.373
$\beta^h - \beta^l$	-0.231	-0.145	-0.087
$t$	-3.54***	-5.02***	-6.50***
<b>Panel B: medium Firm</b>			
$\beta^h$	0.819	0.838	1.011
$\beta^l$	0.543	1.197	1.367
$\beta^h - \beta^l$	0.184	0.482	-0.320
$t$	-1.071	-4.30***	-6.34***
<b>Panel C : Large Firm</b>			
$\beta^h$	0.762	1.036	0.950
$\beta^l$	0.957	1.182	1.058
$\beta^h - \beta^l$	-0.191	-0.160	-0.048
$t$	-1.67*	-3.38***	-4.76***

From Table 5, all differences between  $\beta_h$  and  $\beta_l$  are close to zero and statistically significant. Therefore, the systematic risk cannot help to explain the high volume return premium. For all groups, the beta for low volume stocks is slightly greater than that for high volume stocks. For large firms, the difference between  $\beta_h$  and  $\beta_l$  is only -0.191 and -0.160 for the 1-day and 10-day testing period respectively. The t-value is correspondingly high as well. Therefore, we can state that the systematic risk cannot be the potential explanation for the high volume return premium.

### **The Effect from Outliers**

An additional explanation for the high volume return premium of large size firms is the effect from possible outliers. For daily sample, the extreme observations are supposed to be taken into account. These have a great probability to drift our results from expected ones. We therefore try to investigate the distribution of the zero investment portfolios for the entire sample. Since the return premium is significant positive through the 20-day test period for the zero investment portfolios of large firms, we therefore analyse the net return of the following 20 trading days from formation date in the 79 intervals of daily data described below.

Taking a long position of one dollar in all high trading volume stocks and taking short position on dollar in all low volume stocks for the zero investment portfolio, the net returns range from different trading interval and for different firms sizes. In Table 6, the horizontal axis represents the net return from zero investment portfolio with 20-day testing period and it covers from -5% to 5%. And the vertical axis stands for the numbers of trading intervals that generates the corresponding net returns in each interval. We calculate the mean by cutting off the five most extremely large or small observations on each of the negative and positive side compared with the original mean of the distribution. What we are interested in is to examine whether the trimmed mean change a lot from the original mean.

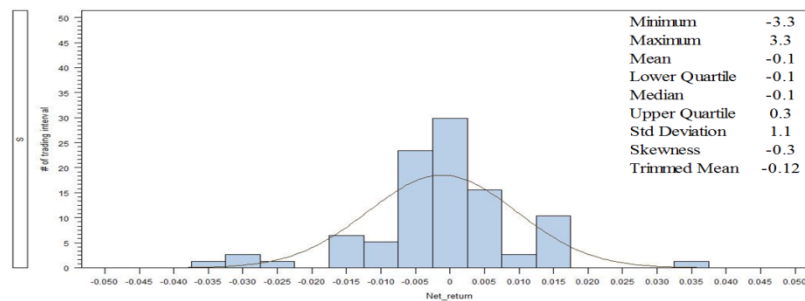
Table 6 presents distribution of net return obtained from zero investment portfolio on a daily base. Panel A in Table 6 is the distribution for small firms. The dispersion of small firms which is measured by the standard deviation is 1.1, which is greater than other firms as illustrated in Panel B and C. The rest of the statistics show a good symmetry in the net return distribution for the small firm. The median is equal to the mean at -0.1% and the lower quartile (25<sup>th</sup> percentile) is the opposite value of upper quartile (75<sup>th</sup> percentile). With the small skewness of 0.3, the trimmed mean slightly reduces to -0.12% and there is no noticeable change compared the mean of -0.1%. Therefore, the negative net return for small firms cannot be explained by the outliers.

In terms of medium firms in Panel B, the trimmed mean is the same as the original mean. For large firms in Panel C, it seems that outliers affect the net returns for large firms. The skewness is much larger and after the cutting off the top or bottom-ranking 5% of the extreme net returns for large firm stocks increase from -0.1% to -0.054%, nearly an 50% increase. Thus, these outliers may help to explain the high volume return premium for large firms in Australia.

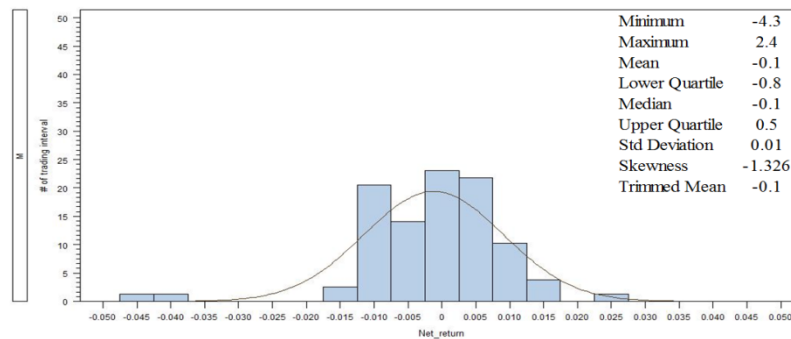
**TABLE 6**  
**NET RETURN DISTRIBUTION OF ZERO INVESTMENT PORTFOLIO FOR DAILY SAMPLE**

All the stocks analysed are divided into high or low trading volume according to the return ranking on the formation period and further split as small, medium and large firms stocks on the basis of the market capitalization close to the end of each year.

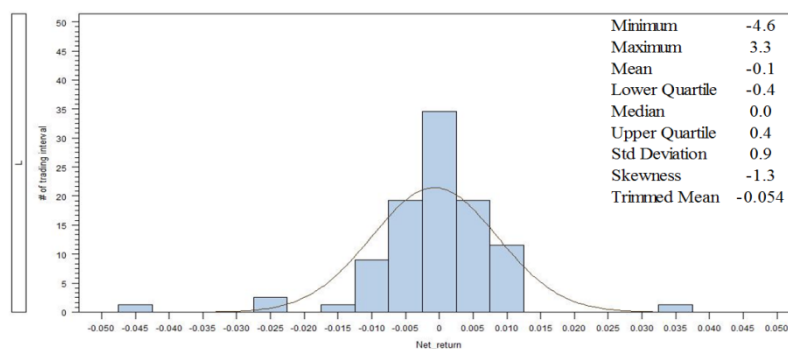
Panel A: Small Firms



Panel B: Medium Firms



Panel C: Large Firms





## CONCLUSION

In this research, it is found that stocks extreme higher volumes (lower) are usually accompanied by higher (lower) returns in the subsequent days with a short testing horizon in the Australian equity market. The positive net returns from these actively traded stocks are defined as the high volume return premium.

To investigate whether the trading volume has a predictive power of the future changes in stock returns, we apply two portfolio strategies: zero investment portfolios with equally-weighted trading volume and size-adjusted reference portfolio according to the numbers of stock expecting the high or low volume in each interval. Apart from the classification of high or low trading volume stocks, they are further split into small, medium and large size firms to examine whether firm specific characteristics have any impact on this premium.

This phenomenon is much stronger for large firms with eight or nine deciles in market capitalization either from the perspective of zero investment portfolio or the reference return portfolio. The positive net returns from high volume stocks exist in both the daily and the weekly sample. However, this return premium does not exist for the small firms whose market capitalization is below five deciles. Moreover, it is suggested that excess positive returns from weekly sample become greater than that from daily sample.

Some possible explanations and potential reasons for this high volume return premium are also examined. Results conclude that the return premium can be partially explained by the short-term autocorrelation. Moreover, the systematic risk is also explored by taking the linear regression of net return and Australian stock market index return. It is demonstrated that the stock beta for high volume stocks is very close to the stock beta from low volume stocks in a given interval. Thus, the systematic risk does not have any explanation power for the high volume return premium. In addition, outliers are taken into consideration, results indicate that outliers can affect mean return distributions for large firms. Therefore, the interaction between volume and return, and outliers may contribute to this high volume return premium phenomenon.

## REFERENCE

- Amihud, Y. & Mendelson, H. (1986). Asset Pricing and the Bid-Ask Spread. *Journal of Financial Economics*, 17, 223-249.
- Andersen, T. G. (1996). Return Volatility and Trading Volume: An Information Flow Interpretation of Stochastic Volatility. *The Journal of Finance*, 51, 169-202.
- Bamber, L. & Youngsoon, S. (1995). Differential Price and Volume Reactions to Accounting Earnings Announcements. *Accounting Review*, 70, 417-441.
- Bernard, V. L. & Thomas, J. K. (1989). Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium? *Journal of Accounting Research*, 27, 1-36.
- Bernardo, A., & Welch, I. (2004). Liquidity and Financial Market Runs. *Quarterly Journal of Economics*, 119, 135-158.
- Blume, L., Easley, D. & O'Hara, M. (1994). Market Statistics and Technical Analysis: The role of Volume. *Journal of Finance*, 49, 153-181.
- Bohl, M. & Henke, H. (2003). Trading Volume and Stock Market Volatility: The Polish Case. *International Trvies of Financial Analysis*, 153, 1-13.
- Brailsford, T. J. (1994). Empirical relationship Between Trading Volume, Returns and Volatility *Research paper, Department of Accounting and Finance*, 1994-01, 1-33.

- Brown, D. & Jennings, R. (1989). On Technical Analysis. *Journal of Finance*, 51, 207-227.
- Campbell, J. Y., Grossman, S. J., & Wang, J. (1993). Trading Volume and Serial Correlation in Stock Returns. *Quarterly Journal of Economics* 108, 905–939.
- Chan, K., Harneed, A., & Tong, W. (2000). Profitability of Momentum Strategies in the International Equity Markets. *Journal of Finance and Quantitative Analysis*, 35, 153-172.
- Clark, P. (1973). A Subordinated Stochastic Process Model with Finite Variance for Speculative Prices. *Econometrica*, 91, 135-156.
- Conrad, J. S., Hameed, A. & Niden, C. (1994). Volume and Autocovariances in ShortHorizon Individual Security Returns. *The Journal of Finance*, 49, 1305-1329.
- Copeland, T. E. (1974). A Model of Asset Trading under the Assumption of Sequential Information Arrival. *Unpublished Ph.D. Dissertation, University of Pennsylvania*.
- Crouch. R. L. (1970). The Volume of Transactions and Price Changes on the New York Stock Exchange. *Financial Analysts Journal*, 26, 104-109.
- Datar, V., Naik, N. & Radcliffe, R. (1998). Liquidity and asset returns: An alternative test. *Journal of Finance*, 1, 203-220.
- Deo, M., Srinivasan, K. & Devanadhen. K. (2008). The Empirical Relationship between Stock Returns, Trading Volume and Volatility: Evidence from Select Asia-Pacific Stock Market. *European Journal of Economics, Finance and Administrative Science*, 12.
- Epps, T. W. & Epps, M. L. (1976 ). The Stochastic Dependence of Security Price Changes and Transaction Volumes: Implications for the Mixture-of-Distributions Hypothesis. *Econometrica*, 44(March), 305-321.
- Epps, T. (1975). Security Price Changes and Transaction Volumes: Theory and Evidence. *American Economic Review*, 65, 586–597.
- Gallant, R., Rossi, P. & Tauchen, G. (1992). Stock Prices and Volume. *Review of Financial Studies*, 5, 199-242.
- Gallo, G. & Pacini, B. (2000). The Effect of Trading Activity on Market Volatility. *The European Journal of Finance*, 163-175.
- Gervais, S., Kaniel, R. & Mingelgrin, D. (2001). The High Volume Return Premium. *Journal of Finance*, 56, 877–919.
- Granger, C. W. J. & Morgenstern, O. (1963). Spectral Analysis of New York Stock Market Prices. *Kyklos*, 16, 1–27.
- Guner, N. & Onder, Z. (2002). Infomation and Volatility: Evidence from an Emeging Market. *Emerging Market Finance and Trade*, 38, 26-46.

- Harris, M. (1986). Cross-Security Tests of the Mixture of Distributions Hypothesis. *Journal of Financial and Quantitative Analysis*, 21(March), 39-46.
- Harris, M. & Raviv, A. (1993). Differences of Opinion Make a Horse Race. *Review of Financial Studies*, 6(3), 473-506.
- Huang, W., Liu, Q., Rhee, S. G. & Zhang, L. (2010). Return Reversals, Idiosyncratic Risk and Expected Returns. *Review of Financial Studies*, 23(1), 147-168.
- Jegadeesh, N. & Sheridan, T. (1993). Returns to Buying Winners and Selling Losers: Implication for Stock Market Efficiency. *Journal of Finance*, 48, 64-91.
- Join, P. C. & Joh, G. (1988). The Dependence between Hourly Prices and Trading Volume. *Journal of Financial and Quantitative Analysis*, 23(September), 269-283.
- Kaniel, R., Ozoguz, A. & Starks, L. (2011). The High Volume Return Premium: Cross-Country Evidence. *Journal of Financial Economics*, 103(2), 255-279.
- Karolyi, G. A., Lee, K. H. & Van Dijk, M. (2009). Commonality in Returns, Liquidity, and Turnover Around The World. *Working Paper. Cornell University, Korea University Business School, and Erasmus University*.
- Karpoff, J. M. (1987). The Relation between Price Changes and Trading Volume: A Survey. *Journal of Financial and Quantitative Analysis*, 22(March), 109-126.
- Lamoureux, C. G. & Lastrape, W. D. (1990). Heteroskedasticity in Stock Return Data: Volume versus GARCH effects. *Journal of Finance*, 45, 221-229.
- Lee, C. M. & Swaminathan, B. (2000). Price Momentum and Trading volume. *Journal of Finance*, 55, 2017-2069.
- Lee, C. & Rui, O. (2000). Does Trading Volume Contain Information to Predict Stock Returns? Evidence from China's Stock Markets. *Review of Quantitative Finance and Accounting*, 14, 341-360.
- Mayshar, J. (1983). On Divergence of Opinion and Imperfections in Capital Markets. *American Economic Review*, 73, 114-128.
- Merton, R. C. (1987). A simple Model of Capital Market Equilibrium with Imcomplete Information. *Journal of Finance*, 42, 483-510.
- Miller, E. (1977). Risk, Uncertainty, and Divergence of Opinion. *Journal of Finance*, 32, 1151-1168.
- Morgan, I. G. (1976). Stock Prices and Heteroskedasticity. *Journal of Business*, 49 (October), 496-508.
- Osborne, M. F. M. (1959). Brownian Motion in the Stock Market. *Operations Research*, 7, 145-173.
- Pastor, L. & Stambaugh, R. (2003). Liquidity Risk and Expected Stock Returns. *Journal of Political Economy*, 111, 642-685.
- Pyun, C. S., Lee, S. Y. & Nam, K. (2000). Volatility and Information Flows in Emerging Equity Market - A Case of the Korean Stock Exchange. *International Review of Financial Analysis*, 9, 405-420.

- Richardson, G., Sefcik, S. E. & Thompson, R. (1986). A Test of Dividend Irrelevance using Volume Reaction to a Change in Dividend Policy. *Journal of Financial Economics*, December, 313 -333.
- Rogalski, R. J. (1978). The Dependence of Prices and Volume. *Review of Economics and Statistics*, 36(May), 268-274.
- Schwert, G. W. (2002). Anomalies and Market Efficiency. *Simon School of Business Working Paper, FR*, 2-13.
- Sentana, E. & Wadwani, S. (1992). Feedback Traders and Stock Return Autocorrelation: Evidence from a Century of Daily Data. *The Economic Journal*, 102, 415-425.
- Gervais, S. Kaniel, R. & Mingelgrin, D. H. (2001). The High-Volume Return Premium. *The Journal of Finance*, 56(3), 877-919.
- Smirlock, M. & Starks, L. (1984). A Transactions Approach to Testing Information Arrival Model. *Working paper, Washington University*.
- Tauchen, G. & Pitts, M. (1983). The Price Variability-Volume Relationship on Speculative Markets. *Econometrica*, 51, 485-505.
- Wang, C. & Chin, S. (2004). Profitability of Return and Volume-Based Investment Strategies in China's Stock Market. *Pacific-Basin Finance Journal*, 12, 542-564.
- Wang, J. (1994). A Model of Competitive Stock Trading Volume. *The Journal of Political Economy*, 102, 127-168.
- Westerfield, R. (1977). The Distribution of Common Stock Price Changes: An Application of Transactions Time and Subordinated Stochastic Models. *Journal of Financial Quantitative Analysis*, 12, 743-765.
- Ying, C. C. (1966). Stock Market Prices and Volumes of Sales. *Econometrica*, 34, 676-686.