

Does individual heterogeneity shape retail investor behaviour?

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Abstract

Purpose – The purpose of this paper is to survey retail investors to study the determinants of their investment behaviour and show that individual heterogeneity and financial factors such as gender, age, educational status, income, and investment levels determine their trading behaviour across three domains; however, features such as marital status and occupation do not play any significant role in shaping their trading behaviour.

Design/methodology/approach – Structured surveys are conducted on retail and small investors using the brokerage services of a firm. Data collected from primary methods are used for statistical analysis in ANOVA and multiple regression frameworks.

Findings – The authors also report that retail investors' self-perceived confidence as a function of both expected and unexpected changes in the market and personal factors largely determines trading behaviour of retail investors and that self-perceived confidence level and self-reported portfolio size are positively associated implying that (over-)confident retail investors tend to believe that their investment skills being superior are bound to perform better and thus they typically hold larger than average investment portfolios.

Practical implications – These findings are significant because research on cross-sectional variance of individual investment behaviour explains how investor heterogeneity plays a critical role in investment and asset allocation decisions. Investors, researchers, and practitioners would use the results for financial decision making specifically related to personal finance, behavioural portfolio management, and investment advisory.

Originality/value – This paper is an empirical approach to explore the retail investor behaviour using psychometric approach with respect to self-perceived confidence and other perceived measures of investor behaviour. The authors contribute to the emerging set of literature on investor behaviour and behavioural finance.

Keywords Behavioural finance, Financial markets, Demography, Investor behaviour, Personal finance, Behavioural economics

Paper type Research paper

Introduction

In the finance literature, it is oft-discussed that individual investors exhibit heterogeneity in financial behaviour with respect to investment decisions and asset allocation. For better understanding of retail investor behaviour, it is essential to explore into the fundamental issues such as what determines retail and small investor behaviour in the financial markets. Is the behaviour of retail investors shaped by the social environment and contextual learning over the period, such as learning and training about the investment decisions through education and peers? Are their behaviours determined by more of demographic characteristics such as gender, age, and occupation, or financial well-being such as income and investment levels? This paper attempts to explore these issues in an empirical setup and



contribute to the literature on behavioural finance by way of explaining the role of heterogeneity in determining retail and small investor behaviour.

To measure the retail investor behaviour in stock market, the paper examines the potential domains of determinants for three aspects – changes in fundamental factors, sudden market events, and personal factors, along with self-perceived confidence level among retail investors. The literature suggests that demographic heterogeneity to a certain extent explains several dynamics of human behaviour and characteristics, such as risk-seeking attribute (Barber and Odean, 2001, 2008), income premium (Light, 2004), asset allocation behaviour (Barnea, *et al.*, 2010), household consumption (Wiemers, 2014), and longevity (Pijoan-Mas and Rios-Rull, 2014). These aspects are examined from demographic and financial points of view in order to establish how investor behaviour varies across three aspects on several demographic and financial parameters. Using data from survey of about 230 retail investors selected from a pool of retail investors using services of a financial brokerage client which maintains a reputation of good standing in financial services domain, the study explores the factors that potentially determine trading behaviour of retail and small investors in general.

The present empirical study of the determinants of retail and small investor behaviour shows that demographic and financial factors such as gender, age, educational status, income, and investment levels determine their trading behaviour across three domains; however, features such as marital status and occupation do not play any significant role in shaping their trading behaviour. It is also found that retail investors' self-perceived confidence as a function of both expected and unexpected changes in the market and personal factors largely determines trading behaviour of retail investors. Self-perceived confidence level and self-reported portfolio size are positively associated implying that (over-)confident retail investors tend to believe that their investment skills being superior they are bound to perform better and thus they typically hold larger than average investment portfolios. These findings are significant because research on cross-sectional variance of individual investment behaviour explains how investor heterogeneity plays a critical role in investment and asset allocation decisions (Campbell, 2006; Curcuru *et al.*, 2009).

This study contributes to the emerging literature on behavioural and personal finance by providing empirical evidence on how retail and small investors perceive changes in fundamentals, unexpected market events and their own confidence with respect to financial and investment decisions, and how these issues vary across individuals with heterogeneous characteristics such as varying demographic and financial factors. Differences in retail investor background such as their age, gender, income, and exposure to stock market determine how they perceive of their self-confidence in taking trading and investment decisions. Our analysis fundamentally models these variations and explains the significance of these variations from the viewpoint of personal financial management.

Review of literature

The issue of determinants of investor behaviour in stock market is important for several reasons. First, it is related to an emerging area of academic research popularly known as behavioural finance and economics. This domain holds equal significance for practitioners in the financial markets and personal finance industry. Second, an understanding of investor behaviour explains further the cross-sectional mechanism of asset allocation puzzle and hence demystifies asset pricing from investors' perspective. This kind of explanation is certainly deemed to help taking the argument of behavioural asset pricing approach further in terms of methodological contributions. Finally, abundant empirical research on investor behaviour has been carried out across various markets and economies, mostly using financial market data. Very little efforts have been devoted to understand investor behaviour through primary investigation approach such as survey, psychometric, and

experimental methods. Such an attempt adds to an extensive body of literature in behavioural finance and economics by providing empirical evidences through these unique approaches typically considered superior for understanding behavioural issues.

That investor behaviour plays a critical role in understanding the dynamics of asset allocation and asset pricing mechanism is more common; however, it influences how funds could be channelized in financial services industry. This phenomenon is highlighted by Cashman *et al.* (2014) as follows:

Investor behaviour can also affect advisor incentives with respect to risk. Chevalier and Ellison (1997) note that mutual fund advisor compensation is typically tied to funds under management with implies that investor flows serve as an implicit incentive mechanism. Brown *et al.* (1996) and Chevalier and Ellison (1997) argue that compensation tied to funds under management and the convex relation between performance and flows combine to create incentives for managers to alter fund risk within a year conditional on performance in the first part of the year.

The dynamics of investor behaviour and performance of investment portfolios are studied with respect to various classes of assets. For example, Johnson (2007) examines mutual fund performance and investor behaviour and contends that if the existing investors become less reactive to less-than-expected performance of the fund, compared to performance as per their expectations, it raises the incentives to shift risk for the fund manager in such situation. But this relationship is from the point of view of financial market and financial services industry. It does not much help understand whether varying characteristics of individual and retail investors shape their investment behaviour.

It is virtually impossible to analyse each and every dimension of the behaviour of investors as much as to study every decision made by them such as decision to invest certain amount of money in stock market, for example. Typically small decisions almost always depend on the context: the investor may have seen in the news that this particular company had some major breakthrough or maybe he just discovered that he will not be able to go on a holiday and decided to invest this money instead and this particular stock was recommended to him by the agent (Salimov, 2012).

Exploring the role of demographic characteristics and financial factors could be two major dimensions of investor behaviour, which if done systematically could have implications for retail and small investors, wealth management professionals, and other market participant alike. The literature shows that demographic characteristics such as gender, age, education, marital status, and income affect individual investor behaviour with respect to investment decisions and risk preferences (see e.g. Hershey and Schoemaker, 1980; Riley and Chow, 1992; Schooley and Worden, 1999, Barber and Odean, 2001, among others). Similarly these factors also affect individual aversion to realize losses, and individual's choices between appropriate scripts/instruments for investment (Fama and French, 2002; Shefrin and Statman, 1995; Filbeck *et al.*, 2005; Daniel *et al.*, 1998).

There are numerous other studies which examine investor behaviour from different innovative aspects such as transactional history using econometric approach, neural data using realization theory framework, and their genetic features using experimental methods. Curcuro *et al.* (2013) show that variation in background risk exposure – from sources such as labour and entrepreneurial income or real estate holdings, and from factors such as transactions costs, borrowing constraints, restricted pension investments, and life cycle considerations – can explain some but not all aspects of the observed cross-sectional variation in portfolio holdings in a traditional utility maximizing framework. The decisions related to the share of risky assets in the overall portfolio of the investor have been explained by using demographic, socio-economic and, most importantly, personality trait variables such as aversion to risk, and cognitive skills among others factors. The choice of the aggregate level of risk by the investor is actually quite rational and relies mostly on the

ability of the investor to quantify and control the risk meaning that the irrationality appears only on the specific level (Salimov, 2012).

Barnea *et al.* (2010) use data on financial portfolios of identical and fraternal twins and show that a genetic factor explains about one-third of the variance in stock market participation and asset allocation; however, family environment affects young individual financial behaviour but only for short time period. They conclude that genetic component of asset allocation explains genetic variation in risk preferences. Frydman *et al.* (2014) study in an experimental market by measuring brain activities through fMRI, and use their neural data to explain investor behaviour. They report that activity in two areas of the brain that are important for economic decision-making is consistent with the predictions of realization utility. These results provide support for the realization utility model. More generally, they demonstrate that neural data can provide helpful and interesting models of investor behaviour.

Cashman *et al.* (2014) provide empirical evidence on investor behaviour by examining the dynamics of gross flows in the mutual fund industry, and suggest that at least some portion of the investors' population evaluates and responds to performance over windows significantly shorter than the year. They argue that understanding investor behaviour has its own potential implications for the incentives faced by fund advisors.

We observe that empirical attempts have been made to examine the relationship between investor-specific characteristics and their choices of asset and risk tolerance; however, literature on association between investor characteristics and their self-perceived confidence *vis-à-vis* their portfolios is virtually non-existent. In our study, we seek to study the determinants of retail and small investor behaviour with respect to their confidence and demographic characteristics.

Methodology and approach

To explore whether the effect of domain-specific determinants of investor behaviour differs across the demographic and financial profile of sample retail investors, we use simple univariate statistical tests, such as paired *t*-test which typically compares two samples in cases where each observation in one sample has a natural partner observation in the other sample. We employ this test to check at the difference between paired values of two (or more) samples (classified by domain and demographic profiles in our case), considering the variation of values within each sample, to produce *t*-statistic.

We test the null hypothesis for the paired *t*-test:

$$H_0 : d = \mu_i - \mu_j = 0$$

where *d* is the mean value of the difference between two samples. The paired *t*-test is a more powerful alternative to a two sample procedure, such as the two sample *t*-test, and can be used here as we have matched samples for our retail investor survey data.

Further, we presume that investor behaviour is a primary mechanism underlying the linear relationship between the demographic and financial characteristics and the investor's perception about the market and himself/herself. We begin with the following model:

$$Self\text{-}confidence_{it} = \alpha_0 + \alpha_F Funda_{it} + \alpha_M MarkEve_{it} + \alpha_P Personal_{it} + \varepsilon_{it} \quad (1)$$

where *Self-confidence_{it}* is a measure of self-perceived confidence level of retail investors, and is a linear function of *Funda_{it}*, *MarkEve_{it}*, and *Personal_{it}*, which are metrics of change in fundamental factors, unexpected market events, and personal factors, respectively. These explanatory factors have been derived from the scores assigned by the sample retail investors to several scenario-based statements reflecting the underlying domains

(see Appendix 1 for the list of statements for each of three domains):

$$Fund_{it} = \sum_{i=6}^n S_{F,it}, \text{ MarkEve}_{it} = \sum_{i=6}^n S_{M,it}, \text{ and Personal}_{it} = \sum_{i=6}^n S_{P,it},$$

where $S_{j,it}$ is a vector of factors represented by the underlying statements for each of the three domains. We expect that the coefficients for change in fundamental factors and personal factors be positively affecting the self-perceived confidence level of retail investors; however, the coefficient for unexpected market event be negatively related as any unexpected event is supposed to influence the perception untowardly.

We also aim to explore further the factors that influence retail investor portfolio size. In our survey of retail investors, we asked them to report the estimated size of their stock market investment portfolios. Based on their reporting, we categorize whether an investor falls into one of the two categories of portfolio holders, namely small portfolios and big portfolios. To understand the effect of demographic, financial, and perceptual determinants of self-reported portfolios, we employ binary regression approach where our dependent variable, that is, self-reported portfolio size, carries a value of 0 (if the investor falls in small portfolio category) or 1 (if the investor falls in large portfolio category). The explanatory variables are a set of demographic characteristics and the self-perceived confidence level. Since the size of portfolio is directly related to self-perceived confidence level, we use this measure as one of the explanatory variables:

$$\begin{aligned} Portfolio_{it} = & \beta_0 + \beta_1 Gender_{it} + \beta_2 Age_{it} + \beta_3 Marital_{it} + \beta_4 Edu_{it} + \beta_5 Occup_{it} \\ & + \beta_6 Income_{it} + \beta_7 Invest_{it} + \beta_8 Self-confidence_{it} + \vartheta_{it} \end{aligned} \quad (2)$$

Finally, we are interested in studying whether self-reported portfolios and self-perceived confidence of retail investors in stock market have any direct association. Since the issue of simultaneous equation bias is likely to crop in while using OLS regression estimation approach, we hereby employ two stages least square (2SLS) regression estimation for examining the relationship between the self-confidence and portfolio size.

As a general rule, when a variable is endogenous, it will be correlated with the disturbance term, hence violating the GM assumptions and making our OLS estimates biased. This is easily seen in the following estimation of two equations where $Portfolio_{it}$ and $Self-Confidence_{it}$ are both endogenous (Nagler, 1999):

$$Portfolio_{it} = \gamma_0 + \gamma_S Self-confidence_{it} + \epsilon_{it} \quad (3a)$$

$$Self-confidence_{it} = \gamma_1 + \gamma_2 Portfolio_{it} + \gamma_3 Demo_{k,it} + \dots + \gamma_k Demo_{k,it} + \omega_{it} \quad (3b)$$

If we substitute the Equation (3a) into Equation (3b), we can see that $Self-confidence_{it}$ is a linear function of ϵ_{it} (among other things), and hence will be correlated with ϵ_{it} . This violates the GM assumptions, and the OLS estimator will be biased. If the set of equations is exactly identified, then we can solve for the reduced-form parameters, and then compute the structural parameters from the reduced-form parameters.

To systematically express the 2SLS that we adopted, we define a linear regression as:

$$Portfolio_{it} = \delta_0 + \delta_1 Self-confidence_{it} + \delta_2 Demo_{1,it} + \dots + \delta_k Demo_{k,it} + \tau_{it} \quad (4a)$$

where $Self-confidence_{it}$ is an endogenous variable.

Now regress $Self\text{-}confidence_{it}$ on Z_{it} along with $Demo_{1,it}$, $Demo_{2,it}$, ..., and $Demo_{k,it}$ to find $Self\text{-}confidence_{it}$.

$$Self\widehat{confidence}_{it} = \delta_{01} + \delta_{11}Z_{it} + \delta_2 Demo_{1,it} + \dots + \delta_k Demo_{k,it} + \tau_{it} \quad (4b)$$

where Z_{it} is an instrument variable.

Now we plug in the fitted value of $Self\widehat{confidence}_{it}$ derived from Equation (4b) into Equation (4a) as:

$$Portfolio_{it} = \delta_0 + \delta_1 Self\widehat{confidence}_{it} + \delta_2 Demo_{1,it} + \dots + \delta_k Demo_{k,it} + \varphi_{it} \quad (4c)$$

where φ_{it} is the composite error term that should be uncorrelated with all explanatory variables.

The 2SLS estimation approach explained above is applied to understand the dynamics of self-perceived confidence level and portfolio size in the presence of instrument variables.

Results and discussion

Sample characteristics

This study explores the determinants of retail investor trading behaviour through survey data collected from a sample of retail investors using services of a financial brokerage house. Survey data were collected using a structured questionnaire distributed through several media, both online and offline. The participation in the survey was voluntary and confidential. The survey instrument consists of the details such as purpose of collecting data and potential uses thereof. The questionnaire was divided in sub-sections on demographic, financial, and psychological items. A total of 500 questionnaires were distributed to the pool of retail investors. Out of this, around 46 per cent ($n = 230$) participants completed the survey. We consider this as a reasonably decent response rate as we did not provide the survey participants with any incentives, financial, or otherwise, for participation in the survey. Our response rate is better compared to some other studies carried out in the Indian context, such as the response rate for Anand (2002) was 15.43 per cent, for Jain *et al.* (2009), it was 19 per cent, for Dhankar and Boora (1996) and Tripathi and Siddiqui (2008), 26 and 77 per cent, respectively. The significant sample characteristics are presented in Table I.

Our sample is comparable to that of Chandra and Kumar (2012) who examined Indian individual investor behaviour using a sub-sample of 355 individual investors. We find that respondents in our sample are relatively more mature, more affluent in terms of annual income, and having bigger investment portfolios, compared to Chandra and Kumar's (2012) sample.

	Investor characteristics $n = 230$		Investor characteristics (Chandra and Kumar, 2012) $n = 355$		<i>t</i> -test value
	Mean	SD	Mean	SD	
Age	42.33	3.016	37.86	9.13	2.653**
Gender dummy	1.22 (78.3%)	0.413	1.08 (63.66%)	0.341	2.379**
Income	1,630,000	224,500	1,099,718	418,060	3.146***
Investment	603,100	102,450	547,605	206,295	2.712**

Notes: Age is measured in years. Gender dummy is a one (zero) if the sample respondent is male (female); Figures in parenthesis represent percentage of male respondents in total sample. Income and investment figures are measured in rupees per annum; we compare our sample characteristics with those of Chandra and Kumar (2012) which was carried out in similar setup, hence comparable. **, ***Coefficients are significantly different from zero at 5 and 1 per cent level, respectively

Table I.
Sample characteristics
of survey participants

As expected, majority of sample investors are male (78 per cent) and only 22 per cent of them are female. Barber and Odean (2001) suggest that women are less risk takers in stock market, and men frequently shuffle their investment portfolios. We, therefore, are at ease with this skewed male-female ratio in our sample. We do not report the statistics on marital status, education, and occupation of the sample respondents; however, we find that about 78 per cent are married, around 73 per cent respondents are graduate, 80 and 10 per cent of them are salaried employees and professionals, respectively. It maybe debated whether these factors matter for retail investor trading behaviour, yet it can be said that it makes our sample heterogeneous, representative, and diversified across various demographic parameters.

Self-reported drivers of trading behaviour

Retail investors trading behaviour can be determined by several factors, both internal and external. Internal factors include psychological heuristics such as self-regulation, prudence and precautionous attitude, and financial heuristics. External factors that might affect their behaviour include economic and market environment, informational asymmetry and financial addiction (Chandra and Kumar, 2012). In this study, sample retail investors' trading behaviour is assessed using a five-point Likert scale, in which they were asked to rate their degree of agreement on five scenario-based statements from three domains each, namely fundamental changes, sudden market events, and personal factors, along with their perceived self-confidence level. The points given for particular domains by the respondents are summed and considered as representing the factors driving retail investor trading behaviour. A simple cross-correlation suggests no problem of multi-collinearity among variables and measures (see Appendix 2). In Table II, we present the results of *t*-tests conducted to check whether determinants of retail trading behaviour differ across demographic characteristics such as gender, age, income, and investment levels. Means and standard deviations for each of the factors are also reported.

Results suggest that how retail investors exhibit their trading behaviour is very much determined by demographic and financial characteristics such as gender, age, educational qualifications, occupation, average investments, and portfolio size. *t*-Statistic values show that the role of change in fundamental factors, unexpected market events, and personal factors differed across the above demographic and financial characteristics; in most cases the coefficient estimates are statistically significant and different from zero at conventional levels. However, we do not find any significant evidence in support of trading behaviour propensity differing across marital status and monthly income. It maybe stated that marital status and monthly income, to some extent, do not play vital role in determining retail investors trading behaviour.

We also derived a self-perceived confidence level in the stock market using survey data and report the same in Table II. It does vary across factors such as gender, age, occupation, investment, and size of portfolio. We hypothesize that investors' self-perceived confidence level is a function of several domain including changes in fundamentals, unexpected market events, and personal factors. To confirm this hypothesis, we regressed *Self-confidence* on the three domains, namely changes in fundamentals, sudden market events, and personal factors[1]. Regression estimates, using the regression equation explained in Equation (1), are presented in Table III, and as can be seen, investor's self-perceived confidence level was positively associated with changes in fundamentals and personal factors, however, negatively related to sudden market events. This reinforce our argument that retail investors are okay with fundamental changes and personal factors, which are mostly expected and known to them a priori, and feel more confident while dealing with their trading decisions. But any sudden and unexpected market movement negatively affects their self-confidence.

Panel A: determinants of trading behaviour across demographic characteristics

Determinants	Mean	Gender		Age ≤25 yrs n = 105	Age ≥25 yrs n = 125	Education Graduates n = 215	Marital status		t-test
		Male n = 180	Female n = 50				Unmarried n = 50	Married n = 180	
Changes in fundamentals	2076	2053	21.60	20.05	21.36	21.19	20.70	20.78	-0.108
Sudden market events	23.15	23.50	21.90	21.67	24.40	23.49	22.70	23.28	-0.378
Personal Factors	22.52	22.36	23.10	20.67	24.08	22.88	20.70	23.03	-2.81**
Self-confidence	19.00	4.378	18.70	18.00	19.84	19.07	18.90	19.03	-872

Panel B: determinants of trading behaviour across financial characteristics

Determinants	Salaried n = 115	Non- salary n = 115	Monthly income		Investment (% of income) ≤20% n = 160	Investment (% of income) ≥20% n = 70	Portfolio size		t-test
			≤Rs. 50,000 n = 120	>Rs. 50,000 n = 110			≤Rs.10L n = 155	>Rs.10L n = 70	
Changes in fundamentals	21.92	16.00	21.17	20.32	21.53	19.00	22.35	17.47	5.14***
Sudden market events	24.11	19.22	23.00	23.32	23.94	21.36	24.44	20.47	4.16***
Personal factors	23.59	18.11	22.21	22.86	23.78	19.64	23.88	19.67	2.67**
Self-confidence	19.59	16.56	19.08	18.91	19.84	17.07	20.16	16.60	3.97***

Note: *, **, ***Statistical significance of the coefficient (being different from zero) at the 10, 5, and 1 per cent levels, respectively

Table II.
Determinants of trading behavior: demographic and financial factors

Determinants of self-reported investment portfolios

Since we studied how self-reported determinants of retail investor's trading behaviour matter across demographic characteristics, we were interested in exploring whether such features determine the reported size of their investment portfolios. We sorted our sample retail investors based on their self-reported portfolio size, and examined whether the self-reported portfolio size is determined by demographic characteristics. Regression estimates from binary regression estimates using Equation (2) are reported in Table IV. We also introduced self-perceived confidence level of the retail investors in the equation and expect it to be positively related to the portfolio size.

We found that certain demographic characteristics such as gender and educational status are positively related to their portfolio size as shown by the statistically significant regression coefficient. It implies that male retail investors hold bigger portfolios, and that higher level of education determines portfolio size of retail investors. At the same time, monthly income and investment as percentage of income also positively affect self-reported portfolio size. However, not surprising, we found that retail investors with higher income and level of investment in stock markets tend to hold bigger portfolio. It is interesting to point out here that age, marital status, and professional occupation do not play any role in determining portfolio size of sample retail investors. In general, as suggested by Barber *et al.* (2005), investor's gender and age are positively related with their portfolio size. We found no relationship with respect to retail investor's age; however, gender does matter in our sample too.

Self-perceived confidence level of retail investors is another very critical determinant of portfolio size. We found that self-confidence is positively and strongly related to the self-reported portfolio size of sample retail investors. This relationship between self-confidence and portfolio size suggests that if retail investors feel self-confident about their stock market skills, they typically tend to hold bigger portfolios. It may also be possible otherwise, that is, when investors hold larger portfolios, (s)he is more confident about his skills and performance in stock market; however, we do not provide any empirical proof for this potential causal relationship between portfolio size and self-confidence in this work.

The regression estimates reported in Table IV confirms our hypothesis that retail investors' portfolio size is determined by their demographic characteristics, mostly if not all, and their financial stature such as income and investment. Self-perceived confidence level also affects how larger portfolio an investor would be holding in the stock market. These results are consistent with the findings of Barber and Odean (2001) that men are more (over-)confident of their investment and trading skills and hence trade much more than their female counterparts and this subsequently reduces their returns as well.

Dependent variable	Self-perceived confidence level
Intercept	2.720 (0.791)***
Changes in fundamentals	0.361 (0.056)***
Sudden market events	-0.271 (-0.055)***
Personal factors	0.112 (0.045)**
Adj. R^2	0.661
F-stat.	149.957
Durbin-Watson	1.866

Notes: Standard errors are reported in parenthesis (); dependent variable: self-confidence; independent variables: changes in fundamentals, sudden market events, and personal factors. ***,** Coefficients are statistically significant at the 5 and 1 per cent levels, respectively

Table III.
Regression estimate
predicting investors'
self-perceived
confidence level

	Self-reported portfolio size
Intercept	-0.726*** (0.141) [26.636]
Gender	0.611** (0.440) [1.930]
Age	0.331 (0.262) [1.599]
Marital status	0.875 (0.752) [1.353]
Education	0.923*** (0.454) [4.141]
Occupation	-0.076 (0.192) [0.155]
Income	0.976*** (0.329) [8.807]
Investment	0.378*** (0.172) [4.831]
Self-confidence	0.255*** (0.057) [20.072]
Log likelihood	196.697
Cox and Snell R^2	0.335
Nagelkerke R^2	0.467

Table IV.
Binary regression
estimates predicting
self-reported
portfolio size

Notes: Standard errors and Wald statistic are reported in parenthesis () and [], respectively; dependent variable: self-reported portfolio size; explanatory variables: gender, age, marital status, education, occupation, monthly income, investment, and self-reported confidence level. **, ***Coefficients are statistically significant at the 5 and 1 per cent levels, respectively

Self-confidence and investment portfolios

In this sub-section, we examine the relationship of the self-reported portfolio size with self-confidence level of sample retail investors. Earlier we found that self-reported portfolio size is positively related to self-confidence as exhibited by the sample investors. We examined that relationship of self-reported portfolio size with several factors in an OLS framework which is often employed to analyse the nature of relationships. Typically OLS coefficients are deemed to be unbiased and consistent estimates of the true parameters given that several underlying assumptions are fulfilled. One such assumption, for example, is that causality runs in one direction in the regression equation, from the independent variable(s) to the dependent variable. The possibility that we fail to meet this assumption is why OLS estimates could be biased and inconsistent. This is also known as simultaneous equation bias (Brinkman, 1985). In the context of our study, we found self-confidence along with several demographic variables influencing self-reported portfolio size of retail investors, but this causality could be untrue. To address this issue, we used 2SLS estimates as explained in Equation (7) on our sample data. The estimates are reported in Table V.

Through 2SLS estimation, we found that self-reported portfolio size of the sample investors is actually an increasing function of their self-perceived confidence level. In this

estimation, we assumed that the error term of the dependent variable, that is, self-reported portfolio size, is correlated with other variables; hence we used a set of instrument variables to address this issue by replacing the problematic variables (see Equations (3) and (4) for details). Our results support the hypothesis of investor trading behaviour is largely determined by her demographic characteristics and self-perceived confidence which is basically a function of several economic and social factors. Heckman test of endogeneity supports the results as robust and significant. In lines with Chandra and Kumar (2012) who explore the impact of behavioural factors and investors' psychology on their investment decision making and to examine the relationship between investors attitude towards risk and behavioural decision-making process. They show that unlike the classical finance theory, individual investors often do not make rational decisions, and that investor decision making is influenced by behavioural factors such as greed and fear, cognitive dissonance, heuristics, mental accounting, and anchoring.

Conclusions

In this paper, we studied how trading behaviour of retail investors evolves depending on their demographic and financial characteristics. Using structured survey data, we measured investor trading propensity in three domains, namely changes in fundamental factors, unexpected market events, and personal factors, and showed that they are differenced across several demographic and financial parameters. Specifically, we empirically showed that: demographic and financial factors such as gender, age, educational status, income, and investment levels determine their trading behaviour across three domains; however, features such as marital status and occupation do not play any significant role in shaping their trading behaviour; retail investors' self-perceived confidence is a function of both expected and unexpected changes in the market and personal factors, and largely determines trading behaviour of retail investors, and self-perceived confidence level and self-reported portfolio size are positively associated implying that (over-)confident retail investors tend to believe that their investment skills being superior is bound to perform better and thus they typically hold larger than average investment portfolios. That self-perceived confidence predicts investment behaviour of retail investors, supports the proposition of importance and requirement of investor education and assessment for sound investment decisions.

Our findings have implications for both academicians working in the area of behavioural finance and practitioners active in stock markets, more particularly dealing with retail investors and personal finance domain. Though the results require more replication and validity in terms of larger sample size and diversified asset classes, the idea supported with empirical

	Self-reported portfolio
Intercept	2.697*** (0.255) [10.567]
Self-confidence	0.391*** (0.031) [5.032]
Adj. R^2	0.696
F -stat.	25.318

Table V.
Regression coefficient
of 2SLS estimates
exploring the
relationship between
self-confidence and
portfolio size

Notes: Standard errors and t -statistic are reported in parenthesis () and [], respectively; dependent variable: self-reported portfolio size; explanatory variable: self-perceived confidence level; instrument variables: income, investment, changes in fundamental, sudden market events, and personal factors. ***Coefficients are statistically significant at the 1 per cent level

findings helps in explaining how retail investors' trading behaviour is shaped depending on their demographic, personal, and financial factors, as proposed by Kaniel *et al.* (2008) and Harris and Liabson (2013).

Young male investors who are relatively younger seem to be more confident in their own perception, hence more vulnerable to irrational (or, quasi-rational) trading behaviour thereby making fatal financial mistakes. With larger coffers on their side, they tend to play riskier bets as they suffer from (over-)confidence about their trading skills in the stock market. Financial advisors and regulators might be concerned over this issue of vulnerability of retail investors by deploying a mechanism that could (positively) influence retail investor behaviour in the stock market, such as customizing investment advice and recommend more appropriate products to counteract undesirable investment choices and/or educate retail investors in customized ways (Markiewicz and Weber, 2013). Socio-demographic profiling of retail investors for devising investment products could be another implications.

Limitations

To summarize the potential limitations that our study is subject to, we state that the sample retail investors are mostly male, mature adults, and decently educated. This type of characteristic suggests that the sample would tend to have a skewed trading behaviour with more risky attitude than the typical investing population (Barber and Odean, 2001). Another limitation associated with sample characteristics could be the level of investment of retail investors and portfolio size. Our sample consisted of less number of retail investors with larger chunk of their income in stock market investment and thus bigger investment portfolio. Such issues might reflect in the measurement of self-perceived confidence level. Since this study used to certain extent the psychometric approach to determine how trading behaviour could be influenced by demographic factors, it carried over the limitations associated with this approach, such as measurement issues and replicability of the results. Yet we hope that our findings will certainly provide further hypotheses for academic researchers and practitioners who wish to explore more dimensions of investor behaviour digging deeper and contributing more to the literature in the area of behavioural and personal finance.

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Note

1. A visual representation of perceived determinants of investor behaviour is presented in Appendix 3.

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Appendix 1. Statements used to collect survey data

- (1) I often blindly imitate decisions of others when making investment decisions.
- (2) I usually invest in companies I am familiar with.
- (3) I am more comfortable investing in shares of local companies than foreign companies.
- (4) I often consider the information that majority of investors focus on as a basis for trading in the stock market.
- (5) I will buy/sell a stock only at my price.
- (6) I don't buy a stock today if it was priced cheap last year.
- (7) I don't sell a stock today if it was priced higher in the past.
- (8) I feel regret of a drop in the price of stock I have purchased.
- (9) I will hold on to a stock that has fallen in multiple sessions thinking that it will go up in the next session.
- (10) I feel to liquidate the position after it has gone up in a series of subsequent trading sessions.
- (11) I am fully responsible for the results of my investment decisions.
- (12) I am confident of my ability to do better than others in picking stocks.
- (13) I have complete knowledge of stock market.
- (14) Before I buy a stock, I analysis that firm with only the available existing information rather than seeking alternatives.
- (15) I buy a stock that has been covered most in media.
- (16) I often seek the information for buying/selling a stock that supports my views.
- (17) I usually tend to sell loser stocks and hold on the winners when trading.
- (18) I always separate stocks while trading in the stock market depending on their performance.
- (19) I always prefer holding on to losing stocks and selling winner.
- (20) I prefer most the gain making stocks rather than loss making.

- (21) I usually consider public information when trading stocks.
 (22) I make investment for making money quickly.
 (23) I make riskier investments for maximum gain.
 (24) I consider the firm image while making investment.
 (25) I always look at and analyse company performance before making a decision to buy or sell.
 (26) My peers influence my participation on the stock market.
 (27) I always seek brokers advice on trading.

Appendix 2

		Correlations						Self- confidence
		Income	Investment	Portfolio	Fundamentals	MrktEve	Personal	
Income	Pearson correlation	1	0.029	0.457**	-0.089	0.000	0.000	-0.089
	Sig. (2-tailed)		0.663	0.000	0.178	0.994	0.996	0.176
	<i>n</i>	230	230	230	230	230	230	230
Investment	Pearson correlation		1	0.302**	-0.234**	-0.189**	-0.230**	-0.211
	Sig. (2-tailed)			0.000	0.000	0.004	0.000	0.001
	<i>n</i>		230	230	230	230	230	230
Portfolio	Pearson correlation			1	-0.323**	-0.201**	-0.239**	-0.295**
	Sig. (2-tailed)				0.000	0.002	0.000	0.000
	<i>n</i>			230	230	230	230	230
Fundamentals	Pearson correlation				1	0.769**	0.711**	0.770
	Sig. (2-tailed)					0.000	0.000	0.000
	<i>n</i>				230	230	230	230
MrktEve	Pearson correlation					1	0.734**	0.753
	Sig. (2-tailed)						0.000	0.000
	<i>n</i>					230	230	230
Personal	Pearson correlation						1	0.682
	Sig. (2-tailed)							0.000
	<i>n</i>						230	230
Self-confidence	Pearson correlation							1
	Sig. (2-tailed)							
	<i>n</i>							230

Table AI.
Correlation
coefficients

Note: **Significant at 5 per cent level

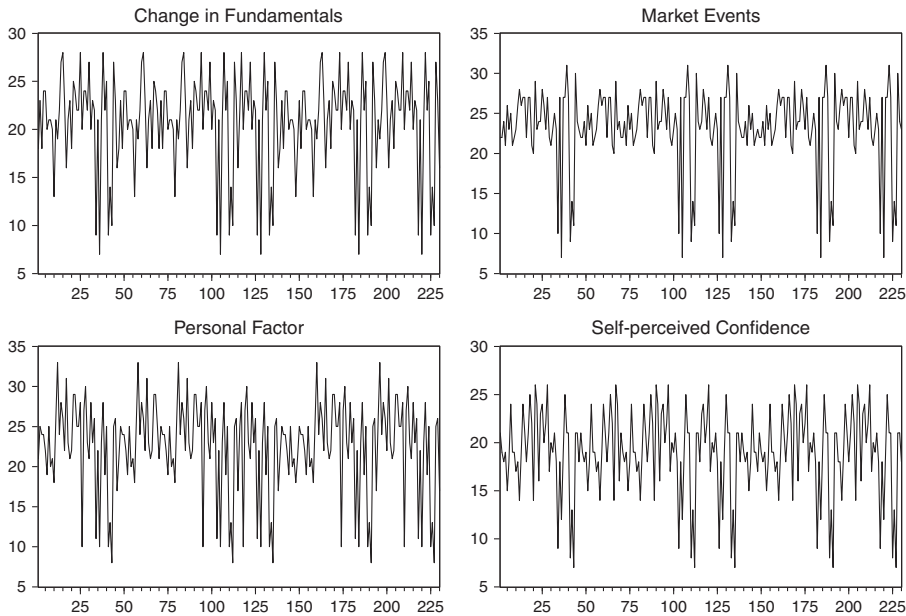


Figure A1.
Movements
of perceived
determinants of
investor behaviour

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