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Effects of Aging on Gender Differences in Financial Markets

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Abstract

Gender differences in risk-taking and investment decisions have been widely documented in the financial markets. Utilizing trading information from individual investor brokerage accounts, this paper explores the effects of aging on gender differences in terms of portfolio turnover and returns. We document that male investors trade more frequently than female investors and yield lower portfolio returns, but these gender differences attenuate substantially with age. Our study suggests that gender differences documented by experiments or surveys with young participants might not be generalized across age groups.

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1. Introduction

Gender differences have been observed in many economic experiments and financial markets. One of the most robust findings is that men are less risk-averse than women. A survey paper by Groson and Gneezy (2009) summarizes the gender difference in risk preferences using laboratory experiments of probability lotteries and portfolio selection. Dwyer et al. (2002) find that women exhibit less risk-taking than men in their mutual fund decisions. Studies also have documented significant gender differences in terms of social preferences (Frank et al. 1993), competitive preferences (Niederle and Vesterlund 2011), and time preferences (Dittrich and Leipold 2014). They have found women to be more cooperative, less competitive, and more patient in comparison to man. Furthermore, Bengtsson et al. (2005) find that male students are more inclined than female students to be overconfident. Barber and Odean (2001), using brokerage account data, provide robust evidence that men trade more frequently than women and their trading reduces returns.

Despite the vast evidence on gender differences documented in the literature, little is known about the robustness of gender differences across age groups. This paper fills in that gap by investigating the effects of aging on gender differences in investor trading behavior. Using the trading information in individual brokerage accounts, we find that male investors trade more frequently than female investors but that gender difference in portfolio turnover attenuates with the investor's age. The performance difference between male and female investors also disappears among older investors.

Our study explores an important economic question: Can gender differences in the financial markets be viewed as general traits? Atkinson et al. (2003) examine the performance and investment behavior of female, fixed-income mutual fund managers and find that funds run by female or male managers do not differ significantly in terms of performance, risk and other characteristics. Gneezy et al. (2009), using a controlled experiment across two distinct societies, document the rare phenomenon that women choose the competitive environment more often than men in a so-called matrilineal society. Sunden and Surette (1998) highlight the effects marital status and other portfolio assets when considering gender differences in retirement saving plan investment.

Our paper contributes to the literature by examining the effects of aging on gender differences in risk-taking and investment decisions in financial markets. Our finding that the trading differences of male and female investors attenuate with investor's age suggests that age is an important factor affecting gender difference. Gender differences documented in the literature from experiments or surveys with young participants might not be generalized across different age groups.

The rest of the paper is organized as follows. Section 2 describes the data and related variables. Section 3 presents the empirical results. Section 4 concludes.

2. Data and Variables

Our analysis is based on a unique data sample provided by a representative nationwide brokerage firm in China. There are around 11,000 active investors who made at least one trade during our sample period, from January 2005 to November 2008. The data consist of three files: account file, trade file, and position file. The account file includes investor gender, age, and total account value at the end of sample period. The trade file includes all the trading records of each individual investor during our sample period. The position file contains the information of stocks held by each investor at the end of November 2008. Combining the position file and trade file, we can obtain the monthly portfolio holdings for each investor in our sample. The stocks in our data set are A-shares listed on two major stock exchanges in China, the Shanghai Stock Exchanges (SHSE) and the Shenzhen Stock Exchange (SZSE). We obtain the monthly stock returns from DataStream. The value weighted average returns of the SHSE A-Share Index and the SZSE A-Share Index are calculated as market returns.

Table 1. Summary Statistics

Panel A summarizes the characteristics of individual investors. Male is a dummy variable taking the value of 1 for male investors and 0 for female investors. Age represents the age of individual investors at the end of sample period. Wealth is proxied by the total value of investors' brokerage accounts at the end of sample period. Panel B summarizes the monthly investor portfolio turnover and return, and monthly market return. The monthly portfolio turnover is calculated using half of the buying turnover plus half of the selling turnover. Portfolio return is the value weighted average monthly returns of stocks held in each individual portfolio. Market return is the value weighted average returns of the SHSE A-shares Index and the SZSE A-share Index.

Panel A: Individual Investors Characteristics

Variable	N	Mean	SD	Min	P25	Median	P75	Max
Male	11209	0.53	0.50	0	0	1	1	1
Age	11209	46.2	10.3	20	38	46	54	70
Wealth	11209	183418	8827659	0	302	17787	71486	933000000

Panel B: Investor Portfolios and Market Returns

Variable	N	Mean	SD	Min	P25	Median	P75	Max
Turnover	432203	0.046	0.118	0.000	0.000	0.000	0.000	0.999
Portfolio Return	432203	0.015	0.164	-1.000	-0.076	0.006	0.099	10.347
Market Return	432203	0.019	0.106	-0.243	-0.050	0.033	0.088	0.255

Panel A of Table 1 summarizes the characteristics of individual investors. *Male* is a dummy variable taking the value of 1 for male investors and 0 for female investors. The mean value is 0.53, which means about 53% of the investors in our sample are male. *Age* represents the investor's age at the end of sample period. The average age of investors in our sample is 46.2, and standard deviation of age is 10.3. We define the younger investors in our sample as those aged below our sample median of 46 and older investors (Elder dummy) as those who aged 46 or older. Wealth is proxied by the total value of the investor's brokerage account at the end of the

sample period. Panel B of Table 1 summarizes the monthly investor portfolio turnover and return, and the monthly market return. Following Barber and Odean (2001), we calculate the monthly portfolio turnover as half of the buying turnover plus half of the selling turnover. The average portfolio turnover is around 4.6% with standard deviation of 11.8%. The portfolio return is the value weighted average monthly returns of stocks held in the investor's monthly portfolio. The average portfolio return is 1.5%, which is slightly lower than the average market return of 1.9%. Both the portfolio returns and market returns exhibit large standard deviations, showing that our sample covers a volatile market period.

3. Empirical Results

We examine the effects of aging on gender differences in terms of investor's portfolio turnover and portfolio returns. For each investor, we first calculate his/her average monthly portfolio turnover and returns over the entire sample period. Then, we summarize and compare the average portfolio turnover and returns of male and female investors across different age groups.

Table 2. Effect of Aging on Gender Difference in Portfolio Turnover

This table summarizes and compares the monthly portfolio turnover (averaged over the sample period) of male and female investors across different age groups. Younger Investors are those investors aged below the sample median of 46. Elder investors are those aged 46 or above. Gender difference in portfolio turnover is calculated using the portfolio turnover of male investors deducting that of the female investors. The statistical significance of gender difference is obtained using t-tests. *, **, and *** denote the two-tailed t-test significance at the 10, 5, and 1 percent level, respectively.

	# of Investors	Male	Female	Gender Difference (Male-Female)	t-statistics
Whole Sample	11209	0.0629	0.0568	0.0061***	4.1633
Younger Investors	5568	0.0706	0.0621	0.0085***	3.7362
Elder Investors	5641	0.0548	0.0519	0.0029	1.5599
Investor Groups					
Age 20-30	630	0.1039	0.0884	0.0156*	1.6674
Age 31-40	3013	0.0709	0.0628	0.0081***	2.6391
Age 41-50	3630	0.0558	0.0503	0.0055**	2.4667
Age 51-60	2875	0.0560	0.0541	0.0020	0.7228
Age 61-70	1061	0.0548	0.0535	0.0013	0.3033

Table 2 reports the t-test results on investor portfolio turnover. Male investors in general trade more frequently than female investors by 0.61%, with the t-statistics of 4.16. The gender difference in portfolio turnover is even larger among younger investors, with the difference of 0.85% (significant at 1% level). However, among older investors, we find no significant gender difference in turnover. Furthermore, when we partition investors by age groups of 10 years, we observe a monotonic decreasing gender differences as investor age increases. For example, for investors aged between 20 and 30, male investors trade more frequently than female investors by

1.56%, and the differences decrease to 0.81%, 0.55%, 0.20% (not significant), and 0.13% (not significant) as investor's age increases by decade.

Table 3. Effect of Aging on Gender Difference in Portfolio Returns

This table summarizes and compares the monthly portfolio returns (averaged over the sample period) of male and female investors across different age groups. Younger Investors are those investors aged below the sample median of 46. Elder investors are those aged 46 or above. Gender difference in portfolio returns is calculated using the portfolio returns of male investors deducting those of the female investors. The statistical significance of gender difference is obtained using t-tests. *, **, and *** denote the two-tailed t-test significance at the 10, 5, and 1 percent level, respectively.

	# of Investors	Male	Female	Gender Difference (Male-Female)	t-statistics
Whole Sample	11209	0.0128	0.0153	-0.0025**	-2.484
Younger Investors	5568	0.0126	0.0156	-0.0031*	-1.9089
Elder Investors	5641	0.0130	0.0150	-0.0021	-1.5924
Investor Groups					
Age 20-30	630	0.0211	0.0171	0.0039	0.9082
Age 31-40	3013	0.0111	0.0158	-0.0047**	-1.9884
Age 41-50	3630	0.0126	0.0156	-0.0031**	-2.0444
Age 51-60	2875	0.0138	0.0140	-0.0002	-0.1281
Age 61-70	1061	0.0107	0.0157	-0.0051	-1.2715

Table 3 follows the same procedure as Table 2 but focuses on investors' portfolio returns. Similar to the results documented in Barber and Odean (2001), we find that male investors perform worse than female investors with the difference in monthly portfolio returns of 0.25%. However, the underperformance of male investors versus female investors only exists among younger investors, and there is no significant difference in portfolio returns of older male investors and female investors. As an additional note, we find no performance differences between the younger investors and older investors. Consistent with the argument in Korniotis and Kumar (2011), older investors gain more experience about trading, but investment skill deteriorates with cognitive aging.

The higher portfolio turnover and lower portfolio returns can be attributed to a higher degree of investor overconfidence (see Odean, 1998; Statman et al., 2006). Our findings suggest that the widely cited argument that men are more overconfident than women in financial decisions might hold mainly among younger investors. Moreover, marital status could not fully explain our finding, since the gender differences in portfolio turnover and returns are significant for those investors in their 30s and 40s.

To further clarifying the significance of aging effects, we exploit a difference-in-difference strategy by regressing the monthly portfolio turnover and returns on the Male dummy and the Elder dummy and on the interaction of these two dummies, controlling for wealth effect,

past one-month portfolio returns, and market returns/time fixed effects.[1] The difference-in-difference strategy can also help controlling for economic shocks, like macroeconomic experiences or advances of trading technologies, because we do not expect these shocks affect male or female investors differently. The main variable of interest is Elder*Male, capturing the difference-in-difference across age and gender.

Table 4. Panel Regression of the Effects of Aging on Gender Differences

This table reports the panel regression results of the effects of aging on gender differences in terms of monthly portfolio turnover and returns. Male is a dummy variable taking the value of 1 for male investors and 0 for female investors. Elder is a dummy variable taking the value of 1 for investors aged 46 or above and 0 for investors aged below 46. LN Wealth is the logarithm of investor wealth, which is proxied by the total value of investor brokerage account at the end of sample period. Past portfolio return is the previous one-month portfolio return of each investor. Market return is the value weighted average returns of the SHSE A-shares Index and the SZSE A-share Index. Year-Month dummies are dummy variables indicating each month during the sample period. Standard errors are clustered at the investor level. T-statistics are reported below the coefficient in parenthesis. *, **, and *** denote significance at the 10, 5, and 1 percent level, respectively (two-tailed).

	(1) Turnover	(2) Turnover	(3) Portfolio Return	(4) Portfolio Return
Male	0.0052*	0.0048*	-0.0026***	-0.0024**
	(1.93)	(1.78)	(-2.73)	(-2.52)
Elder	-0.0034***	-0.0028**	-0.0009**	-0.0007
	(-2.84)	(-2.29)	(-2.11)	(-1.61)
Elder * Male	-0.0044**	-0.0046**	0.0012**	0.0010*
	(-2.43)	(-2.55)	(1.97)	(1.65)
LN Wealth	-0.0017***	-0.0026***	-0.0002***	-0.0004***
	(-10.21)	(-15.52)	(-2.84)	(-5.48)
LN Wealth * Male	0.0003	0.0004	0.0002**	0.0002**
	(1.21)	(1.45)	(2.14)	(2.05)
Past Portfolio Return	0.0749***	0.0204***	0.0027**	-0.0455***
	(43.02)	(9.23)	(2.25)	(-21.97)
Market Return	0.0401***		0.9551***	
	(19.81)		(449.29)	
Constant	0.0587***	0.1376***	-0.0000	0.1035***
	(32.82)	(52.58)	(-0.01)	(55.25)
Year-Month Dummy	No	Yes	No	Yes
# of Observations	420994	420994	420994	420994
Adjusted R-square	0.017	0.072	0.385	0.536

[1] Note that the analyses of gender difference across age groups in Table 2 and 3 show the patterns of aging effects, but have not shown the statistical significance.

We report the regression results in Table 4, with standard errors clustered at the investor level. The dependent variable in regressions (1) and (2) is portfolio turnover, and regression (2) drops market returns and includes times fixed effects. In regression (1), the coefficient of Elder*Male is -0.44%, which is different from zero at the 1% significance level. Male investors trade more frequently than female investors, but being older reduces this gender difference by 0.44%. This effect is also economically large. Recall the mean gender difference on turnover in the whole sample (in Table 2) is 0.61%. Being older reduces this difference by around 72% (=0.44%/0.61%) of its sample mean. The other controlling variables are also worth mentioning. Wealthier investors have lower portfolio turnover, but the wealth effect cannot explain gender difference in turnover. Past portfolio returns and market returns are both positively related to portfolio turnover, which is similar to the findings in Glaser and Weber (2009), supporting the argument that attribution bias creates overconfident traders with higher trading frequency. The results in regression (2) are virtually unchanged from those in regression (1).

We examine the effects of aging on gender difference in portfolio returns in regressions (3) and (4) of Table 4. Consistent with previous findings in Table 3, we show that the coefficients of Elder*Male are significantly positive, with magnitudes of around 0.1%, which means the underperformance of males among older investors is reduced by 0.1% in monthly portfolio returns. Considering the mean underperformance of male investors of 0.25% (in Table 3), being older reduces the underperformance by 40% (=0.1%/0.25%) of its sample mean.

Overall, we find both statistically and economically significant evidence that gender differences in portfolio turnover and portfolio returns attenuate with age, and these findings are robust after controlling wealth effects, past portfolio returns, and time fixed effects.

4. Conclusions

This paper examines the effects of aging on gender differences in terms of portfolio turnover and portfolio returns. Utilizing the individual investors trading information in their brokerage accounts, we document that male investors trade more frequently and perform worse than female investors, but these gender differences attenuate substantially with age. Our study highlights the importance of incorporating age effects when examining gender differences in risk-taking and investment decisions. Our results imply that gender differences documented in the literature from experiments or surveys with only young respondents cannot be generalized across age groups.

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