A Factor Analysis of Investment Behaviour for Small Investors in the Hong Kong Stock Market

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Abstract. Hon (2012) found that small investors were overconfident and bought more stock during the buoyant market in the Hong Kong stock market. Small investors also exhibited herd behaviour. In this paper we extend his paper to identify and analyse the important factors that capture the behaviour of small investors in the Hong Kong stock market,especially during the financial crisis.Exploratory factor analysis is employed to analyse the data, we found that monitor investments is the second important factor and reference group is the most important factor..

Keywords. Factor analysis, Small investors, Stock market, Hong Kong.

JEL. E22, G02, G10.

1. Introduction

Hong Kong is a small open economy. It is common to find that some small investors have done less-rational things in the financial markets, especially when investing in stocks. The primary objective is to identify and analyse the important factors that capture the behaviour of small investors inthe Hong Kong stock market. It is important to find out whether their investment behaviour can be explained by some underlying factors grounded in the behavioural approach to the study of financial markets. We collected our data from 1,199 respondents via a survey questionnaire. Hon (2012) concluded that small investors were overconfident and bought more stock during the buoyant market in the Hong Kong stock market. Small investors also exhibited herd behaviour.Exploratory factor analysis was employed to analyse the data. In doing so, we hope to extend Hon's paper and contribute to the study of behavioural finance in the context of an Asian financial centre, namely Hong Kong.

This paper is organised as follows: Section 2 reviews the related literature; Section 3 explains the methodology of the present study; Section 4reports the research findings; and Section 5 provides the conclusion.

2. Literature Review

Although many personal and situational factors may influence the behaviour of small investors in the stock market, research on this topic is sparse. Previous studies found that interpersonal influence (Hoffmann & Broekhuizen, 2009), knowledge (Wang, 2009), and some other personal factors such as gender and personality traits (Durand et al., 2008) are crucial in explaining investment behavior. However, it is important to explore the psychological processes (such as perception, attitudes, learning, and motivation) that affect individual's decision

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regarding investment. For example, one's gender and educational level (i.e., individual factors) may affect his or her knowledge and orientation in investment, which then influences the risk perception, and finally his or her investment behaviour. Graham et al. (2009) noted that male investors, and investors with larger portfolios or more education, are more likely to perceive themselves as competent as are female investors, and investors with smaller portfolios or less education. Hoffmann & Post (2012) found that past returns positively impact investors' return expectations and risk tolerance, and negatively impact their risk perception. Besides, Korniotis & Kumar (2011) suggested that older peoplemake better investment choices as they gain more investmentknowledge and experience, or whether their investment skilldeteriorates with age is largely due to the adverse effects of cognitiveaging.

Obviously, the notion of risk tolerance is highly important for investor's assets allocations. The determinants of risk tolerance are central to the study of behavioural finance. Portfolio theory postulates that risk tolerance is a salient factor in portfolio construction and asset allocation. Risk tolerance, reflecting a person's attitude towards taking on risk, is a complex psychological concept. Jackson et al. (1972) contended that risk tolerance has four dimensions: financial, physical, social, and ethical. Hoffmann et al. (2011) showed how an investor's perceptions change, drive trading and risk-taking behaviour, and impact investment performance during the financial crisis of 2007-2009. They noted that revisions in return expectations and risk tolerance are positively, and revisions in risk perceptions are negatively, related to overall market developments. Successful investors had higher return expectations and lower risk tolerance, which led them to trade less, take less risk, and have lower buy-sell ratios. Hallahan et al. (2004) found that people's self-assessed risk tolerance and ProQuest risk tolerance score (RTS) generally accord, and there is considerable variation with a tendency for respondents to underestimate their risk tolerance. Wang & Hanna (1997) showed that risk tolerance increases with age when other variables have been controlled.

As argued by Shefrin (2000), the financial community ignores the psychology of investing at its own peril. Beyond greed and fear illuminate behavioural finance for today's investors. Behavioural finance can help practitioners to recognize and avoid bias and error in their decisions, as well as to modify and improve their overall investment strategies.Tversky & Kahneman (1974) defined availability as the situation which people assess the frequency or probability of an event by the ease with which instances can be brought to mind. Generally speaking, availability is the degree to which information is readily available. Availability bias exists when the investors wrongly weight the importance or relies upon available information for decision making without examining other alternatives (Sewell, 2010). Singh (2012) pointed out that individual investors can benefit by increasing awareness of the various human biases and the high costs they impose on their portfolio. Law (2010) argued that traditional risk disclosure requirements, known as financial risk disclosure, cannot sufficiently protect retail investors from cognitive and psychological biases. Kannadhasan (2006) reported that an optimum investment plays an active role and is a significant consideration. There is suggestive evidence that the experience of the investor has an explanatory role in this regard with less experienced investors being prone to extrapolation (i.e., representativeness), while more experienced investors commit the gambler fallacy, which is misconception of chance. Tversky & Kahneman (1971) defined gambler's fallacy as a misconception of the fairness of the law of chance. Under gambler's fallacy, people apply small samples as well as to large samples.

3. Data and Method

The data for the present study were collected from small investors in Hong Kong through a survey questionnaire. The main purpose of the survey is to collect their opinions, investment behaviour, and financial decision-making behaviour in the stock market. The survey was conducted between October and November 2008. The snowball method was adopted to select individuals aged 18 or above in Hong Kong population. A group of undergraduate students helped to distribute 1,200 questionnaires to the respondents. Finally, there were 1,199 selected respondents who completed and returned the questionnaires and this represents a response rate of 99.92 per cent.Before we begin using the survey dataset for factor analysis, we need to ensure the survey results are reliable enough. According to Carmines & Zeller (1987), reliability focuses on the extent to which the empirical indicator provides consistent results across repeated measurements. In testing the applicability of survey results, we used the Cronbach alpha (Cronbach, 1947; Cronbach & Shavelson, 2004) to test the reliability.Also, we use the coefficient of variation for comparing the reliability and precision of the results of our survey (Bruton, 2000) which are subject to sample error and non-sampling error. It should be noted that the measure used to assess the statistical significance of the item was the coefficient of variation (CV), which expresses the ratio of the standard error to the arithmetic mean $C.V. = \dfrac{S_{\overline{X}}}{\left|\overline{X}\right|}$ .The CVs for each of questionnaire items have been shown in the table 1. Taking a look at these CVs, we can find the maximum and minimum value is 1.91% and 0.99% respectively with mean 2.73%. Accordingly, it was considered the consensus had been achieved when the level of item was on the statistically significant (that is $C.V. \leq 5\%$)

Factor analysis is employed to identify the key factors that affect the behaviour of small investors in the Hong Kong stock market. We make the factor structure more interpretable. The initial extracted factor matrix must be rotated before the final factor solution is achieved. Bartlett's test of sphericity and Kaiser-Meyer-Olkin measure of sampling adequacy are both tests that can be used to determine the factorability of the matrix as a whole. If Bartlett's test of sphericity is large and significant and the Kaiser-Meyer-Olkin measure is greater than 0.6, then factorability is assumed. If the sums of squares of the loadings on the extracted factors are no longer dropping but are remaining at a low and rather uniform level, factor extraction may be reasonably terminated. Cattell's (1966) Scree test is based on this principle. SPSS use a default option of extracting all principal factors with eigenvalues of 1.0 or more (i.e., the Kaiser-Guttman rule). The main thing to consider in deciding when to stop factoring is that it is better to err on the side of extracting too many factors rather than too few. One of the most commonly used is Cronbach'scoefficient α, which is based on the average correlation of items within a reliability test if the items are standardised. Cronbach'scoefficient α can be interpreted as a correlation coefficient; it ranges in value from 0 to 1. However, content validity refers to the representativeness and comprehensiveness of the items used to create the scale. It is assessed by examining the process through which the scale items are generated (Straub 1989; Woobock & Kim 2002).In this research, the definitions of behavioural finance were initially proposed based on reviews of Tversky & Kahneman (1971, 1974). Previous studies on behavioural finance and other disciplines were comprehensively reviewed to develop the measurement items. On the other hand, construct validity examines the extent to which a scale measures a theoretical variable of interest. There are many different aspects of construct validity that have been proposed in psychometric literature

(Bagozzi et al. 1991; Straub 1989). To test construct validity, factor analysis with varimax rotation were performed. For convergent validity, the corrected item-to total correlation (that is, the correction of each item to the sum of the remaining items) is appropriate.

4. Results

The coefficient of variation (CV) of the estimates of the main items in the survey questionnaire and the profile of the respondents is reported in Table 1.

Table 1: *The coefficient of variation (CV) of the estimates of the main items in the survey questionnaire*

Items	No.	% of total
1. When making investment decisions *today*, which of the following factors do you consider most important when making investments? Choose one alternative: (C.V = 1.91%)		
Information from the company as a basis for a fundamental analysis.	303	25.3
Recommendations, advice and forecasts from professional investors.	221	18.4
The overall past performance of the market seen from a historical perspective.	301	25.1
Information from newspapers / TV.	113	9.4
Information from the Internet.	47	3.9
Discussion with personal friends.	85	7.1
Information from colleagues at work.	30	2.5
Own intuition of future performance.	99	8.3
2. When you made investment decisions *during* the period from January 2006 to the end of October 2007, which of the following factors did you consider most important when making decision. Choose one alternative: (C.V. = 1.82%)		
Information from the company as a basis for a fundamental analysis.	242	20.2
Recommendations, advice and forecasts from professional investors.	265	22.1
The overall past performance of the market seen from a historical perspective.	287	23.9
Information from newspapers / TV.	125	10.4
Information from the Internet.	58	4.8
Discussion with personal friends.	89	7.4
Information from colleagues at work.	38	3.2
Own intuition of future performance.	95	7.9
3. Do you monitor your investments with a short-term investment horizon more often today compared with the period before the market decline at the end of October 2007. Choose one alternative: (C.V. = 1.34%)		
Yes	413	34.4
No	222	18.5
The same	448	37.4
Cannot say	116	9.7
4. Do you monitor your investments with a long-term investment horizon more often today compared with period before the market decline at the end of October 2007. Choose one alternative: (C.V. =1.26%)		
Yes	383	31.9
No	152	12.7

The same	566	47.2
Cannot say	96	8.0
5. Please choose your relevant age group: (C.V. = 1.42%)		
18 - 25 years old	397	33.1
26 – 35 years old	297	24.8
36 – 50 years old	332	27.7
51 – 65 years old	148	12.3
over 65 years old	25	2.1
6. Your average monthly income (including salaries, interest, rent and other earnings): (C.V. = 1.67%)		
Below HK$5,000	265	22.1
HK$5,000 -HK$9,999	226	18.8
HK$10,000 - HK$14,999	268	22.4
HK$15,000 - HK$19,999	193	16.1
HK$20,000 - HK$24,999	117	9.8
HK$25,000 - HK$29,999	46	3.8
HK$30,000 - HK$49,999	52	4.3
HK$50,000 or above	32	2.7
7. During the increases in equity prices from January 2006 up to the end of October 2007, did you at any point in time think that you could forecast the future market development? (C.V. = 1.09%)		
Yes	336	28.0
No	490	40.9
Cannot say	369	30.8
8. During the increases in equity prices from January 2006 up to the end of October 2007, how did you react to announcements and other information from companies? Choose one alternative: (C.V. = 1.07%)		
I made changes in my portfolio after the first news announcements	182	15.2
I made changes in my portfolio after a number of consequent news announcements that pointed into the same direction	465	38.8
I was not concerned about news announcements	393	32.2
I cannot say	158	13.2
9. What do you think was the most important contributing factor to the *decline* in the market from the end of October 2007 up until today? Choose one alternative: (C.V. = 1.10%)		
The news stories in the media.	120	10.0
The forecasts of analysts.	95	7.9
Loss of confidence among investors in the stock market.	391	32.6
Earnings and profitability of the listed companies.	214	17.8
Herd behavior, i.e. small investors following the majority.	294	24.5
10. According to you, what is generally the reason for your less successful investments? Choose one alternative: (C.V. = 0.99%)		
Incorrect recommendations or advice from broker /analyst/ banker etc.	151	12.6
Incorrect recommendations or advice from other sources	161	13.4
The market has, in general, performed poorly	460	38.4
Own errors	404	33.7
Others (please specify):_____	22	1.8

The majority of the respondents were under the age of 50 (85.6%), and only 14.4% were aged 51 or above. The median income was $12,034. 37.4% of the respondents monitored their investments with a short-term investment horizon the

same today compared with the period before the market decline at the end of October 2007.Also, 47.2% of the respondents monitored their investments with a long-term investments horizon the same today compared with the period before the market decline at the end of October 2007. These group may have superiority in strategy formulation in decision making than those who responded "Yes". These groups of small investors were overconfident.In view of the above demographic profile of the respondents, we believe that they are representative of small investors in Hong Kong.

Table 2: *Descriptive statistics*

	Item name	Mean	Standard error of mean	Standard deviation	t	d.f.	Sig. (two-tailed)
1	Reference group affects investment decision today	3.2085	0.06132	2.12346	52.320	1198	0.000
2	Reference group affected past investment decision	3.3219	0.06045	2.09334	54.949	1198	0.000
3	Monitor short-term investments	2.2227	0.02968	1.02780	74.882	1198	0.000
4	Monitor long-term investments	2.3133	0.02914	1.00813	79.389	1196	0.000
5	Age	2.2552	0.03197	1.10693	70.547	1198	0.000
6	Personal income	3.1476	0.05255	1.81968	59.896	1198	0.000
7	Forecasting the future market development	2.0276	0.02221	0.76791	91.276	1194	0.000
8	Announcements from companies	2.4399	0.02608	0.90260	93.564	1197	0.000
9	Factor for bear market	3.4192	0.03777	1.26079	90.516	1113	0.000
10	Reason for investment failure	2.9875	0.02960	1.02468	100.913	1197	0.000

The importance of various items on the behaviour of small investors when they invested on stock market is presented in Table 2. All the items are statistically significant with high mean values. To identify the underlying dimensions of the items, which are perceived to be important by the respondents, the 10 items were then factor analysed. Initial visual assessment of the correlation matrix indicated considerable degree of inter-factor correlation (see Table 3). In addition, from the factor correlation matrix, the Barlett test of Sphericity ($\rho < 0.000$) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy index (with a value of 0.546) confirm the appropriateness of the data for exploratory factor analysis.

Table 3: *Factor correlation matrix*

Item	1	2	3	4	5	6	7	8	9	10
1	1.000									
2	0.615**	1.000								
3	0.067*	0.035	1.000							
4	0.045	0.045	0.444**	1.000						
5	0.062*	0.057*	-0.014	-0.047	1.000					
6	-0.043	-0.020	-0.060*	-0.036	0.315**	1.000				
7	-0.002	0.022	0.104**	0.081**	0.002	-0.089**	1.000			
8	0.120**	0.092**	0.257**	0.195**	-0.023	-0.085**	0.206**	1.000		
9	-0.009	0.012	-0.025	0.049	-0.031	0.049	0.023	-0.020	1.000	
10	0.032	0.054*	0.055*	0.087**	-0.066*	0.058*	0.071**	0.059*	0.021	1.000

Notes: *Correlation is significant at the 0.05 level (one-tailed) and **Correlation is significant at the 0.01 level (one-tailed) Extraction method: principal component analysis, Rotation method: Varimax with Kariser Normalization, Kaiser-Meyer-Olkin (KMO) index: 0.546, Bartlett's test of Sphericity: $\rho<0.000$. Item name (see also Table3) 1.Reference group affects investment decision today, 2. Reference group affected past investment decision, 3.Monitor short-term investments, 4. Monitor long-term investments, 5.Age, 6. Personal income, 7. Forecasting the future market development, 8. Announcements from companies, 9. Factor for bear market, 10.Reason for investment failure

Given that our aim was to identify the minimum number of factors that would account for the maximum portion of variance of original items, the principal component analysis was selected (Nunnally, 1978) to reduce the number of factors with an eigenvalue greater than 1. A cumulative percentage of variance explained being greater than 50% is the criteria used in determining the number of factors. On the basis of the criteria, five factors were extracted (see Table 4).

Table 4: *Principal component analysis*

Item	Item name	Commu nality	Factor (Compo nent)	Eigen value	Per cent of variance	Cumulat ive per cent
1	Reference group affects investment decision today	0.813	1	1.877	18.768	18.768
2	Reference group affected past investment decision	0.811	2	1.545	15.451	34.219
3	Monitor short-term investments	0.716	3	1.268	12.678	46.897
4	Monitor long-term investments	0.704	4	1.052	10.520	57.417
5	Age	0.720	5	1.013	10.130	67.547
6	Personal income	0.700				
7	Forecasting the future market development	0.786				
8	Announcements from companies	0.513				
9	Factor for bear market	0.534				
10	Reason for investment failure	0.459				

The five factors, collectively, accounted for a satisfactory 67.547% of the variance. Communality values in between 1.0 and 0 indicate partial overlapping between the items and the factors in what they measure. Furthermore, the communality column, provides further evidence of the overall significance, albeit, moderate, of the solution. The underlying rationale for the Scree test is based on the fact that within a set of items, a limited number of factors are measured more precisely than the others. By graphing the eigenvalues, we found that the smaller factors form a straight line sloping downward. The dominant factors will fall above the line. Figure 1 demonstrates a five-factor solution is obtained.
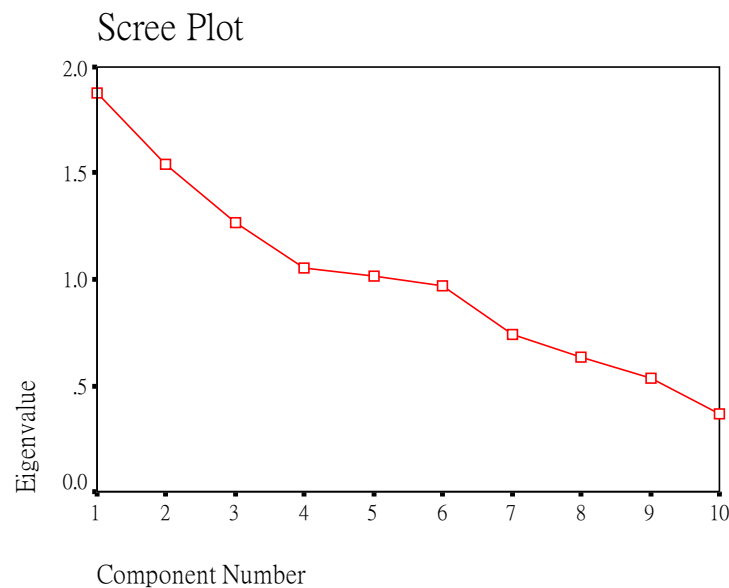

Figure 1: Scree plot

Table 5: *Varimax-rotated principal component loadings*

Item	A	B	C	D	E	Item name	Factor
			Factor				
1	0.900					Reference group affects investment decision today	A
2	0.898					Reference group affected past investment decision	A
3		0.836				Monitor short-term investments	B
4		0.828				Monitor long-term investments	B
5			0.817			Age	C
6			0.799			Personal income	C
7				0.877		Forecasting the future market development	D
8				0.594		Announcements from companies	D
9					0.722	Factor for bear market	E
10					0.651	Reason for investment failure	E

Having established that the analysis has provided a stable solution, examination of the varimax-rotated principal component loading was performed (see Table 5). The cumulative factors revealed that the first factor accounts for 18.768% of the variance. The second factor accounts for 34.219% of the variance. The third factor accounts for 46.897% of the variance. The fourth factor accounts for 57.417% of the variance. Finally, the fifth factor accounts for 67.547% of the variance. After the rotation, there are no negative loadings on any consequence on factor A, factor B, factor C, factor D or factor E. We found five factors affecting the behaviour of small investors in the Hong Kongstock marketas follows: factor A might be interpreted as reference groupwhich includescommentators' recommendations from newspapers/TV/magazines, relatives/friends, Internet, investment consultants, and companies' annual reports; factor B as monitor investmentswhich includesmonitor short-term and long-term investments;factor C as personal background which includesage, personal income; factor D as reaction to announcementswhich includes announcements and other information from companies, forecasting the future market developmentand factor E as cognitive style which includesfactor for bear market and reason for investment failure.The specific name given to each factor is designed to reflect an item or notion that conceptually relates to the rest of the items under a particular factor.

Table 6: *Internal consistency and related decisions of first structure*

Factors and items	Corrected item-total correlation	α value	Decision
Factor A (Reference Group)			
Reference group affects investment decision today	0.6155	0.7619	Retained
Reference group affected past investment decision	0.6155		
Factor B (Monitor Investments)			
Monitor short-term investments	0.4436	0.6145	Retained
Monitor long-term investments	0.4436		
Factor C (Personal Background)			
Age	0.3149	0.4370	Eliminated
Personal income	0.3149		
Factor D (Reaction to announcements)			
Forecasting the future market development	0.2060	0.3380	Eliminated
Announcements from companies	0.2060		
Factor E (Cognitive Style)			
Factor for bear market	0.0214	0.0410	Eliminated
Reason for investment failure	0.0214		

The reliability test is reported in Table 6. At this point only initial of internal reliability of the expected factors was performed in the form of Cronbach's coefficient α. For the purposes of this study, the cut-off value adopted was 0.5 (Nunnally, 1978) and the acceptable benchmark level of item-to-total correlation was set above 0.3. Corrected item-total correlation gives the Pearson correlation coefficient between the score on the individual item and the sum of score on the remaining items. Following the decision relating to the internal reliability, the factors were re-specified. This was undertaken to further reduce the number of factors. The internal reliability of the first structure was tested and the decision results provide evidence as to the weakness of the structure since two factors (factor A and B) exceeded the adopted criteria. It is found that factor A contains two items and relates to "reference group". Factor B is made up of two items and refers to "monitor investments". The derived scales appear to possess moderate to weak internal consistency. So, we eliminated among factors C, D and E (see Table 7).

Table 7: *Internal consistency of final revised structure*

Items	Number of item	Corrected item-total correlation	α value
Factor A (Reference Group)			
Reference group affects investment decision today	2	0.6155	0.7619
Reference group affected past investment decision		0.6155	
Factor B (Monitor Investments)			
Monitor short-term investments	2	0.4436	0.6145
Monitor long-term investments		0.4436	

To examine possible differences in the perceived importance of five factors, our analyses indicate that out of four criteria (i.e., rotated principal component loadings, scree test, KMO and Bartlett's test, reliability test) examined, only two factors (reference group and monitor investments) are significant. Based on these results, monitor investmentsis the second important factor and reference group is the most important factor.

5. Conclusion

The primary objective is to identify and analyse the important factors that capture the behaviour of small investors in the Hong Kong stock market. Using factor analysis, we identify five factors that capture the behaviour of small investorsin the Hong Kong stock market. The factors are reference group, monitor investments, personal background, reaction to announcements and cognitive style. The factor of reference group includes commentators' recommendations from newspapers/TV/magazines, relatives/friends, Internet, investment consultants, companies' annual reports; the factor of monitor investments includes monitor short-term and long-term investments; the factor of personal background includes age and personal income; the factor of reaction to announcements includes announcements and other information from companies, forecasting the future market development and the factor of cognitive style includes factor for bear market and reason for investment failure.In order to examine possible differences in the perceived importance of the five factors, our analysis indicate that out of four criteria (including rotated principal component loadings, scree test, KMO and

Bartlett's test, and reliability test) examined, only two factors (i.e., reference group,monitor investments) stand out to be significant. Accordingly, it can be concluded that monitor investmentsis the second important factor and reference group is the most important factor

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