Do better educated investors make smarter investment decisions?

Petra Halling[1]

University of Vienna

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[1] Contact: petra.halling@univie.ac.at or petra.halling@utah.edu; Phone: +1 801 585 7340.

Abstract

This paper analyzes the role of human capital and education in investment decision making. Using data from an Austrian online broker from 2001 to 2007 which contains detailed information on individuals' domestic and foreign investments, I examine whether better educated investors make smarter investment decisions and exhibit greater investment skill than less educated ones. I analyze how the education of individuals influences the general performance as well as excess trading, underdiversification and the home bias phenomenon. I find that older investors and traders with a university degree achieve a better stock investment performance than less educated and younger individuals. Contradicting the recent literature which claims that excess trading hurts the performance of individuals, I show that female investors who trade most outperform women who trade less frequently. Better education increases the performance of both local and international stock traders.

JEL classification: G11, I21

Keywords: education, private investors, investment performance, home bias, excess trading, underdiversification

1 Introduction

Household finance, a relatively new strand of literature in financial economics, has received growing attention during the past few years. As Campbell (2006) points out, the household finance literature asks "how households use financial instruments to attain their objectives", while papers in corporate finance question how firms "use financial instruments to further the interest of their owners, and in particular to resolve agency problems".

This paper fits into the household finance literature by analyzing the role of human capital and education in investment decision making. Using new data that directly links information on the education of private investors and their trading history in domestic and foreign stocks, I examine whether better educated investors make smarter investment decisions and therefore achieve a higher investment performance than less educated ones. I do also analyze how education influences excess trading, underdiversification and home bias. In addition to the level of education, the data also reveals information about special education in certain fields. I exploit that issue by analyzing how specific knowledge influences investment decisions and performance.

The retail investor literature has documented that private investors make investment decisions which do not follow the advice of mainstream finance. Barber and Odean (2000) show that individual investors hurt their stock investment performance by trading too much. They argue that overconfidence of individuals accounts for high trading levels. I investigate the relation between education and excess trading, considering that better educated investors might be more confident – or too confident – concerning their investment skill.

The home bias phenomenon refers to the fact that investors tend to hold domestic portfolios despite the benefits of international diversification (French and Poterba (1991)). The recent literature has put forward two main explanations for this bias. Investors may prefer to invest locally because of the frictions associated with national boundaries. Grinblatt and Keloharju (2001) find that language, culture and distance are important attributes for investors when trading stocks. Knüpfer (2007) documents that investors living in high community spirit areas where people interact a lot with each other are more likely to overweight local stocks due to loyalty. Another explanation for preference for local stocks is related to informational advantages. Coval and Moskowitz (1999) show that investment managers overweight local stocks in domestic equity

portfolios. They suggest asymmetric information between local and non-local investors as the main reason for selecting investments which are close from a geographical perspective. In the household finance literature, researchers disagree whether investors are able to exploit local knowledge and achieve superior returns in local stocks. Ivkovic and Weisbenner (2005) claim that individuals have better information about their local investments. Using the same dataset, Seasholes and Zhu (2005) strongly disagree and argue that the findings of Ivkovic and Weisbenner (2005) are driven by cross-sectional correlation of stock returns. They conclude that living near a company does not lead to any value-relevant informational advantage. Using new data, this paper attempts to shed further light on this discussion. Whereas Ivkovic and Weisbenner (2005) and Seasholes and Zhu (2005) are only able to compare local and nonlocal domestic investments, this paper also looks at international investments of individual investors. I investigate whether better educated investors, possibly possessing better information processing capabilities, achieve different returns in their domestic and foreign investments than less educated individuals.

Several studies have documented that investors hold only a few assets in their stock portfolios. Ivkovic et al (2008) classify investors as holding concentrated or diversified portfolios according to the number of stocks in their account.[2] They test whether individuals hold concentrated portfolios because of informational advantages and find support for this hypothesis. Additional to the number of stocks in the portfolio, Goetzmann and Kumar (2008) use the normalized portfolio variance and the deviation from the market portfolio as measures of diversification. They investigate how investors' diversification choices develop over time and how they are related to individual investor characteristics. As a measure of education, they use the proportion of people with a bachelor's degree living in the zip code area of a sample investor. I investigate a similar question knowing unambiguously whether a sample investor has received a university degree or not.

In the economics literature, human capital is an important variable in various fields. Romer (1986) develops an "equilibrium model of endogenous technological change in which long-run growth is driven primarily by the accumulation of knowledge by forward-looking, profit-maximizing agents". Ashenfelter and Krueger (1994) estimate the economic returns to schooling and conclude that each completed year of school

[2] An investor with one or two stocks in the portfolio is classified as concentrated. A portfolio of three or more stocks is considered to be diversified.

education raises the wage rate of workers by 12 to 16 percent. In household finance, the role of education has been analyzed in the context of stock market participation of households (Mankiw and Zeldes (1991), Bertaut (1998), among others). The general finding of this literature is that higher education of investors leads to a higher propensity to participate in the stock market. Christiansen et al. (2008) document that economists have a significantly higher probability of stock market participation than investors with any other educational background.

To my knowledge, research in household finance has lacked exact data that is able to directly link information on education and specific knowledge of investors to trading histories and investment decisions of individuals. The literature has tried to draw conclusions about the education of investors from other available variables. Dhar and Zhu (2006) use the occupational status of individuals to proxy for their education. They argue that people having professional occupations (professional/technical or managerial/administrative positions) are likely to possess a better education than those with non-professional occupations (white collar/clerical, blue collar/craftsman or service/sales positions). Goetzmann and Kumar (2008) and Korniotis and Kumar (2008a, 2008b) infer the education level of investors from their zip code. Individuals who live in a zip code area with a higher proportion of people with a bachelor's degree are assumed to be more educated. Calvet, Campbell and Sodini (2007, 2008) use high school and post-high school dummies for the household lead, but can link these variables to end-of-year wealth information only as their data does not provide the exact price and timing of asset trades.

The data used in this paper has two unique features. First, it provides a direct link between the trading history of individuals and their education. Besides other socio-demographic variables like age, gender and nationality, the data reveals for each investor in the sample whether she has finished a university degree or not. An interesting characteristic of the education variable is that some academic degrees in the sample provide information on the particular type of studies of the investor, i.e. economics/business administration or science/engineering. This data like all other socio-demographic information is not self-reported, but has to be confirmed when the investor opens an account. The second specific feature of the sample is that investors are not restricted to trading domestic products. They may diversify internationally.

The main findings of this paper are as follows. The average sample individual achieves a monthly stock investment performance of 0.61% before transaction costs. Older investors and individuals with a university degree achieve a higher portfolio performance when trading stocks than less educated and younger ones. Like in Barber and Odean (2001), female investors outperform men. These results are robust to the inclusion of different performance measures. Panel regression estimations show the following: Depending on the econometric model estimated, the stock investment performance of individuals with a degree is between 51 and 91 basis points higher than the one of traders without a degree. If the degree variable is split up into different backgrounds, I find that all distinct degrees have a positive coefficient, with the "Mag" degree[3] having the most positive influence on the stock investment performance, followed by investors who have finished doctoral studies and individuals with special knowledge in technical disciplines.

Looking at the relation between turnover and performance, the results of Barber and Odean (2000) who show that investors who trade less outperform individuals who trade most, can be confirmed for raw returns only. Including investor attributes in the analysis, I find that female investors in the highest turnover quintile outperform women in the lowest turnover quintile when measuring performance via Jensen's Alpha. This is true for both women with and without university degree. A panel regression analysis indicates that being male increases the stock turnover rate, whereas holding a university degree decreases it.

Analyzing portfolio concentration, I present evidence that diversified investors outperform individuals who hold concentrated portfolios. The performance differential is higher for women than for men. I do also find that internationally diversified investors achieve a better performance than individuals who trade local stocks only. Better education increases the performance of both local and international investors.

The remainder of this paper is organized as follows. Section 2 introduces the data used in this paper. Section 3 describes the methodology. Section 4 presents the results of the empirical analysis. Section 5 concludes.

[3] The Austrian degree "Mag" represents a master degree which can be obtained from various fields of specialization.

2 Data

The data consist of two different files: an account data file, and a demographical data file. The data are provided by an Austrian online broker in anonymous form and range from September 2001 to July 2007 with a daily frequency.

The basic account data file contains the entire record of all trades of each investor over the sample period. In total, this file provides information about 3 338 686 different trades. Each investor's account can be identified via a unique account identifier. I further know the exact trade date, a unique identifier of the traded security, the quantity traded, the trade price (before transaction costs), the trade currency, the relevant exchange rate in case the security has been traded in another currency than EUR, an indicator whether the security has been sold or bought, and a variable that reveals the asset class of the traded security.

The account data contains trades in various assets classes: stocks, mutual funds, certificates, and options. I follow existing research and do not look at other asset classes than equity. Extracting all trades in stocks, I end up with 1 921 075 distinct trades to be analyzed.

The second data file provides the following socio-demographic information on the clients of the online broker: age, gender, academic degrees (education), and citizenship.

Table 1 presents the number of investors who belong to different subsamples that are formed based on either demographic (gender and education) or trade-behavior related characteristics (investors who trade all asset classes and equity traders). It is interesting to mention that not all investors in the sample trade stocks: there are 22776 investors in the sample out of which 16708 (73%) trade in equity.

It can be seen that the average trader in the sample is male and has not finished a university degree: around 15% of investors are female, and around 30% of traders do not hold an academic degree. Men also dominate women if we further analyze subsamples formed based on gender *and* education: 27% of investors are male and hold a university degree, whereas 3% of investors are female degreeholders. 58% of the traders are male and have not finished a university education. Female investors without a degree represent 12% of the sample population. It is interesting to mention that the percentages are similar for all traders in the sample and for the subsample of investors who trade in equity.

If we look at the trading attitude, investors who trade in equity represent similar proportions in the demographic subsamples: 73.36% of all investors are equity traders. The same is true for 73.76% of men, 71.17% of women, 74.17% of academics and 73.01% of non-academics (percentages are not reported explicitly in the table).

Table 1. Comparison of investor types across different subsamples

This table presents the number of investors in different demographic and trade-behavior related subsamples of the master data. In the columns, investors with different trading behavior are considered. The column "Whole Sample" includes all investors that may trade all different kinds of asset classes. The "Equity traders" include all investors in the sample who trade in equity at least once over the observation period. The rows of the table differentiate investors according to various socio-demographic variables. The first row "All Investors" is the reference category includes all investors irrespective of demographic characteristics. The second row "Male" examines male investors only, whereas the third row "Female" looks at female investors. "Degree" means that all investors holding an academic title, no matter which one, are considered. "No Degree" refers to traders who have not finished a degree at university. Percentages are calculated columnwise and are given in parenthesis.

Investor Type	All Traders	Equity Traders
All Investors	22776 (100%)	16708 (100%)
Male	19248 (84.51%)	14197 (84.97%)
Female	3528 (15.49%)	2511 (15.03%)
Degree	6875 (30.19%)	5099 (30.52%)
No Degree	15901 (69.81%)	11609 (69.48%)
Male & Degree	6055 (26.59%)	4536 (27.15%)
Male & No Degree	13193 (57.93%)	9661 (57.82%)
Female & Degree	820 (3.60%)	563 (3.37%)
Female & No Degree	2708 (11.89%)	1948 (11.66%)

The academic degrees of individual investors are an important feature of my data. The different titles allow me to explore the role of education in investment decision making. The data provide information on the following (Austrian) academic degrees an investor holds: Ing, DI, Mag, Dr, or Dkfm (which are the abbreviations for *Ingenieur*, *Diplomingenieur*, *Magister*, *Doktor* and *Diplomkaufmann*, respectively).

Once an investor holds an academic degree, we obviously know that she finished university education. Furthermore, we are able to draw conclusions about the educational background and the fields of specialization of the investors via their degrees. "Ing" and "DI" reveal that the investor must have some science/engineering background where the former indicates that the investor has finished a program at a high school with a science curriculum and has at least three years of specific job experience and the latter means that the investor has finished some science/engineering program at university. Therefore, I am able to differentiate between investors with and without university education within the sub-sample of investors who have a science background. The degree "Dkfm" reveals that this investor either holds an economics or a business degree from a university. It was used in Austria until 1975 and is still used in Germany while graduates from an Austrian business program now receive the degree "Magister" (abbreviated as Mag). Since the Austrian "Magister" nowadays might be held by graduates with diverse backgrounds including education, pharmacy, psychology, arts and humanities as well as economics and business administration, it is not possible to infer anything about their fields of specialization from this degree.

The degree "Dr" is also awarded to students with diverse backgrounds. It is carried by medical doctors as well as graduates who finish a PhD. Although it is not possible to draw any conclusions about the exact field of specialization of an investor from this degree, we do know, however, that such an investor finished a program with a total of at least six years of university education.

Table 2 shows how all 6875 investors who hold a degree are distributed in different trader type related samples. The following is true for the whole sample of investors as well as for the subsample of individuals who trade in equity. We observe that the majority of academics, around 40%, hold the degree "Mag", a degree that cannot be used for drawing conclusions about a specific background, similar to around 18% of investors who hold the degree "Dr". However, from about 40% of investors we know that they have a technical background: around 22% of the degreeholders may use the

degree “Ing”, and 19% have finished a technical/engineering education at a university and hold the degree “DI”.

Table 2. Comparison of trader types and education characteristics

This table shows the number of investor with a specific degree in different trading-behavior related samples. The columns differentiate investors who trade any asset class (“All Traders”) and investor who trade in equity at least once during the observation period (“Equity Traders”). The rows differentiate investors according to the specific degree that they hold. The first row (“Any”) is the reference category and represents all sample investors with a degree. “Ing” and “DI” refer to investors who have a technical/engineering background (the latter have studied at university, the former not) and “Dkfm” represents investors with special education in economics/business administration. “Mag” and “Dr” investors may have any educational background, while the latter had at least six years of university education. Percentages are calculated columnwise and are given in parenthesis.

Degree	All Traders	Equity Traders
Any	6875 (100%)	5099 (100%)
Ing	1507 (21.92%)	1159 (22.73%)
DI	1261 (18.34%)	962 (18.87%)
Mag	2736 (39.80%)	2005 (39.32%)
Dkfm	145 (2.11%)	94 (1.84%)
Dr	1226 (17.83%)	879 (17.24%)

Table 3 describes the socio-demographic and portfolio characteristics of different groups of investors: all investors who trade in stocks, and equity traders with and without a degree. More than half of the individuals in the different groups trade options. The proportion of equity traders who also invest in mutual funds is 37.78% for all sample traders and 34.83% out of those investors who have no degree. While education does not seem to influence the proportion of option traders a lot, 44.47% of stock traders with a degree do also invest in mutual funds. The percentage of male investors as well as the average money amount invested when trading stocks are lowest in the sample of stock traders without a degree (83.36% and EUR 4113 respectively). The average investor is 39 years old when trading stocks and trades 99 times over the

observation period. These two variables as well as the median number of stock trades over the observation period are similar for all investor groups examined.

Table 3. Portfolio Characteristics, Education, and Investor Characteristics
This table compares the portfolio and socio-demographic characteristics of all equity traders ("All"), stock traders with and without a degree ("Degree" and "No Degree", respectively). "Proportion Option Trader" and "Proportion Mutual Fund Trader" refers to individuals who trade at least once in options or mutual funds, respectively. "Proportion Male" describes the percentage of male investors. "Average Trade Size" is the mean amount invested when trading in stocks. "Average Number Stock Trades" and "Median Number Stock Trades" are the average and median number of stock trades per investor over the whole observation period, respectively. "Age" is the mean age when investors trade in stocks.

Characteristic	All	Degree	No Degree
Proportion Option Trader	52.72%	53.45%	52.49%
Proportion Mutual Fund Trader	37.78%	44.47%	34.83%
Proportion Male	85.09%	88.98%	83.36%
Average Trade Size	EUR 4216	EUR 4468	EUR 4113
Average Number Stock Trades	99	98	99
Median Number Stock Trades	23	22	23
Age	38.66	38.82	38.60

3 Methods

3.1 General Performance

3.1.1 Measuring Returns

I consider all trades in stocks for which end-of-month price time series can be downloaded from Thomson Datastream as of December 2007. I follow the approach by Barber and Odean (2000) when calculating monthly returns for investors' stock portfolios. Purchases and sales of stocks are treated as if they are performed on the last day of the month, i.e. the exact timing of the trades is disregarded. In case of a purchase, the return made from the exact trading time until month-end is excluded. In case of a

sale, the return from the sell date until the last day of the month is included. Stocks that are bought and sold within a month are not considered.[4]

I drop all monthly portfolio returns which exceed the 99% percentile to remove extreme and unreasonable data points. I also delete all return observations that are achieved when the investor is below the age of 25. I select that threshold because students are likely to have finished their education in Austria by that age.

I calculate value weighted returns where the weight of a specific stock is its market value at the end of a particular month divided by the market value of the whole stock portfolio at the same time.

In addition to raw returns, I compute several measures of risk adjusted performance.

First, I estimate the alpha resulting from the market model in excess return form. I regress the investor group stock portfolio return during month t – the average of the stock portfolio returns of all individuals belonging to a specific investor group in month t – on the excess market return during month t. Investor groups are formed based on gender and education. As the sample is provided by an Austrian online broker but investors may buy international stocks, I estimate two market models, applying the Austrian Traded Index (ATX) and a global market factor[5] (MKTGLOB) as market variable.

$$r_{g,t} - r_{f,t} = \alpha_g + \beta_g * (r_{m,t} - r_{f,t}) + \varepsilon_{g,t}$$

where

$r_{g,t}$	stock portfolio return of investor group g in month t
α_g	estimated intercept for investors in group g
β_g	estimated market beta for investor group g
$r_{m,t}$	market return during month t
$r_{f,t}$	risk-free rate[6]
$\varepsilon_{g,t}$	estimated error term.

[4] Barber and Odean (2000) show in the appendix of their paper that accounting for the exact timing of trades would reduce the performance of individuals by around 0.29 percent per year. The inclusion of intramonth trades would increase the annual performance by about 0.06%.

[5] The global market factor is downloaded from the international data section of Ken French's data library.

[6] I use the 1month EURIBOR as riskfree rate.

Second, I employ an intercept test using the international model proposed by Fama and French (1998):

$$r_{g,t} - r_{f,t} = \alpha_g + \beta_g MKTRF_t + h_g HML_t + \varepsilon_{g,t}$$

where $MKTRF_t$ is the value weighted return on a global market factor minus the riskfree rate in month t, , and HML_t is the value weighted return on a global portfolio of high book-to-market stocks minus the value weighted return on a global portfolio of low book-to-market stocks in month t.[7]

3.1.2 Performance and Investor Attributes

To analyze the relation between investor attributes, in particular the education of individuals, and their stock investment performance, I perform a panel data analysis. The panel data's time series dimension covers monthly stock portfolio returns over the period September 2001 to July 2007. The cross-sectional dimension of the data consists of the socio-demographic characteristics of the online brokers' clients who trade in stocks over that time interval. I receive an unbalanced panel as investors enter and exit the sample at different points in time over the observation period.

Consider the following panel data model:

$$r_{it} = \alpha + \sum_k \beta_k * x_{kit} + v_{it}$$

and

$$v_{it} = c_i + u_{it}$$

where

r_{it}	stock portfolio return of investor i in month t
α	(estimated) constant
β_k	(estimated) coefficient of variable x_k
x_{kit}	independent variable k related to investor i in month t
v_{it}	composite error
c_i	unobserved component
u_{it}	idiosyncratic error

[7] For details on the construction of the portfolios, please refer to the international section of the data library on Ken French's homepage.

I estimate the model above using both pooled OLS and random effects analysis, accounting for clustered standard errors.

Table 4 presents the independent variables that are used when estimating the models. I include independent variables that are fixed over the observation period, and variables that change over time.

The variables “Mf_trader” and “Ow_trader” indicate whether the investor - additionally to trading stocks - also invests in mutual funds and options or warrants respectively. “Age” displays the age of the investor at the end of a particular trading month. “Male” provides information about the gender of the investor. It is included in the analysis in order to compare the results of this paper to the ones of Barber and Odean (2001).

Table 4. Independent Variables

This table lists all the independent variables that are used in the panel data regressions.

Variable name	Value	Description
Mf_trader	=1	Stock trader who also trades mutual funds
	=0	Otherwise
Ow_trader	=1	Stock trader who also trades options/warrants
	=0	Otherwise
Age	≥25	Investor age when trading stocks in month t
Male	=1	Investor is male
	=0	Investor is female
Degree	=1	Investor holds any degree
	=0	Investor holds no degree at all
Tech	=1	Investor holds a technical degree
	=0	Otherwise
Econ	=1	Investor holds a business/economics degree
	=0	Otherwise
Long Educ	=1	Investor has the degree "Dr"
	=0	Otherwise
Mag	=1	Investor has the degree "Mag"
	=0	Otherwise
Market		Return of ATX in month t
Num_trade		Number of all stock trades during month t
Turnover		Total turnover rate during month t

The variable “Degree” differentiates between academics and non-academics. It reveals whether an investor holds any degree at all. With the dummies “Tech” and “Econ”, it is possible to draw conclusions about a specific academic background of the trader. “Tech” reveals whether the investor possesses either the degree “Ing” or “DI”, which both refer to a science/engineering background. “Econ” is used to identify investors with special education in economics or business administration. “Long Educ” shows whether the investor has completed doctoral studies, indicating that she has received a university education for a minimum of six years. “Mag” is a university degree that does not reveal any information about the specific field of studies of the investor. “Market” is the return of the Austrian Traded Index (ATX). The following variables aim to measure trading experience. “Num_trade” displays the number of all trades during a particular month respectively. “Turnover” is the total turnover rate during month t, calculated as the average of buy turnover and sell turnover during month t.

3.2 Excess Trading

3.2.1 Measuring Turnover

Monthly total turnover is measured as the average of buy turnover and sales turnover in a particular month. Similar to Barber and Odean (2000, 2001), buy turnover BT_t and sales turnover ST_t for month t are calculated as follows:

$$BT_t = \sum_{i=1}^{N_{j,t}} p_{i,t+1} \min\left(1, \frac{B_{i,t}}{H_{i,t+1}}\right)$$

$$ST_t = \sum_{i=1}^{N_{j,t}} p_{i,t} \min\left(1, \frac{S_{i,t}}{H_{i,t}}\right)$$

where $N_{j,t}$ is the number of stocks held by investor j in month t, $B_{i,t}$ is the number of stock i bought during month t, $S_{i,t}$ is the number of stock i sold during month t, $p_{i,t}$ and $p_{i,t+1}$ is the market value of stock i divided by the total market value of the portfolio at the beginning of month t and month t+1 respectively, $H_{i,t}$ and $H_{i,t+1}$ is the number of stock i held at the beginning of month t and month t+1 respectively. Maximum turnover cannot exceed 100 percent in a month.

3.2.2 Trading Frequencies

To determine trading frequencies, we calculate the number of trades performed by each investor during every month of the observation period. We compute the number of monthly purchases, the number of monthly sales, and the total number of trades per month.

3.2.3 Excess Trading and Investor Attributes

In section 3.1.2, we have introduced a panel data analysis where we examine the relation between stock investment performance and investor attributes, focusing in particular on investor education. In order to investigate the relation between excess trading and investor characteristics, we perform a similar analysis. We now use various measures expressing the trading behavior of individuals as dependent variables when estimating pooled OLS and random effects models: the monthly total turnover rate, the total number of trades during a particular month, the number of purchases per month, as well as the number of sales per month. The independent variables consist of market information and investor-specific characteristics which are presented in table 4. For further details on the model setup, please refer to section 3.1.2.

3.3 Portfolio Concentration

This paper follows Ivkovic et al (2008) in classifying individuals as concentrated or diversified investors by looking at the number of stocks in an individuals' stock portfolio. Concentrated investors hold one or two stocks, whereas diversified investors hold more than two stocks in their portfolio. For both concentrated and diversified investors, I compute the performance measures introduced in section 3.1.1: raw returns, CAPM alphas, and alphas resulting from international one-factor and two-factor models. I do also calculate the performance differential and test it for significance. Please note that I use all available data to calculate the difference portfolio. As a result, the differential portfolio is not always the exact difference between the concentrated and the diversified portfolio (as it would be when using matching months only).

In order to examine the relation between portfolio concentration and education as well as other investor characteristics, I perform a similar analysis as in section 3.1.2 and section 3.2.3. I estimate pooled OLS and random effects models where the number of

stocks in an investor's portfolio in a particular month is regressed on investor attributes and market information. Details on the independent variables can be found in section 3.1.2 and table 4.

3.4 Home Bias

To check for the consequences of home bias, I identify investors who trade Austrian stocks only and individuals who do also buy international stocks. For those two samples, I calculate the same performance measures as introduced in section 3.1.1. I also calculate the performance differential and test it for significance, using all available data.

As described in the previous subsections, I perform a panel regression analysis to analyze the influence of education and other investor attributes on the performance of local and international investors, using pooled OLS and random effects models.

4 Results

4.1 General Performance

Table 5 shows several performance measures for various investor groups which are formed based on investor gender and investor education. We compare value weighted raw returns before transaction costs ("Raw Return"), and the intercepts resulting when regressing the value weighted excess group stock portfolio return on the market excess return ("Alpha ATX" and "Alpha MKTGLOB", depending on which market index is applied), on a global market factor and a global distress factor following Fama and French (1998), ("Alpha FF98").

For all performance measures, we reach the following conclusions when comparing investor groups. Men achieve on average a lower stock investment performance than women, confirming the findings of Barber and Odean (2001). Analyzing education, we observe that investors with a degree achieve a higher stock investment performance than investors who have not finished some university education. If we form investor groups based on gender *and* education at the same time, we find that male investors with a degree outperform men without degree. The same is true for women.

Table 5. Performance Measures and Investor Types

This table shows various performance measures for different investor groups which are formed based on investor attributes. "Raw Return (VW)" is the mean monthly value weighted stock portfolio return of individual investors before transaction costs. "Alpha ATX" and "Alpha MKTGLOB" are the resulting intercepts when regressing the excess value weighted stock portfolio return on the excess return of the Austrian Traded Index (ATX) and the excess return of a global market factor index respectively. "Alpha FF98" is the intercept resulting from a two-factor model as proposed by Fama and French (1998). The stock portfolio return is regressed on the return of a global market factor and the return of a risk factor for relative distress. t-statistics can be found in parenthesis.

	Raw Return	**Alpha ATX**	**Alpha MKTGLOB**	**Alpha FF98**
All Investors	0.0061***	-0.0168**	0.0089*	0.0045
	(29.40)	(-2.46)	(1.79)	(0.80)
Male	0.0059***	-0.0174**	0.0081	0.0037
	(26.21)	(-2.59)	(1.64)	(0.67)
Female	0.0074***	-0.0134*	0.0136**	0.0086
	(13.78)	(-1.75)	(2.33)	(1.29)
Female - Male	0.0015	0.0040*	0.0056**	0.0048*
	(2.61)	(1.82)	(2.30)	(1.72)
Degree	0.0097***	-0.0151**	0.0121**	0.0069
	(29.40)	(-2.15)	(2.48)	(1.26)
No Degree	0.0043***	-0.0178**	0.0074	0.0032
	(16.22)	(-2.62)	(1.44)	(0.55)
No Degree - Degree	-0.0054***	-0.0027	-0.0047**	-0.0037
	(-12.68)	(-1.53)	(-2.43)	(-1.67)
Male & Degree	0.0093***	-0.0156**	0.0105**	0.0060
	(26.84)	(-2.33)	(2.33)	(1.13)
Male & No Degree	0.0040***	-0.0184***	0.0068	0.0025
	(13.83)	(-2.72)	(1.75)	(0.43)
(Male & No Degree) - (Male & Degree	-0.0053***	-0.0028**	-0.0037**	-0.0035**
	(-11.68)	(-2.07)	(-2.39)	(-2.01)
Female & Degree	0.0126***	-0.0123	0.0166**	0.0060
	(12.61)	(-1.38)	(2.22)	(1.13)
Female & No Degree	0.0058***	-0.0135*	0.0108*	0.0025
	(9.06)	(-1.84)	(1.36)	(0.43)
(Female & No Degree) - (Female & Degree)	-0.0068***	-0.0013	-0.0058	-0.0001
	(-5.77)	(-0.22)	(-0.89)	(-0.01)

Tables 6 and 7 show the coefficients resulting from pooled OLS regressions and random effects model estimations. The dependent variable is the value weighted monthly stock portfolio return. All independent variables are described in table 4. The lower part of the tables reveals which econometric approach is applied, i.e. pooled OLS vs. random effects models. Some models do not produce standard errors which are robust to within cluster correlation, others account for clustered standard errors in the investor

dimension, and some models produce standard errors which account for two dimensions of within cluster correlation (investors and time).

The following results seem to be robust as we reach the same conclusions no matter which model is estimated. Stock traders which additionally invest in mutual funds or options and warrants achieve a higher portfolio return (holding all other variables constant). I find evidence that older investors achieve a higher stock investment performance than younger ones, though the coefficient of the age coefficient is close to zero. Consistent with the findings of Barber and Odean (2001), the coefficient of the gender dummy is negative. Barber and Odean (2001) argue that men hurt their stock investment performance by being too overconfident about their skill. Focusing on education, it can be observed that holding a university degree increases the stock investment performance of private investors. If the degree variable is split up into different backgrounds, I find that all distinct degrees have a positive coefficient, with the "Mag" degree having the most positive influence on the stock investment performance, followed by investors who have finished doctoral studies and individuals with special knowledge in technical disciplines. Unlike the results for all other independent variables, the coefficient of the "Econ" variable – investors with special education in economics and business administration – is insignificant for 75% of the estimated models. The number of trades does not influence the stock investment performance of individuals in my sample: the coefficients are close to zero and often insignificant.

Table 6. Panel Data Regressions: Performance and Investor Characteristics I

This table shows the coefficients resulting from several panel data regressions when using the monthly value weighted portfolio return achieved by private investors as dependent variable. The independent variables represent investor specific attributes and are described in table 4. The lower part of the table reveals whether a pooled OLS or a random effects model is estimated and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis below the coefficients.

	Dependent Variable: Value weighted portfolio return							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mf_trader	0.0047***	0.0047***	0.0076***	0.0076***	0.0047***	0.0047***	0.0075***	0.0075***
	(7.63)	(3.24)	(6.19)	(8.60)	(7.56)	(3.21)	(6.17)	(8.57)
Ow_trader	0.0072***	0.0072***	0.0072***	0.0072***	0.0071***	0.0071***	0.0070***	0.0070***
	(8.43)	(2.74)	(5.77)	(6.85)	(8.33)	(2.71)	(5.68)	(6.75)
Age	0.0002***	0.0002***	0.0003***	0.0003***	0.0002***	0.0002***	0.0003***	0.0003***
	(8.91)	(3.22)	(4.84)	(6.88)	(8.79)	(3.28)	(4.76)	(6.71)
Male	-0.0039***	-0.0039***	-0.0037**	-0.0037***	-0.0036***	-0.0036***	-0.0033*	-0.0033**
	(-4.35)	(-4.08)	(-2.17)	(-2.90)	(-3.90)	(-3.66)	(-1.91)	(-2.55)
Degree	0.0051***	0.0051***	0.0074***	0.0074***				
	(7.91)	(3.70)	(5.84)	(8.04)				
Econ					0.0029	0.0029	0.0075	0.0075*
					(1.19)	(0.93)	(1.01)	(1.76)
Tech					0.0024**	0.0024*	0.0043**	0.0043***
					(2.57)	(1.79)	(2.45)	(3.23)
Long_educ					0.0069***	0.0069***	0.0099***	0.0099***
					(7.03)	(4.20)	(3.86)	(6.31)
Mag					0.0073***	0.0073***	0.0097***	0.0097***
					(8.19)	(4.53)	(5.25)	(7.75)
Market	0.7256***	0.7256***	0.7270***	0.7270***	0.7255***	0.7255***	0.7270***	0.7270***
	(104.08)	(12.16)	(105.26)	(104.53)	(104.06)	(12.17)	(105.26)	(104.52)
Num_trade	0.0000**	0.0000*	0.0001***	0.0001**	0.0000**	0.0000*	0.0001***	0.0001**
	(2.13)	(1.95)	(6.67)	(2.28)	(2.14)	(1.95)	(6.67)	(2.28)
R-squared	0.1487	0.1487	0.1482	0.1482	0.1488	0.1488	0.1483	0.1483
Models								
Pooled OLS	YES	YES	NO	NO	YES	YES	NO	NO
Random Effects Model	NO	NO	YES	YES	NO	NO	YES	YES
Clustered SE								
Across Investors	YES	YES	NO	YES	YES	YES	NO	YES
Across Investors and Time	NO	YES	NO	NO	NO	YES	NO	NO

Table 7. Panel Data Regressions: Performance and Investor Characteristics II

This table shows the coefficients resulting from various panel data regressions when using the monthly value weighted portfolio return achieved by private investors as dependent variable. The independent variables represent investor specific attributes and are described in table 4. The lower part of the table reveals whether a pooled OLS or a random effects model is estimated and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis below the coefficients.

	Dependent Variable: Value weighted portfolio return							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mf_trader	0.0048***	0.0048***	0.0076***	0.0076***	0.0047***	0.0047***	0.0076***	0.0076***
	(7.71)	(3.30)	(6.24)	(8.67)	(7.64)	(3.27)	(6.22)	(8.64)
Ow_trader	0.0071***	0.0071***	0.0071***	0.0071***	0.0070***	0.0070***	0.0070***	0.0070***
	(8.37)	(2.72)	(5.72)	(6.80)	(8.27)	(2.69)	(5.64)	(6.70)
Age	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***	0.0002***
	(8.90)	(3.21)	(4.81)	(6.85)	(8.78)	(3.27)	(4.74)	(6.68)
Male	-0.0039***	-0.0039***	-0.0038**	-0.0038***	-0.0036***	-0.0036***	-0.0033*	-0.0033**
	(-4.36)	(-4.09)	(-2.18)	(-2.92)	(-3.91)	(-3.67)	(-1.93)	(-2.57)
Degree	0.0051***	0.0051***	0.0075***	0.0075***				
	(7.92)	(3.70)	(5.86)	(8.06)				
Econ					0.0029	0.0029	0.0074	0.0074*
					(1.16)	(0.91)	(1.00)	(1.74)
Tech					0.0024***	0.0024*	0.0044**	0.0044***
					(2.58)	(1.79)	(2.47)	(3.26)
Long_educ					0.0070***	0.0070***	0.0099***	0.0099***
					(7.04)	(4.21)	(3.87)	(6.33)
Mag					0.0073***	0.0073***	0.0097***	0.0097***
					(8.20)	(4.52)	(5.26)	(7.76)
Market	0.7255***	0.7255***	0.7270***	0.7270***	0.7255***	0.7255***	0.7269***	0.7269***
	(104.09)	(12.17)	(105.26)	(104.56)	(104.07)	(12.17)	(105.26)	(104.55)
Num_buy	-0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000
	(-0.55)	(-0.42)	(0.16)	(0.21)	(-0.53)	(-0.40)	(0.16)	(0.22)
Num_sale	0.0001***	0.0001**	0.0002***	0.0002***	0.0001***	0.0001**	0.0002***	0.0002***
	(3.64)	(2.36)	(6.18)	(4.31)	(3.66)	(2.36)	(6.17)	(4.32)
R-squared	0.1488	0.1488	0.1482	0.1482	0.1489	0.1489	0.1484	0.1484
Models								
Pooled OLS	YES	YES	NO	NO	YES	YES	NO	NO
Random Effects Model	NO	NO	YES	YES	NO	NO	YES	YES
Clustered SE								
Across Investors	YES	YES	NO	YES	YES	YES	NO	YES
Across Investors and Time	NO	YES	NO	NO	NO	YES	NO	NO

4.2 Excess Trading

4.2.1 Turnover

Table 8 shows descriptive statistics for monthly total turnover rates of individual investors according to their socio-demographic attributes. The individuals in this sample are quite active investors: the average total turnover is 22.66% per month. We observe that the turnover rate for men (22.85%) is greater than the one for women (21.62%). Investors with degree are less active traders than those without degree (20.91% versus 23.52% respectively).

Tables 9 to 11 show several performance measures which are sorted into quintiles based on mean monthly total turnover (the average of buy and sell turnover), and which are presented for various investor groups. These groups are formed according to investor gender and education. Barber and Odean (2000) claim that "trading is hazardous to your wealth" due to their finding that investors with high turnover underperform those with low turnover. Our analysis of performance, turnover *and* investor attributes cannot confirm their result for all performance measures and all investor groups.

Analyzing raw returns and turnover presented in table 9 (Panel A), we find results similar to Barber and Odean (2000). With one exception (female investors without degree), we observe that investors in the lowest turnover quintile outperform individuals in the highest turnover quintile. Within both the lowest and the highest turnover quintile, women outperform men, and investors with degree outperform individuals without university education. The same is true if we combine gender and education at the same time: women with and without degree always achieve a better performance than their male counterpart.

Table 10 shows global alphas, using a global market factor (Panel C) and both a global market factor and a global distress factor (Panel D) as independent variables. Alphas are sorted into turnover quintiles and calculated for different investor groups. The results are no longer in line with Barber and Odean (2000). For both panel B, C, and D, we find that female investors in the highest turnover quintile outperform women in the lowest turnover quintile, no matter whether they have a university degree or not.

Table 11 presents some coefficients resulting from panel model estimations. The monthly total turnover rate is regressed on different investor attributes and market information. The lower part of the table shows which econometric model is applied

(pooled OLS or random effects model) and whether the models produce standard errors which are robust to within cluster correlation. We present various models to show that the results are robust to different model specifications.

We find that stock traders who do also invest in mutual funds have a lower turnover rate in stocks, whereas individuals who do also trade options or warrants possess a higher stock turnover rate, holding all other variables constant. Being male increases the turnover rate. Analyzing education, it can be seen that holding a university degree decreases the stock turnover rate of individuals. If the degree variable is split up into different disciplines (model (5)-(8)), we observe that all background variables get a positive and significant coefficient, except the coefficient for the "Econ" variable which is negative and insignificant.

Table 8. Descriptive Statistics: Turnover Rate and Investor Attributes

This table presents the mean monthly total turnover rate as well as turnover centiles for different investor groups which are formed on the basis of demographic attributes. Total turnover is defined as the average of buy and sell turnover.

		Percentile								
Investor Group	**Mean**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
All Investors	0.2266	0.0540	0.0833	0.1108	0.1429	0.1807	0.2301	0.2844	0.3660	0.5000
Male	0.2285	0.0553	0.0839	0.1124	0.1444	0.1830	0.2324	0.2860	0.3679	0.5000
Female	0.2162	0.0486	0.0749	0.1000	0.1328	0.1726	0.2170	0.2718	0.3540	0.5000
Degree	0.2091	0.0500	0.0774	0.1000	0.1277	0.1646	0.2052	0.2547	0.3333	0.4808
No Degree	0.2352	0.0556	0.0856	0.1169	0.1529	0.1912	0.2431	0.2987	0.3798	0.5000
Male & Degree	0.2107	0.0515	0.0783	0.1018	0.1313	0.1663	0.2074	0.2575	0.3333	0.4824
Female & Degree	0.1963	0.0414	0.0665	0.0891	0.1111	0.1493	0.1894	0.2500	0.3157	0.4736
Male & No Degree	0.2378	0.0569	0.0875	0.1189	0.1552	0.1934	0.2465	0.3006	0.3839	0.5000
Female & No Degree	0.2225	0.0511	0.0769	0.1043	0.1429	0.1787	0.2251	0.2824	0.3632	0.5000

Table 9. Performance, Turnover and Investor Attributes I

This table presents two performance measures for different investor groups and turnover quintiles: mean monthly value weighted stock portfolio returns before transaction costs (Panel A) and Jensen's Alpha when the ATX is chosen as market index (Panel B). Investor groups are formed based on investor's socio-demographic characteristics. For each investor group, quintiles are calculated based on mean monthly investor turnover. t-statistics can be found in parenthesis.

Panel A: Raw Returns

	Turnover Quintile				
Investor Group	**Low**	**2**	**3**	**4**	**High**
All Investors	0.0074***	0.0099***	0.0068***	0.0066***	0.0007
	(19.17)	(24.83)	(14.70)	(12.73)	(0.94)
Male	0.0070***	0.0100**	0.0070***	0.0062***	-0.0007
	(16.77)	(23.27)	(14.08)	(11.09)	(-0.89)
Female	0.0098***	0.0010***	0.0051***	0.0086***	0.0092***
	(10.12)	(9.24)	(3.97)	(6.22)	(5.20)
Degree	0.0105***	0.0134***	0.0097***	0.0096***	0.0071***
	(17.18)	(21.59)	(12.85)	(11.84)	(6.46)
No Degree	0.0056***	0.0082***	0.0054***	0.0044***	-0.0014
	(11.40)	(16.00)	(9.19)	(6.55)	(-1.45)
Male & Degree	0.0099***	0.0130***	0.0103***	0.0087***	0.0066***
	(15.22)	(19.65)	(13.39)	(10.07)	(5.66)
Female & Degree	0.0158***	0.0179***	0.0099***	0.0125***	0.0111***
	(9.18)	(9.23)	(3.96)	(4.75)	(3.63)
Male & No Degree	0.0054***	0.0083***	0.0053***	0.0043***	-0.0036***
	(9.94)	(14.74)	(8.19)	(5.95)	(-3.45)
Female & No Degree	0.0073***	0.0067***	0.0061***	0.0064***	0.0087***
	(6.23)	(5.07)	(4.38)	(3.84)	(4.22)

Panel B: Alpha ATX

	Turnover Quintile				
Investor Group	**Low**	**2**	**3**	**4**	**High**
All Investors	-0.0168**	-0.0135*	-0.0164**	-0.0154**	-0.0194***
	(-2.51)	(-1.88)	(-2.35)	(-2.11)	(-2.88)
Male	-0.0171**	-0.0136**	-0.0163**	-0.0163**	-0.0219***
	(-2.55)	(-2.00)	(-2.36)	(-2.21)	(-3.28)
Female	-0.0184***	-0.0124	-0.0203***	-0.0115	-0.0038
	(-2.78)	(-1.40)	(-2.83)	(-1.28)	(-0.46)
Degree	-0.0143**	-0.0086	-0.0192***	-0.0164**	-0.0124*
	(-2.01)	(-0.88)	(-2.89)	(-2.29)	(-1.88)
No Degree	-0.0194***	-0.0146**	-0.0153**	-0.0154*	-0.0236***
	(-3.06)	(-2.15)	(-2.18)	(-1.95)	(-3.42)
Male & Degree	-0.0148**	-0.0125*	-0.0173**	-0.0167**	-0.0150**
	(-2.03)	(-1.80)	(-2.63)	(-2.37)	(-2.29)
Female & Degree	-0.0140**	-0.0101	-0.0196	-0.0190	-0.0031
	(-2.24)	(-1.40)	(-1.62)	(-1.35)	(-0.40)
Male & No Degree	-0.0194***	-0.0152**	-0.0155**	-0.0162*	-0.0253***
	(-3.06)	(-2.25)	(-2.25)	(-1.92)	(-3.70)
Female & No Degree	-0.0219***	-0.0141*	-0.0137*	-0.0107	-0.0067
	(-3.04)	(-1.82)	(-1.91)	(-1.24)	(-0.78)

Table 10. Performance, Turnover and Investor Attributes II

This table shows alphas for different investor groups which are sorted into quintiles based on mean monthly turnover. "Alpha MKTGLOB" is the resulting intercept when regressing the excess value weighted stock portfolio return on the excess return of a global market index. "Alpha FF98" is the resulting intercept when regressing the excess value weighted stock portfolio return on the excess return of a global market index and the return of a global distress factor. t-statistics can be found in parenthesis.

Panel C: Alpha MKTGLOB

	Turnover Quintile				
Investor Group	**Low**	**2**	**3**	**4**	**High**
All Investors	0.008	0.0129**	0.0064	0.012**	0.0074
	(1.66)	(2.46)	(1.07)	(2.27)	(1.42)
Male	0.0077	0.0114**	0.0065	0.0118**	0.0041
	(1.6)	(2.24)	(1.10)	(2.25)	(0.72)
Female	0.0078	0.0170**	0.0037	0.0174**	0.0227***
	(1.61)	(2.34)	(0.56)	(2.31)	(3.40)
Degree	0.0077	0.0114**	0.0065	0.0118**	0.0041
	(1.60)	(2.24)	(1.10)	(2.25)	(0.72)
No Degree	0.0078	0.0170**	0.0037	0.0174**	0.0227***
	(1.61)	(2.34)	(0.56)	(2.31)	(3.40)
Male & Degree	0.0121**	0.0149***	0.0078	0.0102*	0.0067
	(2.41)	(2.84)	(1.43)	(1.93)	(1.10)
Female & Degree	0.0085*	0.0143**	0.0096	0.0264**	0.0216***
	(1.73)	(2.28)	(0.84)	(2.19)	(3.27)
Male & No Degree	0.0033	0.0097*	0.0064	0.0138**	0.0019
	(0.65)	(1.91)	(1.06)	(2.20)	(0.33)
Female & No Degree	0.0060	0.0122*	0.0117*	0.0164**	0.0202***
	(1.08)	(1.88)	(1.78)	(2.17)	(2.77)

Panel D: Alpha FF98

	Turnover Quintile				
Investor Group	**Low**	**2**	**3**	**4**	**High**
All Investors	0.0044	0.0091	0.0032	0.0082	0.0012
	(0.80)	(1.53)	(0.46)	(1.36)	(0.21)
Male	0.0041	0.0086	0.0036	0.0072	-0.0026
	(0.75)	(1.47)	(0.54)	(1.21)	(-0.41)
Female	0.0025	0.0088	-0.0049	0.0150*	0.0177**
	(0.46)	(1.08)	(-0.67)	(1.73)	(2.32)
Degree	0.0041	0.0086	0.0036	0.0072	-0.0026
	(0.75)	(1.47)	(0.54)	(1.21)	(-0.41)
No Degree	0.0025	0.0088	-0.0049	0.0150*	0.0177**
	(0.46)	(1.08)	(-0.67)	(1.73)	(2.32)
Male & Degree	0.0084	0.0089	0.0035	0.0075	-0.0011
	(1.46)	(1.51)	(0.57)	(1.23)	(-0.16)
Female & Degree	0.0038	0.0104	-0.003	0.0117	0.0183**
	(0.69)	(1.45)	(-0.24)	(0.85)	(2.42)
Male & No Degree	0.0001	0.0076	0.0024	0.0087	-0.0051
	(0.02)	(1.29)	(0.34)	(1.23)	(-0.80)
Female & No Degree	-0.0001	0.0056	0.0057	0.0134	0.0147*
	(-0.01)	(0.77)	(0.77)	(1.54)	(1.77)

Table 11. Panel Data Regressions: Turnover and Investor Characteristics

This table shows the coefficients resulting from several panel data regressions. The dependent variable is the mean monthly turnover rate of the stock portfolios of individual investors. "Vw_pfret_lag1" and "Market_lag1" are the value weighted investor stock portfolio return and the return of the ATX during the previous month respectively. All other independent variables are described in table 4. The lower part of the table reveals whether a pooled OLS or a random effects model is estimated and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis below the coefficients.

	Dependent Variable: Monthly Total Turnover							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mf_trader	-0.0070**	-0.0070**	-0.0159***	-0.0159***	-0.0070**	-0.0070**	-0.0159***	-0.0159***
	(-2.56)	(-2.22)	(-5.51)	(-5.89)	(-2.53)	(-2.20)	(-5.51)	(-5.90)
Ow_trader	0.0175***	0.0175***	0.0068**	0.0068**	0.0176***	0.0176***	0.0070**	0.0070**
	(6.21)	(4.66)	(2.38)	(2.46)	(6.25)	(4.70)	(2.45)	(2.54)
Age	0.0002*	0.0002	-0.0007***	-0.0007***	0.0002	0.0002	-0.0008***	-0.0008***
	(1.70)	(1.61)	(-6.00)	(-5.74)	(1.41)	(1.34)	(-6.38)	(-6.06)
Male	0.0109***	0.0109***	0.0192***	0.0192***	0.0101***	0.0101**	0.0179***	0.0179***
	(2.86)	(2.78)	(4.85)	(5.32)	(2.63)	(2.57)	(4.50)	(4.93)
Degree	-0.0164***	-0.0164***	-0.0239***	-0.0239***				
	(-5.75)	(-5.78)	(-7.97)	(-8.57)				
Econ					0.0014	0.0014	0.0041	0.0041
					(0.08)	(0.08)	(0.23)	(0.24)
Tech					-0.0121***	-0.0121***	-0.0180***	-0.0180***
					(-2.96)	(-2.98)	(-4.32)	(-4.63)
Long_educ					-0.0175***	-0.0175***	-0.0194***	-0.0194***
					(-3.25)	(-3.33)	(-3.21)	(-3.56)
Mag					-0.0214***	-0.0214***	-0.0336***	-0.0336***
					(-5.50)	(-5.47)	(-7.82)	(-8.77)
Vw_pfret_lag1	0.0120**	0.0120	0.0134***	0.0134**	0.0120**	0.0120	0.0134***	0.0134**
	(2.12)	(1.58)	(9.28)	(2.44)	(2.13)	(1.58)	(9.28)	(2.44)
Market_lag1	0.1140***	0.1140**	0.1029***	0.1029***	0.1139***	0.1139**	0.1028***	0.1028***
	(8.84)	(2.35)	(9.52)	(8.79)	(8.83)	(2.35)	(9.51)	(8.78)
R-squared	0.0077	0.0077	0.0051	0.0051	0.0078	0.0078	0.0052	0.0052
Model								
Pooled OLS	YES	YES	NO	NO	YES	YES	NO	NO
Random effects model	NO	NO	YES	YES	NO	NO	YES	YES
Clustered SE								
Across Investors	YES	YES	NO	YES	YES	YES	NO	YES
Across Investors and Time	NO	YES	NO	NO	NO	YES	NO	NO

4.2.2 Trading Frequencies

Table 12 presents descriptive statistics for the total number of monthly trades of individual investors. We confirm the results of section 4.2.1 where we have applied the turnover rate as trading measure. The individuals in our sample are active traders. The average number of trades per month is 6.63. Men trade more than women (6.82 vs. 5.56), and individuals with degree trade less than those without university education (6.01 vs. 6.93). We get similar results when the total number of trades is split up into the number of purchases and the number of sales in table 13 and table 14.

Tables 15 to 17 present the results from various panel model estimations. We aim to determine the relation between the number of trades and investor characteristics in a panel model framework. The dependent variable is the ln of the total number of trades (table 15), the ln of the total number of purchases (table 16), and the ln of the total number of sales (table 17). As independent variables, we use investor attributes and market information (for a detailed description, please refer to table 4).

Table 12. Descriptive Statistics: Number of Trades and Investor Characteristics

This table shows descriptive statistics for the total number of monthly trades per investor for different groups which are formed according to socio-demograhic attributes. We present the mean as well as the distribution of the number of trades across percentiles.

		Percentile								
Investor Group	**Mean**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
All Investors	6.6283	1.25	1.75	2.1429	2.7	3.3333	4.1714	5.5	7.7195	12.8571
Male	6.8185	1.3333	1.8182	2.25	2.8	3.4924	4.3125	5.6559	7.88	13.0461
Female	5.5606	1	1.5	2	2.2	2.75	3.5	4.6667	6.6667	11.2802
Degree	6.0114	1.1667	1.6667	2	2.5982	3.0833	4	5.0333	7	11.5626
No Degree	6.9297	1.25	1.7839	2.2	2.75	3.5	4.3333	5.7273	8	13.2544
Male & Degree	6.1431	1.2	1.75	2.1538	2.6667	3.2	4	5.1835	7.1064	11.5791
Female & Degree	4.9495	1	1.5	1.8333	2	2.5	3	4.0929	6.3067	11.4886
Male & No Degree	7.1727	1.3333	1.8889	2.3333	2.8889	3.6	4.5	5.9497	8.2169	13.75
Female & No Degree	5.7531	1	1.5	2	2.25	2.8604	3.6	4.8271	6.7206	11.2532

Table 13. Descriptive Statistics: Number of Purchases and Investor Attributes

This table presents descriptive statistics for the number of monthly purchases per investor. Investor classes are formed based on socio-demographic characteristics. We present the mean as well as the distribution of the number of purchases across percentiles.

		Percentile								
Investor Group	**Mean**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
All Investors	3.9012	1	1.0526	1.4737	1.75	2.0714	2.625	3.4	4.5833	7.4222
Male	3.9994	1	1.1304	1.5	1.8235	2.1667	2.6923	3.4853	4.6667	7.5801
Female	3.3501	1	1	1.25	1.5	1.8571	2.2	3	4.0633	6.5171
Degree	3.5902	1	1	1.4286	1.7143	2	2.5	3.1667	4.2274	6.8116
No Degree	4.0532	1	1.0769	1.5	1.8	2.1429	2.6823	3.5	4.75	7.7143
Male & Degree	3.6514	1	1.0909	1.4545	1.75	2	2.5455	3.2266	4.2679	6.7778
Female & Degree	3.0965	1	1	1.25	1.5	1.8571	2.1137	2.9014	3.9212	7
Male & No Degree	4.1818	1	1.1429	1.5	1.8889	2.2240	2.7912	3.6	4.8763	8
Female & No Degree	3.4300	1	1	1.25	1.5	1.8661	2.2389	3	4.1713	6.5

Table 14. Descriptive Statistics: Number of Sales and Investor Attributes

This table shows descriptive statistics for the total number of sales for various investor classes which are formed according to socio-demographic attributes. We present the mean as well as the distribution of the total number of sales across percentiles.

		Percentile								
Investor Group	**Mean**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
All Investors	2.7271	0	0.5	0.6667	1	1.2423	1.6364	2.2	3.1818	5.6
Male	2.8191	0	0.5	0.75	1	1.2857	1.6923	2.3022	3.2632	5.7278
Female	2.2105	0	0.1667	0.5	0.75	1	1.2857	1.7926	2.7367	4.8850
Degree	2.4212	0	0.3333	0.6	0.8889	1.1111	1.5	2	2.8889	5.0214
No Degree	2.8765	0	0.5	0.75	1	1.2857	1.7106	2.3333	3.3333	5.8800
Male & Degree	2.4917	0	0.4	0.6667	1	1.1690	1.5	2	2.9292	5.1130
Female & Degree	1.8530	0	0	0.4	0.5953	0.8182	1	1.6	2.5048	4.7327
Male & No Degree	2.9908	0	0.5	0.7778	1	1.3333	1.7865	2.4286	3.5	6
Female & No Degree	2.3231	0	0.25	0.5	0.7867	1	1.3636	1.8696	2.7956	4.9326

Table 15. Panel Data Regressions: Total Number of Trades and Investor Attributes

This table shows the coefficients resulting from several panel data regressions. The dependent variable is the logarithm of the total number of stock trades of individual investors during a sample month. "Vw_pfret_lag1" and "Market_lag1" are the value weighted investor stock portfolio return and the return of the ATX during the previous month respectively. All other independent variables are described in table 4. The lower part of the table reveals whether a pooled OLS or a random effects model is estimated and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis below the coefficients.

	Dependent Variable: ln(number_of_trades)					
	(1)	(2)	(3)	(4)	(5)	(6)
Mf_trader	-0.0784***	-0.0723***	-0.0723***	-0.0790***	-0.0725***	-0.0725***
	(-3.35)	(-4.91)	(-4.63)	(-3.37)	(-4.93)	(-4.65)
Ow_trader	0.2441***	0.1739***	0.1739***	0.2450***	0.1745***	0.1745***
	(10.44)	(11.63)	(11.22)	(10.52)	(11.67)	(11.26)
Age	0.0108***	0.0106***	0.0106***	0.0103***	0.0103***	0.0103***
	(10.78)	(17.06)	(15.80)	(10.20)	(16.20)	(15.05)
Male	0.0704**	0.1304***	0.1304***	0.0657*	0.1268***	0.1268***
	(2.03)	(6.28)	(6.03)	(1.90)	(6.08)	(5.84)
Degree	-0.0474*	-0.0645***	-0.0645***			
	(-1.90)	(-4.20)	(-4.02)			
Econ				0.1576	0.1065	0.1065
				(1.07)	(1.21)	(1.01)
Tech				-0.0414	-0.0572***	-0.0572***
				(-1.18)	(-2.68)	(-2.59)
Long_educ				0.0075	-0.0238	-0.0238
				(0.15)	(-0.77)	(-0.72)
Mag				-0.1010***	-0.1058***	-0.1058***
				(-2.88)	(-4.75)	(-4.75)
Vw_pfret_lag1	0.0511	0.0536***	0.0536	0.0511	0.0536***	0.0536
	(1.23)	(5.70)	(1.45)	(1.23)	(5.70)	(1.45)
Market_lag1	0.3013***	0.4449***	0.4449***	0.3002***	0.4448***	0.4448***
	(3.80)	(6.45)	(6.29)	(3.79)	(6.44)	(6.29)
R-squared	0.0272	0.0251	0.0251	0.0279	0.0257	0.0257
Model						
Pooled OLS	YES	NO	NO	YES	NO	NO
Random effects model	NO	YES	YES	NO	YES	YES
Clustered SE						
Across Investors	YES	NO	YES	YES	NO	YES

We use the same design for tables 15 to 17: The upper part reveals the resulting coefficients from the panel model regressions. The lower part shows whether pooled OLS or random effects model have been estimated, and whether the resulting standard errors are robust to within cluster correlation. We estimate various models to check whether our findings are robust to different model specifications. Models (1) to (3) do use a general degree dummy. In models (4) to (6), the degree dummy is split into different backgrounds.

Table 16. Panel Data Regressions: Number of Purchases and Investor Attributes

This table presents the coefficients resulting from several panel data regressions. The dependent variable is the logarithm of the total number of stock purchases of individual investors during a sample month. "Vw_pfret_lag1" and "Market_lag1" are the value weighted investor stock portfolio return and the return of the ATX during the previous month respectively. All other independent variables are described in table 4. The lower part of the table reveals whether a pooled OLS or a random effects model is estimated and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis below the coefficients.

	Dependent Variable: ln(number_of_purchases)					
	(1)	(2)	(3)	(4)	(5)	(6)
Mf_trader	-0.0581***	-0.0472***	-0.0472***	-0.0588***	-0.0473***	-0.0473***
	(-2.58)	(-3.59)	(-3.30)	(-2.60)	(-3.59)	(-3.30)
Ow_trader	0.2000***	0.1327***	0.1327***	0.2003***	0.1330***	0.1330***
	(8.65)	(9.82)	(9.24)	(8.71)	(9.83)	(9.25)
Age	0.0099***	0.0093***	0.0093***	0.0095***	0.0091***	0.0091***
	(10.33)	(16.67)	(15.15)	(9.89)	(16.02)	(14.59)
Male	0.0563*	0.1034***	0.1034***	0.0540	0.1014***	0.1014***
	(1.68)	(5.52)	(5.15)	(1.61)	(5.39)	(5.02)
Degree	-0.0197	-0.0350**	-0.0350**			
	(-0.82)	(-2.55)	(-2.38)			
Econ				0.1207	0.0725	0.0725
				(0.82)	(0.92)	(0.72)
Tech				-0.0236	-0.0312	-0.0312
				(-0.70)	(-1.64)	(-1.54)
Long_educ				0.0312	-0.0160	-0.0160
				(0.65)	(-0.58)	(-0.53)
Mag				-0.0564*	-0.0581***	-0.0581***
				(-1.66)	(-2.90)	(-2.83)
Vw_pfret_lag1	0.0420	0.0445***	0.0445	0.0420	0.0446***	0.0446
	(1.02)	(4.97)	(1.28)	(1.02)	(4.97)	(1.28)
Market_lag1	0.1366*	0.3044***	0.3044***	0.1355*	0.3042***	0.3042***
	(1.75)	(4.46)	(4.37)	(1.73)	(4.46)	(4.37)
R-squared	0.0253	0.0233	0.0233	0.0258	0.0236	0.0236
Model						
Pooled OLS	YES	NO	NO	YES	NO	NO
Random effects model	NO	YES	YES	NO	YES	YES
Clustered SE						
Across Investors	YES	NO	YES	YES	NO	YES

No matter whether we use the total number of trades, the number of buys, or the number of sales as dependent variable, we get the following results which confirm our prior panel analysis of the turnover rate. Being male, trading in options besides stocks, and age increases the number of trades. A positive market environment in the previous month and positive prior portfolio performance do also boost the trading frequency. Analyzing education, we find that having a degree diminishes the number of trades. If the degree variable is split up into different backgrounds, we find that all but the "Econ" variable decrease the number of trades, but only the "Mag" variable remains significant.

Table 17. Panel Data Regressions: Number of Sales and Investor Attributes

This table shows the coefficients resulting from several panel data regressions. The dependent variable is the logarithm of the total number of stock sales of individual investors during a sample month. "Vw_pfret_lag1" and "Market_lag1" are the value weighted investor stock portfolio return and the return of the ATX during the previous month respectively. All other independent variables are described in table 4. The lower part of the table reveals whether a pooled OLS or a random effects model is estimated and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis below the coefficients.

	Dependent Variable: ln(number_of_sales)					
	(1)	(2)	(3)	(4)	(5)	(6)
Mf_trader	-0.0615***	-0.0574***	-0.0574***	-0.0620***	-0.0577***	-0.0577***
	(-2.69)	(-4.63)	(-4.10)	(-2.71)	(-4.65)	(-4.13)
Ow_trader	0.1921***	0.1217***	0.1217***	0.1930***	0.1224***	0.1224***
	(8.27)	(9.51)	(8.72)	(8.35)	(9.56)	(8.76)
Age	0.0090***	0.0085***	0.0085***	0.0086***	0.0082***	0.0082***
	(9.37)	(16.24)	(14.30)	(8.86)	(15.30)	(13.54)
Male	0.0543	0.0946***	0.0946***	0.0501	0.0917***	0.0917***
	(1.61)	(5.36)	(4.84)	(1.49)	(5.17)	(4.68)
Degree	-0.0084	-0.0323**	-0.0323**			
	(-0.35)	(-2.50)	(-2.24)			
Econ				0.1563	0.0850	0.0850
				(1.10)	(1.17)	(0.90)
Tech				-0.0027	-0.0284	-0.0284
				(-0.08)	(-1.58)	(-1.42)
Long_educ				0.0426	0.0192	0.0192
				(0.91)	(0.74)	(0.65)
Mag				-0.0579*	-0.0720***	-0.0720***
				(-1.68)	(-3.82)	(-3.57)
Vw_pfret_lag1	0.0226	0.0301***	0.0301	0.0226	0.0300***	0.0300
	(0.88)	(3.36)	(1.20)	(0.88)	(3.35)	(1.20)
Market_lag1	-0.1772**	0.0587	0.0587	-0.1787**	0.0584	0.0584
	(-2.26)	(0.81)	(0.83)	(-2.28)	(0.81)	(0.82)
R-squared	0.0221	0.0192	0.0192	0.0227	0.0198	0.0198
Model						
Pooled OLS	YES	NO	NO	YES	NO	NO
Random effects model	NO	YES	YES	NO	YES	YES
Clustered SE						
Across Investors	YES	NO	YES	YES	NO	YES

4.3 Portfolio Concentration

Table 18 shows the mean as well as the distribution of the number of stocks in individuals' portfolios for various investor groups which are defined on the basis of socio-demographic characteristics. We observe that the stock portfolio of the average sample investor consists of 3.89 stocks. Men hold more stocks than women, as do investors with university degree compared to individuals without degree.

Table 18. Descriptive Statistics: Portfolio Concentration and Investor Attributes

This table presents the mean monthly number of stocks in the portfolio as well as the related centiles. Investor groups are formed according to the socio-demographic attributes of the individuals.

		Percentile								
Investor Group	**Mean**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
All Investors	3.8881	1	1.2	1.6667	2	2.55	3.125	4	5.4102	8.1744
Male	3.9454	1	1.2364	1.6667	2	2.5882	3.1667	4.0758	5.5	8.3170
Female	3.5590	1	1	1.5	2	2.3846	3	3.7683	4.8113	7.5070
Degree	4.1674	1	1.2639	1.7744	2.1765	2.7727	3.4211	4.4	5.8436	8.7059
No Degree	3.7648	1	1.1538	1.6	2	2.4615	3	3.9352	5.2083	8
Male & Degree	4.2202	1	1.3	1.8	2.2	2.8	3.4545	4.4286	5.9545	8.7778
Female & Degree	3.7418	1	1.044	1.6	2	2.5714	3.2057	4.0405	5	7.8689
Male & No Degree	3.8161	1	1.2	1.6429	2	2.5	3.0267	4	5.3104	8.1206
Female & No Degree	3.5050	1	1	1.5	1.9587	2.3114	2.9073	3.6667	4.7648	7.3871

Table 19. Performance, Stock Portfolio Concentration, and Investor Characteristics I

This table presents raw stock portfolio returns (Panel A) and the intercepts resulting from the market model in excess return form when the ATX is used as market index (Panel B). Investors are classified into groups according to their socio-demographic characteristics and their diversification behavior. Individuals are considered to possess concentrated portfolios when they hold not more than two stocks in their portfolio. Investors are called diversified if they hold more than two stocks in their portfolio. t-statistics are given in parenthesis.

	Panel A: Raw Returns			Panel B: Alpha ATX		
	Concentrated (1)	Diversified (2)	Difference (2) - (1)	Concentrated (3)	Diversified (4)	Difference (4) - (3)
All Investors	-0.0146***	0.0093***	0.0239***	-0.0282***	-0.0124*	0.0158***
	(-13.37)	(20.49)	(20.24)	(-4.16)	(-1.80)	(9.75)
Male	-0.0144***	0.0093***	0.0236***	-0.0286***	-0.0131*	0.0155***
	(-12.03)	(18.67)	(18.25)	(-4.29)	(-1.93)	(9.13)
Female	-0.0154***	0.0098***	0.0252***	-0.0264***	-0.0081	0.0187***
	(-5.88)	(8.53)	(8.82)	(-3.07)	(-1.07)	(4.94)
Degree	-0.0081***	0.0122***	0.0203***	-0.0272***	-0.0113	0.0158***
	(-4.71)	(18.33)	(10.98)	(-3.91)	(-1.58)	(5.85)
No Degree	-0.0175***	0.0079***	0.0254***	-0.0290***	-0.0131*	0.0159***
	(-12.76)	(13.15)	(16.94)	(-4.21)	(-1.90)	(7.83)
Male & Degree	-0.0087***	0.0120***	0.0207***	-0.0265***	-0.0122*	0.0143***
	(-4.63)	(16.89)	(10.31)	(-3.83)	(-1.81)	(6.35)
Female & Degree	-0.0040	0.0136***	0.0176***	-0.0370***	-0.0066	0.0265***
	(-0.96)	(7.47)	(3.86)	(-3.94)	(-0.75)	(3.82)
Male & No Degree	-0.0173***	0.0077***	0.0250***	-0.0298***	-0.0138**	0.0161***
	(-11.29)	(11.72)	(15.01)	(-4.43)	(-2.00)	(7.99)
Female & No Degree	-0.0188***	0.0086***	0.0274***	-0.0232**	-0.0091	0.0132***
	(-5.96)	(6.08)	(7.92)	(-2.56)	(-1.33)	(3.07)

Table 20. Performance, Stock Portfolio Concentration, and Investor Characteristics II

This table presents the intercepts from two regression models. In Panel C, the excess monthly stock portfolio return is regressed on the excess return of a global market factor. In Panel D, the excess monthly stock portfolio return is regressed on the excess return of the same market factor as in Panel C and the return of a global distress factor. Investors are classified into groups according to their socio-demographic characteristics and their diversification behavior. Individuals are considered to possess concentrated portfolios when they hold not more than two stocks in their portfolio. Investors are classified as diversified if they hold more than two stocks in their portfolio. t-statistics are given in parenthesis.

	Panel C: Alpha MKTGLOB			Panel D: Alpha FF98		
	Concentrated (1)	Diversified (2)	Difference (2) - (1)	Concentrated (3)	Diversified (4)	Difference (4) - (3)
All Investors	-0.0028	0.0132**	0.0160***	-0.0086	0.0096	0.0181***
	(-0.54)	(2.62)	(8.67)	(-1.49)	(1.66)	(8.77)
Male	-0.0035	0.0121**	0.0156***	-0.0092	0.0087	0.0179***
	(-0.69)	(2.41)	(8.08)	(-1.63)	(1.52)	(8.29)
Female	0.0017	0.0186***	0.0173***	-0.0062	0.0141**	0.0198***
	(0.23)	(3.25)	(4.04)	(-0.77)	(2.16)	(4.05)
Degree	-0.0011	0.0163***	0.0173***	-0.0065	0.0111**	0.0176***
	(-0.21)	(3.27)	(5.74)	(-1.11)	(1.99)	(5.06)
No Degree	-0.0037	0.0117**	0.0154***	-0.0096	0.0086	0.0182***
	(-0.69)	(2.22)	(6.71)	(-1.61)	(1.42)	(7.12)
Male & Degree	-0.0002	0.0139***	0.0141***	-0.0055	0.0097*	0.0152***
	(-0.05)	(2.91)	(5.55)	(-0.95)	(1.80)	(5.22)
Female & Degree	-0.0123	0.0227***	0.0272***	-0.0192*	0.0148*	0.0274***
	(-1.37)	(3.30)	(3.46)	(-1.88)	(1.92)	(3.04)
Male & No Degree	-0.0051	0.0113**	0.0164***	-0.0109*	0.0080	0.0189***
	(-0.97)	(2.17)	(7.20)	(-1.86)	(1.34)	(7.38)
Female & No Degree	0.0054	0.0142**	0.0103**	-0.0017	0.0123*	0.0123**
	(0.7)	(2.45)	(2.16)	(-0.19)	(1.84)	(2.24)

Sorting on education and gender, we find that the highest number of stocks is held by men with degree, followed by male investors without degree, and women who have and have not successfully finished university education.

Table 19 and 20 present evidence that diversified sample investors significantly outperform individuals who hold concentrated stock portfolios. This is true for all performance measures which we consider: raw returns (table 19, panel A), alphas resulting from the market model in excess return form when the ATX and a global market factor are used as market factors (table 19, panel B and table 20, panel C respectively), and alphas resulting from the global model proposed by Fama and French (1998) where a global market factor and a global distress factors are used as independent variables (table 20, panel D). For all performance measures, the performance differential between concentrated and diversified investors is higher for women than for men.

Table 21. Panel Data Regressions: Stock Portfolio Concentration and Investor Attributes

This table shows the coefficients resulting from various panel data regressions. The average number of stocks in the portfolio is each month regressed on several independent variables which are described in table 4. The bottom of the table reveals whether a pooled OLS or a random effects model is estimated, and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis.

	Dependent Variable: Number of stocks in portfolio					
	(1)	(2)	(3)	(4)	(5)	(6)
Mf_trader	1.0423***	0.6632***	0.6632***	1.0386***	0.6604***	0.6604***
	(7.57)	(8.69)	(8.09)	(7.53)	(8.66)	(8.05)
Ow_trader	2.3530***	1.9752***	1.9752***	2.3531***	1.9753***	1.9753***
	(23.64)	(26.18)	(26.62)	(23.68)	(26.17)	(26.65)
Age	0.1126***	0.0929***	0.0929***	0.1100***	0.0910***	0.0910***
	(15.47)	(29.05)	(22.51)	(14.76)	(27.98)	(21.88)
Male	0.6356***	0.6280***	0.6280***	0.6258***	0.6211***	0.6211***
	(3.88)	(6.02)	(6.18)	(3.77)	(5.91)	(6.05)
Degree	0.3464***	0.2996***	0.2996***			
	(2.63)	(3.78)	(3.57)			
Econ				1.5026	1.0395**	1.0395
				(1.47)	(2.24)	(1.47)
Tech				0.2833	0.2608**	0.2608**
				(1.61)	(2.36)	(2.26)
Long_educ				0.7023**	0.6581***	0.6581***
				(2.22)	(4.09)	(3.21)
Mag				0.1689	0.1331	0.1331
				(0.98)	(1.16)	(1.22)
Vw_pfret_lag1	0.2040*	0.0259	0.0259	0.2040*	0.0258	0.0258
	(1.75)	(1.24)	(1.36)	(1.75)	(1.24)	(1.36)
Market_lag1	-0.3184**	-0.0749	-0.0749	-0.3143**	-0.0749	-0.0749
	(-2.29)	(-0.46)	(-0.72)	(-2.26)	(-0.46)	(-0.72)
R-squared	0.0919	0.0920	0.0856	0.0925	0.0861	0.0861
Model						
Pooled OLS	YES	NO	NO	YES	NO	NO
Random effects model	NO	YES	YES	NO	YES	YES
Clustered SE						
Across Investors	YES	NO	YES	YES	NO	YES

Table 21 presents the coefficients resulting from various panel regression models. The number of stocks in an investor's portfolio in a particular month is regressed on investor characteristics and market information. Stock investors who do also trade mutual funds or options and warrants, hold a higher number of stocks in their portfolio, as do men, older investors and individuals with university degree. Among investors with degree, individuals who finished doctoral studies seem to care most about diversification.

4.4 Home Bias

Table 22 and 23 show several performance measures for local and international investors: raw value weighted stock portfolio returns (panel A), intercepts resulting from the market model in excess return form when using the ATX (panel B) or a global market index (panel C) as market factor, and the resulting intercepts when regressing the excess stock portfolio return on the excess return of a global market index and the return of a global distress factor (panel D). We also present the corresponding performance differential. The results are shown for various investor groups, formed based on investor attributes as in previous sections. Whereas panel B gives mixed results, panel A and C indicate that international traders outperform local investors. Among international investors, men underperform women, and degreeholders outperform investors without degree. The pattern is reversed for local investors. The analysis in panel D delivers insignificant results.

Table 22. International vs. Local Stock Investment Performance I

This table shows raw stock portfolio returns (Panel A) and the intercepts resulting from the market model in excess return form when the ATX is used as market index (Panel B). Investors are called "Local" (columns (2) and (4)) if they trade Austrian stocks only, and "International" (column (1) and (3)) otherwise. Investors are further classified into groups according to their socio-demographic characteristics. t-statistics are given in parenthesis.

	Panel A: Raw Returns			Panel B: Alpha ATX		
	International (1)	Local (2)	Difference (2) - (1)	International (3)	Local (4)	Difference (4) - (3)
All Investors	0.0006	-0.0024***	-0.0029***	-0.0172**	-0.0124*	0.0071
	(0.93)	(-2.58)	(-2.67)	(-2.46)	(-1.80)	(1.12)
Male	0.0006	-0.0018*	-0.0024***	-0.0177**	-0.0134**	0.0067
	(0.92)	(-1.77)	(-1.98)	(-2.59)	(-2.57)	(1.11)
Female	0.0004	-0.0044**	-0.0048*	-0.0137*	-0.0119	0.0049
	(0.23)	(-2.21)	(-1.85)	(-1.74)	(-1.62)	(0.54)
Degree	0.0057***	0.0005	-0.0052***	-0.0152**	-0.0198***	-0.0039
	(6.22)	(0.35)	(-3.07)	(-2.14)	(-3.15)	(-0.49)
No Degree	-0.0019**	-0.0041***	-0.0022	-0.0182**	-0.0123**	0.0088
	(-2.42)	(-3.42)	(-1.57)	(-2.62)	(-2.12)	(1.36)
Male & Degree	0.0053***	0.0008	-0.0044**	-0.0157**	-0.0233***	-0.0072
	(5.35)	(0.54)	(-2.42)	(-2.32)	(-3.16)	(-0.84)
Female & Degree	0.0096***	-0.0015	-0.0111**	-0.0122	-0.0108	-0.0005
	(3.99)	(-0.40)	(-2.94)	(-1.34)	(-1.43)	(-0.05)
Male & No Degree	-0.0017**	-0.0037***	-0.0019	-0.0189***	-0.0132**	0.0082
	(-2.10)	(-2.63)	(-1.18)	(-2.72)	(-2.30)	(1.31)
Female & No Degree	-0.0025	-0.0054**	-0.0029	-0.0139*	-0.0116	0.0038
	(-1.23)	(-2.30)	(-0.93)	(-1.84)	(-1.14)	(0.35)

Table 23. International vs. Local Stock Investment Performance II

This table presents the intercepts from two regression models. In Panel C, the excess monthly stock portfolio return is regressed on the excess return of a global market factor. In Panel D, the excess monthly stock portfolio return is regressed on the excess return of the same market factor as in Panel C and the return of a global distress factor. Investors are called "Local" (columns (2) and (4)) if they trade Austrian stocks only, and "International" (column (1) and (3)) otherwise. Investors are further classified into groups according to their socio-demographic characteristics. t-statistics are given in parenthesis.

	Panel C: Alpha MKTGLOB			Panel D: Alpha FF98		
	International	Local	Difference	International	Local	Difference
	(1)	(2)	(2) - (1)	(3)	(4)	(4) - (3)
All Investors	0.0090*	0.0132**	-0.0046	0.0045	0.0096	-0.0011
	(1.78)	(2.62)	(-0.70)	(0.79)	(1.66)	(-0.15)
Male	0.0081	0.0023	-0.0046	0.0037	-0.0001	-0.0013
	(1.63)	(0.36)	(-0.74)	(0.66)	(-0.02)	(-0.18)
Female	0.0140**	0.0005	-0.0096	0.0089	-0.0017	-0.0051
	(2.38)	(0.05)	(-1.03)	(1.33)	(-0.16)	(-0.47)
Degree	0.0122**	-0.0027	-0.0128	0.0069	-0.0037	-0.0084
	(2.48)	(-0.35)	(-1.49)	(1.26)	(-0.42)	(-0.84)
No Degree	0.0075	0.0029	-0.0033	0.0032	0.0001	-0.0000
	(1.44)	(0.40)	(-0.49)	(0.54)	(0.01)	(-0.00)
Male & Degree	0.0105**	-0.0030	-0.0129	0.0060	-0.0014	-0.0060
	(2.20)	(-0.36)	(-1.34)	(1.11)	(-0.14)	(-0.54)
Female & Degree	0.0176**	-0.0002	-0.0139	0.0098	-0.0073	-0.0157
	(2.45)	(-0.02)	(-1.36)	(1.22)	(-0.67)	(-1.30)
Male & No Degree	0.0069	0.0020	-0.0037	0.0025	-0.0013	-0.0010
	(1.35)	(0.28)	(-0.58)	(0.43)	(-0.17)	(-0.14)
Female & No Degree	0.0111*	-0.0004	-0.0096	0.0085	-0.0002	-0.0031
	(1.78)	(-0.03)	(-0.81)	(1.19)	(-0.01)	(-0.23)

Table 24 presents the coefficients from a panel regression analysis. The monthly stock portfolio return of traders who invest internationally is regressed on investor-specific attributes and market information. Pooled OLS and random effects models are estimated. Table 25 follows the same logic as table 24, but uses the stock portfolio returns of local traders only as dependent variable in the panel model regressions. For both local and international traders, better education leads to higher performance: the coefficient of the degree dummy is positive. Men underperform women both when trading locally and internationally. Contradicting the standard literature, the coefficient of the turnover variable is positive which will be further investigated and checked for robustness in the next version of this paper.

Table 24. Panel Data Regressions: International Trader Returns and Investor Attributes

This table shows the coefficients resulting from several panel data regressions. The monthly stock portfolio return of traders who invest in international stocks is regressed on investor attributes and market information. The independent variables are described in more detail in table 4. The bottom of the table reveals whether a pooled OLS or a random effects model is estimated, and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis.

	Dependent variable: monthly international stock portfolio return							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mf_trader	0.0066***	0.0066***	0.0093***	0.0093***	0.0066***	0.0066***	0.0093***	0.0093***
	(10.95)	(5.13)	(8.39)	(11.46)	(10.86)	(5.10)	(8.36)	(11.42)
Ow_trader	0.0092***	0.0092***	0.0118***	0.0118***	0.0091***	0.0091***	0.0117***	0.0117***
	(11.83)	(5.78)	(10.53)	(12.41)	(11.71)	(5.73)	(10.40)	(12.26)
Age	0.0002***	0.0002***	0.0003***	0.0003***	0.0002***	0.0002***	0.0003***	0.0003***
	(9.74)	(4.95)	(6.33)	(8.69)	(9.67)	(5.15)	(6.33)	(8.59)
Male	-0.0027***	-0.0027***	-0.0029*	-0.0029**	-0.0023**	-0.0023**	-0.0023	-0.0023*
	(-2.96)	(-2.97)	(-1.81)	(-2.33)	(-2.53)	(-2.54)	(-1.48)	(-1.89)
Degree	0.0053***	0.0053***	0.0075***	0.0075***				
	(8.15)	(4.74)	(6.48)	(8.65)				
Econ					0.0021	0.0021	0.0066	0.0066**
					(0.71)	(0.59)	(0.98)	(2.02)
Tech					0.0027***	0.0027**	0.0040**	0.0040***
					(2.97)	(2.33)	(2.51)	(3.07)
Long_educ					0.0067***	0.0067***	0.0094***	0.0094***
					(5.46)	(4.29)	(3.97)	(5.97)
Mag					0.0076***	0.0076***	0.0107***	0.0107***
					(8.70)	(5.82)	(6.30)	(9.69)
Market	0.7027***	0.7027***	0.7037***	0.7037***	0.7026***	0.7026***	0.7037***	0.7037***
	(123.32)	(10.79)	(127.01)	(123.84)	(123.32)	(10.79)	(127.01)	(123.84)
Turnover	0.0070***	0.0070	0.0121***	0.0121***	0.0071***	0.0071	0.0121***	0.0121***
	(5.67)	(1.36)	(12.44)	(9.42)	(5.71)	(1.37)	(12.45)	(9.43)
R-squared	0.1195	0.1195	0.1188	0.1188	0.1196	0.1196	0.1190	0.1190
Models								
Pooled OLS	YES	YES	NO	NO	YES	YES	NO	NO
Random Effects Model	NO	NO	YES	YES	NO	NO	YES	YES
Clustered SE								
Across Investors	YES	YES	NO	YES	YES	YES	NO	YES
Across Investors and Time	NO	YES	NO	NO	NO	YES	NO	NO

Table 25. Panel Data Regressions: Local Trader Returns and Investor Attributes

This table shows the coefficients resulting from several panel data regressions. The monthly stock portfolio return of traders who invest in the local Austrian market only is regressed on investor attributes and market information. The independent variables are described in more detail in table 4. The bottom of the table reveals whether a pooled OLS or a random effects model is estimated, and whether the standard errors are robust to within cluster correlation. All standard errors are heteroskedasticity consistent. t-statistics/z-statistics can be found in parenthesis.

	Dependent variable: monthly local stock portfolio return							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mf_trader	0.0003	0.0003	0.0007	0.0007	0.0003	0.0003	0.0007	0.0007
	(0.28)	(0.09)	(0.56)	(0.61)	(0.28)	(0.09)	(0.55)	(0.59)
Ow_trader	-0.0017	-0.0017	-0.0013	-0.0013	-0.0018	-0.0018	-0.0013	-0.0013
	(-1.47)	(-0.41)	(-1.08)	(-1.13)	(-1.52)	(-0.43)	(-1.12)	(-1.17)
Age	0.0002***	0.0002	0.0002***	0.0002***	0.0001***	0.0001	0.0002***	0.0002***
	(3.68)	(1.56)	(3.29)	(3.80)	(3.38)	(1.46)	(3.11)	(3.56)
Male	-0.0014	-0.0014	-0.0006	-0.0006	-0.0013	-0.0013	-0.0005	-0.0005
	(-1.08)	(-0.97)	(-0.45)	(-0.47)	(-0.96)	(-0.89)	(-0.36)	(-0.37)
Degree	0.0044***	0.0044**	0.0044***	0.0044***				
	(3.95)	(2.46)	(3.64)	(3.95)				
Econ					0.0108***	0.0108**	0.0105	0.0105**
					(2.66)	(2.43)	(1.55)	(2.57)
Tech					0.0034**	0.0034*	0.0035**	0.0035**
					(2.13)	(1.71)	(1.98)	(2.16)
Long_educ					0.0059***	0.0059***	0.0055**	0.0055***
					(2.89)	(2.78)	(2.36)	(2.61)
Mag					0.0041***	0.0041**	0.0043***	0.0043***
					(2.79)	(2.15)	(2.68)	(2.94)
Market	0.6279***	0.6279***	0.6269***	0.6269***	0.6279***	0.6279***	0.6269***	0.6269***
	(46.63)	(10.32)	(44.82)	(46.65)	(46.62)	(10.33)	(44.82)	(46.65)
Turnover	0.0260***	0.0260***	0.0260***	0.0260***	0.0260***	0.0260***	0.0260***	0.0260***
	(10.58)	(4.48)	(10.89)	(10.40)	(10.60)	(4.48)	(10.90)	(10.41)
R-squared	0.1925	0.1925	0.1930	0.1930	0.1925	0.1925	0.1930	0.1930
Models								
Pooled OLS	YES	YES	NO	NO	YES	YES	NO	NO
Random Effects Model	NO	NO	YES	YES	NO	NO	YES	YES
Clustered SE								
Across Investors	YES	YES	NO	YES	YES	YES	NO	YES
Across Investors and Time	NO	YES	NO	NO	NO	YES	NO	NO

5 Conclusion

This paper asks whether better educated investors make smarter investment decisions. For this purpose, I analyze how education influences the general investment performance of individuals as well excess trading, underdiversification and home bias – three investment phenomena which have been identified in the retail investor literature but are not in accordance with the advice of mainstream finance. I use data from an Austrian discount broker over the period September 2001 to July 2007 which combines information on individual equity trades with socio-demographic investor characteristics like gender, age, and academic degrees.

I find that the average sample investor achieves a value weighted stock portfolio return of 0.61% per month before transaction costs. Better educated investors are able to generate a higher stock investment performance: Panel data regressions show that holding a university degree positively affects the stock portfolio return.

Analyzing the relation between turnover and performance, Barber and Odean (2000) show that "trading is hazardous to your wealth". Using a different data set, I can confirm this result for raw returns only. Including investor attributes in the analysis, I find that female investors who trade most outperform women in the lowest turnover quintile when measuring performance via Jensen's Alpha. A panel regression analysis indicates that being male increases the stock turnover rate, whereas holding a university degree decreases it.

I find that diversified investors achieve a better stock investment performance than individuals with concentrated portfolios. The performance differential is higher for female investors than for men. I document that stock investors who do also trade other assets classes hold better diversified stock portfolios. Comparing local and international stock traders, I find that internationally diversified investors outperform individuals who trade local stocks only.

6 References

Anderson, Anders, 2007, All Guts, No Glory: Trading and Diversification Among Online Investors, *European Financial Management* 13, 448-471.

Ashenfelter, Orley, and Alan Krueger, 1994, Estimates of the Economic Return to Schooling from a New Sample of Twins, *American Economic Review* 84 (5), 1157-1173.

Barber, Brad, and Terrance Odean, 2000, Trading is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors, *Journal of Finance* 55, 773-806.

Barber, Brad, and Terrance Odean, 2001, Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment, *Quarterly Journal of Economics* 116, 261-292.

Bertaut, Carol C., 1998, Stockholding Behavior of U.S. Households: Evidence from the 1983-1989 Survey of Consumer Finances, *Review of Economics and Statistics* 80, 263-275.

Calvet, Laurent, John Campbell, and Paolo Sodini, 2007, Down or Out: Assessing the Welfare Costs of Household Investment Mistakes, *Journal of Political Economy* 115(5), 707-747.

Calvet, Laurent, John Campbell, and Paolo Sodini, 2008, Fight or Flight: Portfolio Rebalancing by Individual Investors, forthcoming *Quarterly Journal of Economics*.

Campbell, John, 2006, Household Finance, *Journal of Finance* 56 (4), 1553-1604.

Carhart, Mark M., 1997, On Persistence on Mutual Fund Performance, *Journal of Finance* 52, 57-82.

Christiansen, Charlotte, Juanna Schroeter Joensen, and Jesper Rangvid, 2008, Are Economists More Likely to Hold Stocks?, *Review of Finance* 12(3), 465-496.

Coval, Joshua D., and Tobias J. Moskowitz, 1999, Home Bias at Home: Local Equity Preference in Domestic Portfolios, *Journal of Finance* 54(6), 2045-2073.

Dhar, Ravi, and Ning Zhu, 2006, Up Close and Personal: Investor Sophistication and the Disposition Effect, *Management Science* 52(5), 726-740.

Fama, Eugene F., and Kenneth R. French, 1993, Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics* 33, 3-56.

Fama, Eugene F., and Kenneth R. French, 1998, Value versus Growth: The International Evidence, *Journal of Finance* 53(6), 1975-1999.

French, Kenneth R., and James M. Poterba, 1991, Investor Diversification and International Equity Markets, *American Economic Review* 81(2), 222-226.

Goetzmann, William N., and Alok Kumar, 2008, Equity Portfolio Diversification, *Review of Finance* 12(3), 433-463.

Grinblatt, Mark, and Matti Keloharju, 2001, How Distance, Language, and Culture Influence Stockholdings and Trades, *Journal of Finance* 56, 1053-1073.

Ivkovic, Zoran, Clemens Sialm, and Scott Weisbenner, 2008, Portfolio Concentration and the Performance of Individual Investors, *Journal of Financial and Quantitative Analysis* 43(3), 613-656.

Ivkovic, Zoran, and Scott Weisbenner, 2005, Local Does as Local Is: Information Content of the Geography of Individual Investors' Common Stock Investments, *Journal of Finance* 60(1), 267-306.

Knüpfer, Samuli, 2007, Community spirit and local bias, Working Paper.

Korniotis, George, and Alok Kumar, 2008a, Does Investment Skill Decline due to Cognitive Aging or Improve with Experience, Working Paper, Federal Reserve Board and University of Texas at Austin.

Korniotis, George, and Alok Kumar, 2008b, Superior Information or a Psychological Bias? A Unified Framework with Cognitive Abilities Resolving Three Puzzles, Working Paper, Federal Reserve Board and University of Texas at Austin

Mankiw, Gregory N., and Stephen Zeldes, 1991, The Consumption of Stockholders and Non-stockholders, *Journal of Financial Economics* 29, 97-112.

Petersen, Mitchell A., 2008, Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches, forthcoming *Review of Financial Studies*.

Romer, Paul, 1986, Increasing Returns and Long-Run Growth, *Journal of Political Economy* 94 (5), 1002-1037.

Seasholes, Mark S., and Ning Zhu, 2005, Is There Information in the Local Portfolio Choices of Individuals?, Working Paper.