The Investor Recognition Hypothesis: the New Zealand Penny Stocks

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Abstract

Recent work by Kaniel, Li, and Starks (2005) confirms the investor recognition hypothesis in many countries. The New Zealand stock market is among a number of developed countries which exhibit significant high-volume return premiums (HVRP). The skewed size distribution of NZX-listed firms, however, suggests that the analysis in New Zealand should control for firm size. This paper shows that HVRP disappears in each of the three size groups when size is measured by market capitalisation. In addition, HVRP in New Zealand is found to be driven by penny stocks only. In support of the investor recognition hypothesis, we show that penny stocks are less liquid and more "neglected," and thus respond more strongly to high-volume shocks.

1. Introduction

Stocks differ in popularity. On the one hand, stocks with a broad investor base, such as constituent stocks in a market index like the NZSE40 in New Zealand (NZ) or the Hang Seng Index in Hong Kong, are more visible (Hyland and Swidler 2002). On the other hand, some stocks have very limited visibility among investors. Examples include the neglected stocks studied by Arbel, Carvell, and Strebel (1983). A distinguishing feature of the less visible stocks is asymmetric diffusion of their information flows. A stock, however, could increase its visibility and broaden its investor base. When this occurs, the firm's cost of capital will decline, causing the market value of the firm to increase. This idea is first formalised in Merton's (1987) investor recognition hypothesis (IRH).

Recent empirical studies have found support for the IRH. In a seminal study, Gervais, Kaniel, and Mingelgrin (2001) find that there is a high-volume return premium

(HVRP) in the U.S., which can be attributed to the link between a stock's abnormal trading volume and its visibility. Kaniel, Li, and Starks (2005) further supports the IRH by documenting a persistent HVRP phenomenon in many international stock markets. The analysis of the New Zealand stock market as a whole by Kaniel et al. (2005) shows that New Zealand is among a number of developed markets that exhibit significant HVRP.

However, the latter cross-country study fails to consider the effect of firm size or price range on HVRP within a national market. Such considerations are especially important for the New Zealand market, given its unique features and regulations.[1] In addition, a more detailed investigation will help identify the underlying causes of and possible explanations for the HVRP phenomenon. These motivations form the basis of this paper. In this paper, we extend Kaniel et al.'s New Zealand data (from January 1990 to June 2001) to include two more years (from January 1990 to December 2003). Our empirical results on the market as a whole confirm Kaniel et al.'s finding that the HVRP exists in the New Zealand stock market. However, when we classify all the NZX-listed firms into three size categories, the HVRP vanishes in each size category. On the other hand, additional tests show that the HVRP exists only in penny stocks but not in other stocks.

One possible explanation for our findings is that penny stocks are among those "neglected" firms that are less liquid and less visible to investors. As noted by Kaniel et. al (2005), stocks are more likely to be "neglected" if they trade in a market dominated by a few large stocks. These "neglected" firms are expected to have less investor awareness (Merton (1987)). As a result, according to the investor recognition hypothesis, the firm's market value should increase if a stock enhances its visibility. Our result shows that penny stocks are less liquid than non-penny stocks, which provides some evidence that penny stocks are less frequently traded and less visible to investors. We argue that penny stocks become more visible after a high volume shock, and therefore induce HVRP.

The rest of this paper is organized as follows. Section 2 reviews key theoretical and empirical papers related to the investor recognition hypothesis. Section 3 discusses the data and sample period studied and briefly outlines the methodology used in Kaniel et al. (2005). Section 4 explains in detail the portfolio formation procedures that produce the HVRP results. Section 5 reports the empirical results before section 6 concludes.

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[1] For example, Bartholdy and Brown (1999) point out that the New Zealand stock market is composed of firms with extreme asset size differentials. In terms of its size, NZ makes up only 0.4% of world equity (Chin, Prevost, and Gottesman, 2002). Moreover, the top 10 companies represent 77% of the market, while the top 40 represent 95% of the market. All the remaining stocks represent only approximately 5% of the market. As a result, most of stocks in the New Zealand Stock Exchange (NZX) are thinly traded and relatively illiquid.

2. Literature Review

Pioneering work by Miller (1977) and Merton (1987) lays the foundation for the investor recognition hypothesis (IRH). Miller (1977) first contends that different investment needs for different individuals cause investors to vary in their evaluation of securities. The probability of a stock being included in an investor's portfolio depends first on its visibility and second on the investor's perception of the attractiveness of the stock. A stock's visibility may be linked to its price, publicity, and the core operations of the firm, including popularity of the firm's products and the firm's social image. High volume *per se* is not always associated with an increase in price. The high volume could be attributed to heavy (or short) selling by some investors (or speculators). However, if the volume does attract attention and therefore increase investor awareness of the stock, then some investors may decide to buy the stock and push up its price. Merton (1987) shows analytically that when a stock is more publicly recognized, its cost of capital will decrease. He also notes that neglected firms studied by Arbel, Carvell and Strebel (1983) are less visible to investors. According to Arbel et al. (1983), these neglected firms receive little or barely any coverage from professional analysts on a regular basis.

A number of studies have empirically investigated predictions implied by the investor recognition hypothesis. Irvin (2003) finds that market participants respond positively to the initiation of analyst coverage of a firm. This finding is consistent with the liquidity hypothesis, which predicts that increased analyst coverage improves liquidity. Chen, Noronha and Singal (2004) find a permanent increase in the stock price if a firm is added into the S&P 500 but no permanent decline for deleted firms. A similar study by Hyland and Swidler (2002) also shows that the addition of a stock to New Zealand's NZSE40 index results in a permanent increase in the stock price. They point out that the trading time series pattern is not related to the price pressure hypothesis because instead of a big jump in trading volume just before the addition of the stock in the index, volume is already high about six months before the event. On the other hand, because of the mechanical index listing rules, limited opportunity for index arbitrage, and low liquidity in the New Zealand stock market, they argue that the publicity of the stock should instead support Merton's attention (recognition) hypothesis. In their paper, higher prices are due to publicity but not related to extreme high or low volumes. Bushee and Miller (2005) find that, by hiring an investor relations firm, small and mid-cap companies can attract a wider following by investors and information intermediaries and improve their market valuation. Lehavy and Sloan (2006) find that contemporaneous stock returns are positively related to change in investor recognition and future stock returns are negatively related to changes in investor recognition.

Other studies in this research area use periods of unusual trading value to proxy for changes in visibility. Gervais et al. (2001) find that the prices of stocks undergoing extremely high (low) trading volume over a day or a week tend to rise (fall) over the next month. They argue that the (positive or negative) return premium is solely caused by the abnormal trading volume. This implies that abnormal trading volume thus contains information about the future direction of stock prices. Gervais et al. further establish the robustness of their results by empirically refuting other possible explanations. Specifically, the authors show that their HVRP results are not driven by: (1) the impact of trading volume on return autocorrelation, (2) the momentum effects documented by Jegadeesh and Titman (1993), (3) company announcements, (4) compensation for low liquidity, or (5) compensation for bearing excessive risk. They postulate that the volume-based premium can be attributed to changes in the visibility of the stocks and is consistent with Miller's IRH. A recent study by Kaniel, Li, and Starks (2005) also establishes the empirical link between the IRH, visibility, and the HVRP. They "*assume that visibility can change from an extreme volume shock and that as predicted by Merton's (1987) hypothesis, the price of the stock should change as a consequence, resulting in a high volume return premium*." Kaniel et al (2005) show that the magnitude of the HVRP is associated with market characteristics that are related to the importance of a stock's visibility. Their results also suggest that the HVRP is a persistent phenomenon among almost all international markets. However, due to the different macroeconomic, stock market, and demographic characteristics across international stock markets, Kaniel et al. (2005) argue the IRH can vary across markets. In Kaniel et al. (2005), the New Zealand stock market is among the G7 and other developed countries to show significant HVRP. The widely documented extreme size differential of the New Zealand stock market, however, suggests that a more vigorous analysis should differentiate stocks based on the size of their market capitalisation. The main contribution of this paper addresses this concern and seeks to identify the causes of the HVRP phenomenon in New Zealand established by Kaniel et al (2005). The current paper finds that only penny stocks experience HVRP. Next, we discuss the data and methodology used to obtain that finding.

3. Data and methodology

We collect daily stock price and trading volume of NZX-listed stocks from Datastream spanning from January 1990 to December 2003. There are a total of 178 companies that have trading history during this period. To ensure that each trading interval has enough stock data, stocks with less than one year of trading history on the NZX are excluded. The final sample has 161 companies, all of which are publicly traded in 2003.

The HVRP is a measure of the mean stock return due to extreme volume shocks. We employ Kaniel et al.'s (2005) methodology to measure this premium. Each trading interval has 70 days comprised of three different periods: the reference, formation, and testing periods. The first 49 days constitute the *reference* period, which is to provide a distribution of the trading volumes of each stock. Then there is a 1-day *formation* period, which is used to measure whether the stock experiences extreme volume shocks on that date compared to the previous 49 volume figures in the reference period. In each trading interval, we eliminate stocks for which less than 40 daily consecutive trading data are available.[2] We also eliminate stocks for which any data is missing.[3] The firms which experienced a merger or a delisting during, or one year prior to, the trading interval are also removed. There is an average of 51 stocks available, that experience normal, high and low volumes, across all trading intervals. It should be noted that there are relatively fewer stocks in the earlier periods. The remaining stocks are defined as having extreme trading volumes during the formation period if a stock's trading volume is among the top or bottom 20% of the volume distribution in the 49 days reference period. Each stock that satisfies this criterion is defined as a high- or low-volume stock. The rest of the stocks are classified as having normal trading volume in the formation period. The last 20 days of the interval are the *testing* period, which is used to measure the subsequent return. Gervais et al. (2001) focus on testing one-day, ten-day, and twenty-day returns after the formation date. In this study, we calculate portfolio returns of one, five, ten, fifteen, and twenty days in our testing period. This enables us to examine a wider spectrum of portfolio returns after extreme volume shocks. The (simple) returns of each stock are calculated as follows:

$$R_t = \left(\frac{P_t}{P_{Formation\ Day}} \right) - 1$$

where t represents the number of days after the formation day.

Similar to Kaniel et al. (2005), our next trading interval (70 days) begins one day after (the first day of?) the reference period of the previous trading interval so that the next testing period begins one day after the previous testing period. This splits the full sample period into 155 trading intervals. The advantage of this approach is to make

[2] By eliminating the interval during which trading frequency is less than 40 days, we can exclude the non-trading stocks in our sample. Since New Zealand stock market contains a lot of infrequently traded stocks, we allow for little non-trading because we do not want to lose too many observations in each interval. This procedure follows that used in Kaniel et al. (2005).

[3] If a stock is missing a price or trading volume during the trading interval, we simply exclude that stock from the trading interval.

full use of the sample data. Even though we have overlapped reference periods, the testing periods do not overlap.

4. Portfolio Formation

We form portfolios based on the stock's trading volume classification for that trading interval. We use two different portfolio formation procedures outlined below.

4.1 The Zero Investment Portfolio

A zero investment portfolio is formed by taking a long position for a total of one dollar in all the high-volume stocks, and a short position for a total of one dollar in all the low-volume stocks. Each stock in the high/low volume category is given equal weight. We adopt the subscript "*ijt*" to denote the trading interval (i = 1, …, 155), the stock j in that trading interval (j = 1, …, M_i), and the t-th day of the testing period, where M_i denotes the number of stocks available in the ith trading interval. R_{ijt} is defined as the *daily* holding return of stock j in trading interval i over the t-th day following the formation period. The cumulative buy and hold return of stock j in trading interval i over the t days following the formation period is computed as

$$R_{ijt} = \prod_{\tau=1}^{t}\left(1 + r_{ij\tau}\right) - 1$$

and the average return in interval i over the t-th day as

$$\overline{R}_{it} = \frac{\sum_{j=1}^{M_i} R_{ijt}}{M_i}$$

The testing period returns of the long and short positions at the end of each interval i are denoted as

$$\overline{R}_{iHt} = \frac{\sum_{j=1}^{M_i} R_{ijt}^{H}}{M_i^{H}} \quad \text{and} \quad \overline{R}_{iLt} = -\frac{\sum_{j=1}^{M_i} R_{ijt}^{L}}{M_i^{L}}$$

where M_i^H and M_i^L denote the number of long and short positions in the ith interval.

M_i^H and M_i^L must both be positive for a zero investment portfolio to be defined.

R_{ijt}^H (R_{ijt}^L) denotes the cumulative buy-and-hold return of stock j which experiences a

high (low) volume shock in the trading interval *i* over *t* days. The net return in interval *i* is the return from combining the two positions based on high and low volume:

$$NR_{it} = \overline{R}_{iHt} + \overline{R}_{iLt}$$

We expect the mean high (low) volume return $\overline{R}_{iH}$ ($\overline{R}_{iL}$) to be positive (negative). Thus, the emphasis will only be on the analysis of the net return from the combination of long and short positions.

4.2 The Reference Return Portfolio

The reference return portfolio requires that each dollar longed in the high-volume stock be offset by one dollar shorted in the size-adjusted reference return portfolio. Similarly, each dollar shorted in a low-volume stock is offset by the size-adjusted reference return portfolio so that the net investment remains zero. The size-adjusted reference return is R_{it} defined in section 4.1. Again, a reference return portfolio is left unbalanced for the test periods subsequent to the formation date.

The average *t*-day return for all the reference return portfolios constructed from high volume stocks is given by

$$\overline{R}_{tH} = \frac{\sum_{i=1}^{155}\sum_{j=1}^{M_i}\left(R_{ijt}^{H} - R_{it}\right)}{\sum_{i=1}^{155} M_i^{H}}$$

and the average *t*-day return for all the reference return portfolios constructed from low volume stocks is given by

$$\overline{R}_{tL} = \frac{\sum_{i=1}^{155}\sum_{j=1}^{M_i}\left(R_{it} - R_{ijt}^{L}\right)}{\sum_{i=1}^{155} M_i^{L}}$$

Finally, the average profit from the combination of long positions in the high volume reference return portfolios and short positions in the low reference return portfolios is defined as:

$$NR_t = \frac{\sum_{i=1}^{155}\left[\sum_{j=1}^{M_i}\left(R_{ijt}^{H} - R_{it}\right) + \sum_{j=1}^{M_i}\left(R_{it} - R_{ijt}^{L}\right)\right]}{\sum_{i=1}^{155}\left(M_i^{H} + M_i^{L}\right)}$$

5. Empirical results

In this section, we first show that the HVRP exists in the New Zealand stock market. We then show that the HVRP is independent of announcement effects. Most of the New Zealand firms are of small size. In particular, about forty percent of our sample firms are small firms which are together worth only one percent of the total market capitalization. We thus classify all firms into large, medium, and small firms. It is perhaps surprising to find that the HVRP actually vanishes in each of the size categories. On the other hand, when we classify all our sample firms into penny and non-penny stocks, we find that the HVRP exists in the penny stocks but not the non-penny stocks. Finally, we provide some evidence that penny stocks are generally more neglected than others.

5.1 HVRP exists in the New Zealand stock market

The results of the HVRP for all sample firms are presented in Table 1. Panel A shows the returns on zero investment portfolios while the reference investment portfolio returns are shown in Panel B. The mean number of high-volume shocks is 12 while that of low-volume shocks is 13 across all trading intervals. The mean number of stocks available across all trading intervals is 51. Both the zero investment portfolios and the reference return portfolios yield significantly positive net returns in all testing period horizons except for the 1-day period. Furthermore, most of the long positions of high-volume stocks in the reference return portfolios generate significantly positive returns, which indicate that stocks experiencing high-volume shocks subsequently generate positive abnormal returns. Short positions of low-volume stocks in the reference return portfolios also generate significantly positive returns in most of the cases. This indicates that stocks generate negative returns after low-volume shocks. The significantly positive returns after high- and low-volume shocks reinforce the existence of HVRP. Overall, these results reinforce the findings of Kaniel et al. (2005) that HVRPs exist in the New Zealand stock market.

Table 1 Mean returns of zero investment portfolio and reference return portfolio

The returns after high/low-volumes and the net return are defined in the portfolio formation section. *T*-statistics are shown in parentheses. For the cases where returns should not be compared to zero, NA indicates that the *t*-statistic is not applicable.

Panel A: Zero investment portfolio

	1	5	10	15	20
High	0.0010	0.0046	0.0099	0.0092	0.0127
	(NA)	(NA)	(NA)	(NA)	(NA)
Low	0.0009	0.0035	-0.0020	0.0000	-0.0034
	(NA)	(NA)	(NA)	(NA)	(NA)
NR	0.0019	0.0082	0.0079	0.0092	0.0092
	(1.8817)	(3.1691)**	(2.3924)*	(2.1007)*	(2.0982)*

Panel B: Reference return portfolio

	1	5	10	15	20
High	0.0010	0.0043	0.0046	0.0055	0.0050
	(1.7196)	(2.7834)**	(2.5367)*	(2.2188)*	(1.9794)*
Low	0.0009	0.00116	0.0032	0.0037	0.0043
	(1.8467)	(3.3409)**	(1.9664)*	(1.7729)	(1.9922)*
NR	0.0008	0.0037	0.0033	0.0040	0.0042
	(1.7871)	(3.1983)**	(2.2501)*	(1.9923)*	(2.1366)*

Note: * and ** denote significance at the 5% level and the 1% level respectively.

5.2 The HVRP is independent of announcement effects

A number of studies have documented the effects of firm announcements on trading volume and stock returns. Bamer and Cheon (1995) find that when earnings announcements are accompanied by large trading volume with small price changes, they tend to be followed by price increases. It is therefore possible that the HVRP is driven by firm announcements. In this study, we remove from each trading interval of our sample those stocks that had a dividend or an earnings announcement on either the day before, the day, or the day after the formation period. We consider the day preceding and following the formation period because some announcements may be recorded on the next day following the actual announcement date. The empirical results are displayed in Table 2. The results are similar to those before excluding firm announcements in Table 1. In the zero investment portfolios, the five-day, ten-day, fifteen-day, and twenty-day net returns are significantly positive at the 1% or 5% level. Similarly, in the reference return portfolios, the five-day, ten-day, and twenty-day net returns are significantly positive at the 1% or 5% level. These results indicate that firm announcements do not explain the HVRP in the New Zealand stock market.

Table 2 Mean returns of zero investment portfolio and reference return portfolio after controlling for firm announcements

The returns after high/low-volumes and the net return are defined in the portfolio formation section. T-statistics are shown in parentheses. For the cases where returns should not be compared to zero, NA indicates that the t-statistic is not applicable.

Panel A: Zero investment portfolio

	1	5	10	15	20
High	0.0010	0.0047	0.0099	0.0090	0.0126
	(NA)	(NA)	(NA)	(NA)	(NA)
Low	0.0009	0.0035	-0.0020	0.0000	-0.0034
	(NA)	(NA)	(NA)	(NA)	(NA)
NR	0.0019	0.0081	0.0078	0.0090	0.0092
	(1.8626)	(3.1604)**	(2.3799)*	(2.0388)*	(2.0837)*

Panel B: Reference return portfolio

	1	5	10	15	20
High	0.0010	0.0042	0.0046	0.0053	0.0050
	(1.6991)	(2.7651)**	(2.5216)*	(2.1415)**	(1.9572)**
Low	0.0009	0.0039	0.0032	0.0037	0.0043
	(1.8316)	(3.3462)**	(1.9552)	(1.7357)	(1.9824)*
NR	0.0008	0.0037	0.0033	0.0039	0.0042
	(1.7613)	(3.1898)**	(2.2296)*	(1.9348)	(2.1113)*

Note: *and ** denote significance at the 5% level and the 1% level respectively.

5.3 The HVRP vanishes in every size category

This section conducts an additional test to examine whether the above findings have been influenced by firm size. We classify all the sample firms into three categories by their market capitalization. We use a classification procedure that reflects the fact that the size distribution in the New Zealand stock market is skewed to large firms. In order to define appropriate size categories, we rank the market capitalization of all sample firms in descending order. A size break point is found in the list of ranked sample firms whenever there is a substantial decrease in size. We then classify each sample firm into the large, medium, or small category. The classification method results in the large, medium, and small firms comprising, on average, 90%, 9%, and 1% of the total market capitalization, respectively. This is summarized in Table 3, which also shows the average percentage of firms in each size category across the sample years.

Table 3 Average representation of the market by each size category

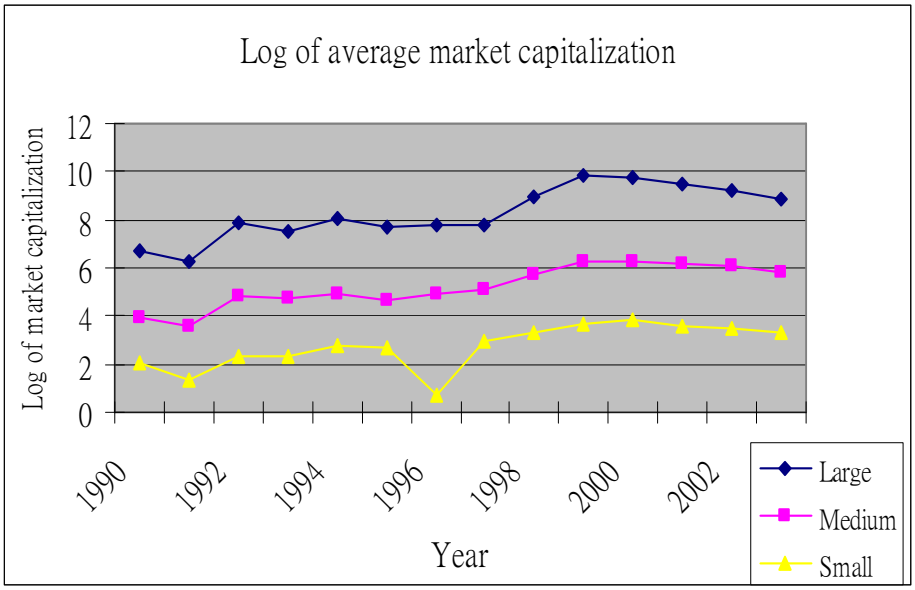
	Percentage of total market capitalization	Percentage of total number of firms
Large	90%	15%-20%
Medium	9%	30%-35%
Small	1%	40%-45%

Table 4 below shows the mean market capitalization of each size category across all sample years. The results indicate that the mean market capitalization of large firms is very large (relative to the other two groups) and is significantly different to the medium firms and small firms. We diagram the natural logarithm of the mean market capitalizations in Figure 1. The figure shows that the log of mean market capitalizations for the three size groups do not overlap, supporting that the classification is appropriate in the New Zealand stock market.

Table 4 Mean market capitalization of each size category in each year

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Large	796.8	536.6	2663.6	1914.5	3269.4	2176.0	2516.3	2517.7	7433.7	18231.0	17960.1	13339.6	9824.4	7282.4
Medium	49.9	35.6	131.1	118.2	136.5	105.9	140.0	168.2	319.3	547.6	529.8	496.5	441.2	344.5
Small	8.0	3.9	10.2	10.0	15.4	14.1	2.0	19.6	27.4	40.8	46.2	34.4	32.3	27.8

Figure 1 Logarithm of mean market capitalization



The mean stock price and mean trading volume for each size category are displayed in Table 5 below. The average price is $6.25 for large firms, $3.04 for medium firms and $1.54 for small firms. The mean trading volume is particularly high in large firms and smallest in small firms. On average, medium firms have the most number of stocks available across all trading intervals while large firms have the least. The average numbers of high-volume shocks for large, medium, and small firms are 3, 6, and 4, respectively. On the other hand, the average numbers of low-volume shocks for large, medium, and small firms are 2, 7, and 5, respectively. The small numbers of high- and low-volume shocks are due to the few observations available in the earlier sample periods.

Table 5 Mean price, volume and number of stocks available

	Mean price	Mean volume (thousand of shares)	Mean number of stocks available
Large firm	$6.2534	490.4838	11
Medium firm	$3.0414	133.3599	28
Small firm	$1.5447	41.3285	20

As for the full sample, a HVRP analysis is done on each of the three size groups. The results for large, medium and small firms are displayed in Tables 6, 7, and 8 in the Appendix. One consistent finding emerges from the size-based results. After controlling for firm size, we find that the HVRP *disappears* in each of the size

categories.[4]

5.4 HVRP exists only in penny stocks

Bowman and Iverson (1998) document that stock prices in the New Zealand stock market mainly lie between the range of $1 to $4 with prices below $1 not unusual. Price movements in low stock prices could yield high returns. In other words, small *absolute* price changes in low price stocks can be large changes in terms of their returns. It is also likely that these penny stocks attract less attention from investors and thereby become 'neglected'. In this section, we investigate the impact of penny stocks on the HVRP. Note that penny stocks are not necessarily stocks of small firms; there are quite a number of stocks in the medium firm-size category with prices below $1.00. Following Bowman and Iverson (1998), we split all sample stocks in the reference period into penny stocks (with mean stock price less than $1) and non-penny stocks (with mean stock price greater than or equal to $1). Table 9 and 10 report the HVRP results for non-penny stocks and penny stocks, respectively. There are approximately 38 stocks on average available for the non-penny stock group and 16 for the penny stock group across all trading intervals. On average, there are 8 high-volume and 9 low-volume shocks for the non-penny group, while the penny group has 4 high-volume and 4 low-volume shocks.

For non-penny stocks, all net returns on both zero investment portfolios and reference return portfolios are not statistically significant. For *penny* stocks, the net returns on the zero investment portfolios are significantly positive at the five-day, fifteen-day, and twenty-day test period returns. The net returns on the reference return portfolios are significantly positive at the five-day and fifteen-day test period returns; the returns after extreme volume shocks are significantly positive at the 5% level or better in three out of the five testing-period cases.

When we more closely compare each return figure in Table 9 with the corresponding figure in Table 10, we observe that the magnitudes of the returns after extreme volume shocks are generally higher for the *penny* stocks. This means that the response of penny stocks to volume shocks, in general, dominates the response of non-penny stocks to volume shocks.

[4] There is only one exception: the positive net return on medium firms' zero investment portfolios is significant in the five-day testing period. However, there is no evidence of HVRP for medium firms for two reasons. First, the HVRP for this size group lacks significance at all other testing-period horizons. Second, the net return on medium firms' reference return portfolios also lacks significance at all testing-period horizons, including the five-day horizon.

Table 9 Mean returns of zero investment portfolio and reference return portfolio for non penny stocks

The returns after high/low-volumes and the net return are defined in the portfolio formation section. T-statistics are shown in parentheses. For the cases where returns should not be compared to zero, NA indicates that the t-statistic is not applicable.

Panel A: Zero investment portfolio

	1	5	10	15	20
High	-0.0013	0.0028	0.0076	0.0042	0.0092
	(NA)	(NA)	(NA)	(NA)	(NA)
Low	0.0004	0.0014	-0.0017	0.0004	-0.0028
	(NA)	(NA)	(NA)	(NA)	(NA)
NR	-0.0009	0.0042	0.0058	0.0046	0.0065
	(-0.9068)	(1.5259)	(1.6562)	(1.0069)	(1.3313)

Panel B: Reference return portfolio

	1	5	10	15	20
High	-0.0007	0.0024	0.0029	0.0025	0.0033
	(-1.2929)	(1.5018)	(1.5474)	(1.0595)	(1.2374)
Low	-0.0002	0.0018	0.0030	0.0021	0.0032
	(-0.3771)	(1.3167)	(1.5349)	(0.8227)	(1.2084)
NR	-0.0003	0.0017	0.0022	0.0019	0.0025
	(-0.8328)	(1.4699)	(1.4104)	(0.9762)	(1.2294)

Note: * and ** denote significance at the 5% level and the 1% level respectively.

Table 10 Mean returns of zero investment portfolio and reference return portfolio for *penny* stocks

The returns after high/low-volumes and the net return are defined in the portfolio formation section. T-statistics are shown in parentheses. For the cases where returns should not be compared to zero, NA indicates that the t-statistic is not applicable.

Panel A: Zero investment portfolio

	1	5	10	15	20
High	0.0069	0.0117	0.0150	0.0185	0.0146
	(NA)	(NA)	(NA)	(NA)	(NA)
Low	0.0013	0.0035	-0.0019	0.0026	0.0050
	(NA)	(NA)	(NA)	(NA)	(NA)
NR	0.0082	0.0183	0.0131	0.0211	0.0196
	(1.8553)	(3.2482)**	(1.8951)	(2.6330)**	(2.1813)*

Panel B: Reference return portfolio

	1	5	10	15	20
High	0.0051	0.0088	0.0076	0.0117	0.0098
	(1.9366)	(2.8593)**	(2.0058)*	(2.4338)*	(1.8625)
Low	0.0032	0.0095	0.0055	0.0095	0.0098
	(1.6222)	(3.3164)*	(1.5590)	(2.5355)**	(2.3299)*
NR	0.0035	0.0077	0.0054	0.0087	0.0078
	(1.7036)	(3.0030)**	(1.7705)	(2.4827)*	(1.9471)

Note: * and ** denote significance at the 5% level and the 1% level respectively.

5.5 Penny stocks are 'neglected'

In general, a less visible stock can benefit considerably from a high volume shock (Kaniel et al. (2005)). An abnormally high volume can cause the investing public to notice the otherwise less visible stock. The heightened investor awareness will therefore induce HVRP. As a result, we argue that the above findings for penny stocks can be attributed to the argument that penny stocks are more "neglected" than others and thereby respond more strongly to extreme volume shocks.

One way to validate this neglect argument is to show that penny stocks are less liquid. We acknowledge that a more direct test of neglect should focus on analyst coverage. However, obtaining information on analyst coverage is costly in the New Zealand market. We therefore use the liquidity of a stock to proxy for the level of neglect experienced by the stock. The use of this measure is justified by the two-way relationship between liquidity and analyst coverage established by Brennan and Tamarowski (2000). First, liquidity is an important consideration to analysts when making equity investment decisions. Second, the amount of analyst coverage negatively affects information asymmetry and thus has a positive effect on the liquidity.

We follow Lesmond, Ogden and Trzcinka (1999) and use the proportion of daily zero returns within a month to measure liquidity of a stock.[5] Lesmond et al. (1999) argue that if the value of an information signal is insufficient to outweigh the transaction cost, market participants will choose not to trade, resulting in an observed zero return. The advantage of using this liquidity measure is that it is easy to obtain and yet highly correlated with more traditional measures of liquidity such as bid-ask spread and turnover (Bekaert, Harvey and Lundblad (2003)).

Since our 49-day reference period is overlapped, it is thus difficult for us to calculate our liquidity measure using the reference period across time. Therefore, the proportion of zero returns is calculated each month. Our purpose is to determine whether penny stocks are on average less liquid than non-penny stocks. We calculate the monthly proportion of zero returns for each stock. They are averaged across stocks in each month, and then average across time. The results are summarized in Table 11. Note that penny stocks make up more than one third of the New Zealand stock market. As expected, proportion of zero returns is 71% for penny stocks and 44% for non-penny stocks. This indicates that penny stocks are less liquid than non-penny stocks and supports our neglect argument. The result of our liquidity analysis is thus consistent with the finding by Kaniel et al. (2005) that stocks are more likely to be 'neglected' if they trade in a market dominated by a few large stocks.

Table 11 Average proportion of zero returns for penny and non-penny stocks.

	Penny Stocks	Non-Penny Stocks
Average Zero	0.71	0.44
Observations	35	55

In short, the HVRP phenomenon in New Zealand is driven by penny stocks that are more neglected and thus react more aggressively to volume shocks. Specifically, since penny stocks in NZ have low liquidity and limited visibility to investors, a high volume shock would attract investors' attention and generate greater demand for the affected penny stocks. Other more visible (non-penny) stocks are less sensitive to high volume shocks. The findings of this paper imply that the investor recognition hypothesis in the New Zealand stock market applies only to penny stocks.

[5] Proportion of zero returns is defined as number of zero returns within a month divided by number of trading days in that month.

6. Conclusion

This study more closely explores the investor recognition hypothesis in the New Zealand stock market. In their cross-country study, Kaniel et al. (2005) find that the HVRP exists in the overall New Zealand stock market. However, the skewed size distribution of New Zealand stocks warrants a more vigorous analysis of the HVRP phenomenon based on size. In this paper, we find that the HVRP actually disappears in each of the three size groups. We then try a different classification criterion related to size: the magnitude of stock price. We classify our sample firms into two groups, penny stock group and non-penny stock group. Our empirical results reveal that the HVRP is never significant for non-penny stocks. On the other hand, the HVRP is significantly positive for penny stocks in most of the testing period horizons. This paper provides empirical evidence that high volume shocks induce penny stocks to generate large net returns. We further show that penny stocks are less liquid than non-penny stocks, indicating that penny stocks are generally less visible to investors in New Zealand. As a result, penny stocks can increase their visibility more considerably from volume shocks and induce more significant high volume return premiums. This leads us to conclude that Merton's (1987) investor recognition hypothesis applies only to penny stocks in the New Zealand stock market.

Appendix

Table 6 Mean returns of zero investment portfolios and reference return portfolios for large size firms

The returns after high/low-volumes and the net return are defined in the portfolio formation section. T-statistics are shown in parentheses. For the cases where returns should not be compared to zero, NA indicates that the t-statistic is not applicable.

Panel A: Zero investment portfolio

	1	5	10	15	20
High	-0.0005	0.0019	0.0051	0.0019	0.0083
	NA	NA	NA	NA	NA
Low	0.0001	0.0021	-0.0035	0.0002	-0.0006
	NA	NA	NA	NA	NA
NR	-0.0004	0.0040	0.0016	0.0021	0.0076
	(-0.3501)	(1.2101)	(0.3893)	(0.4006)	(1.3561)

Panel B: Reference return portfolio

	1	5	10	15	20
High	-0.0002	0.0027	0.0023	0.0023	0.0044
	(-0.2783)	(1.5549)	(1.0900)	(0.8188)	(1.5306)
Low	-0.0003	0.0013	-0.0007	-0.0002	0.0032
	(-0.3725)	(0.7461)	(-0.2989)	(-0.0763)	(1.0348)
NR	-0.0002	0.0020	0.0010	0.0015	0.0037
	(-0.3614)	(1.3412)	(0.5759)	(0.6508)	(1.5082)

Note: * and ** denote significance at the 5% level and the 1% level respectively.

Table 7 Mean returns of zero investment portfolios and reference return portfolios for medium size firms

The returns after high/low-volumes and the net return are defined in the portfolio formation section. T-statistics are shown in parentheses. For the cases where returns should not be compared to zero, NA indicates that t-statistic is not applicable.

Panel A: Zero investment portfolio

	1	5	10	15	20
High	-0.0007	0.0042	0.0071	0.0065	0.0080
	(NA)	(NA)	(NA)	(NA)	(NA)
Low	0.0012	0.0018	-0.0005	-0.0015	-0.0012
	(NA)	(NA)	(NA)	(NA)	(NA)
NR	0.0004	0.0060	0.0067	0.0050	0.0068
	(0.3053)	(2.0824)*	(1.6352)	(1.0014)	(1.2746)

Panel B: Reference return portfolio

	1	5	10	15	20
High	0.0000	0.0028	0.0033	0.0023	0.0022
	(-0.0522)	(1.8143)	(1.5024)	(0.8665)	(0.7581)
Low	0.0005	0.0032	0.0033	0.0026	0.0046
	(0.7056)	(2.0152)*	(1.5573)	(1.0279)	(1.6448)
NR	0.0002	0.0023	0.0027	0.0023	0.0033
	(0.2743)	(1.9221)	(1.5084)	(1.0258)	(1.4131)

Note: * and ** denote significance at the 5% level and the 1% level respectively.

Table 8 Mean returns of zero investment portfolios and reference return portfolios form small size firms

The returns after high/low-volumes and the net return are defined in the portfolio formation section. T-statistics are shown in parentheses. For the cases where returns should not be compared to zero, NA indicates that t-statistic is not applicable.

Panel A: Zero investment portfolio

	1	5	10	15	20
High	0.0052	0.0093	0.0158	0.0131	0.0141
	(NA)	(NA)	(NA)	(NA)	(NA)
Low	-0.0017	-0.0017	-0.0083	-0.0047	-0.0096
	(NA)	(NA)	(NA)	(NA)	(NA)
NR	0.0035	0.0076	0.0075	0.0084	0.0045
	(0.9277)	(1.3129	(0.9948)	(1.0584)	(0.4598)

Panel B: Reference return portfolio

	1	5	10	15	20
High	0.0025	0.0050	0.0061	0.0057	0.0031
	(1.4861)	(1.6784)	(1.4320)	(1.2294)	(0.5273)
Low	0.0010	0.0026	0.0014	0.0028	0.0014
	(0.4100)	(0.8057)	(0.3542)	(0.730)	(0.3229)
NR	0.0020	0.0035	0.0030	0.0029	0.0008
	(1.2650)	(1.4187)	(0.9315)	(0.8242)	(0.1852)

Note: * and ** denote significance at the 5% level and the 1% level respectively.

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