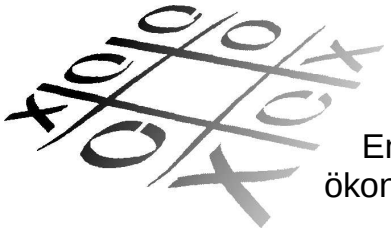


SONDERFORSCHUNGSBEREICH 504

Rationalitätskonzepte,
Entscheidungsverhalten und
ökonomische Modellierung

No. 03-18

Online Broker Investors: Demographic Information, Investment Strategy, Portfolio Positions, and Trading Activity

Markus Glaser*

October 2003

Financial support from the Deutsche Forschungsgemeinschaft, SFB 504, at the University of Mannheim, is gratefully acknowledged.

*Sonderforschungsbereich 504, email: Glaser@bank.BWL.uni-mannheim.de

Universität Mannheim
L 13,15
68131 Mannheim

Online Broker Investors: Demographic Information, Investment Strategy, Portfolio Positions, and Trading Activity

Markus Glaser*

October 1, 2003

Abstract

It is often argued that the internet influences investor behavior. Furthermore, the recent "bubble" in internet stocks is sometimes ascribed, at least in part, to online trading. However, little is known about how online investors actually behave. This paper contributes to fill this gap. A sample of approximately 3,000 online broker investors is studied over a 51 month period ending in April 2001. The main goal of this paper is to present various descriptive statistics on demographic information, investment strategy, portfolio positions, and trading activity. The main results of this paper can be summarized as follows. Online broker investors trade frequently. The median stock portfolio turnover is about 30 % per month. The average number of stocks in portfolios increases over time suggesting that, ceteris paribus, diversification increases. Trading activity is tilted towards technology, software, and internet stocks. About half of the investors in our sample trade warrants and half of the transactions of all investors are purchases and sales of foreign stocks. Income and age are negatively and the stock portfolio value is positively related to the number of stock transactions. Warrant traders buy and sell significantly more stocks than investors who do not trade warrants. Warrant traders and investors who describe their investment strategy as high risk have higher stock portfolio turnover values whereas the opposite is true for investors who use their online account mainly for retirement savings. The stock portfolio value is negatively related to turnover. The higher the stock portfolio value, the higher the average trading volume per stock market transaction.

Keywords: Individual Investor, Online Broker Investor, Online Trading, Trading Volume, Investor Behavior

JEL Classification Code: G1, D8

---

*Markus Glaser is from the Lehrstuhl für Bankbetriebslehre, Universität Mannheim, L 13, 15, 68131 Mannheim. E-Mail: glaser@bank.BWL.uni-mannheim.de. I would like to thank Martin Weber and seminar participants at the University of Mannheim for valuable comments and insights. Financial Support from the Deutsche Forschungsgemeinschaft (DFG) is gratefully acknowledged.

Online Broker Investors:

Demographic Information, Investment Strategy,

Portfolio Positions, and Trading Activity

Abstract

It is often argued that the internet influences investor behavior. Furthermore, the recent "bubble" in internet stocks is sometimes ascribed, at least in part, to online trading. However, little is known about how online investors actually behave. This paper contributes to fill this gap. A sample of approximately 3,000 online broker investors is studied over a 51 month period ending in April 2001. The main goal of this paper is to present various descriptive statistics on demographic information, investment strategy, portfolio positions, and trading activity. The main results of this paper can be summarized as follows. Online broker investors trade frequently. The median stock portfolio turnover is about 30 % per month. The average number of stocks in portfolios increases over time suggesting that, ceteris paribus, diversification increases. Trading activity is tilted towards technology, software, and internet stocks. About half of the investors in our sample trade warrants and half of the transactions of all investors are purchases and sales of foreign stocks. Income and age are negatively and the stock portfolio value is positively related to the number of stock transactions. Warrant traders buy and sell significantly more stocks than investors who do not trade warrants. Warrant traders and investors who describe their investment strategy as high risk have higher stock portfolio turnover values whereas the opposite is true for investors who use their online account mainly for retirement savings. The stock portfolio value is negatively related to turnover. The higher the stock portfolio value, the higher the average trading volume per stock market transaction.

Keywords: Individual Investor, Online Broker Investor, Online Trading, Trading Volume, Investor Behavior

JEL Classification Code: G1, D8

1 Introduction

It is often argued that the internet influences investor behavior. Furthermore, the recent "bubble" in internet stocks is sometimes ascribed, at least in part, to online trading.[1] Online investors have access to vast information sources, they usually act without investment advice, and transaction costs at internet brokers are low.[2] Online trading is not merely a small fraction of the whole trading activity of individual investors. For example, online trading accounted for 37 % of all retail trading volume in equities and options in the year 1998 in U.S.[3] However, little is known about how online investors actually behave. There are only two recent papers that study how the internet influences investor behavior. Barber and Odean (2002) analyze trading volume and performance of a group of 1,600 discount broker investors who switched from phone-based to online trading during the sample period studied. They find that trading volume increases and performance decreases after going online. Choi, Laibson, and Metrick (2002) analyze the impact of the introduction of an internet-based trading channel in two corporate 401(k) retirement savings plans. They find that trading frequency increases. Moreover, internet trades tend to be smaller and online investors have smaller portfolios than other traders.

This paper contributes to the endeavor to better understand how online investors behave. A sample of approximately 3,000 online broker investors is studied over a 51 month period ending in April 2001. The main goal of this paper is to present various descriptive statistics on demographic information, investment strategy, portfolio positions, and trading activity

[1] See, for example, Shiller (2000).

[2] Barber and Odean (2001b) present a survey of the influence of the internet on brokerages and stock exchanges, the market for financial advice, and decisions of online investors and their influence on market outcomes.

[3] See Barber and Odean (2001b), p. 41.

of this sample of German online broker investors. The investors in our sample trade via internet and almost all investors buy and sell stocks during the 51 month period. These two characteristics imply that our investor sample is not representative for the average private investor in Germany. There are households in Germany that do not invest in stocks or that have no access to the internet. For example, only 8.9 % of the German population above 14 years held stocks in the year 2001.[4] In contrast, almost all investors in our sample trade stocks. This paper primarily provides descriptive statistics and does not test a specific theory. Most of the analysis of this paper thus focuses on descriptive statistics of the number of stock transactions, the calculation of portfolio turnover, and general determinants of several measures of trading volume (number of transactions, portfolio turnover, average trading volume per transaction).

The online broker which provided the data set necessary for this paper can be classified as a discount broker. Discount brokers carry out buy and sell orders of investors but offer more limited service than other retail banks. Online brokerage is one part of online banking. Online brokers are online banks that offer security transactions and keep online accounts but usually do not provide other banking services.[5] The online broker who provided the data for this thesis does not offer investment advice and the fees are much lower than the fees of other, full-service retail brokers. Schüler (2002) shows that the average transactions costs for a 2,500 EUR and a 6,000 EUR transaction at the 12 largest online brokers in Europe are 13.11 EUR and 21.13 EUR, respectively.

The main results of this paper can be summarized as follows. Online broker investors trade frequently. The median stock portfolio turnover is about 30 % per month. The av-

[4]See Deutsches Aktieninstitut (2002), Table 8.3.

[5]See, for example, Schüler (2002).

erage number of stocks in portfolios increases over time suggesting that, ceteris paribus, diversification increases. Trading activity is tilted towards technology, software, and internet stocks. About half of the investors in our sample trade warrants and half of the transactions of all investors are purchases and sales of foreign stocks. Income and age are negatively and the stock portfolio value is positively related to the number of stock transactions. Warrant traders buy and sell significantly more stocks than investors who do not trade warrants. Warrant traders and investors who describe their investment strategy as high risk have higher stock portfolio turnover values whereas the opposite is true for investors who use their online account mainly for retirement savings. The stock portfolio value is negatively related to turnover. The higher the stock portfolio value, the higher the average trading volume per stock market transaction.

The rest of this paper is organized as follows. Section 2 discusses related literature. Section 3 describes the data set of this study. Section 4 presents descriptive statistics on various demographic variables as well as the investment strategy of the investors in the sample. Section 5 is concerned with portfolio positions. Section 6 contains descriptive statistics on the trading activity of investors and presents cross-sectional regression results on the determinants of trading volume. The last section summarizes the main results and concludes.

2 Related Literature

This paper belongs to the strand of literature that analyzes how individual investors actually behave.

Schlarbaum, Lewellen, and Lease (1978a, 1978b) analyze the performance of a sample

of 2,500 retail investors from 1964 to 1970. Odean (1999) analyzes the trades of 10,000 individuals with discount brokerage accounts over the period from 1987 through 1993. He finds that these investors reduce their returns by trading and thus concludes that trading volume is excessive. Barber and Odean (2000) analyze portfolio performance of 66,000 households with accounts at a discount broker during 1991 to 1996. They find that investors trade to their detriment: The average household underperforms appropriate benchmarks and, the higher portfolio turnover, the lower the return net of transaction costs. Barber and Odean (2001a) study a similar data set and they find that men trade more than women and, as a consequence, earn lower returns. Using another data set of a U.S. discount broker, Odean (1998) documents the disposition effect, the tendency to sell winners too early and ride losers too long (see also Shefrin and Statman (1985)).

This small survey shows that our knowledge about the behavior of retail and discount broker investors has improved considerably in the last years.[6] However, these studies do not analyze the behavior of online investors.

3 Data

This study is based on the combination of several data sets. The main data set consists of 563,104 buy and sell transactions as well as monthly portfolio positions of 3,079 individual investors from a German online broker in the period from January 1997 to April 2001. We consider all investors who trade via internet, had opened their account prior to January 1997, had at least one transaction in 1997, and have an e-mail address (which was

[6]Further studies focusing on the behavior of individual investors are Grinblatt and Keloharju (2000, 2001). Surveys that discuss the behavior of individual investors are Shiller (1999), Daniel, Hirshleifer, and Teoh (2002), De Bondt (1998), and Barberis and Thaler (2003).

necessary for another project. See Glaser and Weber (2003) for details). The second data set consists of demographic and other self-reported information (age, gender, income, investment strategy, investment experience), that was collected by the online broker at the time each investor opened her or his account. Data on the securities traded are obtained from Datastream, our third data source.

Table 1 and Table 2 present some descriptive statistics of the transaction data set. Approximately 56 % of all transactions are stock purchases or sales.[7] Perhaps surprisingly high is the number of warrant transactions (about 25 % of all transactions). Approximately 15 % of all transactions are trades in mutual funds. Only few trades (1% of all transactions or less) are in the remaining security categories (bonds, subscription warrants/rights, certificates, profit participation rights). Our online broker sample trades 20,540 different securities. More than half of these securities are warrants. Warrants are financial instruments that are issued by banks and are afterwards traded on exchanges. Warrants are a form of derivative and derive their value from another underlying security (for example, stocks or a share price index). They give the holder, for example, the right to purchase the underlying security at a particulary price according to the terms if issue. These terms of issue are the most important explanation of the large number of warrants traded by investors in our data set when compared to other security categories. Usually, there are several warrants that are issued over a single security or a single share price index. These warrants have, for example, different expiry dates or exercise prices. Furthermore, the investors in our sample trade 4,763 different stocks, 1,480 different mutual funds, and 956 different bonds.

[7] This result is similar to Barber and Odean (2000) who analyze a data set from a U.S. discount broker which is comparable to ours. They report that slightly more than 60 % of all trades are in stocks.

4 Demographic Information and Investment Strategy

Table 3 presents descriptive statistics of self-reported demographic variables (age, gender, income) and self-reported information on stock market investment experience and on the investment strategy. The data was collected by the online broker at the time each investor opened her or his account. Income is reported within five ranges, where the top range is more than 102,258.38 EUR (200,000 Deutsche Mark (DM)).[8] We calculate means, medians, and standard deviations using the midpoint of each range and 115,040.67 EUR (225,000 DM) for the top range. The table presents mean, median, standard deviation (std.dev.), and the number of accounts (no. obs.) for which the self-reported data is available.

The mean (median) age of investors in our data set is 40.85 (39). The vast majority of investors is male (approximately 95 %). The mean income is about 52,000 EUR whereas the median is about 38.000 EUR. Note, however, that the self-reported income variable is only available for one third of all investors. About half of the individuals in our sample had stock market investment experience between five and ten years at the time the online broker account was opened.

The last part of Table 3 presents the self-reported investment strategy of our investor sample. Only about 5 % of the investors use their account for retirement savings. Approximately 15 % of the investors characterize their investment strategy as speculation or high risk. The vast majority of individuals (more than 50 %) with data on investment strategy available states that they have no specific investment strategy.

[8] 1 EUR is equal to 1.95583 DM.

5 Portfolio Positions

Table 4 presents descriptive statistics of portfolio positions (time series average of the monthly stock portfolio value, time series average of the number of stocks in portfolio). The monthly stock portfolio value is calculated using price data from Datastream. Stock price data is available for 3,961 out of 4,763 stocks (83.16 %) that are traded in our sample. Furthermore, we only consider stocks that are traded in the currencies EUR and DM[9] as we have to calculate monthly portfolio positions in the following way. At the beginning of the year 1999, all stocks bought in DM were converted to EUR. Using the transactions from January 1997 until April 2001, we are therefore only able to calculate monthly portfolio positions for stocks that are traded in these two currencies. Together with the above mentioned limited number of stocks with price data in Datastream, this corresponds to 271,571 out of 316,134 stock trades (85.90 %).

During our sample period, the median investor holds, on average, 5.17 stocks worth 15,680 EUR. These figures are positively skewed. The mean investor holds 6.76 stocks worth 36,623 EUR, on average. The mean of the stock portfolio value is more than twice as high as the median. 10 % of the investors in our sample have an average stock portfolio value of about 90,000 EUR or higher. These results are consistent with prior findings. Barber and Odean (2000) analyze a similar data set from a U.S. discount broker. Their data set covers six years from 1991 to 1996. Investors in this sample mainly trade phone-based. Barber and Odean (2000) report that the median investor holds 2.61 stocks worth $ 16,000. These figures are also positively skewed. The mean household holds 4.3 stocks worth $ 47,000.

[9]More than 97 % of all stock purchases and sales are in DM of EUR. Almost all of the remaining transactions are in U.S. $.

The investors in our data set hold more stocks than the investors in Barber and Odean (2000). A possible explanation is the different time period covered. Figure 1 and Figure 2 show that the mean and median number of stocks in portfolios increase monotonically during our sample period. The mean and median number of stocks at the beginning of our sample period are close to the values reported by Barber and Odean (2000). The almost linear increase of the average number of stocks in portfolios is strikingly similar to findings of Goetzmann and Kumar (2002). They show exactly the same pattern for U.S. discount broker investors.

Figure 3 and Figure 4 present the time series of the mean and median of the stock portfolio value in EUR across investors.

The stock portfolio value shows a time series pattern that one would have expected as it is similar to the development of the German stock market. The time series pattern is especially similar to the New Market index Nemax50 which started in the end of the year 1997 with a value of 1000 (see Figure 5 and Figure 6). However, the peak of the stock portfolio value is reached some months after the German blue chip index DAX and the New Market index Nemax50 reached their respective peaks. A comparison with the results of Barber and Odean (2000), who study investors who mainly trade phone-based, shows that the portfolio values in our sample at the beginning of our sample period - the end of the Barber and Odean (2000) sample period - are lower than the portfolio values in the Barber and Odean (2000) study. These findings are consistent with the results of Choi, Laibson, and Metrick (2002) who find that online investors tend to have smaller portfolios than other investors.

6 Trading Activity

This section is subdivided in two subsections. The first subsection presents detailed descriptive statistics about the transactions of the investors in our sample. Subsection 6.1 is concerned with the time series behavior of the number of transactions, the distribution of transactions in various security categories across investors, and the distribution of stock transactions and stocks traded across industries and countries. Subsection 6.2 presents cross-sectional regression results on the relation between several measures of trading volume (number of stock market transactions, number of stock market purchases, number of transactions (all security categories), mean monthly turnover, average trading volume per stock market transaction) and several explanatory variables that are known to affect financial decision making (investment experience, gender, age, a retirement saving dummy variable, a warrant trader dummy variable, mean monthly stock portfolio value, income).

6.1 Descriptive Statistics

Time Series of the Number of Transactions Figure 7 plots the time series of the sum of transactions across all investors each month. In the first two years of our sample period, the sum of transactions is between 5,000 and 10,000 per month. In the beginning of the year 1999, the number of transactions exceeds 10,000 per month. The peak of the number of transactions is reached in March 2000 when the stock market in Germany reached its all time high (see Figure 5 and Figure 6).

Distribution of the Number of Transactions across Security Categories Table 5 and Table 6 show descriptive statistics of the number of trades, the number of purchases, the number

of sales, and the number of transactions across all seven security categories in our data set (stocks, bonds, subscription warrants/rights, certificates, profit participation rights, mutual funds, warrants).

97 % of all investors trade stocks, 73 % trade mutual funds, 54 % trade warrants, and 23 % trade bonds. The average number of transactions in all security categories is 183 or about 3.6 transactions per month. The median is 103 transactions. Table 6 shows that the skewness of the number of transactions is positive (5.72). 10 % of our investors have more than 380 transactions in our 51 month period.

Distribution of Stocks Traded and Stock Transactions across Industries Table 7 presents the distribution across industries (exactly in the way the respective industry classification is stored in Datastream) of stocks that are traded by investors in our data set and that are covered in Datastream.[10] Most of the stocks traded are technology, software, or internet companies.

Table 8 presents the distribution of stock transactions across industries. A similar picture emerges. More than 13 % of all transactions are purchases and sales of "software" stocks. Other heavily traded industries are "internet", "pharmaceuticals", "telecom equipment", "computer hardware", and "telecom fixed line".

These findings are similar to Goetzmann and Kumar (2002), who analyze a subset of the Barber and Odean (2000) data set, and show that among the 20 most actively traded securities, there are mainly technology stocks like IBM, Intel, Microsoft, or Apple.

[10] 4,231 of 4,763 stocks are covered in Datastream with industry classification datatype indm.

Distribution of Stocks Traded and Stock Transactions across Countries Table 9 presents the distribution across countries of stocks traded by our investor sample. Most of the stocks traded are U.S. stocks (42 %). About 1,000 stocks are German stocks (24 %). Less than 4 % of stocks traded are from Japan and the remaining 52 countries in our data set.

Table 10 shows that the picture is different when the distribution of stock transactions across countries is considered. More than half of all stock transactions are purchases and sales of German stocks. About 30 % of all transactions are purchases and sales of U.S. stocks.

Figure 8 and Figure 9 present the results of Table 9 and Table 10 aggregated across regions. The main message of these figures is that investors internationally diversify. Studies analyzing portfolio diversification of retail brokers usually find that investors' portfolio holdings reveal a strong bias towards domestic stocks (home bias).[11] This stylized fact about behavior and portfolio positions of individual investors does not seem to apply to our online broker investors.

Calculation of Turnover Stock portfolio turnover is calculated as follows. We only consider stocks that are bought or sold in the currencies DM or EUR and are covered in Datastream. The whole data set contains 316,134 stock trades. 3,961 out of the 4,763 stocks (83.2 %) in our sample are covered in Datastream with daily closing price data. This corresponds to 271,571 stock trades (85.90 % of 316,134). We first calculate the sum of the absolute values of purchases and sales per month for each investor. The median of the sum of the absolute values of purchases and sales per month across all observations is 6,878 EUR whereas the mean is 24,176 EUR. When we first calculate the mean per

[11] See Kilka and Weber (2000) for references.

investor across months, the results for the mean and median across investors are similar to these values. The median of the absolute values of purchases and sales per month across investors is slightly higher whereas the mean is slightly lower. In the next step, we need the stock portfolio value per month for each investor (see Section 5 for details). Again, we only consider stocks that are bought or sold in the currencies DM or EUR and are covered in Datastream.[12] The median stock portfolio value across all observations is 14,264 EUR whereas the mean is 41,917 EUR. When we first calculate the mean stock portfolio across months for each investor the results are as follows. The median stock portfolio value (averaged across months for each investor) across investors is 15,680 EUR whereas the mean is 36,623 EUR. 2,998 (of 3,079) investors in our data set trade stocks at least once from January, 1st, until April, 17th. However, only 2,964 investors have end-of-month stock portfolio positions. To calculate the monthly average turnover per investor we only consider investors who have at least five end-of-month stock portfolio positions. We are therefore only able to calculate the average monthly stock portfolio turnover for 2,904 investors. The median of the average monthly stock portfolio turnover is 32.64 % whereas the mean is 134.41 %. These turnover values appear quite high. However, these values appear reasonable when we take into account the above mentioned absolute values of purchases and sales per month and the monthly stock portfolio values. Furthermore, focusing only on the mean turnover value is quite misleading. For example, in one month we calculate a turnover of more than 2,000,000 % for one investor: The absolute value of purchases and sales in this month is about 40,000 EUR whereas the end-of-month stock portfolio value is 2 EUR. When we only focus on stock portfolio values of more than 500 EUR, the following picture emerges. The median of turnover across investors is now 29.08

[12] See Subsection 5 for details.

% per month whereas the mean is 62.55 % per month. Barber and Odean (2000) report a median monthly turnover of about 3 % per month compared with about 30 % per month in our data set. These different turnover figures are consistent with the different values of the average number of stock trades per investor per month. In the Barber and Odean (2000) data set, the average number of stocks traded per month is approximately 0.4 per month compared to 2.1 in our data set. Furthermore, Barber and Odean (2000) calculate turnover in a way that it cannot exceed 100 % per month.[13] Thus, the turnover measure of Barber and Odean (2000) is likely to be biased downwards and can be regarded as a lower bound for the true turnover values in their sample. Why are the number of transactions and turnover between five and ten times higher in our data set when compared to the Barber and Odean (2000) study? One explanation might be the fact that our investors trade via internet. Barber and Odean (2002) and Choi, Laibson, and Metrick (2002) present evidence that online trading leads to higher stock portfolio turnover. For example, Barber and Odean (2002) show that annualized turnover for investors who switch from phone to online trading from increases from 70 % before going online to 120 % after the switch to online trading. Two years after the switch the turnover is still 90 % whereas in the same period there is no difference in portfolio turnover ratios of size-matched investors, i.e. investors with similar stock portfolio values. However, in contrast to findings of Choi, Laibson, and Metrick (2002), the comparison between our results and the results of Barber and Odean (2000) suggest that the impact of the internet on turnover is stronger than its impact on trading frequency.

[13] See Barber and Odean (2000), footnote 8.

Turnover and Various Investor Characteristics Table 11 presents the number of transactions (mean, standard deviation, skewness, kurtosis, and various percentiles), income in EUR, average monthly stock portfolio value from January 1997 until April 2001 in EUR (mean, standard deviation, skewness, kurtosis, and various percentiles), age, percentage of female investors, percentage of warrant traders, percentage of investors who use their account for retirement savings, percentage of investors who classify their investment strategy as high risk, and investment experience in years for turnover quintiles.

The results of Table 11 are unsurprising. The higher turnover, the higher the number of trades, the lower age, the higher the percentage of warrant traders, the lower the percentage of investors who use their account for retirement savings, and the higher the percentage of investors who classify their investment strategy as high risk. The average of the monthly stock portfolio value is negatively related to turnover. The stock portfolio value in the highest turnover quintile is very low (the median is about 10,900 EUR). We will analyze these relations more comprehensively in the next subsection using a multiple regression analysis.

6.2 Cross-Sectional Regressions

In this subsection, we analyze the general determinants of measures of trading volume in the whole data set. Table 12 shows pairwise correlation coefficients of five measures of trading volume (logarithm of the number of stock market transactions, logarithm of the number of stock market purchases, logarithm of the number of transactions (all security categories), logarithm of mean monthly turnover, logarithm of the average trading volume per stock market transaction) as well as the significance level of each correlation coeffi-

cient (in parentheses) and the number of observations used in calculating the correlation coefficient.[14] All correlation coefficients are significantly positive at the 1 % level. There is, however, a large variation in the magnitude of the correlation coefficients. The average trading volume per stock market transaction is only weakly, although significantly, correlated with the four remaining measures of trading volume when compared to the other correlations.

Table 14 presents regression results on the relation between the five measures of trading volume as the dependent variable and stock market investment experience, a gender dummy variable (the variable takes the value 1 if the investor is male), age, a retirement saving dummy variable (the variable takes the value 1 if the account is used for retirement savings), a warrant trader dummy variable (the variable takes the value 1 if the investor trades warrants at least once in the time period from January 1997 until April 2001), a high risk investment strategy dummy (the variable takes the value 1 if the investor classifies her investment strategy as high risk), the logarithm of the mean monthly stock portfolio value, and the logarithm of income. In the second, fourth, sixth, eighth, and tenth regression, we exclude the income variable to increase the number of observations. Income and investment experience are reported as described above. Table 13 summarizes and defines dependent and independent variables of the cross-sectional regression analysis of Table 14 and presents their respective data source.

The number of stock market transactions is not related to investment experience, gender,

[14] We use the natural logarithm of the five trading volume measures as these variables are positively skewed. Tests show, that we thus avoid problems like non-normality, non-linearity, and heteroskedasticity in the cross-sectional regression analysis in this subsection. See Spanos (1986), Chapter 21, especially, pp. 455-456, Davidson and McKinnon (1993), Chapter 14, and Atkinson (1985), pp. 80-81. We therefore use the natural logarithm of the above mentioned variables when calculating correlation coefficients.

and a high risk investment strategy. The retirement savings dummy is significant at the 10 % level when income is excluded. Investors who mainly invest for retirement savings trade less. The higher income, the lower the number of stock market transactions. Age is negatively related to the number of stock market transactions, especially when the income variable is excluded. This finding might by explained by the positive correlation of age and income in our data set. Investors who trade warrants trade significantly more stocks (t-values in regressions (1) and (2) are 8.20 and 11.79, respectively). The warrant trader dummy variable can be interpreted as a proxy for investor sophistication. The more sophisticated an investor, the higher the number of transactions. The value of the stock portfolio is significantly positively related to the number of stock trades with t-values of 20.67 and 29.01, respectively.

The results in regressions (3) and (4) are similar. The number of stock market purchases are positively related to the stock portfolio value and negatively related to income and age. Investors who trade warrants buy significantly more stocks. In regression (3), the gender dummy is positively related to the number of stock purchases at the 10 % level. Men buy more stocks than women. Furthermore, the high risk investment strategy dummy is positively related with the number of stock market purchases at the 10 % level.

The number of transactions in all security categories are analyzed in regressions (5) and (6). Investment experience and the value of the stock portfolio are significantly positively related to the number of transactions. Investors who describe their investment strategy as high risk and investors that trade warrants trade significantly more.

Regressions (7) and (8) present results on the determinants of mean monthly turnover. Investment experience, gender, and income are unrelated to turnover. Age is negatively

related to turnover when the income variable is excluded. Investors who mainly invest for retirement savings turn over their stock portfolio less frequently. In contrast, warrant traders and investors with a high risk strategy have higher turnover values. In addition, the higher the stock portfolio value the lower turnover. The adjusted R-squared of regressions (7) and (8) are only 10 % and 11 %, respectively, compared to adjusted R-squared-values between 28 % and 36 % in regressions (1) to (6). It is harder to explain the variation of turnover than the variation of the number of trades.

Dorn and Huberman (2002) find results similar to ours using another data set from a German online broker. They study 1,000 customers between January 1995 and May 2000. When risk tolerance is excluded as explanatory variable there is no significant gender effect on turnover. Whether gender has a significant effect on turnover strongly depends on the set of explanatory variables.[15] Barber and Odean (2001a) find that women have significantly lower turnover values but their regressions have a very low adjusted R-squared (1.53 % compared to 10 % and 11 % in our regressions).[16]

The last two columns (regressions (9) and (10) of Table 14) show the relation between the average trading volume per stock market transaction and explanatory variables. Two results have to be stressed: Firstly, the value of the stock portfolio is, not surprisingly, positively related to the average trading volume per stock market transaction with t-values of 26.38 and 39.95, respectively, whereas income has no explanatory power. This might be explained by the fact that high-income investors do not report their income at the time the account was opened. Secondly, the adjusted R-squared values are very high (50 % and 51 %, respectively).

[15] See Dorn and Huberman (2002), Table VIII.

[16] Barber and Odean (2001a), p. 280.

7 Summary and Conclusion

The main goal of this paper was to present various descriptive statistics on demographic information, investment strategy, portfolio positions, and trading activity of the sample of German online broker investors. Most of the analysis of this paper focused on descriptive statistics of the number of stock transactions, the calculation of portfolio turnover, and general determinants of several measures of trading volume (number of transactions, portfolio turnover, average trading volume per transaction).

The main findings of this paper can be summarized as follows.

- Online broker investors trade frequently. The median stock portfolio turnover is about 30 % per month.
- The average number of stocks in portfolios increases over time suggesting that, ceteris paribus, diversification increases over time.
- Trading activity is tilted towards technology, software, and internet stocks.
- About half of the investors in our sample trade warrants.
- Half of the transactions of all investors are purchases and sales of foreign stocks.
- Income and age are negatively and the stock portfolio value is positively related to the number of stock transactions. Warrant traders buy and sell significantly more stocks than investors who do not trade warrants.
- Warrant traders and investors who describe their investment strategy as high risk have higher stock portfolio turnover values whereas the opposite is true for investors who use their online account mainly for retirement savings. The stock portfolio value

is negatively related to turnover.

- The higher the stock portfolio value, the higher the average trading volume per stock market transaction.

The above mentioned results might suggest that the effect of the internet on the quality of investment decisions is ambiguous. There are effects that are likely to be positive (the number of stocks increases and transactions are not biased towards domestic stocks in a way discovered by studies analyzing other retail investors), others are likely to be negative (trading volume volume and, as a consequence, transaction costs, are high and investors trade high risk technology stocks). Accordingly, the net effect on risk-adjusted performance is unclear. The studies of Barber and Odean (2002) and Choi, Laibson, and Metrick (2002) lead to opposing conclusions. Barber and Odean (2002) find that online investors reduce their portfolio performance by trading. In contrast, Choi, Laibson, and Metrick (2002) find no significant difference in the performance of web traders and phone traders. Therefore, future research should focus on the performance of online broker investors.

References

Atkinson, A.C., 1985, *Plots, Transformations, and Regression* (Clarendon Press).

Barber, Brad M., and Terrance Odean, 2000, Trading is hazardous to your wealth: The common stock investment performance of individual investors, *Journal of Finance* 55, 773–806.

——— , 2001a, Boys will be boys: Gender, overconfidence, and common stock investment, *Quarterly Journal of Economics* 116, 261–292.

——— , 2001b, The internet and the investor, *Journal of Economic Perspectives* 15, 41–54.

——— , 2002, Online investors: Do the slow die first?, *Review of Financial Studies* 15, 455–487.

Barberis, Nicholas, and Richard Thaler, 2003, A survey of behavioral finance, in G.M. Constandinidis, M. Harris, and R. Stulz, ed.: *Handbook of the Economics of Finance*, pp. 1053–1123 (Elsevier).

Choi, James J., David Laibson, and Andrew Metrick, 2002, How does the internet affect trading? Evidence from investor behavior in 401(k) plans, *Journal of Financial Economics* 64, 397–421.

Daniel, Kent, David Hirshleifer, and Siew Hong Teoh, 2002, Investor psychology in capital markets: evidence and policy implications, *Journal of Monetary Economics* 49, 139–209.

Davidson, Russell, and James G. MacKinnon, 1993, *Estimation and Inference in Econometrics* (Oxford University Press).

De Bondt, Werner F.M., 1998, A portrait of the individual investor, *European Economic Review* 42, 831–844.

Deutsches Aktieninstitut, 2002, *Factbook* (Deutsches Aktieninstitut).

Dorn, Daniel, and Gur Huberman, 2002, Who trades?, Working paper, Columbia University.

Glaser, Markus, and Martin Weber, 2003, Overconfidence and trading volume, CEPR Discussion Paper No. 3941.

Goetzmann, William N., and Alok Kumar, 2002, Equity portfolio diversification, Working paper.

Grinblatt, Mark, and Matti Keloharju, 2000, The investment behavior and performance of various investor types: a study of Finland's unique data set, *Journal of Financial Economics* 55, 43–67.

——— , 2001, What makes investors trade?, *Journal of Finance* 56, 589–616.

Kilka, Michael, and Martin Weber, 2000, Home bias in international stock return expectations, *Journal of Psychology and Financial Markets* 1, 176–192.

Odean, Terrance, 1998, Are investors reluctant to realize their losses?, *Journal of Finance* 53, 1775–1798.

——— , 1999, Do investors trade too much?, *American Economic Review* 89, 1279–1298.

Schlarbaum, Gary G., Wilbur G. Lewellen, and Ronald C. Lease, 1978a, The common-stock-portfolio performance record of individual investors: 1964-70, *Journal of Finance* 33, 429–441.

——— , 1978b, Realized returns on common stock investment: The experience of individual investors, *Journal of Business* 51, 299–325.

Schüler, Martin, 2002, Integration of the european market of e-finance: Evidence from online brokerage, Centre for European Economic Research (ZEW) Discussion Paper No. 02-24.

Shefrin, Hersh, and Meir Statman, 1985, The disposition to sell winners too early and ride losers too long: Theory and evidence, *Journal of Finance* 40, 777–790.

Shiller, Robert J., 1999, Human behavior and the efficiency of the financial system, in J.B. Taylor, and M. Woodford, ed.: *Handbook of Macroeconomics*, pp. 1305–1340 (Elsevier Science).

——— , 2000, *Irrational exuberance* (Princeton University Press).

Spanos, Aris, 1986, *Statistical foundations of econometric modelling* (Cambridge University Press).

Table 1: Descriptive Statistics: Transaction Data Set

This table presents the number of all transactions as well as the numbers of purchases and sales across all 3,079 accounts of individual investors in our data set. Time period is January, 1st, 1997 to April, 17th, 2001. Furthermore, this table shows the distribution of the number of buy-, sell-, and all transactions across the seven security categories in our data set.

Security category	Number of purchases	Number of sales	All trades
Stocks	177,981	138,153	316,134
Bonds	2,040	1,940	3,980
Subscription warrants/rights	1,517	4,253	5,770
Certificates	5,461	2,220	7,681
Profit participation rights	295	341	636
Mutual funds	61,863	22,508	84,371
Warrants	79,241	65,291	144,532
All types of securities	328,398	234,706	563,104

Table 2: Descriptive Statistics: Numbers of Securities Traded

This table presents the number of securities traded by all 3,079 accounts of individual investors in our data set. Time period is January, 1st, 1997 to April, 17th, 2001. Furthermore, this table shows the distribution of the number of securities traded across the seven security categories in our data set.

Security category	Numbers of securities traded
Stocks	4,763
Bonds	956
Subscription warrants/rights	260
Certificates	478
Profit participation rights	83
Mutual funds	1,480
Warrants	12,520
All security categories	20,540

Table 3: Descriptive Statistics: Demographic Information and Investment Strategy

This table presents descriptive statistics of self-reported demographic variables (age, gender, income) and self-reported information on stock market investment experience and on the investment strategy. The data was collected by the online broker at the time each investor opened her or his account. Income is reported within five ranges, where the top range is more than 102,258.38 EUR (200,000 Deutsche Mark (DM)). We calculate means, medians, and standard deviations using the midpoint of each range and 115,040.67 EUR (225,000 DM) for the top range. The table presents mean, median, standard deviation (std.dev.), and the number of accounts (no. obs.) for which the self-reported data is available.

Demographic variables	Age	Mean	40.85
		Std.dev.	10.23
		Median	39
		No. obs.	2,552
	Gender	Men	2,931 (95.19 % of 3,079)
		Women	148 (4.81 %)
		No. obs	3,079
	Income (in EUR)	Mean	52,069.19
		Std.dev.	26,407.17
		Median	38,346.89
		No. obs.	1,128
Investment experience	No experience		1 (0.04 % of 2,387)
	Up to 5 years		1,056 (44.24 %)
	5 to 10 years		1,271 (53.25 %)
	10 to 15 years		17 (0.71 %)
	More than 15 years		42 (1.76 %)
	Sum		2,387
Investment strategy	High current returns		68 (2.85 % of 2,388)
	Realizing short term gains		80 (3.35 %)
	Retirement savings		115 (4.82 %)
	No specific strategy		1,268 (53.10 %)
	Speculation/high risk		370 (15.49 %)
	Higher returns with moderate risk		487 (20.39 %)
	Sum		2,388

Table 4: Descriptive Statistics: Portfolio Positions

This table presents several descriptive statistics of portfolio positions (time series average of the monthly stock portfolio value, time series average of the number of stocks in portfolio). The table presents mean, median, standard deviation, skewness, kurtosis, and various percentiles.

Time series average of the monthly stock portfolio value (January 1997 until April 2001; in EUR)	Mean	36,622.87
	Standard deviation	69,847.77
	Skewness	6.88
	Kurtosis	81.06
	10th Percentile	2,367.06
	25th Percentile	6,075.08
	Median	15,679.79
	75th Percentile	38,306.82
	90th Percentile	87,474.42
Time series average of the number of stocks in portfolio (January 1997 until April 2001)	Mean	6.76
	Standard deviation	5.83
	Skewness	2.30
	Kurtosis	10.72
	10th Percentile	1.65
	25th Percentile	2.84
	Median	5.17
	75th Percentile	8.73
	90th Percentile	13.50

Table 5: Descriptive Statistics: Transactions (All Security Categories)

This table presents descriptive statistics of the number of trades, the number of purchases, the number of sales, and the number of transactions across all seven security categories of all 3,079 accounts of individual investors in our data set. Time period is January, 1st, 1997 to April, 17th, 2001. The table presents mean, median, standard deviation (std.dev.), and the number of accounts (no. obs.) that trade in the respective security category in our sample period and that are used to calculate means, medians, and standard deviations.

Number of	Mean	182.89
transactions	Std.dev.	284.16
(all securities)	Median	103
	No. obs.	3,079
Number of	Mean	107.71
purchases	Std.dev.	158.35
(all securities)	Median	64
	No. obs.	3,049 (99.03 % of 3,079)
Number of	Mean	76.35
sales	Std.dev.	129.89
(all securities)	Median	39
	No. obs.	3,074 (99.84 %)
Number of	Mean	105.45
transactions	Std.dev.	180.37
(stocks)	Median	54
	No. obs.	2,998 (97.37 %)
Number of	Mean	5.50
transactions	Std.dev.	9.69
(bonds)	Median	2
	No. obs.	717 (23.29 %)
Number of	Mean	3.13
transactions	Std.dev.	2.77
(subscription warrants/rights)	Median	2
	No. obs.	1,933 (62.78 %)
Number of	Mean	11.61
transactions	Std.dev.	18.11
(certificates)	Median	6
	No. obs.	1,947 (63.23 %)
Number of	Mean	2.96
transactions	Std.dev.	5.52
(profit participation rights)	Median	2
	No. obs.	226 (7.34 %)
Number of	Mean	37.61
transactions	Std.dev.	65.21
(mutual funds)	Median	16
	So. obs.	2,244 (72.88 %)
Number of	Mean	87.60
transactions	Std.dev.	209.34
(warrants)	Median	27
	No. obs.	1,650 (53.59 %)

Table 6: Descriptive Statistics: Transactions (All Transactions and Stock Market Transactions)

This table presents descriptive statistics of the number of transactions (all security categories) and the number of stock transactions of all 3,079 accounts of individual investors in our data set. Time period is January, 1st, 1997 to April, 17th, 2001. The table presents mean, standard deviation, skewness, kurtosis, various percentiles, and the number of accounts (no. obs.) that trade in stocks in our sample period.

	Number of transactions (all security categories)	Number of stock transactions
Mean	182.89	105.45
Standard deviation	284.16	180.37
Skewness	5.72	6.13
Kurtosis	53.41	60.46
10th Percentile	21	9
25th Percentile	49	23
Median	103	54
75th Percentile	206	115
90th Percentile	380	348
Maximum	4,382	2,838
No. obs.	3,079	2,998

Table 7: Distribution of Stocks Traded across Industries

This table presents the distribution across industries of stocks that are traded by the 3,079 individual investors in our data set and that are covered in Datastream (datatype indm). Time period is January, 1st, 1997 to April, 17th, 2001.

Industry	Number of stocks	Percent	Industry	Number of stocks	Percent
Software	389	9.19	Other insurance	21	0.50
Pharmaceuticals	237	5.60	Paper	21	0.50
Electronic equipment	169	3.99	Other distributors	20	0.47
Computer services	165	3.90	Other health care	19	0.45
Business support	162	3.83	Oil services	18	0.43
Banks	160	3.78	Cable and satellite	17	0.40
Telecom fixed line	157	3.71	Aerospace	16	0.38
Internet	138	3.26	Hotels	16	0.38
Engineering, general	128	3.03	Life assurance	16	0.38
Diversified industry	114	2.69	Commercial vehicles	15	0.35
Computer hardware	103	2.43	Engineering fabricators	15	0.35
Semiconductors	101	2.39	Retailers, soft goods	15	0.35
Telecom equipment	92	2.17	Home entertainment	14	0.33
Electrical equipment	78	1.84	Education and training	13	0.31
Medical equipment and supplies	73	1.73	Personal products	13	0.31
Building materials	69	1.63	Environmental control	12	0.28
Gold mining	67	1.58	Health maintenance organizations	12	0.28
Telecom wireless	64	1.51	Leisure equipment	12	0.28
Food processors	58	1.37	Re-insurance	12	0.28
Other mining	58	1.37	Tobacco	11	0.26
Chemicals, commodity	50	1.18	House building	10	0.24
Investment companies	48	1.13	Packaging	10	0.24
Oil and gas, exploration and production	48	1.13	Restaurants and pubs	10	0.24
Electricity	47	1.11	Shipping and ports	10	0.24
Leisure facilities	41	0.97	Gaming	9	0.21
Automobile	40	0.95	Soft drinks	9	0.21
Broadcasting	40	0.95	Defence	8	0.19
Asset managers	38	0.90	Household products	8	0.19
Publishing and printing	38	0.90	Consumer finance	7	0.17
Clothing and footwear	36	0.85	Discount stores	7	0.17
Retailers, e-commerce	36	0.85	Distillers and vintners	7	0.17
Household appliances and housewares	34	0.80	Forestry	7	0.17
Media agencies	34	0.80	Tyres and rubber	7	0.17
Investment banks	33	0.78	Vehicle distribution	7	0.17
Other business	33	0.78	Water	7	0.17
Other construction	33	0.78	Other warrants	6	0.14
Real estate development	33	0.78	Photography	6	0.14
Airlines and airports	32	0.76	Property agencies	6	0.14
Oil integrated	32	0.76	Chemicals, advanced materials	5	0.12
Engineering contractors	31	0.73	Gas distribution	5	0.12
Insurance non-life	31	0.73	Security and alarms	5	0.12
Chemicals, speciality	30	0.71	Farming and fishing	4	0.09
Auto parts	29	0.69	Mining finance	4	0.09
Steel	29	0.69	Builders' merchants	3	0.07
Textiles and leather goods	29	0.69	Insurance brokers	3	0.07
Brewers	28	0.66	Mortgage finance	3	0.07
Retailers, hardlines	28	0.66	Funerals and cemeteries	2	0.05
Other financial	27	0.64	Offshore funds	2	0.05
Rail, road, freight	27	0.64	Real estate investment trusts	2	0.05
Retailers, multi department	27	0.64	Investment trusts, European	1	0.02
Food and drug retailers	25	0.59	Investment trust, venture and development	1	0.02
Non-ferrous metals	25	0.59	Investment companies (United Kingdom)	1	0.02
Furnishings and floor coverings	23	0.54			
Distributors of industrial components	22	0.52	Total	4,231	100
Hospital management	22	0.52			

Table 8: Distribution of Stock Transactions across Industries

This table presents the distribution of stock transactions by the 3,079 individual investors in our data set across industries. Stocks have to be covered in Datastream (datatype indm). Time period is January, 1st, 1997 to April, 17th, 2001.

Industry	Number of transactions	Percent	Industry	Number of transactions	Percent
Software	39,019	13.34	Other health care	986	0.34
Internet	16,599	5.68	Retailers, soft goods	914	0.31
Pharmaceuticals	16,445	5.62	Restaurants and pubs	913	0.31
Telecom equipment	15,331	5.24	Household products	889	0.30
Computer hardware	12,474	4.27	Real estate development	882	0.30
Telecom fixed line	11,945	4.08	Steel	822	0.28
Banks	11,395	3.90	Tyres and rubber	812	0.28
Asset managers	9,532	3.26	Insurance brokers	797	0.27
Electronic equipment	9,378	3.21	Hospital management	775	0.27
Automobile	9,342	3.19	Retailers, hardlines	713	0.24
Computer services	9,068	3.10	Furnishings and floor coverings	677	0.23
Semiconductors	8,122	2.78	Brewers	673	0.23
Engineering, general	7,665	2.62	House building	655	0.22
Business support	7,260	2.48	Environmental control	648	0.22
Chemicals, commodity	6,373	2.18	Health maintenance organizations	605	0.21
Diversified industry	6,026	2.06	Other business	486	0.17
Electrical equipment	4,832	1.65	Paper	484	0.17
Telecom wireless	4,434	1.52	Education and training	361	0.12
Oil and gas, exploration and production	3,562	1.22	Engineering fabricators	347	0.12
Home entertainment	3,077	1.05	Property agencies	289	0.10
Retailers, e-commerce	3,001	1.03	Commercial vehicles	285	0.10
Investment companies	2,873	0.98	Leisure equipment	232	0.08
Medical equipment and supplies	2,701	0.92	Distillers and vintners	228	0.08
Clothing and footwear	2,695	0.92	Discount stores	227	0.08
Media agencies	2,528	0.86	Security and alarms	220	0.08
Building materials	2,459	0.84	Oil services	216	0.07
Engineering contractors	2,410	0.82	Photography	211	0.07
Leisure facilities	2,369	0.81	Packaging	198	0.07
Airlines and airports	2,284	0.78	Cable and satellite	197	0.07
Broadcasting	2,253	0.77	Hotels	189	0.06
Auto parts	2,236	0.76	Insurance non-life	184	0.06
Personal products	2,230	0.76	Consumer finance	173	0.06
Electricity	1,966	0.67	Distributors of industrial components	170	0.06
Retailers, multi department	1,862	0.64	Farming and fishing	137	0.05
Chemicals, speciality	1,835	0.63	Chemicals, advanced materials	121	0.04
Gold mining	1,827	0.62	Investment companies (United Kingdom)	118	0.04
Food and drug retailers	1,800	0.62	Water	118	0.04
Other insurance	1,794	0.61	Vehicle distribution	114	0.04
Oil integrated	1,579	0.54	Offshore funds	94	0.03
Household appliances and housewares	1,578	0.54	Defence	82	0.03
Other financial	1,487	0.51	Shipping and ports	55	0.02
Other distributors	1,466	0.50	Forestry	37	0.01
Publishing and printing	1,410	0.48	Gas distribution	34	0.01
Investment banks	1,406	0.48	Other warrants	32	0.01
Tobacco	1,349	0.46	Gaming	30	0.01
Non-ferrous metals	1,272	0.43	Mortgage finance	28	0.01
Other mining	1,233	0.42	Mining finance	17	0.01
Aerospace	1,229	0.42	Builders' merchants	16	0.01
Other construction	1,218	0.42	Funerals and cemeteries	13	0.00
Textiles and leather goods	1,204	0.41	Investment trusts, European	7	0.00
Food processors	1,188	0.41	Investment trust, venture and development	7	0.00
Soft drinks	1,141	0.39	Real estate investment trusts	2	0.00
Life assurance	1,109	0.38			
Re-insurance	1,041	0.36	Total	292,419	100
Rail, road, freight	987	0.34			

Table 9: Distribution of Stocks Traded across Countries

This table presents the distribution across countries of stocks that are traded by the 3,079 individual investors in our data set and that are covered in Datastream. Time period is January, 1st, 1997 to April, 17th, 2001.

Country	Number of stocks	Percent
United States	1,787	42.26
Germany	1,034	24.45
Japan	167	3.95
United Kingdom	125	2.96
Canada	109	2.58
Australia	85	2.01
Hong Kong	84	1.99
France	81	1.92
Switzerland	81	1.92
Netherlands	69	1.63
Italy	61	1.44
Austria	40	0.95
Spain	38	0.9
South Africa	36	0.85
Thailand	32	0.76
Sweden	31	0.73
Russian Federation	29	0.69
Greece	25	0.59
Hungary	25	0.59
Czech Republic	24	0.57
Finland	24	0.57
Israel	23	0.54
Indonesia	21	0.50
Singapore	18	0.43
China	17	0.40
India	16	0.38
Brazil	15	0.35
Turkey	13	0.31
South Korea	11	0.26
Belgium	10	0.24
Malaysia	10	0.24
Poland	10	0.24
Denmark	8	0.19
Norway	8	0.19
Mexico	7	0.17
Chile	6	0.14
Ireland	6	0.14
Portugal	6	0.14
Estonia	5	0.12
Taiwan	5	0.12
Argentina	4	0.09
Slovakia	4	0.09
Egypt	3	0.07
Luxembourg	3	0.07
Croatia	2	0.05
Peru	2	0.05
Bermuda	1	0.02
Colombia	1	0.02
New Zealand	1	0.02
Other Western European	1	0.02
Papua New Guinea	1	0.02
Philippines	1	0.02
Slovenia	1	0.02
Venezuela	1	0.02
Zimbabwe	1	0.02
Total	4,229	100

Table 10: Distribution of Stock Transactions across Countries

This table presents the distribution of stock transactions by the 3,079 individual investors in our data set across countries. Stocks have to be covered in Datastream. Time period is January, 1st, 1997 to April, 17th, 2001.

Country	Number of transactions	Percent
Germany	148,048	50.63
United States	84,403	28.87
Netherlands	8,513	2.91
Japan	6,382	2.18
Russian Federation	5,003	1.71
Finland	3,746	1.28
Canada	3,377	1.15
United Kingdom	3,322	1.14
Hong Kong	3,196	1.09
Thailand	3,012	1.03
Switzerland	2,637	0.90
France	2,378	0.81
Australia	2,376	0.81
Sweden	2,041	0.70
Spain	1,583	0.54
South Korea	1,433	0.49
Italy	1,416	0.48
Indonesia	1,223	0.42
Israel	865	0.30
Austria	838	0.29
South Africa	727	0.25
Hungary	616	0.21
Turkey	549	0.19
India	513	0.18
Singapore	511	0.17
Czech Republic	394	0.13
Belgium	359	0.12
Brazil	330	0.11
China	324	0.11
Malaysia	255	0.09
Portugal	246	0.08
Norway	232	0.08
Greece	196	0.07
Taiwan	160	0.05
Ireland	143	0.05
Estonia	126	0.04
Denmark	123	0.04
Other Western European	118	0.04
Mexico	117	0.04
Luxembourg	99	0.03
Poland	94	0.03
Zimbabwe	78	0.03
Bermuda	62	0.02
Egypt	51	0.02
Peru	30	0.01
Argentina	28	0.01
Slovakia	28	0.01
Croatia	23	0.01
Chile	17	0.01
Papua New Guinea	16	0.01
Slovenia	15	0.01
Philippines	12	0.00
New Zealand	6	0.00
Venezuela	2	0.00
Colombia	1	0.00
Total	292,393	100

Table 11: Turnover Quintiles and Demographic and Other Information

This table presents the number of transactions (mean, standard deviation, skewness, kurtosis, and various percentiles), income in EUR, average monthly stock portfolio value from January 1997 until April 2001 in EUR (mean, standard deviation, skewness, kurtosis, and various percentiles), age, percentage of female investors, percentage of warrant traders, percentage of investors who use their account for retirement savings, percentage of investors who classify their investment strategy as high risk, and stock market investment experience in years for turnover quintiles.

		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Monthly turnover	Median	0.08	0.19	0.33	0.60	1.66
Number of transactions	Mean	77.85	123.56	187.26	212.32	347.07
	Std.dev	87.88	148.40	228.84	238.83	483.18
	Skewness	4.55	8.15	4.96	3.77	3.84
	Kurtosis	37.46	109.82	44.20	23.94	23.33
	10th Percentile	13	27	37	42	48
	25th Percentile	26	48	64	73	93
	Median	57	89	122	146	185
	75th Percentile	102	156	221	262	382
	90th Percentile	154	259	373	427	812
	Maximum	1,015	2,375	2,834	2,230	4,382
Income	Mean	54,275.15	50,989.22	57,374.76	48,944.42	47,549.60
(EUR)	Median	38,346.89	38,346.89	63,911.49	38,346.89	38,346.89
Average portfolio value	Mean	53,315.07	43,202.33	34,893.53	30,032.80	26,681.59
(EUR)	Std.dev	99,307.01	60,300.88	56,562.45	61,043.70	64,263.41
	Skewness	6.03	3.37	5.79	7.72	8.74
	Kurtosis	61.17	18.31	58.64	84.49	100.99
	10th Percentile	3,600.99	3,811.65	3,254.00	2,562.36	1,724.28
	25th Percentile	8,576.95	8,992.96	7,292.37	5,573.66	3,967.24
	Median	20,631.07	21,953.19	17,068.74	13,450.29	10,917.75
	75th Percentile	55,409.48	55,637.86	37,558.82	29,597.34	27,484.47
	90th Percentile	132,794.60	101,346.40	87,205.73	70,406.03	55,312.74
Age	Mean	43.20	41.63	40.46	40.85	38.85
	Median	40.5	40	39	38	37
Percentage of female investors	%	5.57	4.35	5.04	5.39	4.01
Percentage of warrant traders	%	32.87	45.39	58.09	62.43	70.21
Percentage retirement saving	%	6.43	4.70	4.17	2.43	1.39
Percentage high risk strategy	%	5.39	8.00	12.52	14.43	18.64
Investment experience	Mean	5.41	5.54	5.84	5.50	5.17

Table 12: Correlation of Trading Volume Measures

This table presents pairwise correlation coefficients of five measures of trading volume (logarithm of the number of stock market transactions, logarithm of the number of stock market purchases, logarithm of the number of transactions (all categories), logarithm of mean monthly turnover, logarithm of the average trading volume per stock market transaction) as well as the significance level of each correlation coefficient (in parentheses) and the number of observations used in calculating the correlation coefficient. Time period is January, 1997 until April, 17th, 2001. Turnover is calculated as the average monthly turnover over this time period.

	ln(Number of stock market transactions)	ln(Number of stock market purchases)	ln(Number of transactions (all categories))	ln(Turnover)	ln(Average trading volume per stock market transaction)
ln(Number of stock market transactions)	1 2,998				
ln(Number of stock market purchases)	0.9826 (< 0.0001) 2,944	1 2,944			
ln(Number of transactions (all categories))	0.7906 (< 0.0001) 2,998	0.7597 (< 0.0001) 2,944	1 3,079		
ln(Turnover)	0.4637 (< 0.0001) 2,874	0.4170 (< 0.0001) 2,857	0.4305 (< 0.0001) 2,874	1 2,874	
ln(Average trading volume per stock market transaction)	0.2294 (< 0.0001) 2,965	0.2080 (< 0.0001) 2,933	0.0994 (< 0.0001) 2,965	0.0702 (0.0002) 2,873	1 2,965

Table 13: Definition of Variables

This table summarizes and defines dependent and independent variables of the cross-sectional regression analysis of Table 14 and presents their respective data source.

Variables	Data source	Description
Experience	Self-reported data collected by the online broker at the time each investor opened the account.	Stock market investment experience in years.
Gender (dummy)	Self-reported data collected by the online broker at the time each investor opened the account.	Dummy variable which takes the value 1 if the investor is male.
Age	Self-reported data collected by the online broker at the time each investor opened the account.	Age of investor.
Income	Self-reported data collected by the online broker at the time each investor opened the account.	Gross income of the investor (in DM).
Retirement saving (dummy)	Self-reported data collected by the online broker at the time each investor opened the account.	Dummy variable which takes the value 1 if the account is used for retirement savings.
High risk (dummy)	Self-reported data collected by the online broker at the time each investor opened the account.	Dummy variable which takes the value 1 if the investment strategy is characterized as high risk.
Warrant trader (dummy)	Transaction data	Dummy variable which takes the value 1 if the investor trades warrants in the period form January 1997 to April 2001.
Number of stock transactions	Transaction data	Number of stock transactions (Sum from January 1997 to April 2001).
Number of stock purchases	Transaction data	Number of stock purchases (Sum from January 1997 to April 2001).
Number of transactions	Transaction data	Number of transactions in all security categories (Sum from January 1997 to April 2001).
Turnover	Transaction data	Average of the monthly turnover from January 1997 to April 2001.
Average trading volume per stock market transaction	Transaction data	Average trading volume per stock market transaction (in EUR).
Portfolio value	Transaction data	Average of the monthly portfolio value of stocks that were bought in DM or EUR and that are covered in Datastream.

Table 14: General Determinants of Trading Volume: Cross-Sectional Regressions

This table presents cross-sectional regression results on the relation between measures of trading volume as the dependent variable (logarithm of the number of stock market transactions, logarithm of the number of stock market purchases, logarithm of the number of transactions (all security categories), logarithm of mean monthly turnover, logarithm of the average trading volume per stock market transaction in EUR) and stock market investment experience, a gender dummy variable (the variable takes the value 1 if the investor is male), age, a retirement saving dummy variable (the variable takes the value 1 if the account is used for retirement savings), a warrant trader dummy variable (the variable takes the value 1 if the investor trades warrants at least once in the time period from January 1997 until April 2001), a high risk dummy (the variable takes the value 1 if the investor classifies her or his investment strategy as high risk), the logarithm of mean monthly stock portfolio value, and the logarithm of income. In the second, fourth, sixth, eighth, and tenth regression, we exclude the income variable to increase the number of observations. Income is reported within five ranges, where the top range is more than 102,258.38 EUR (200,000 Deutsche Mark (DM)). In the regressions we use the logarithm of the midpoint of each range and and the logarithm of 115,040.67 EUR (225,000 DM) for the top range. Investment experience is reported within five ranges, where the top range is more than 15 years. In the regressions we use the midpoint of each range and 17.5 years for the top range. Absolute value of t statistics are in parentheses. * indicates significance at 10%; ** indicates significance at 5%; *** indicates significance at 1%.

	(1) ln(Number of stock market transactions)	(2) ln(Number of stock market transactions)	(3) ln(Number of stock market purchases)	(4) ln(Number of stock market purchases)	(5) ln(Number of transactions (all categories))	(6) ln(Number of transactions (all categories))	(7) ln(Turnover)	(8) ln(Turnover)	(9) ln(Average trading volume per stock market transaction)	(10) ln(Average trading volume per stock market transaction)
Experience	0.007	0.009	0.008	0.006	0.023	0.021	-0.009	0.006	-0.001	0.011
	(0.69)	(1.13)	(0.77)	(0.75)	(2.45)**	(2.84)***	(0.69)	(0.64)	(0.13)	(2.25)**
Gender	0.312	-0.065	0.345	-0.044	0.064	-0.012	-0.056	-0.154	-0.034	0.003
	(1.48)	(0.54)	(1.72)*	(0.37)	(0.33)	(0.11)	(0.22)	(1.06)	(0.27)	(0.05)
Age	-0.007	-0.012	-0.004	-0.010	-0.000	-0.002	-0.003	-0.006	0.009	0.008
	(1.79)*	(4.72)***	(1.17)	(4.31)***	(0.06)	(0.90)	(0.57)	(1.99)**	(3.96)***	(4.95)***
Retirement saving	-0.168	-0.209	-0.110	-0.164	-0.045	-0.062	-0.366	-0.491	-0.074	-0.154
	(1.37)	(1.86)*	(0.93)	(1.51)	(0.40)	(0.61)	(2.53)**	(3.70)***	(1.00)	(2.24)**
Warrant trader	0.600	0.572	0.512	0.487	0.859	0.879	0.421	0.524	0.051	0.025
	(8.20)***	(11.79)***	(7.28)***	(10.37)***	(12.72)***	(19.79)***	(4.84)***	(9.04)***	(1.16)	(0.84)
High risk	0.114	0.082	0.143	0.101	0.214	0.177	0.327	0.190	0.045	0.008
	(1.46)	(1.27)	(1.90)*	(1.62)	(2.98)***	(3.02)***	(3.52)***	(2.45)**	(0.96)	(0.21)
ln(Portfolio value)	0.538	0.504	0.525	0.497	0.335	0.278	-0.151	-0.176	0.411	0.426
	(20.67)***	(29.01)***	(20.62)***	(29.34)***	(13.96)***	(17.47)***	(4.71)***	(8.12)***	(26.38)***	(39.95)***
ln(Income)	-0.204		-0.235		-0.079		-0.062		0.056	
	(3.37)***		(4.01)***		(1.41)		(0.86)		(1.56)	
Constant	0.751	-0.612	0.608	-1.095	1.686	1.523	1.058	0.797	2.994	3.489
	(1.10)	(2.93)***	(0.92)	(5.40)***	(2.68)***	(7.97)***	(1.29)	(3.14)***	(7.36)***	(27.22)***
Observations	904	1928	890	1912	906	1930	873	1869	904	1927
Adjusted R-squared	0.36	0.34	0.36	0.34	0.31	0.28	0.10	0.11	0.50	0.51

Figure 1: Time Series of Means of the Number of Stocks in Portfolios

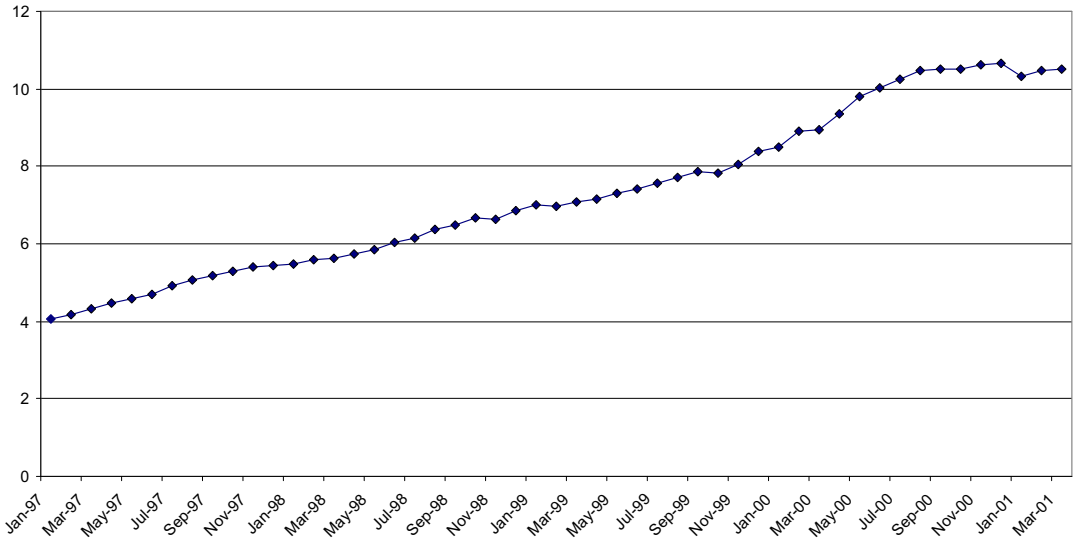


Figure 2: Time Series of Medians of the Number of Stocks in Portfolios

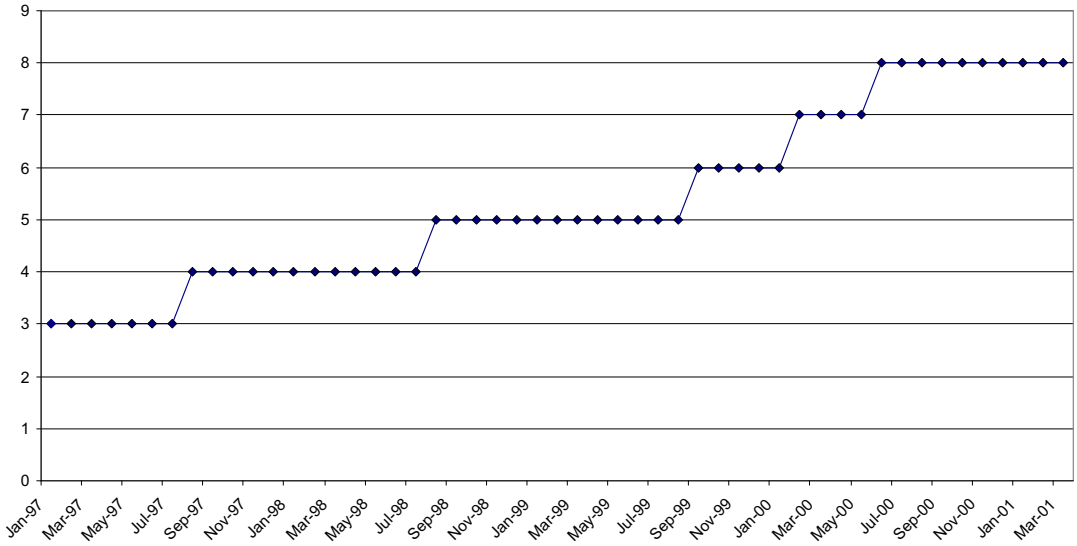


Figure 3: Time Series of Means of Stock Portfolio Values

This figure presents the time series of the mean of the stock portfolio value in EUR across investors.

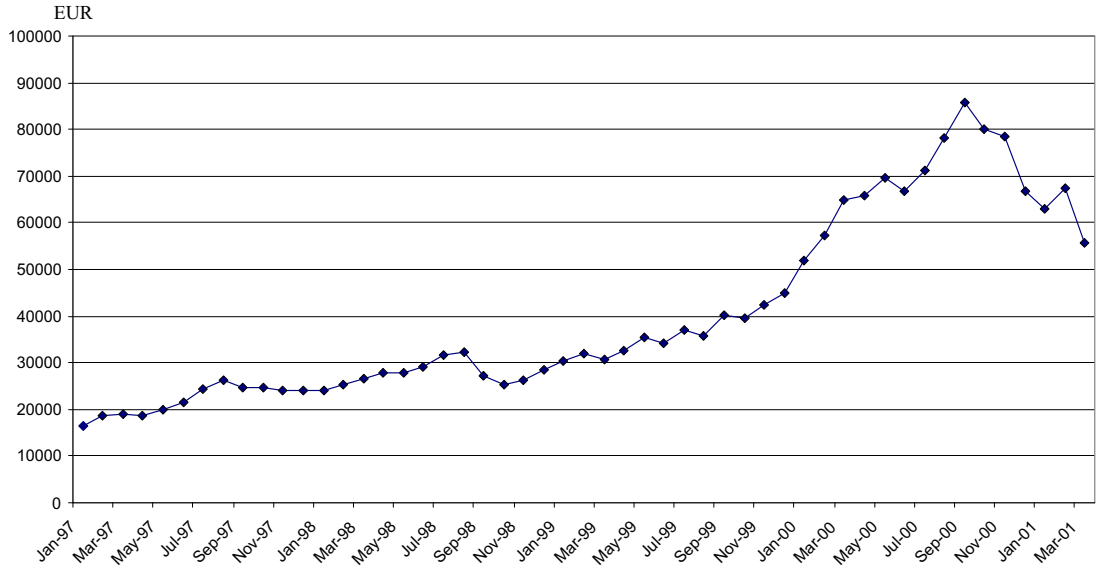


Figure 4: Time Series of Medians of Stock Portfolio Values

This figure presents the time series of the median of the stock portfolio value in EUR across investors.

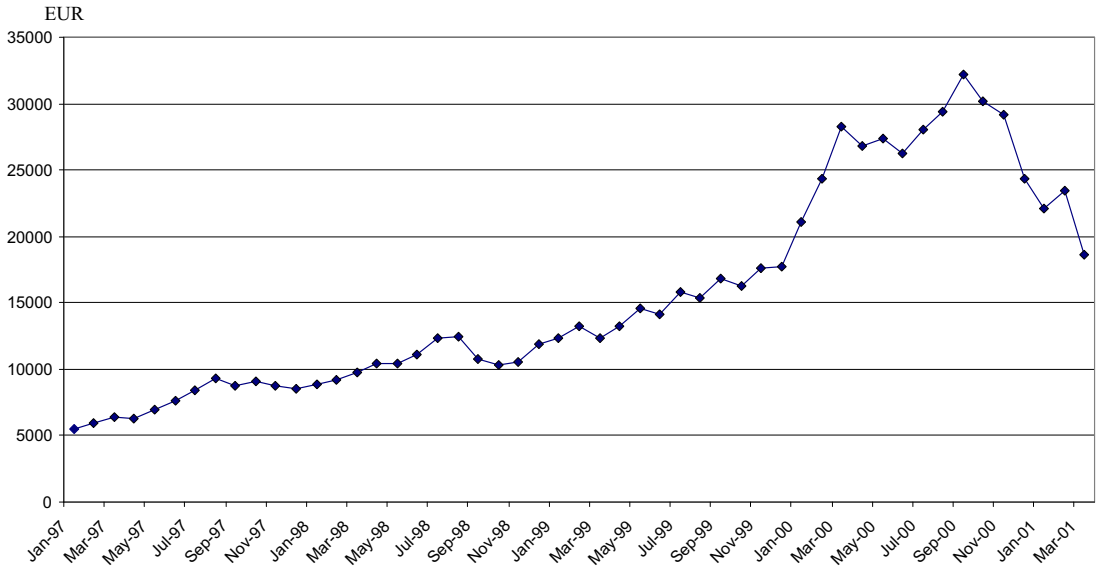


Figure 5: Time series of the DAX from January 1997 to March 2001 (End of Month Values)

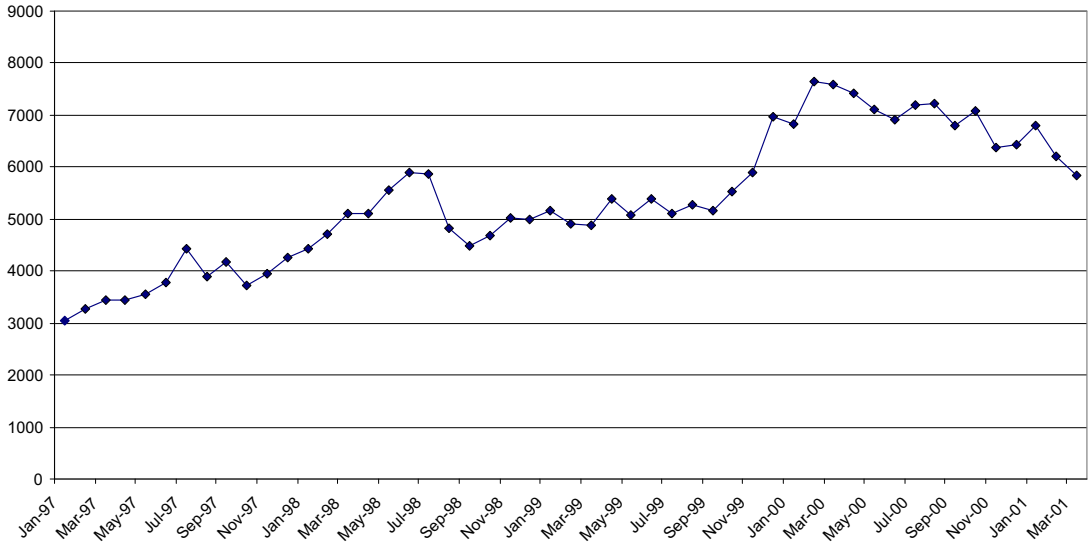


Figure 6: Time series of the Nemax50 from December 1997 to March 2001 (End of Month Values)

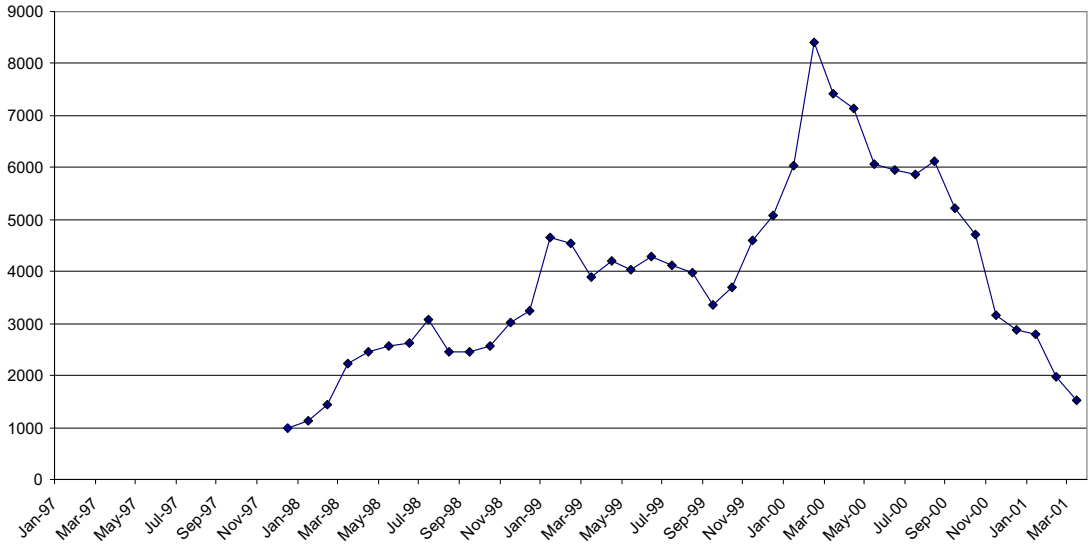


Figure 7: Time Series of the Number of Transactions

This figure plots the time series of the sum of transactions across all investors each month.

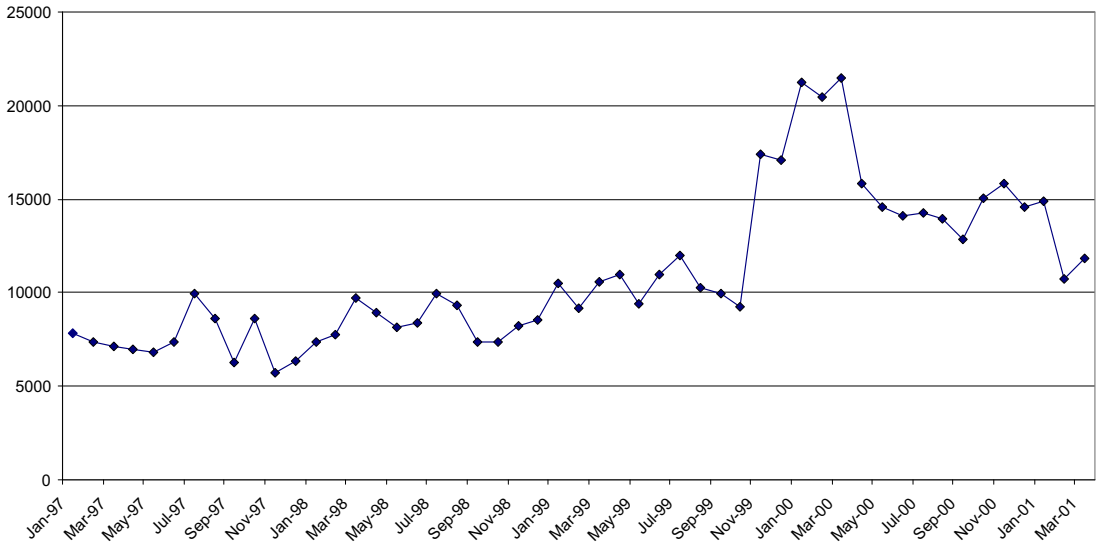


Figure 8: Distribution of Stocks Traded across Regions

This figure presents the results of Table 9 aggregated across regions.

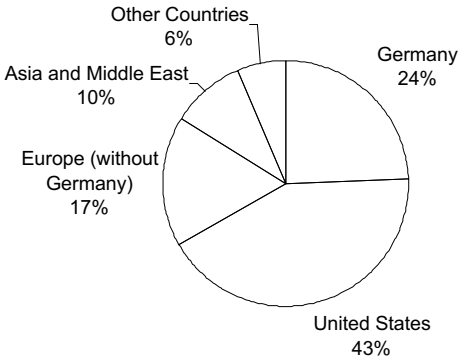
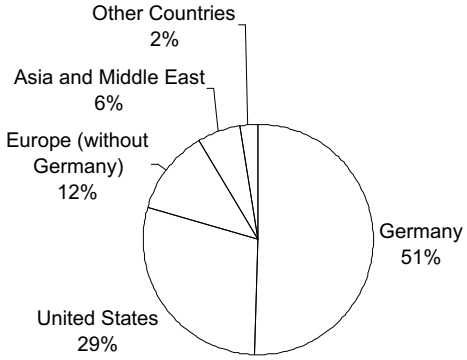


Figure 9: Distribution of Stock Transactions across Regions

This figure presents the results of Table 10 aggregated across regions.



Nr.	Author	Title
03-18	Markus Glaser	Online Broker Investors: Demographic Information, Investment Strategy, Portfolio Positions, and Trading Activity
03-17	Markus Glaser Martin Weber	September 11 and Stock Return Expectations of Individual Investors
03-16	Siegfried K. Berninghaus Bodo Vogt	Network Formation and Coordination Games
03-15	Johannes Keller Herbert Bless	When negative expectancies turn into negative performance: The role of ease of retrieval.
03-14	Markus Glaser Markus Nöth Martin Weber	Behavioral Finance
03-13	Hendrik Hakenes	Banks as Delegated Risk Managers
03-12	Elena Carletti	The Structure of Bank Relationships, Endogenous Monitoring and Loan Rates
03-11	Isabel Schnabel	The Great Banks‘ Depression - Deposit Withdrawals in the German Crisis of 1931
03-10	Alain Chateauneuf Jürgen Eichberger Simon Grant	Choice under Uncertainty with the Best and Worst in Mind: Neo-additive Capacities.
03-09	Peter Albrecht Carsten Weber	Combined Accumulation- and Decumulation-Plans with Risk-Controlled Capital Protection
03-08	Hans-Martin von Gaudecker Carsten Weber	Surprises in a Growing Market Niche - An Evaluation of the German Private Annuities Market
03-07	Markus Glaser Martin Weber	Overconfidence and Trading Volume
03-06	Markus Glaser Thomas Langer Martin Weber	On the trend recognition and forecasting ability of professional traders
03-05	Geschäftsstelle	Jahresbericht 2002

Nr.	Author	Title
03-04	Oliver Kirchkamp Rosemarie Nagel	No imitation - on local and group interaction, learning and reciprocity in prisoners break
03-03	Michele Bernasconi Oliver Kirchkamp Paolo Paruolo	Expectations and perceived causality in fiscal policy: an experimental analysis using real world data
03-02	Peter Albrecht	Risk Based Capital Allocation
03-01	Peter Albrecht	Risk Measures
02-51	Peter Albrecht Ivica Dus Raimond Maurer Ulla Ruckpaul	Cost Average-Effekt: Fakt oder Mythos?
02-50	Thomas Langer Niels Nauhauser	Zur Bedeutung von Cost-Average-Effekten bei Einzahlungsplänen und Portefeuilleumschichtungen
02-49	Alexander Klos Thomas Langer Martin Weber	Über kurz oder lang - Welche Rolle spielt der Anlagehorizont bei Investitionsentscheidungen?
02-48	Isabel Schnabel	The German Twin Crisis of 1931
02-47	Axel Börsch-Supan Annamaria Lusardi	Saving Viewed from a Cross-National Perspective
02-46	Isabel Schnabel Hyun Song Shin	Foreshadowing LTCM: The Crisis of 1763
02-45	Ulrich Koch	Inkrementaler Wandel und adaptive Dynamik in Regelsystemen
02-44	Alexander Klos	Die Risikoprämie am deutschen Kapitalmarkt
02-43	Markus Glaser Martin Weber	Momentum and Turnover: Evidence from the German Stock Market
02-42	Mohammed Abdellaoui Frank Voßmann Martin Weber	An Experimental Analysis of Decision Weights in Cumulative Prospect Theory under Uncertainty