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Are Professional Investors Sophisticated?

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Abstract

Existing empirical evidence is inconclusive on whether professional investors show sophisticated behavior or not, a question which is at the heart of market efficiency. This ambiguous evidence is mostly based on trading data or laboratory evidence, which each has its limitations. We complement these approaches by conducting a survey of 500 investors, including several measures of sophistication, three relevant groups of investors and essential control variables. We find that both professional investors and laymen do indeed show unsophisticated investment behavior on aggregate. Furthermore, while some professional investors – institutional investors – behave at least more sophisticated than laymen, other professionals – investment advisors – seem to do even worse.

JEL-Classification: G 1, D 80

Keywords: Institutional investors, investment advisors, individual investors, investment behavior

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Are Professional Investors Sophisticated?

1 Introduction

Sophisticated behavior of some investors – presumably professional investors – is a necessary condition for financial market efficiency. Unfortunately, existing empirical studies investigating this crucial condition show inconclusive results, so that it is even unclear whether professional investors are sophisticated or not. A problem with earlier evidence is, that it is mostly based on real trading data, which is “hard”, but also necessarily has a narrow coverage. Other evidence is based on experiments and can thus precisely control environmental conditions; however, this comes at the price of generalizability because students usually acting in experiments do not have the knowledge and experience of financial professionals.

Thus, we provide complementary evidence by a fundamentally different approach. We collect survey data of about 500 investors that has desirable features: it allows comprehensive inference about sophisticated behavior of professional investors, it distinguishes between relevant groups of investors, it includes personal characteristics of investors, it contains necessary control variables and is collected under equal conditions. We find that both professionals and laymen are plagued by systematic biases and cannot be considered sophisticated on aggregate. While at least some professional investors – institutional investors – perform better than laymen, there are other professionals – investment advisors – who seem to do even worse.

Participants in financial markets often show unsophisticated behavior that reduces their performance (e.g. Barber and Odean, 2000). It may be less expected that not only individual investors but also professionals are plagued by “biased” behavior as demon-

strated by excessive turnover (Dow and Gorton, 1997), home bias (Shiller et al., 1996), loss aversion (Coval and Shumway, 2005) and herding (Sias, 2004). Professionals' deficits can become so severe that their decisions are even inferior to those of laymen (e.g. Dennis and Strickland, 2002, Glaser et al., 2005, Haigh and List, 2005, Dasgupta et al., 2007).¹ However, professionalism has also proved to be a performance-enhancing factor (e.g. Locke and Mann, 2005, Alevy et al., 2007). So, are professional investors sophisticated?

Our study differs from earlier research about the impact of professionalism on investor behavior due to its empirical design as a survey study which has characteristics of a "framed field experiment" in the sense of Harrison and List (2004).² This approach is different from conventional empirical analyses and laboratory experiments. In comparison to the study of trading data it is not as eclectic by focusing on several behavioral phenomena simultaneously, it considers crucial control variables suggested by theory or earlier empirical evidence and it is not polluted by job-related incentives. In comparison to conventional laboratory experiments it targets those who really act in financial markets. Moreover, the careful design of the questionnaire as well as its distribution through a professional intermediary aim for providing a representative environment for respondents (Levitt and List, 2007). This is often seen as decisive to get unbiased answers (List, 2006). Our survey covers almost 500 investors and contributes to the literature in four ways, which are rare or even unique:

¹ Dohmen (2008) presents evidence which shows that performance pressure might have detrimental incentive effects. This might also be a channel which worsens finance professionals' decisions.

² Out of the six factors discussed by Harrison and List (2004) defining field experiments, it is "the nature of the stakes" which is necessarily artificial in a questionnaire study as there is no financial incentive. However, meaningful financial incentives for financial professionals will blow up research budgets anyway.

First, we address the concern that evidence in behavioral finance often seems eclectic (e.g. Shiller, 1999). Accordingly, we examine the impact of professionalism on six measures of sophisticated investment behavior. This is the avoidance of five biases which can be seen as stylized facts of financial markets – excessive turnover, home bias, reluctance to loss realization, the disposition effect and herding – and forecasting ability.³

Second, we extend existing evidence by jointly considering three groups of investors, among them two groups of professional investors, i.e. institutional investors and investment advisors.⁴ We compare these professionals with interested laymen.⁵ The latter provides a more meaningful benchmark than average laymen or students because such less interested investors will be either marginal in that they have little to invest or if they have significant private funds they will tend to buy investment advice.

Third, we carefully control the possible impact of professionalism by a set of variables indicating sophisticated behavior including “investment experience” (see Feng and Seasholes, 2005, Dorn and Huberman, 2005, on individual investors; Menkhoff et al., 2006, Greenwood and Nagel, 2007, on institutional investors), “wealth” of investors

³ There is clear evidence that these biases reduce performance as e.g. Barber and Odean (2000) show for high turnover, Lewis (1999) demonstrates for home bias and Odean (1998) proves for reluctance to loss aversion and Shefrin and Statman (1985) show for the disposition effect. The case of trend following is more complicated and thus discussed later.

⁴ Investment advisors are educated professionals who work for a financial institution and give advice to customers. However, they seem to be less professional on average than institutional investors because of their job profile: their customers are less qualified in financial terms, they have to deal with more clients, they do not have access to first hand information (but get financial information from the bank’s headquarter) and they usually earn a lower salary than institutional investors.

⁵ Studies comparing institutional and individual investors include Shiller and Pound, 1989, who show that institutional investors rely more on fundamental information; Grinblatt and Keloharju, 2000, Barber and Odean, 2007, reveal superior performance of institutional investors; Shapira and Venezia, 2001, find a weaker disposition effect for institutional investors; Cohen et al., 2002, find a more rational response of institutions towards news; see also Glaser et al., 2005, Haigh and List, 2005, introduced above.

(Vissing-Jørgensen, 2003) and their “risk aversion” (Dorn and Huberman, 2005).⁶ Finally, the survey approach allows considering further important control variables, such as age, the degree of education, the seniority of position reached and investors’ attitudes.⁷

Fourth, we seek for evidence without interference from other determinants of investment decisions, such as incentives or transaction costs. We know for example: institutional investors have higher turnover than individual investors (e.g. Carhart, 1997), they invest less at home (Grinblatt and Keloharju, 2001), they sell assets easier conditional on capital losses (Grinblatt and Keloharju, 2001a) and they do take profits better (Shapira and Venezia, 2001). However, these studies compare institutionals’ job behavior with individuals’ private behavior. Despite their appeal in relying on “hard” trading figures, this kind of studies faces the disadvantage that institutional investors’ decisions are known to be determined by transaction costs and incentives in addition to professionalism.⁸ Thus, higher turnover or less home bias may be the outcome of lower transaction costs, high turnover may be due to portfolio churning (Dow and Gorton, 1997) and willingness to sell may be driven by “window dressing” as well (Lakonishok et al., 1991).

Our study provides two major findings which shed some light on the unclear impact of being a professional investor on investment behavior. First, we find that professional investors are subject to some degree of biased investment behavior. To put the degree of biasedness into perspective we compare professionals to laymen and find, second, that some professionals, i.e. institutional investors, behave more sophisticated than laymen

⁶ An important role of experience has been found in other settings too, such as the field study of List (2003) and the experiment of Loomes et al. (2003).

⁷ Accordingly, questionnaire surveys have become a standard research tool when information is required that cannot be drawn from other sources (see e.g. Blinder, 2000, on central banks’ views about credibility, surveys on investors’ beliefs as for example Shiller and Pound, 1989, or surveys on investors’ price expectations, such as Frankel and Froot, 1987).

⁸ This is of course no argument against the analysis of (institutional investors’) trading data but in favor of using survey data as complementary evidence.

whereas other professionals, i.e. investment advisors, seem to do even worse. Taken together, these results complement available evidence and cautiously indicate why other approaches may produce heterogeneous and thus inconclusive evidence about the impact of professionalism on investment behavior.

The paper proceeds in the following way. Section 2 gives information on the data. Descriptive results on measures of sophisticated investment behavior are presented in Section 3, whereas Section 4 considers controls in the multivariate approach. Economic significance and robustness is presented in Section 5 and conclusions are discussed in Section 6.

2 Data

This section shows that the data set is useful to serve our research purpose. The data are by and large reliable (Section 2.1) and they are representative for relevant investor groups (Section 2.2).

2.1 Data compilation

The data employed here have been compiled to examine our research questions. Data come from an online survey of German investors conducted from 4th to 11th November 2004 in cooperation with sentix[®].

The latter is a large German online platform where registered investors reveal their expectations concerning relevant financial and economic indicators and asset prices on a weekly basis. As a reward for their participation, users can view results of the surveys and market analyses based on these surveys provided by the operators of sentix. Thus,

sentix users do not represent average but highly committed individual investors.⁹ Moreover, due to their commitment, we expect investors to understand the questionnaire well and to respond carefully. We used this platform to distribute our own survey questionnaire and received a total of 497 responses during the above-mentioned week in November 2004. The absolute response is thus in the same dimension as the number of active participants during the first two weeks in November 2004 (475 and 509 respondents respectively).¹⁰

Since the survey is anonymous we asked participants to indicate whether they are individual investors, investment advisors or institutional investors. Our 497 responses are made up of 75 institutional investors, 78 investment advisors and 344 individual investors. This self-indication of respondents can be cross-checked with the database of sentix[®], which contains information about the affiliation of investors with professional financial institutions such as banks, asset managers, or insurance companies; so we can be sure that participants did not indicate themselves as professionals although they are not.

Often-voiced concerns regarding survey data are that participants do not fully understand all questions, that they answer strategically or that they randomly answer without thinking about the questions. However, none of these objections seems to be a problem in this online survey. First, we conducted a pretest to ensure understandable wording and relevant questions. Nevertheless, investors did not have to answer all questions if they did not like to or if they did not understand the questions. Second, since the questionnaire was anonymous and announced to be used for academic purposes only, there does not seem to be an incentive for strategic answering. Strategies aiming for a distort-

⁹ The online survey among registered users is anonymous and voluntary. Registration is necessary to ensure prudent behavior at the platform and is not restricted otherwise. More details can be inferred via www.sentix.de.

¹⁰ This equals a response rate of about 25% of all registered users.

tion of the overall level of answers were useless ex ante due to the large number of participants addressed; this disincentive has proved to be credible because of the many responses realized. Third, since participants in our survey are registered users of sentix[®] and take part in the weekly questionnaire voluntarily, it can be expected that they are highly interested in financial market research and have an intrinsic motivation to answer correctly.

Overall, the data seem to be as reliable as can be expected for a survey questionnaire. Further insights can be gained from analyzing participants attributes.

2.2 Participants' objective attributes

This section shows objective attributes of participants, such as age, education etc., which allows comparisons with other data sets describing investors. We find that our sample is by and large representative for our target investor groups.

The average investor of our survey is about 40 years old, has roughly 12 years of investment experience, has earned a university degree, is male, occupies a senior position, privately invests a securities volume of about 250 thousand Euros and holds an equity share of 40%. Therefore, we have a sample of well-qualified investors (details are provided in [Table 1](#)).¹¹

Investor groups differ in some characteristics to a statistically significant degree. Individual investors are older than the two other groups, have the shortest investment experience (despite their highest age) and occupy most senior positions on average (possibly reflecting their higher age). Investment advisors' experience is different from insti-

¹¹ We also use these personal characteristics as control variables because they are related to investment behavior (e.g. Agnew et al., 2003, Vissing-Jørgensen, 2003, Graham et al., 2005, Menkhoff et al., 2006, Karlsson and Nordén, 2007).

tutional investors as there are more persons with shorter experience as well as more persons with very long experience. Finally, institutional investors are most wealthy – indicated by the investors’ private portfolio volume – as about a quarter of them own a portfolio of more than one million Euros (significant at the 10% level).¹²

Many of these attributes have been compiled in earlier survey studies on institutional investors in Germany and show that our sample is similar to them (see Menkhoff et al., 2006 and sources therein). Regarding individual investors, demographic information about survey respondents from a June 2000 survey of a German online broker’s clients (Dorn and Huberman, 2005) matches our data quite well; our data is also similar to the UBS/Gallup participants studied by Graham et al. (2005). When we compare our individual investors, however, with the total investor population in Germany, it becomes obvious that our sample is distorted towards more qualified individual investors (see data in Dorn and Huberman, 2005).

In summary, our sample of investors in Germany is quite representative of institutional investors but reflects characteristics of highly-qualified individual investors. Thus, the difference between groups is narrower than in the full population which heightens the stakes to find any effect by professionalism on investment behavior.

3 Descriptive information about investors’ behavior

This section provides information about investors’ self-stated behavior, covering measures of sophisticated behavior (Section 3.1) and further variables which are used as controls (Section 3.2).

¹² Unfortunately, the low variance of “gender” in our sample does not allow us to include this

3.1 Measures of sophisticated behavior

The examination of sophisticated investment behavior relies on six measures. Some of these measures indicate biased behavior and should thus be avoided by sophisticated investors, which is, however, not found in our sample.

Our first measure of sophisticated behavior is the avoidance of *excessive turnover*. For this measure we relate portfolio turnover to portfolio volume (see item 1 in [Table 2](#)). Participants choose between four categories, where long-term buy and hold investors would select category 1 or possibly 2, whereas investors with a clear tendency towards portfolio churning would fall into categories 3 and 4 accordingly. In fact, our investors tend towards portfolio churning as only about 10% of them belong to the category with very low turnover and another 30% to the next category. 60% of our investors, however, have a turnover rate of more than 25%, 40% are even above 50%. [Figure 1A](#) gives the frequency distribution for the groups of investors, showing that institutional investors behave least biased. 30% of institutional investors, 40% of investment advisors and 43% of individual investors have an annual turnover of more than 50%. Assuming a rather conservative midpoint of 75% for the highest turnover category, the mean turnover rates for these three investor groups are roughly 38%, 44% and 45% respectively.¹³ We will use these four categories of increasingly higher turnover as our measure of portfolio churning.¹⁴

item in any regression.

¹³ A typical turnover figure for institutional investors is about 70 to 80% (e.g. Carhart, 1997). Turnover figures for individual investors seem to depend on investor and portfolio type. For example, investors with an online broker show very high turnover, such as roughly 75% p.a. (Barber and Odean, 2000, p.775) for a US case, contrasted by the figure from US single 401(k) pension investments with turnover of 16% (Agnew et al., 2003, p.194).

¹⁴ We are aware that this is an imprecise measure because there may be very different motivations for transactions, such as pure liquidity motives or private information. However, the same criticism would also apply to a statistical figure being derived from bank accounts and is thus a price that has to be paid when analyzing turnover.

Our second measure of sophisticated behavior is the avoidance of *home bias*. We ask participants to allocate an amount of 10,000 € to five world regions (see item 2 in Table 2). The share being invested in Germany, i.e. in the domestic country, is the figure of interest.¹⁵ Only about 4% of these investors prefer a German investment share of up to 5%. The mean value of home investment is 29.6% and the median is still 20%.¹⁶ Figure 1B gives the frequency distribution of preferred domestic investment share for the groups of institutional investors, investment advisors and individual investors are 19.2 (17.5), 31.8 (25.0) and 31.5 (20.0) for the mean (median) respectively. This preference contrasts with Germany's share in world stock market capitalization of 3-5% only, depending on the type of securities considered. So, investment shares of 10% and more, as they characterize the preferences of about 90% of investors, can be qualified as home bias. Accordingly, we simply take the share being invested in Germany – grouped into six categories – as the degree of home bias.¹⁷

As our third measure of sophisticated investment we take avoidance of *reluctance to loss realization*. This is the degree of approval to the statement that an investor usually waits for a price recovery instead of selling those securities in case of a loss position (see item 3 in Table 2). In theory, there is no reason to wait for a price recovery which is simply an orientation on past prices. In reality, however, the frequency distribution of

¹⁵ This measure of preferred home investment is thus undistorted by any regulatory requirements that effectively limit for example pension funds to invest abroad.

¹⁶ When one analyzes the share of home investment in absolute terms, the mean value of 30% seems rather low compared to earlier measures given in the literature (Lewis, 1999, Lütje and Menkhoff, 2007). A reason may be that our sample is biased towards more sophisticated investors as indicators of education, experience, equity share and volume reveal.

¹⁷ Two qualifications have to be made here: First, Germany's share in bond markets is higher at about up to 7%. So, Germany's total share in world market capitalization may be up to 5%. Second, all investors who allocate 3-5% to Germany do not show any home bias. These qualifications are considered in our analysis, however, as we categorize the degree of home bias into six groups, starting with all investors in the same group who allocate less than 10% to the German market.

answers in [Figure 1C](#) indicates that investors tend to behave reluctantly to realize losses: 30% of the respondents rather agree with the statement and less than 25% completely disapprove. The figure also directly visualizes the difference between investor groups: whereas 40% of individual investors and even 43% of investment advisors rather agree with the statement, only 28% of institutional investors do so.

The fourth measure of sophisticated behavior is avoidance of the *disposition effect*. This effect is approximated by item 4 in Table 2, i.e. the preference to sell profitable assets in case of liquidity demand. Again, there is no theoretical reason to do so, nevertheless, investors are plagued by this behavior (see Shefrin and Statman, 1985, Weber and Camerer, 1998). Interestingly, there is some evidence that institutional investors are less affected by the detrimental disposition effect than individual investors (Shapira and Venezia, 2001). The answers in our sample indicate that the disposition effect applies to all kinds of investors to a relevant degree, although somewhat less to institutional investors (see [Figure 1D](#)).

As a fifth measure of sophisticated behavior we employ a proxy for *herding*. The survey approach has the advantage of identifying herding – and distinguishing it from common reaction on the same fundamental information – by asking directly for trend following behavior (see item 5 in Table 2). About 60% say to conform to this approach which contradicts conventional theoretical expectations of rational behavior. However, theoretical models show that in a rational expectations equilibrium, past prices may be informative for an asset's value when some traders have private information (see e.g. early Grundy and McNichols, 1989). Moreover, from a purely empirical point of view, it is well-known that trend-following momentum strategies are profitable (Jegadeesh and Titman, 2001) and may be thus less surprising that asset managers tend to apply these

strategies (e.g. Grinblatt et al., 1995). It seems thus interesting to note that institutional investors tend more towards trend following behavior than other investors (see [Figure 1E](#)).

Finally, the sixth measure of sophisticated behavior is straight forward because we ask for stock indices return *forecasts*. The survey includes two forecasts, on the expected German stock index DAX and the US stock index Dow Jones, both one month ahead (see item 6 in Table 2). Due to extremely strong index up-movements at that time we restrict our analysis to simple directional forecasts. Only about one half of all investors expected an increase of both indices. Nevertheless, [Figure 1E](#) shows that institutional investors are tentatively better than others, although at a slight margin.

Overall, our descriptive analysis of sophisticated investment behavior indicates that all investors seem to be biased to a significant degree. While this applies to both laymen and professional investors, it can also be seen that all professionals are not alike: institutional investors are less biased than laymen whereas investment advisors are not.

3.2 Further control variables

Investment behavior may be influenced by further investor attitudes which we introduce in two groups, one reflecting more general influences, the other being specific to the home bias phenomenon.

To control the importance of professionalism, two variables of general relevance are included (see items 7 and 8 in Table 2). First, the general attitude regarding risk aversion in professional investment decisions is asked for (see Dorn and Huberman, 2005). Second, a long-term forecasting horizon when making investment decisions may influence behavior and is thus elicited (Klos et al., 2005). Investors in our survey classify

themselves as being somewhat less risk averse than the hypothetical average investor (detailed responses are documented in [Table 3](#)). Finally, the investors' forecast horizon is distributed around "2-6 months" as the median and modus; individual investors have the relatively shortest horizon.

The last two variables, local information advantage and return optimism, are relevant as determinants of home bias only (see French and Poterba, 1991). Obviously, the belief in a domestic information advantage (see item 9 in [Table 3](#)) is not so strong because answers tend slightly towards contradiction than approval. Interestingly, individual investors believe least in a domestic information advantage and investment advisors most.¹⁸ In item 6, investors are asked to give their return expectation for Germany's leading stock market index, the DAX, because a higher share of investments at home would make sense if return optimism were higher too. However, return expectations of respondents are distributed around zero. Note that differences *within* groups are large whereas differences *between* the three groups are not statistically significant. Tentatively, home bias is positively related to return optimism in our sample, reflecting the fact that home bias has been found to be related to unrealistic return optimism among institutional investors (Shiller et al., 1996, Strong and Xu, 2003).

Up to this point of analysis, lessons from descriptive statistics show how different investors between and within groups are, how much most of them are plagued with biased behavior and how diverse differences between financial professionals and laymen are. These complex relations provide a strong motivation to perform multivariate regressions. This is done in the following section.

¹⁸ Theoretical studies (e.g. Gehrig, 1993) and empirical works (e.g. Coval and Moskowitz, 2001, for fund managers and Ivkovic and Weisbenner, 2005, for individual investors) have shown that a local information advantage may be real, although others find contradictory evidence (e.g. Huberman, 2001, for individual investors, Lütje and Menkhoff, 2007, for institutional investors).

4 Regression analyses

We find that professionalism only sometimes is a robust correlate of more sophisticated investment behavior. After a note on methods in Section 4.1, we show results for the six measures of sophisticated behavior in Section 4.2.

4.1 Methods applied

The data generated by the survey are available in different forms which require appropriate regression techniques each. To account for heteroscedasticity, all statistical inference is based on robust standard errors.¹⁹

In most cases we employ ordered probit regressions to account for the ordered, discrete nature of our response variables. This applies to four measures of sophisticated investment behavior as responses were given according to four or six categories: turnover, reluctance to loss realization, disposition effect and trend following. As responses to the question of home investments are available as percentage shares we employ a censored linear regression for this dependent variable where the censoring takes place at an investment share of zero and one hundred percent. Finally, in order to test directional forecasting ability for the DAX and Dow Jones we rely on simple bivariate probit regressions.

As a robustness check, we reestimate the home bias variable in parallel to other measures via an ordered probit regression. The dependent variable is then a categorical transformation of our domestic investment variable, since this original variable lies in the interval $[0,1]$ and is thus not necessarily well captured by standard linear regression mod-

els, even when a censored regression model is used. We make use of the ordered nature of our data and form six different categories: [0,10), [10,30), [30,50), [50,70), [70,90), [90,100]. The two smaller categories in the left-hand and right-hand margins are used to capture the observed extreme realizations of home bias. Using this ordered approach does not impact qualitative results, however (results are available on request).

4.2 Correlates of sophisticated investment behavior

This section analyzes results from regressions on the above introduced six measures of sophisticated behavior. These regressions include all relevant variables that have been discussed in Section 2.

Starting with *turnover*, column (1) in [Table 4](#) shows regression results for “explaining” turnover. Institutional investors have significantly lower turnover – i.e. less excessive turnover – than the two other groups. Further variables being related to lower turnover include higher age, longer experience, better education and a longer horizon. However, there are also variables “increasing” turnover, i.e. more wealth and willingness to accept a higher investment risk. These results are similar to those found in Dorn and Huberman (2005, Table 9).²⁰

The regression results for our second measure, *home bias*, are given in column (2) of [Table 4](#). Surprisingly, the coefficient signs for the two groups of professionals are different: institutional investors show less home bias than individual investors whereas in-

¹⁹ We have also run all following regressions with standard errors based on a bootstrap with 250 repetitions. Results are very similar to those reported in the following.

²⁰ They also find experience, knowledge (in our study: education), wealth and risk aversion to explain turnover as we do. Moreover, they find men and overconfident investors to exhibit more turnover, variables which cannot be used in our sample, whereas we find occupation and forecasting horizon to be significant, two variables that are not included in Dorn and Huberman (2005). The only variable that comes out somewhat differently is age, which loses significance in Dorn and Huberman (2005) when they use a larger set of controls.

vestment advisers have a significantly higher degree of home bias. Furthermore, we find that older and less experienced investors show more home bias, longer horizons are related to less home bias and, finally, that the belief of a domestic information advantage leads to a larger home investment share.

The fact that older investors prefer home assets compared to younger ones has been found by Karlsson and Nordén (2007) and Lütje and Menkhoff (2007) before. However, further correlations which were found to be important by Karlsson and Nordén (2007) are not significant in the extended approach here. This refers to share of equities, higher wealth and also to better education and more senior position.²¹ It is reassuring that the “information advantage” variable which is among the best-established correlates of home bias according to earlier studies also shows up significantly here.²² This is despite the different method for data compilation, the questionnaire survey, and despite many more control variables that are included here compared to earlier work.

The results on *reluctance to loss realization* are given in column (3) of Table 4. Again, institutional investors respond differently from individual investors to a statistically significant degree. Also the response of investment advisors is tentatively the same as for home bias, as they again tend to be more biased than individual investors, although at a significance level of only 14%. There is one more variable “explaining” less reluctance to loss realization, i.e. being more experienced. Overall, explanatory power is comparatively weak.

²¹ In order to come closer to a replication of Karlsson and Nordén (2007), we have run a regression explaining individual investors' home bias solely by these personal characteristics. We find that in this case higher age and also investment volume (as a proxy for wealth) significantly reduce home bias.

²² One may question the meaning of the information advantage variable as it is measured as a subjective assessment and does not necessarily mean that an information advantage exists.

This also applies to our fourth measure, i.e. a response in accordance with the *disposition effect*. The regression result in column (4) of Table 4 shows that investor groups do not differ in this respect. By contrast, “wealth” is the most significant variable in relation to a reduced disposition effect, followed by experience, the latter at the 10% significance level.

Investor groups become important again at the next measure of sophisticated behavior, i.e. *trend following*. Column (5) in Table 4 shows that institutional investors – but not investment advisors – apply this strategy to a significantly higher degree than individual investors. This appears a bit surprising having the conventional wisdom in mind that trend following is not oriented towards fundamentals and thus indicates unsophisticated behavior. However, whatever the reason is, empirical evidence and theoretical arguing shows – as mentioned above – that trend following may be profitable and a fully rational strategy. The degree of trend following is also related to being older but less experienced, holding a higher equity share, being more risk averse and having a shorter investment horizon.

Finally, as another simple sophistication measure, we examine *directional return forecasts*. Column (6) for the German stock index DAX and column (7) for the US stock index Dow Jones show that these two cases of forecasting cannot be well explained. The reason is probably extremely high volatility at the time of forecasting, i.e. in 2003. Accordingly only those investors with low risk aversion – indicating among others their optimism – are mostly correct in predicting the realized upwards movement in stock prices. Investors groups are less relevant as institutional investors do not forecast particularly well (at that time), whereas investment advisors made significantly worse forecast about the US index compared to individual investors.

In summary and comparing results on these various measures of sophisticated investment behavior there emerges a clear pattern: being a financial professional does not seem enough to bring about behavior generally more sophisticated than that of advanced individual investors. Rather some professionals, i.e. institutional investors, behave less biased than individual investors, whereas other professionals, i.e. investment advisors, behave the same as individual investors or even more biased.

It also seems interesting to note that in our sample which includes a large set of relevant control variables, the variable “investment experience” also has a quite clear relation to a more rational investment behavior. This relation holds in addition to being an institutional investor and thus obviously covers another important aspect of more sophisticated behavior. Contrarily, “wealth” and “risk aversion” do not provide much additional insight in understanding investment behavior, at least not in our sample of relatively advanced investors.

5 Economic significance and robustness

This section rounds up our main findings by addressing some potential concerns. We proceed in three steps, first showing that findings are not only statistically significant but also economically relevant, second demonstrating that it is important to distinguish financial professionals in our sample into two groups and third checking that a stepwise exclusion of insignificant control variables does not qualitatively impact our results.

In order to investigate the economic significance of our results, we show marginal effects for being an institutional investor and an investment advisor, respectively. Most of our regression models (except for the home bias censored regression model) do not allow a direct interpretation of the estimated coefficients so that an analysis of this kind seems

useful. We base the calculation of marginal effects on the specifications shown in Table 4 although we only report the effects for the two occupation dummies to conserve space. Marginal effects are calculated at variable medians and results are shown in Table 5. Being an institutional investor increases the probability of being in one of the “low turnover categories” (i.e. $x \leq 25\%$ p.a.) – which has an unconditional probability of about 34% – by more than 11 percentage points.²³ Thus, the marginal effect is roughly 33% of the unconditional probability, which clearly is of economic significance. Results are not always as impressive for the further measures but nevertheless they are not negligible. In short, being an institutional investor decreases the probability of being in the three categories with the highest reluctance to loss realization by about 9% (unconditional probability: 38%), increases the probability of being in the three categories with the highest disposition effect by only 1% (unconditional probability: 49%), being in the three highest trend following categories by 13% (unconditional probability: 60%). Contrary to these figures for institutional investors, being an investment advisor increases the probability of being reluctant to loss realization by 8% and the probability of a high disposition effect by 6.5% whereas there is no real effect on trend following.

Finally, for the directional forecasts, being an institutional investor increases the likelihood of a correct DAX forecast direction by roughly 6% and decreases the likelihood of a correct DJ forecast direction by 3.5%. Being an advisor has no significant effect on the DAX forecast but reduces the probability of a correct DJ forecast by almost 14%. Therefore, relative to each other, institutionals clearly outperform advisors in the forecasting exercises.

²³ This can be seen by adding the first two entries in the table corresponding to the “institutional investors” variable (i.e. $5.12+6.23 = 11.35 \approx 11\%$).

To prove the importance of distinguishing financial professionals into two groups we rerun the above regression from Table 4 but merge institutional investors and investment advisors into one group. Results on this new variable in [Appendix 1](#) show unanimously that professionalism tends to have the expected influence on some variables but that it is never statistically significant at the 10% level. This underlines that it is not professionalism as such that drives results and it makes even more plausible why we may often find inconclusive results in the literature.

Finally, to make sure that our findings are not driven by a fortunate constellation of included explanatory variables in the regressions, we start with the results presented in Table 4 and all variables that are not significant at a 10% level. The new outcome is shown in [Appendix 2](#). Clearly, the main findings are not qualitatively affected by the inclusion or exclusion of some variables.

6 Conclusions

Recent studies have found that professionals do not necessarily behave sophisticated in (financial) markets. Therefore, it is not clear *ex ante* whether institutional investors and investment advisors show pronounced biases and whether their degree of biases differs from those of individual investors. More sophistication of professionals would be important for both market efficiency and heterogeneous agent models.

Our study complements available evidence from trade data and laboratory experiments by providing evidence similar to a framed field experiment. Our survey of about 500 German investors generates information on investment behavior that was not available before: it examines the impact of various measures of sophisticated investment behavior to overcome more eclectic evidence, it compares investors with different degree of

professionalism, it controls for a large set of variables suggested in the literature and it compares professionals and laymen on an equal basis, i.e. regarding their private investment decisions.

We find clear evidence that professional investors and laymen do not behave as sophisticated investors on aggregate. Even worse, neither group can be considered sophisticated individually. This becomes obvious when comparing them to a theoretically derived ideal behavior. The good and bad news is, that there is one group of professionals, i.e. institutional investors, which behaves at least more sophisticated than laymen, whereas other professionals, i.e. investment advisors, seem to do even worse. This helps to understand the inconclusive evidence about the impact of professionalism on investment behavior resulting from earlier work.

In relation to being an institutional investors, we find that investment experience is related to further improved behavior. Wealth and risk aversion, however, do not seem to be equally important. Finally, our approach highlights that it is important to compare professionals and laymen in a truly uniform way, as institutional investors trade more heavily than individual investors when examining their job behavior but they trade less when both groups are compared on their private investments.

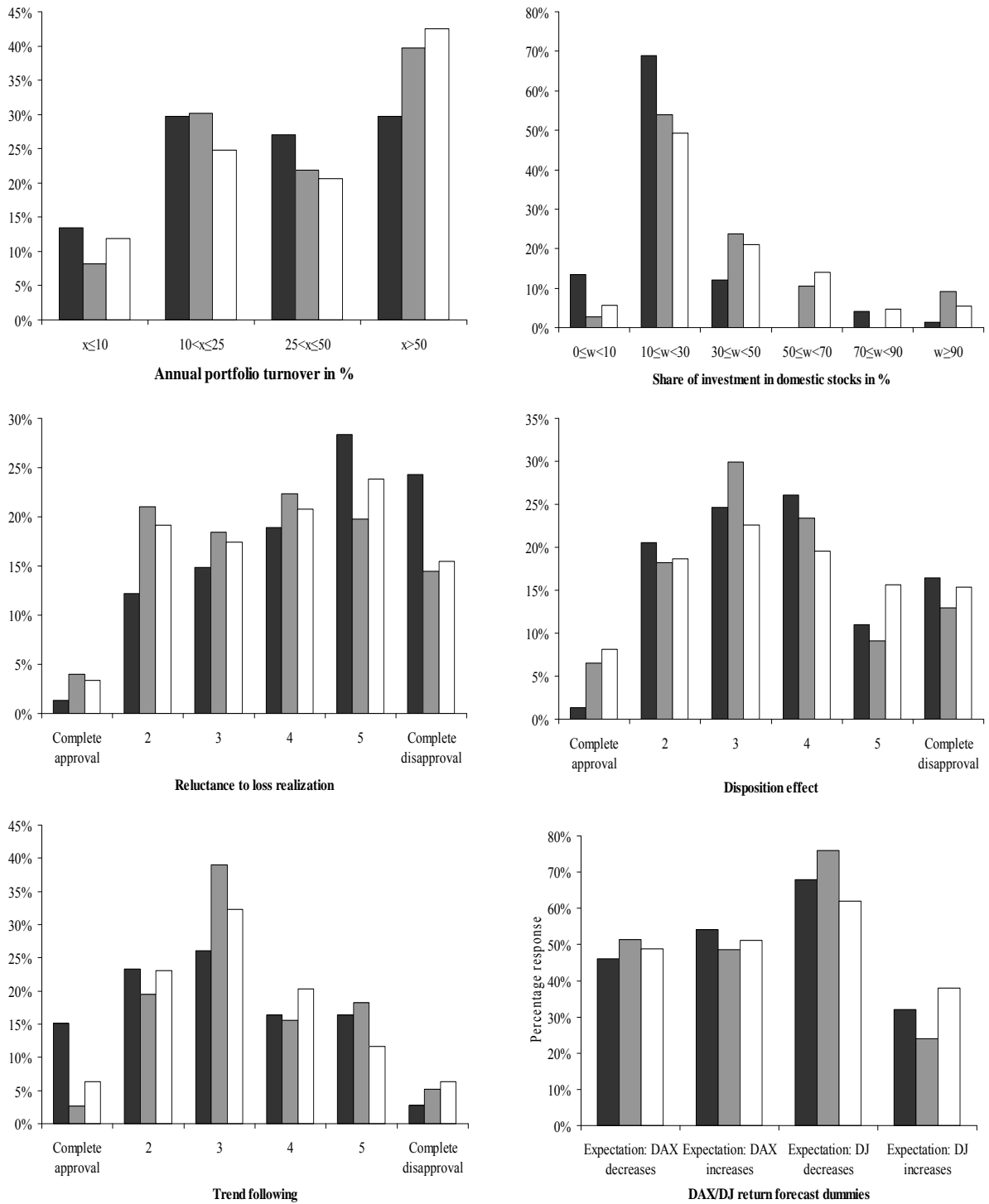
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Figure 1. Distribution of indicators of sophisticated investment behavior



Note: Black bars show responses of institutional investors, grey bars are for investment advisors, and white bars stand for individual investors.

Table 1. Survey participants' objective attributes

		Responses (in percent)				KW Test ¹
		all	Institutional investors	Investment advisors	Individual investors	
Age	<25 years	4.2	0.0	5.3	4.9	4.23 **(0.00)
	25-35	28.6	39.0	42.1	23.3	
	36-45	34.8	50.6	38.2	30.5	
	46-55	19.7	10.4	11.8	23.5	
	56-65	9.5	0.0	2.6	13.1	
	>65	3.2	0.0	0.0	4.7	
	mean ²	41.1	37.1	36.4	43.1	
	obs	497	75	78	344	
(Investment) Experience	<4 years	5.1	2.7	0.0	7.0	3.39 **(0.00)
	4-6	20.9	9.5	21.1	23.7	
	7-9	18.0	14.9	11.8	20.3	
	10-12	13.3	21.6	5.3	13.3	
	13-15	9.8	14.9	13.2	7.7	
	>15	32.9	36.5	48.7	28.0	
	mean ²	12.0	13.5	14.2	11.1	
	obs	497	75	78	344	
University degree (yes)		66.8	62.3	63.5	68.6	0.17 (0.87)
	obs	485	75	76	334	
Gender (Male)		0.98	0.96	0.98	0.96	0.11 (0.92)
	obs	497	75	78	344	
Hierarchy	Junior	16.8	17.6	25.0	13.3	2.83 **(0.01)
	Senior	43.1	52.7	54.7	34.3	
	Head of ...	40.1	29.7	20.3	52.4	
	obs	477	74	74	329	
(Higher) Wealth in thousand EUR (Portfolio volume)	$0 \leq x \leq 10$	14.62	10.77	12.5	15.89	1.81 (0.07)
	$10 < x \leq 50$	33.87	33.85	31.25	34.44	
	$50 < x \leq 250$	33.41	24.62	45.31	32.78	
	$250 < x \leq 1,000$	10.44	6.15	7.81	11.92	
	$x > 1,000$	7.66	24.62	3.13	4.97	
	mean	241.2	455.4	173.7	209.3	
	obs	491	74	77	340	
Share of equities ³	$0 \leq x \leq 20\%$	35.81	32.00	30.77	37.79	0.60 (0.55)
	$20 < x \leq 40\%$	19.52	25.33	16.67	18.90	
	$40 < x \leq 60\%$	16.30	16.00	19.23	15.70	
	$60 < x \leq 80\%$	14.89	10.67	20.51	14.53	
	$80 < x \leq 100\%$	13.48	16.00	12.82	13.08	
	mean	40.1	40.7	43.6	39.2	
	obs	497	75	78	344	

¹ KW presents the Kruskal Wallis test statistic of the Null that there is no difference between the three investor group's answers. Stars refer to the level of significance: ***: 1%, **: 5%, *:10%.

² Mean values are calculated assuming that values in the two open categories are 23 and 68 years, and 2 and 23 years of experience, respectively.

³ Share of equities denotes the share of total investment volume that is invested in equities

Table 2. Description of further variables

Item	Question, statement	Categories
1. Higher turnover	What is your annual turnover (sum of buy and sell transaction volume) relative to the total volume of your portfolio?	4 categories (1 = <10%, 2 = 10-25%, 3 = 25-50%, 4 = >50%).
2. More home bias	Please allocate an amount of 10,000 € on the following regions so that shares add up to 100 percent. 5 regions: Germany, Europe (ex Germany), USA and Canada, Asia, Emerging Markets.	In percent between 0 and 100.
3. Less reluctance to loss realization	I generally wait for a price recovery of a loss position, instead of selling this position.	6 categories from "complete approval" (coded as 1) to "complete disapproval" (coded as 6)
4. Less disposition effect	I prefer to take profits when I am confronted with unexpected liquidity demands.	See item 3.
5. Less trend following	I generally follow the trend.	See item 3.
6. DAX/Dow Jones return forecast dummy	Please estimate the development of the DAX/Dow Jones over the next month.	Point forecast. Coded as "1" if DAX/Dow Jones index is expected to increase and "0" otherwise.
7. Less risk averse	Please classify your personal risk taking: With respect to professional investment decisions, I mostly act...	6 categories from "very risk averse" (coded as 1) to "little risk averse" (coded as 6)
8. Longer forecasting horizon	What is your typical personal forecasting horizon when making investment decisions?	5 categories from "Days" (coded as 1), "Weeks", "2-6 Months", "6-12 Months" to "Years" (coded as 5)
9. Less domestic information advantage	As a domestic investor I benefit from better information compared to foreign market players.	See item 3.
10. Higher DAX optimism	Please estimate the development of the DAX within the next month.	Point forecast (converted into return forecast).

Table 3. Responses in percent and descriptive statistics

Item		all	Institutional investors	Investment advisors	Individual investors	KW Test ¹
1. Higher turnover	Mean	43.45	38.12	43.70	44.62	2.47 (0.29)
	Obs	457	74	73	310	
2. More home bias	Mean	29.65	19.18	31.75	31.45	23.28 *** (0.00)
	obs	465	74	76	315	
3. Less reluctance to loss realization	Mean	3.97	4.34	3.77	3.94	6.05 * (0.05)
	obs	455	74	73	308	
4. Less disposition effect	Mean	3.62	3.74	3.49	3.62	0.91 (0.63)
	obs	482	73	77	332	
5. Less trend following	Mean	3.26	3.04	3.43	3.27	2.96 (0.23)
	obs	484	73	77	334	
6a. DAX return forecast dummy	Mean	0.51	0.54	0.49	0.51	0.22 (0.81)
	obs	465	74	76	315	
6b. DJ return forecast dummy	Mean	0.35	0.32	0.24	0.39	6.12 ** (0.05)
	obs	462	74	76	312	
7. Less risk averse	Very risk averse	0.65	0.00	1.32	0.63	0.52 (0.77)
	2	9.68	8.11	7.89	10.48	
	3	15.05	22.97	14.47	13.33	
	4	20.86	21.62	19.74	20.95	
	5	35.27	27.03	38.16	36.51	
	Little risk averse	18.49	20.27	18.42	18.10	
	obs	465	74	76	315	
8. Longer forecasting horizon	Days	14.88	9.33	11.69	16.87	6.41 ** (0.04)
	Weeks	22.73	18.67	15.58	25.30	
	2-6 months	31.20	37.33	36.36	28.61	
	6-12 months	18.60	22.67	20.78	17.17	
	Years	12.60	12.00	15.88	12.05	
	obs	484	75	77	332	
9. Less domestic information advantage	Complete approval	2.70	2.78	3.90	2.40	6.33 ** (0.04)
	2	16.80	22.22	20.78	14.71	
	3	26.76	20.83	35.06	26.13	
	4	18.46	25.00	11.69	18.62	
	5	20.95	15.28	19.48	22.52	
	Complete disapproval	14.32	13.89	9.09	15.62	
obs	482	72	77	333		
10. Higher DAX optimism	Mean	-0.72	-0.25	-0.88	-0.79	1.16 (0.56)
	Standard deviation	4.83	4.50	4.50	4.99	
	Skewness	-0.68	-0.54	-1.06	-0.62	
	Kurtosis	5.53	3.37	6.52	5.63	
	obs	450	74	76	300	

¹ The test statistic reported for the DAX return forecast dummy (item 6) corresponds to a t-test of equal means and not the Kruskal-Wallis test for equal medians across groups.

Stars refer to the level of significance: ***: 0.01, **: 0.05, *: 0.10

Table 4. Determinants of sophisticated investment behavior

	Turnover	Home bias	Reluctance to loss realization	Disposition effect	Trend following	Direction DAX	Direction Dow Jones
Institutional Investors	-0.35 **(0.02)	-6.43 **(0.02)	0.24 *(0.09)	-0.02 (0.86)	-0.38 **(0.02)	0.16 (0.37)	-0.10 (0.59)
Investment advisors	0.01 (0.95)	6.63 *(0.07)	-0.21 (0.14)	-0.17 (0.22)	0.01 (0.93)	-0.01 (0.97)	-0.43 **(0.02)
More experienced	-0.13 *** (0.00)	-3.77 *** (0.00)	0.09 ** (0.01)	0.07 * (0.05)	0.08 ** (0.02)	-0.01 (0.79)	0.03 (0.56)
Higher age	-0.16 *** (0.00)	5.01 *** (0.00)	-0.03 (0.64)	-0.08 (0.14)	-0.13 *** (0.01)	0.08 (0.22)	0.07 (0.29)
University degree	-0.21 * (0.05)	1.76 (0.46)	0.03 (0.74)	-0.03 (0.75)	0.11 (0.30)	0.13 (0.30)	0.03 (0.79)
More senior	0.15 (0.20)	3.25 (0.26)	0.11 (0.38)	-0.09 (0.46)	0.20 (0.11)	0.07 (0.61)	0.17 (0.25)
Higher share of equities	-0.00 (0.87)	0.02 (0.58)	0.00 (0.83)	-0.00 (0.18)	-0.04 *** (0.01)	0.00 (0.27)	0.00 (0.24)
More volume	0.17 *** (0.00)	-0.38 (0.63)	-0.01 (0.80)	0.09 *** (0.01)	-0.05 (0.19)	0.01 (0.78)	-0.04 (0.40)
Less risk averse	0.17 *** (0.00)	0.16 (0.87)	0.01 (0.87)	-0.05 (0.25)	0.10 ** (0.03)	0.11 ** (0.03)	0.10 * (0.05)
Longer forecasting horizon	-0.31 *** (0.00)	-1.93 * (0.05)	0.07 (0.12)	-0.06 (0.22)	0.19 *** (0.00)	0.01 (0.90)	0.01 (0.86)
Less domestic information advantage		-2.26 *** (0.01)					
Higher DAX optimism		0.03 (0.50)					
Constant 1	-1.94		-1.38	-1.79	-0.91		
Constant 2	-0.95		-0.28	-0.92	0.09		
Constant 3	-0.27	41.05 *** (0.00)	0.24	-0.27	0.96	-0.91 ** (0.02)	-1.14 *** (0.00)
Constant 4			0.78	0.33	1.54		
Constant 5			1.50	0.84	2.31		
LRT (p-value)	***135.01		**21.59	***21.78	***45.99	9.93	*17.98
(Pseudo) R ²	0.10	0.13	0.01	0.01	0.03	0.02	0.03
obs	456	451	454	451	453	449	444

Table 5. Marginal effects

	Turnover				
	Low	2	3	High	
Inst. Inv.	5.12	6.23	-0.20	-11.16	
Inv. Adv.	0.52	0.75	0.05	-1.34	
Prob(uncond.)	8.02	26.03	26.37	39.58	

	Reluctance to loss realization					
	Approval	2	3	4	5	Disapproval
Inst. Inv.	-1.31	-5.12	-2.55	-0.57	2.92	6.62
Inv. Adv.	1.48	4.71	1.80	-0.16	-2.97	-4.88
Prob(uncond.)	2.72	17.81	17.62	21.25	23.61	16.99

	Disposition effect					
	Approval	2	3	4	5	Disapproval
Inst. Inv.	0.30	0.47	0.20	-0.15	-0.29	-0.53
Inv. Adv.	2.27	3.39	1.20	-1.26	-2.07	-3.54
Prob(uncond.)	6.10	18.73	24.31	22.75	24.43	13.67

	Trend following					
	Approval	2	3	4	5	Disapproval
Inst. Inv.	5.62	8.26	-0.30	-4.78	-5.81	-2.99
Inv. Adv.	-0.14	-0.26	-0.04	0.13	0.19	0.11
Prob(uncond.)	6.14	23.41	33.32	19.06	13.41	4.67

	Direction DAX		Direction DJ	
	Correct direction		Correct direction	
Inst. Inv.	6.09		-3.66	
Inv. Adv.	-0.41		-13.91	
Prob(uncond.)	50.90		34.38	

Appendix 1. Combining professional investors in one group

	Institutional investors & investment advisors	(Pseudo) R ²
Turnover	-0.17 (0.17)	0.10
Home bias	0.30 (0.91)	0.11
Reluctance to loss realization	-0.10 (0.37)	0.01
Disposition effect	0.01 (0.91)	0.01
Trend following	-0.18 (0.12)	0.03
Direction DAX	0.07 (0.60)	0.01
Direction Dow Jones	-0.26 *(0.07)	0.03

Appendix 2. Excluding insignificant explanatory variables

	Turnover	Home Bias	Reluctance to loss realization	Disposition effect	Trend following	Direction DAX	Direction Dow Jones
Institutional Investors	-0.34 **(0.02)	-7.40 *** (0.00)	0.25 ** (0.04)		-0.38 ** (0.01)		
Investment Advisors		6.06 * (0.08)					-0.43 ** (0.01)
More experienced	-0.12 *** (0.00)	-3.59 *** (0.00)	0.09 *** (0.00)	0.03 (0.32)	0.07 ** (0.02)		
Higher age	-0.15 *** (0.00)	4.64 *** (0.00)			-0.12 ** (0.01)		
University degree	-0.18 * (0.09)						
More senior							
Higher share of equities					-0.04 *** (0.00)		
More volume	0.18 *** (0.00)			0.08 *** (0.01)			
Less risk averse	0.19 *** (0.00)				0.10 ** (0.02)	0.09 ** (0.05)	0.11 ** (0.04)
Longer forecasting horizon	-0.31 *** (0.00)	-1.78 * (0.08)			0.20 *** (0.00)		
Less domestic information advantage		-2.41 (0.00)					
Higher DAX optimism							
Constant 1			-1.47	-1.13	-0.86		
Constant 2	-2.05	44.08	-0.41	-0.28	0.14	-0.38	-0.76
Constant 3	-1.07	*** (0.00)	0.09	0.38	1.00	(0.08)	*** (0.00)
Constant 4	-0.44		0.64	0.94	1.58		
Constant 5	1.30		1.33	1.42	2.34		
LRT (p-value)	***133.61		***16.38	***10.04	***40.07	**3.99	***10.71
(Pseudo) R ²	0.10	0.12	0.01	0.01	0.03	0.01	0.02
Obs	463	459	485	480	461	458	453