

DETERMINING THE PERFORMANCE OF INDIVIDUAL INVESTORS: THE PREDICTIVE ROLES of DEMOGRAPHIC VARIABLES and TRADING STRATEGIES

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Abstract

Revealing more about the psychological components of outstanding trading performance is of great interest for researchers. Thus, this study aimed investigate adaptive and maladaptive effects of certain demographic variables (age, gender, education and marital status) and trading strategies (portfolio value, turnover ratio, investment period, consulting advice, number of stocks in the portfolio, percentage of stock investment) on trading performance of individual investors. We analyzed a data set consisting of position statements and trading activities of 60 real individual investors, who actively trade above a certain amount of portfolio size and examined the actual portfolios of those investors through a 6 year period within 1996-2001. The findings suggest that in general investors who have less amounts of portfolio value and turnover rates, have tendency to outperform the market and thus exhibit superior performance. Moreover, the study revealed that the investors who are outperforming the market are the ones with highly educated, relying on the recommendations of experts and women in gender.

Key words: Trading performance, behavioral finance, individual investors, demographic factors.

JEL Classification: D81, G32, O16

1. Introduction

Rationality and efficient market idea dominated the theory and practice in financial economics starting 1960's. This continued with diminished interest through late 1980's. With the spread of understanding that financial markets consists of human beings and the thought that human behavior can not be understood solely mathematical or economic studies; it has become an obvious necessity to analyze stock markets from a different alternative perspective. This new perspective is called Behavioral Finance, a theoretical model applying the principles of psychology to finance (Pompian, 2006). Evidence in the literature of psychology also expressed that individuals have limited information processing capabilities, they are prone to making mistakes and also they exhibit systematical errors. The sources of these irrationalities are often attributed to psychological factors or demographic factors and emotional responses to price fluctuations and dramatic changes in an investor's wealth. Individuals' decisions have significant consequences. Individual investors who trade in capital markets are searching for new strategies to maximize their returns.

Those individuals make periodic contributions and withdrawals from their investment portfolios in a way trying to minimize their losses and maximize their gains. This research is based on the assumption that in face of uncertainty most people can not systematically describe problems, record all necessary material and synthesize information to create rules for making decisions. They use more subjective and less ideal paths of reasoning in consistent with their basic judgment and preferences. So, in contrast to homo-economicus, we assume that certain demographic characteristics and trading strategies do play a role in the magnitude of trading returns of individual investors. In other words, we presume that an investor's background and past experiences can play a significant role in decisions made during asset allocation process. If investors fitting specific profiles are more likely to exhibit specific outcomes, then practitioners can attempt to recognize the relevant behavioral tendencies before investment decisions are made. In this paper, we attempt to shed light on the investment performance of common stocks held directly by the individual investors in Turkey. In the light of behavioral agenda, this paper aims to investigate adaptive and maladaptive effects of certain demographic variables (age, gender, education and marital status) and trading strategies (portfolio value, turnover ratio, investment period, consulting advice, number of stocks in the portfolio, percentage of stock investment) on trading performance of individual investors. Thus, we analyzed a data set consisting of position statements and trading activities of real individual investors.

This paper distinguishes itself from the previous studies by focusing its attention to many demographic and financial variables simultaneously which might affect the portfolio performance of the investors. Second, the previous research mostly uses self-assessed data gathered through questionnaires from individual investors for deriving trading strategies of individual investors. However, the current study does not utilize derived data, instead examines the actual portfolios of real investors through a 6 year period within 1996-2001. Thus, we contribute to debate about whether certain individual demographic variables as well as trading strategies are predictive, in determining the magnitude returns of individual investors; if so which of those variables are adaptive or maladaptive in the portfolio performance of the investors.

2. Literature Review

a. Trading Volume and Trading Performance

Studies investigating the trading activities of investors focus on two different competing theories. Researches utilizing the rational expectation theory (Grossman and Stiglitz, 1980) argue that investors will continue to trade when the marginal benefit of doing so is equal to or exceeds the marginal cost of trade. In contrast, other behavioral models of financial markets (Cabelle and Sakovics, 1998; Odean, 1998) argue that investors suffer from overconfidence and overconfidence leads to lesser profits.

For example, in consistent with the rational theory; Schlarbaum, Lewellen and Lease (1978) examined a data consisting of common stock transactions and portfolio- balance information for a sample of 2506 accounts drawn from the a large brokerage house between 1964 and 1970. The authors reported that individual investors outperform market returns by overtrading.

However, Barber and Odean (2000) investigated a data set of 66,465 household accounts from a large discount broker between the period of 1991 to 1996. In contrast to Schlarbaum et al. (1978), the authors report that those households who trade most earn an annual return of 14.4%, while the market returns 17.97%. Although there is little difference in terms of gross performance of households between those who trade frequently and infrequently; considering the net performance, findings revealed that households who trade frequently earn a net annualized geometric mean return of 11.4%, while the latter earn 18.5%. It is commonly stated that overconfidence can explain high trading levels and the resulting poor performance of individual investors. In the current study, we build upon the work of behavioral agenda. In other words, we presume a negative relation between portfolio value, trading volume, turnover rate and magnitude of returns. Thus, we hypothesized that those individuals with higher trading volume and higher turnover rates would likely to exhibit poor performance due to increasing costs of trading.

b. Demographic Factors and Trading Performance

A considerable amount of research focuses on the demographic differences in terms of individual investors trading strategies, risk preferences and trading performance. From a general framework, researchers commonly agree that women are more risk averse than men, similarly men are more risk tolerant than women (Bajtelsmit and Bernasek, 1996; Sung and Hanna, 1996); unmarried individuals are more risk tolerant compared to married couples (Lee and Hanna, 1991) and the tendency to held more risky and volatile assets decrease as age increases (Barber and Odean, 2001; Sung and Hanna, 1996).

Lewellen, Lease and Schlarbaum (1977)'s study, using a data set of 972 individual investors from 1964 through 1970, report that men spend more time and money on security analysis and rely less on their brokers, make more transactions, believe returns are more highly predictable, and anticipate higher possible returns than do women. Barber and Odean (2001) investigated a huge account data of 35.000 households from a brokerage firm and analyze the common stock investments of men and women separately within a period of 1991-1997. Their study findings report that men trade 45% more than women; however men's net returns are 2.65% less than women due to overtrading. Moreover, the authors revealed that turnover rate of common stocks for men is nearly one and a half times that for women and men's net returns are 0.94% points less than women in a year. The gender differences between trading performances is heavily explained by overconfidence. It is believed that greater overconfidence leads to greater trading and thus lower expected utility (Barber and Odean, 2001; Fischhoff, Slovic and Lichtenstein, 1977). While both men and women exhibit overconfidence, men are generally more overconfident than women especially for masculine tasks.

Barber and Odean (2001)'s investigation of 35.000 households common stock investments also offer interesting findings about age. Concerning age of households, the findings revealed that young investors hold more volatile portfolios and their average monthly turnover declines as age increases. Barber and Odean (2001) also reported that these differences are more pronounced between single men and single women. Single men trade 67 % more than single women and earn annual risk-adjusted net returns that are 2.3 % less than those earned by single women. Additionally, married women earned a stock market annual risk-adjusted net return 1.4 % more than married men. Our intent is here to identify those aspects of investors' trading strategies and their demographic variables which appear to account for the differences in trading returns. We presume demographic characteristics of the individual investors will have predictive effects on the portfolio performance of the investors.

3. Method

a. Data and Procedure

We derive our observations from the data set of 4 various sized brokerage firms, which have the authorization to trade on ISE (Istanbul Stock Exchange) of Turkey. The database of the firms consists of the real investor accounts providing information about the position statements and the trading activities of a total of 2400 investor customers. The sample selection was performed at the investor level and selection was based on the criteria that the accounts a) of the investors who embrace a wide spectrum of portfolio size b) of the investors who were labeled as active traders by the brokerage firms c) of the investors actively attending to trading sessions at least 4 times a week d) of the investors who have a persistent relationship with the same brokerage firm between the years of January 1995-January 2001 continuously. The precise 6 year period chosen for investigation reflects an attempt to span a variety of external equity market conditions.

The above criteria resulted in a sample size of 60 active, speculative investors, who actively trade above a certain amount of portfolio size and have persistent relationship with same brokerage firm within 6 year period (1995-2001). Among 2400 investor accounts, a number of 60 investors is noteworthy given that the investors frequently shift among brokerage firms due to changing commissions and taxes as a result of intensive competition between the firms. The brokerage firms also provided us demographic information about those 60 investors. Table 1 gives a brief summary about the demographic profile of the investors.

Insert table (1) about here

In the current study, we focused on the common stock investments of the investors. For each of the selected 60 individual investors, a complete record of transaction activity over the 6 years was obtained. We also gathered information about the investment period, portfolio strategies, and asset holdings about the investors through self-assessed questionnaires (See in Table 2). The individuals were assured about the confidentiality of the data regarding the name of the investors and the firms. The value of the portfolio at the beginning of the 6 year period was taken as the base year. Then, we investigate the common stock activities of the investors on monthly basis for 6 year period. Nonetheless, we are provided with a total observation of 4320 cases on monthly basis within 6 years for a total of 60 investors.

b. Study variables

The final data set includes all accounts opened by 60 investors at four brokerage firms. We only analyzed common stock investments of the investors and thus exclude all the remaining accounts which are held in cash, securities or investments other than individual common stocks.

Individual investors were additionally provided self-assessed questionnaires including information about their investment period, number of stocks in their portfolio, consulting and share of common stock holdings. The investigation will make use of some 16 variables, derived from either the questionnaire responses or the account transaction records as descriptors of investor behavior and investor demographics. Employing data from brokerage firms to explore the common stock performance of individual investors, we composed main study variables. Table 2 provides the broad definitions of the main study variables.

Insert table (2) about here

4. Results

The statistical analysis starts with designating the descriptive statistics concerning the study variables used in our analysis in Table 3.

Insert table (3) about here

As it can be seen in table 3, the mean value of the monthly return of SME is slightly greater than the mean value returns of individual investors. For the remaining statistical analysis, we applied logarithmic transformations for the variables of portfolio value and turnover and used logarithmic values of those variables. We also present the correlation matrix in Table 4. Judging from the correlation coefficients across the variables, we see that we are not under threat of severe multicollinearity. A quick examination of the correlations reveals that investors' performance is significantly and positively correlated with portfolio value, investor's age, education, marital status (married), investment period, share number, analysis method and consulting. However, a significant and negative correlation is detected between investor performance, turnover, investment percent and gender (male).

Insert table (4) about here

The goal of the present study was to shed light on the investment performance of common stocks held directly by the individual investors and to explore the adaptive and maladaptive effects of portfolio value, trading volume, turnover rate, trading strategies and demographic variables (gender, age, education, marital status) on the performance of individual investors. We use logistic regression to conduct our analysis. Our estimation technique allows a binary dependent variable, which rules our regression analysis including linear probability model. Our estimations are based on dummy variable differentiated as the ones taking the value of unity if abnormal return is positive. In other words, if the calculated difference between average monthly return of ISE 100 index and average monthly return of investor is positive, we assume the investor outperform the market and thus possess superior investor performance.

A sequential (forward) logistic regression analysis is performed to assess the prediction of the trading performance of 2 categories (superior performance vs poor performance) on the basis of all independent variables. The probability of score statistics for variable entering was set to 0.05 as the default in order to maximize the number of variables. The comparison of each model including different variables was based on the goodness of fit measures. At each stage, the difference in Chi-square was estimated and evaluated in comparison with the immediately preceding model. This process was stopped when any further constraints did not significantly increase the fitness of the model. Thus, the final model against a constant model was statistically reliable [$\chi^2(6, N=60) = 5.13, p < .05, \text{Nagelkerke R-Square} = .670$] indicating that 6 predictors as a set reliably distinguished between superior trading performance (outperforming the market) versus poor performance (underperforming the market). Table 5 presents the binomial logistic regression results.

Insert table (5) about here

Table 5 also displays the goodness of fit tests, regression coefficients, Wald statistics, odd ratios and significance levels. The goodness of fit tests such as Nagelkerke, Cox & Snell R Square support the success of our model. According to Wald criterion, portfolio value ($p = .014$), turnover ($p = .000$), consulting ($p = .010$), marital status ($p = .024$), gender ($p = .000$), and education ($p = .046$) reliably predicted the superior trading performance outcomes. We base our interpretation of the results on the odd-ratios. Thus, an examination of the Exp(B) ratios of the significant variables reveals that the odds of exhibiting superior trading performance increase when investors' education levels are high and when they consult for the recommendations of the experts. However, the odds of exhibiting superior performance are associated with a decrease when portfolio value, turnover rate, gender (being men) and marital status (being married) increases. Put differently, a one unit increase in education level is associated with an approximate increase by a factor of 1.2 in the odds of exhibiting superior performance.

Similarly, the odds of exhibiting superior performance is 1.4 times more likely for the investors who consult their trading activities compared to investors who do not consult. Additionally, the odds of exhibiting superior performance decreases by 17% and 6% for one unit increase in portfolio value and turnover ratio respectively. Moreover, the odds of exhibiting superior performance is 66% more likely for women investors than men investors, and also 14% more likely for single investors compared to married investors.

5. Discussion

In this study, we aimed to explore adaptive and maladaptive effects of certain demographic variables (age, gender, education and marital status) and trading strategies (portfolio value, turnover ratio, investment period, consulting advice, number of stocks in the portfolio, percentage of stock investment) on trading performance of individual investors operationalized as outperforming or underperforming the market.

In this respect, we analyzed the investment performance of 60 individual investors purposively drawn from the account data of 4 brokerage firms for the period of 6 years.

In summary, the findings suggest that in general investors who have less amounts of portfolio value and turnover rates, have tendency to outperform the market and thus exhibit superior performance. Since higher levels of turnover are associated with overtrading, this finding confirms the previous study results displaying investors hurt their performance by overtrading (Barber and Odean, 2000).

Similarly, the findings of the current study also revealed that the investors exhibiting superior performance (outperforming the market) are the ones who are more educated and the ones who rely on the recommendations of experts (brokerage firm experts, TV and media comments, periodical experts) while investing their money.

Another study result is that we find strong evidence of women investors as compared to men investors and single investors as compared to married ones perform better in common stock investments. This finding also confirms the previous literature exhibiting the relation between demographics and trading performance of individual (Barber and Odean, 2001). An examination of the correlation table also displays a positive association between turnover and gender, indicating male investors have higher turnover rates. This result is also in parallel with the previous research displaying that men overtrade more than women due to their higher confidence levels. Moreover, this finding might be also the reason explaining the inverse relation between turnover and performance aroused in the study.

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Table 1 Brief summary about the demographic profile of investors

Demographics	Frequency	Percentage
Gender		
Male	46	76.63
Female	14	23.33
Education		
High school	19	31.66
University graduate	32	53.33
Post graduate	9	15
Marital status		
Married	42	70
Single/widowed	18	30
Age		
21-30	1	1.66
31-40	23	38.33
41-50	21	35
51-60	9	15
61 and over	6	10

Table 2 Definitions about the study variables

Study variables	Definitions and Measurements
ISE (Istanbul Stock Exchange) return	The average monthly portfolio return of ISE 100 index (\$)
Return	The average monthly portfolio return of investor (\$)
Abnormal return	Average monthly return of ISE index-Average monthly return of investor
Performance	(1)=If Abnormal return is >0 ; (0)=If abnormal return< 0
Volume	Monthly trading volume of the investors (\$)
Value	Investor's total portfolio value used only for common stock investment on monthly basis (\$)
Turnover	Monthly portfolio turnover calculated as the monthly trading volume divided by portfolio value.
Age	Age of investors men=1 women=0
Marital status	Married=1 single/widow=0
Children	Number of children the investor has
Education	Education level of the investors Middle school=1 High school=2 University graduate=3 Post graduate=4
Investment period	a)sells daily (1) b)1-3 days (2) c)weekly(3) d)monthly(4) e)1-12 months (5)
Analysis method	The investor's indication as to which of the following common stock evaluation approach he employs a. technical analysis b. fundamental analysis d) rely on account executive for advice e) brokerage house
Share number (verification)	Number of stocks allocated in your portfolio a)one stock(1) b)2-5 stocks(2) c)5-10 stocks(3) d)more than 10 stocks(4)
Consulting	Whether or not the investor consults or relies on the recommendations of brokerage firm experts, TV and media comments or periodical experts while investing? a. Yes I consult and rely on the recommendations (1) b. No, I do not consult.(0)
Investment Percent	The percentage of the investor's total asset holdings which he reports is invested in common stocks a.0-20% (1) b.20-40% (2) c.40-60% (3) d.60-80% (4) e.80% and over(5)

Note: The numbers in parentheses corresponds to codes in data encoding.

Table 3 Descriptive statistics about the study variables

	Mean	Standard Error	Median	Mode	St. Deviation	Range	Minimum	Maximum	Sum
ISE'S RETURN	2,773	0,288	1,033	-1,104	19,053	135,823	-42,900	92,923	12147,843
RETURN	2,342	0,267	0,741	#N/A	17,699	187,960	-79,750	108,210	10258,816
ABNORMAL RETURN	-0,431	0,128	-0,040	#N/A	8,504	116,566	-64,608	51,959	-1889,027
VALUE	1012238,730	22917,398	504438,192	#N/A	1516709,370	13432728,380	2648,332	13435376,715	4433605637,211
TURNOVER	59,021	0,821	48,042	#N/A	54,359	409,187	0,862	410,050	258510,384
AGE	43,817	0,128	43,000	39,000	8,452	37,000	29,000	66,000	191917,000
SEX	-	0,006	1,000	1,000	0,423	1,000	0,000	1,000	3358,000
EDUCATION	2,683	0,012	3,000	3,000	0,785	3,000	1,000	4,000	11753,000
MARITAL ST	-	0,010	1,000	1,000	0,654	3,000	0,000	3,000	3723,000
CHILD	1,333	0,017	2,000	2,000	1,106	4,000	0,000	4,000	5840,000
INV.PERIOD	1,783	0,013	1,500	1,000	0,858	2,000	1,000	3,000	7811,000
SHARE NUMBER	2,583	0,017	3,000	3,000	1,130	4,000	1,000	5,000	11315,000
ANY METHOD	1,967	0,013	2,000	1,000	0,875	2,000	1,000	3,000	8614,000
CONSULTING	3,617	0,016	4,000	4,000	1,066	4,000	1,000	5,000	15841,000
INV PERCENT	4,250	0,011	4,000	4,000	0,745	3,000	2,000	5,000	18615,000

Note: This table presents descriptive statistics about the study variables

Table 4 Correlation table among the study variables

	PERFORMA	VALUE	TURNOVER	AGE	SEX	EDUCATION	MARITAL	INVPERIOD	SHRENUM	ANALYSIS	CONSULTI	INVPERCE
PERFORMA	1.000											
VALUE	.369*	1.000										
TURNOVER	-.574*	-.537*	1.000									
AGE	.231*	.325*	-.135*	1.000								
SEX	-.499*	-.208*	.391*	-.183*	1.000							
EDUCATIO	.098*	.060*	-.048*	-.075*	.111*	1.000						
MARITAL	.322*	.316*	-.389*	.197*	-.264*	.129*	1.000					
INVPERIO	.416*	.456*	-.431*	.258*	-.373*	.220*	.299*	1.000				
SHARENUM	.084*	.070*	.128*	.251*	-.187*	-.074*	.079*	.251*	1.000			
ANALY/METHOD	.823*	.432*	-.668*	.267*	-.601*	.105*	.390*	.506*	.119*	1.000		
CONSULTI	.231*	.151*	-.232*	.181*	-.014*	.009*	.096*	.321*	.007*	.273*	1.000	
INVPERCE	-.152*	-.077*	.196*	-.164*	.205*	-.150*	-.297*	-.307*	-.253*	-.181*	-.150*	1.000

Notes: This table presents the Pearson's Correlation matrix for the main variables used in our analysis. Definitions for all variables are provided in Table 2.

* Correlation is significant at the 0.01 level (2-tailed)

Table 5 Binomial logistic regression estimations predicting superior trading performance

Predictors	B	Std. Error	Wald	p-value	Exp (B)
Intercept	4.683	.5423	74.593	.000	
Value	-.1980	.0808	6.003	.014	.8204
Turnover	-.0642	.0025	683.12	.000	.9378
Gender (1=men)	-1.0530	.1004	109.93	.000	.3489
Education	.2498	.0659	14.869	.046	1.28
Marital status(1=married)	-.1482	.0659	5.056	.024	.8628
Consulting	.3584	.1391	74.593	.010	1.431
Goodness of fit tests	Value				
Cox & Snell R ²	.498				
Nagelkerke R ²	.670				
-2 Log Likelihood	2886.52				

Notes: This table provides results of the stepwise (forward) binomial logistic regression. The dependent variable is a dummy variable which takes the value of unity for the values where abnormal return is positive and takes the value of "0" for the values where abnormal return is negative. The reference categories for the categorical independent variables are specified in parentheses.