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Do retail investors bite off more than they can chew? A close look at their return objectives☆

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ABSTRACT

Using self-reported retail investor information from a risk-return profile survey, we investigate the determinants of individual return objectives as well as the capacity of investors to achieve them. Controlling for a large set of covariates, we provide empirical evidence that return objectives are related to subjective individual characteristics (such as financial literacy and risk tolerance), some sociodemographic variables (age and education), and recent past trading intensity. Retail investors with higher return objectives perform better than their counterparts who want to avoid any risk of capital loss. The capacity to achieve the return objective, however, decreases as the level of the objective increases.

1. Introduction

The 2016 Global Survey of Individual Investors published by Natixis Global Asset Management offers an overview of the expectations of 7100 investors from 22 countries.[1] When asked what they need to achieve their goals, investors around the globe answered that they would require returns of 9.5% above inflation. More than six out of ten investors believe that their objectives are realistic. More recently, respondents in the Schroders Global Investor Study 2020[2] answered they expect an average annual total return of 10.92% over the next five years, which is 1.02% higher than the expectation reported two years ago. Despite some significant differences across countries, the conclusion of the Schroders survey is unambiguous: people are overoptimistic in their return objectives.

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[1] Investors from the Americas, Asia, Europe, the Middle East and Oceania with a minimum of $200,000 (or the purchase price parity equivalent in USD) in net investable assets were surveyed.

[2] The Schroders Global Investor Study 2020 was conducted online in April 2020 to explore the behaviors and attitudes of more than 23,000 people who invest from 32 locations around the globe (Europe, Asia, the Americas and more). This survey defines investors as those who will be investing at least € 10,000 (or the equivalent) in the next 12 months and who have made changes to their investments within the last 10 years.

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Broadly speaking, return objectives are key information used by investment firms for portfolio management services. In the writing of an investment policy statement (IPS),[3] the return objective is elicited as an important component of the client's general investment goals and objectives. Although this practice was long confined to institutional investors and private wealth management, it was extended to retail investors in Europe with the November 2007 implementation of the Markets in Financial Instruments Directive (MiFID).[4] MiFID makes it compulsory for investment firms in EU member states to collect specific information about their retail clients' needs and preferences through so-called MiFID questionnaires (or MiFID tests). Both the quantity and the nature of information to be collected depend on the type of services requested by the retail investor. Basically, MiFID distinguishes among the execution of orders, provision of financial advice, and supply of portfolio management services (see Fig. A.1 in the appendix). Return objectives must be elicited in the MiFID Suitability questionnaire, which is required for any retail investor who requests financial advice and/or portfolio management services. The purpose of this questionnaire is to ensure that the instruments and services offered by the investment firm are appropriate to the investor's knowledge and experience, investment objectives and financial situation (i.e., regular income, savings, and liabilities). Retail investors requiring order execution, on the other hand, must complete the MiFID Appropriateness questionnaire only when they want to trade "complex" instruments.[5] This specific test aims to ensure that the investor has the necessary experience and knowledge to understand the risks involved in complex financial instruments before investing. In practice, the Appropriateness test focuses on investors' knowledge and experience, while investment objectives and financial resources are outside of its scope.[6]

Given both its objective and the three items it has to cover (i.e., the investor's objectives, financial situation, knowledge and experience), the MiFID Suitability questionnaire arguably may be viewed as a kind of regulated IPS. This means that since the advent of MiFID, retail investors in the EU have been asked by their brokers to declare their return objectives in the Suitability questionnaire before making investment decisions. To what extent do retail investors' past behavior and realized returns drive the return objectives declared in the MiFID questionnaire? Do retail investors with higher return objectives earn higher realized returns than their counterparts? Are retail investors able to achieve their return objectives? Combining trading data and survey-based data from a large Belgian online brokerage house, we address these three research questions in this paper.

Our primary dataset consists of the trading accounts of 4140 retail investors who held stocks over the period January 2008–March 2012. In addition, we match sociodemographic and survey-based characteristics for each investor. The latter were directly collected by the brokerage house within its MiFID Suitability questionnaire. Since MiFID came into force at the end of 2007, we trace trading accounts back for investors who traded before the implementation of the MiFID questionnaire. In particular, these additional trading data enable us to look at how a subset of 2746 investors behaved and performed over the two-year presample period, that is, from January 2006 to December 2007. One of the strengths of this paper is therefore the richness of our data. They allow us to investigate in an original way the relationships between return objectives, past behavior and returns, and actual behavior and returns after the completion of the MiFID questionnaire by a large sample of retail investors.

Because return objectives are most of the time unobserved, past research has addressed retail investment motives (e.g., Xiao and Anderson, 1989; Canova et al., 2005; Devaney et al., 2007; Fisher and Montalto, 2010; Soman and Zhao, 2011; Fisher and Anong, 2012). Their impact on individual behavior is quite well documented: saving motives have a positive impact on the likelihood of saving regularly (Fisher and Montalto, 2010), while speculative motives lead to higher turnover and riskier portfolios (Hoffmann and Shefrin, 2014). Unlike this stream of research, in which individuals' explicit return objectives remain unknown, this paper relies on a unique dataset incorporating the return objectives self-reported by retail investors in the MiFID questionnaire.[7] Practically speaking, this questionnaire is an online risk-return profile survey that investors fill out on their own, without the help of a financial intermediary. This survey contains one specific item about

[3] An IPS is a written document that clearly sets out a client's return objectives and risk tolerance over that client's relevant time horizon, along with applicable constraints such as liquidity needs, tax considerations, regulatory requirements, and unique circumstances (Maginn et al., 2006). The following items are key for an IPS: goals and objectives, fears and concerns, investment time frame, expected mortality, retirement time frame, short-term financial needs, risk tolerance attitudes, and risk capacity (Boone and Lubitz, 2004).

[4] MiFID is central to the regulation of financial markets in the EU since it regulates the provision of investment services in financial instruments by banks and investment firms as well as the operation of stock exchanges and alternative trading venues. One of its core objectives is to ensure a high degree of harmonized protection for investors in financial instruments. MiFID I (2004/39/EC) was the first version of this directive, while a review of it (known as MiFID II (2014/65/UE)) was implemented in January 2018. For more details on the MiFID regulation, please visit the European Commission website (https://ec.europa.eu/info/law/markets-financial-instruments-mifid-ii-directive-2014-65-eu_en).

[5] The European regulator provides only guidelines and general rules for implementing the MiFID tests. Neither a clear definition nor a specific list of complex instruments is available. The general consensus is that derivatives (such as options, futures, and warrants) and structured products are prototypical complex instruments. However, due to the precautionary principle, most investment firms tend to consider almost all financial securities with random returns as complex instruments.

[6] Appropriateness is often viewed as a less rigorous type of suitability. Practically speaking, the Appropriateness test is sometimes incorporated into the Suitability questionnaire.

[7] Over the period under scrutiny, the brokerage house that provided us with the data did not offer portfolio management delegation services. All retail investors in our sample completed the MiFID Suitability questionnaire to receive free access to a financial tool on stocks. More information is available in Section 2.

"the annual yield that investors expect on their investments,"[8] which must be selected on a five-level scale ranging from 0% to 12% above the inflation rate. Consistent with the purpose of an IPS, there is no negative value on the scale,[9] and the lowest level corresponds to no risk of capital loss, that is 0%. This item arguably elicits the investor's return objective, that is, the goal or outcome toward which the investor is supposed to strive when making investment decisions.

A crucial point is how the return objective at the core of this paper differs from the return expectations investigated in prior literature. First, return expectations is a broader term referring to either estimates or beliefs provided by investors about a specific return. It may refer to either the stock market in general or individual portfolios, depending on the context.[10] By contrast, the return objective is conceptually linked to the investor's own portfolio or total investments (i.e., there is no return objective for the market). Next, to the best of our knowledge, the elicitation of investors' return expectations for their own portfolios always relies on specific surveys, in many cases especially designed for the purpose of the study. Most of the time, participants in these bespoke surveys must repeatedly provide numerical estimates (such as best-high-low estimates with a given confidence interval) of future returns on their investments for the coming months, which allows researchers to calculate numerical return expectations as well as implicit expected volatility (e.g., Weber et al., 2013; Merkle and Weber, 2014; Merkle, 2017; Merkle, 2020). In some cases, qualitative estimates are requested, and investors have to rate the returns that they expect from their own portfolios over the coming months on a seven-point Likert scale aimed at capturing individual perceptions or optimism (e.g., Hoffmann et al., 2013; Weber et al., 2013; Merkle and Weber, 2014; Hoffmann et al., 2015; Merkle et al., 2015; Hoffmann and Post, 2017; Merkle, 2020).[11] In this paper, both the information collected and the context differ. As mentioned earlier, all investors in the sample were asked to select the annual return that they expect on their investments on a preset scale ranging from 0% to 12% above inflation. The nature of this task is less cognitively demanding than providing several numerical estimates within a given confidence interval, as is required in the surveys about return expectations. Moreover, this was a one-shot task since the MiFID Suitability questionnaire had to be completed only once,[12] requiring much less effort than monthly or quarterly requests for return estimates. It is also noteworthy that investors knew that their return choices would contribute to the determination of their risk-return profile (as in an IPS).[13]

Our contribution to the literature is threefold. First, we contribute to the growing body of empirical evidence on how past behavior and experienced returns affect beliefs and preferences. In the aforementioned papers, beliefs generally refer to individual return expectations. Some authors also consider risk perceptions to be beliefs (Hoffmann et al., 2013; Hoffmann and Post, 2017), while preferences are associated with risk tolerance (Hoffmann et al., 2013; Hoffmann and Shefrin, 2014; Hoffmann and Post, 2017). In comparison, we examine a new facet, that is, individual return objectives. Since our data trace trading activity back for a subset of 2746 investors who had traded for at least two years before completing the MiFID questionnaire, we are able to check whether both their past behavior and their past realized returns are important determinants of their return objectives. Second, the availability of individual return objectives allows us to address whether higher return objectives lead to higher realized returns, as predicted by the goal-setting effects documented in the psychology literature (Locke and Latham, 1990; Heath et al., 1999; Larrick et al., 2009). Third, by measuring the gap between the investor's return objective declared in the MiFID questionnaire and the actual gross realized return, we investigate whether retail investors can achieve their return objectives. In particular, we identify the main determinants of this gap among a large set of covariates, including sociodemographic and individual subjective characteristics and trade- and portfolio-based variables.

To further stress our contribution, we should point out that the sample of investors used in this paper has some distinctive features over those used in prior studies devoted to individual beliefs and preferences. Most of the papers addressing return expectations on individual portfolios (Weber et al., 2013; Merkle and Weber, 2014; Merkle et al., 2015; Merkle, 2017; 2020) actually rely on the same survey data collected from a UK online brokerage firm, which cover a sample of 617 self-directed investors.[14] This sample is not representative of retail investors.[15] For instance, Merkle (2017) reports that in the study's sample, the average number of different securities held in a portfolio is close to 16 (with a median of 12) and the average portfolio value is £314,663 (with a median of £41,687). These values are obviously high and not consistent with the

[8] We use quotes because this expression is based on the exact wording of the question used in the MiFID questionnaire. More details are provided in Section 2.

[9] It would make no sense for an investor to declare a negative return objective (i.e., to make investment decisions with the purpose of losing money) in the risk-return profile survey.

[10] Some studies based on survey data focus on overall expectations for stock market returns (e.g., Vissing-Jorgensen, 2004; Dominitz and Manski, 2007; Greenwood and Shleifer, 2014), while others also investigate the return expectations of individuals for their own portfolios (e.g., Hoffmann et al., 2013; Weber et al., 2013; Merkle and Weber, 2014; Merkle, 2017; Merkle, 2020).

[11] For example, in Merkle et al. (2015), investors are surveyed about their happiness or unhappiness with their required portfolio returns and, after the returns are realized, rate the returns on a seven-point scale from "extremely bad" to "extremely good." Hoffmann et al. (2015), for their part, use another seven-point scale reflecting how optimistic investors are about their investment portfolios and their returns for the upcoming month.

[12] Regular updates were not required during the period under scrutiny.

[13] Once the online survey is fully completed, investors are assigned a given investment profile, depending on their total score. More details are provided in Section 2.

[14] The survey, which was conducted in cooperation with Barclays Wealth, took place every three months from September 2008 to December 2010. Among the 617 investors, 394 participated multiple times. The minimum number of observations is 130 for each of the nine rounds (Merkle, 2017).

[15] As Merkle and Weber (2014) explicitly mention, their "sample is clearly not representative, neither for the total UK population, nor for UK stock market investors, maybe not even for Barclays' online brokerage clients."

underdiversification that is well documented in the literature on retail investors. In most empirical studies, the typical retail investor holds between 3 and 7 stocks (e.g., Barber and Odean, 2000; Kumar and Lee, 2006; Goetzmann and Kumar, 2008; Korniotis and Kumar, 2013; Leal et al., 2017). Similarly, the portfolio values reported for the 617 self-directed investors point to a sample of investors with considerable portfolio wealth. This is not a trivial matter since wealth (or income) is generally used to control for sophistication, in addition to sociodemographic indicators such as education and age (e.g., Calvet et al., 2009; Dhar and Zhu, 2006). In this paper, we rely on a sample that is clearly representative of retail investors: the median investor holds a five-stock portfolio, and the median end-of-month portfolio value is approximately € 16,539. Our sample of retail investors is more in line with the one used in Hoffmann et al. (2013), Hoffmann et al. (2015) and Hoffmann and Post (2017). These papers actually rely on the same dataset, which combines the brokerage records of 1376 clients of the largest discount broker in the Netherlands with matched monthly questionnaire data collected from April 2008 through March 2009. Nevertheless, our sample covers a larger set of investors as well as a much longer time period. Furthermore, because all the retail investors in our sample completed the MiFID questionnaire, our study does not suffer from selection bias.

In addition to return objectives, we use other items available in the MiFID questionnaire, namely, subjective financial literacy, subjective risk tolerance, annual net income, and investment horizon. These subjective individual characteristics self-reported by investors are valuable control variables that are complementary to the usual sociodemographic and other trade- and portfolio-based variables characterizing actual investor behavior. By relating this self-reported information to investors' prior behavior and their behavior after completion of the MiFID questionnaire, our empirical work contributes overall to the literature addressing the capacity of questionnaires to describe actual behavior (e.g., Choi and Robertson, 2020; Giglio et al., 2020; Liu and Palmer, 2021).

Our main findings can be summarized as follows. Using multinomial logit models to analyze whether either past behavior or past realized returns are important determinants of individual return objectives, we find that only portfolio turnover over the recent past (i.e., over the last six or three months) is positively related to the return objective level. Neither past realized returns nor past portfolio diversification (or experience) determine individual return objectives. This finding is valid for both long and short horizons. Our large set of covariates reveals that higher return objectives are more likely to be held by investors with higher financial literacy, investors with higher risk tolerance, high-income investors, investors with longer investment horizons, younger investors, French-speaking investors, and highly educated investors. Consequently, return objectives are mainly related to subjective individual characteristics (such as financial literacy and risk tolerance), some sociodemographic traits (age, education, and spoken language), and recent trading intensity. These findings support the conclusions of other work indicating that retail investors learn poorly or slowly from their experiences (Gervais and Odean, 2001; Seru et al., 2010). The results also confirm the failure of retail investors to correctly assess their past realized stock portfolio returns (Glaser and Weber, 2007).

Based on OLS regressions allowing us to control for the level of return objective, we find that investors with higher return objectives earn higher realized returns than their counterparts who want to avoid any risk of capital loss (i.e., the lowest return objective that can be selected). This provides empirical evidence that more demanding return objectives lead to higher realized returns. In addition, our results provide new insights indicating that investors who declare the highest risk tolerance achieve lower returns than other investors. We also show that consistent with past research, realized returns significantly increase with age, education, portfolio size, investor experience, and risk-taking. Women also achieve higher realized returns than men. Most of these findings are still qualitatively similar when we exclude the impact of the 2008 financial crisis. When comparing risk-adjusted performance across return objective levels, we confirm that investors who declare the highest return objectives (i.e., equal to or above 8% plus inflation) outperform over the entire sample period. These investors exhibit a positive and statistically significant alpha, meaning their realized returns over that 51-month period are not merely a compensation for risk.

Regarding the capacity of investors to achieve their return objectives, we measure the divergence from the objective and show that this gap is significantly higher for investors with higher objectives. In other words, the capacity to achieve the return objective decreases as the return objective level increases. We also provide evidence that the ability to achieve the return objective is significantly lower among investors who declare the highest risk tolerance than among other investors, consistent with the lower realized returns that the former achieve. The divergence from the return objective also decreases with age, education, portfolio size, experience, and actual risk-taking. Women also come significantly closer to achieving their return objectives than men, suggesting that women are better at setting more realistic return objectives. This result is consistent with Barber and Odean (2001), who document that men are more prone to overconfidence than women.

This paper is organized as follows. Section 2 describes the data and our sample. Section 3 reports our empirical work. Section 4 concludes the paper.

2. Data and sample

Our primary dataset comes from a large Belgian online brokerage firm. For the purpose of this study, we select the trading accounts of 4140 retail investors holding stocks – and only stocks – over the entire sample period from January 2008 to March 2012. We focus on investors who trade only common stocks because their portfolio returns are perfectly

equal to their actual realized returns.[16] Hence, for these investors, we can directly compare realized portfolio returns to the return objectives declared in the MiFID questionnaire.[17] Moreover, our investors must hold at least one stock in each month of the full sample period. By construction, we disregard short-term investors who execute only a few trades or/and hold stocks for a few months. This filter makes comparisons of investor realized returns more meaningful.[18] Our retail investors are long-term investors with some exposure to market risk at all times, even during the 2008 financial crisis.

For each investor, we have detailed trading records (International Securities Identification Number [ISIN] code, timestamp, trade direction, executed quantity, trade price, explicit transaction costs, etc.). We use these data to rebuild end-of-month individual portfolios. Historical stock prices[19] allow us to value end-of-month portfolios. We calculate monthly portfolio gross and net returns using an approximation of the modified Dietz method, with the aim of delivering a return close to the money-weighted rate of return (Shestopaloff and Shestopaloff, 2007). Specifically, we compute portfolio returns per investor and month assuming that all the purchases (sales) executed in a given month take place on the first (last) day of the month. Mathematically, we have:

$$R_t = \frac{EMV_t - EMV_{t-1} - P_t + S_t}{EMV_{t-1} + P_t} \tag{1}$$

where R_t is the portfolio gross return for month t, EMV_t is the end-of-month portfolio value at month t, EMV_{t-1} is the end-of-month portfolio value at month $t-1$, and P_t and S_t are the aggregate monetary value of all purchases and sales executed during month t. When calculating net returns, we subtract from the numerator the aggregate monetary value spent on transaction costs during month t.

Over the 51-month period, our retail investors executed a total of 187,204 trades on stocks, for an aggregate amount of more than € 1,825 million.[20] Table 1 shows in Panel A that the average investor executes less than one trade (0.89) per month, which corresponds to a monthly trading volume of € 8,647. The medians and quartiles, however, exhibit lower values, suggesting that the sample includes some large investors who drive the means upward. Panel B of Table 1 reports that our average investor holds a seven-stock portfolio (and the median investor a five-stock portfolio). The average end-of-month portfolio value is € 55,144 (with a median value of approximately € 16,539). According to the characteristics usually documented in the literature, our sample is representative of retail investors. In most empirical studies, the typical retail investor holds between 3 and 7 stocks in a portfolio, depending on the sample (e.g., Barber and Odean, 2000; Kumar and Lee, 2006; Korniotis and Kumar, 2013; Magron and Merli, 2015). Consistent with the presence of some large investors in our sample, the average monthly portfolio turnover[21] is high (4.02), while the corresponding median is low (0.05).

Regarding realized portfolio returns, Panel C of Table 1 shows that both gross and net returns are negative, even for the upper quartile. The average volatility of monthly portfolio returns is approximately 0.2320, while the average skewness is negative (−0.0213). These results are not surprising since our sample period includes the 2008 financial crisis, and most investors are likely to have been hit hard by this crisis (Hoffmann et al., 2013).

In addition to trading and portfolio data, we use matched individual data that we classify as either sociodemographic or survey-based. Sociodemographic indicators encompass gender, age, level of education, and spoken language. Our sample includes 383 females (i.e., 9.25%), with the average (median) investor being 48 (47) years old in 2008. Three levels of education are available: no degree, secondary/high school degree, and university degree (or equivalent). The majority of our retail investors (2896, i.e., 70%) have the highest level of education. In regards to spoken language, Belgium has three official languages (French, Dutch and German), among which French and Dutch are spoken the most.[22] Our sample consists of 2553 Dutch-speaking and 1587 French-speaking investors.

The survey data provide investor characteristics collected by the brokerage house within the context of the European MiFID regulation. As explained in the introduction, this regulation makes it compulsory for investment firms to collect specific information about their retail clients' needs and preferences. Accordingly, investment firms operating in the EU are obliged to submit MiFID Suitability questionnaires to their clients to determine their level of knowledge and experience, invest-

[16] When investors also invest in other assets (such as bonds, mutual funds, or derivatives), obtaining the corresponding historical market asset prices is often difficult, but the latter are necessary to compute investor realized aggregate portfolio returns.

[17] In an unreported robustness check, we extend the sample to include investors holding stocks over the entire sample period and also investing in other assets such as funds and options. This extension leads to our adding more sophisticated individuals to the sample since they are more likely to be active participants in derivatives markets (Hsiao and Tsai, 2018). We replicate all our analyses with this extended sample of 6662 investors. Overall, the key results reported in Section 3 are still similar, though realized stock portfolio returns provide for some investors only a partial picture of the actual realized returns earned on their aggregate trading activities. These unreported findings are available upon request.

[18] Comparing the realized returns achieved by long-term investors to those obtained by short-term investors (who hold stocks only either from time to time or over a few months) would introduce noise because of the many monthly portfolio returns equal to zero.

[19] We collect historical prices from either Eurofidai for European stocks (http://www.eurofidai.org) or Bloomberg for US and non-European stocks.

[20] Most of the trading activity in our sample pertains to Belgian, US, French and Dutch stocks. This feature is due to the small size of the Belgian stock market (only approximately 150 stocks are listed on the Euronext Brussels stock exchange in comparison with more than 4000 domestic stocks listed in the US).

[21] Monthly portfolio turnover is calculated as in Hoffmann et al. (2013), that is, as the sum of all purchases and sales in a particular month, divided by the average of the portfolio values at the beginning and the end of the particular month. It turns out that the average portfolio value can sometimes be very small, which can lead to extreme values for turnover. Therefore, average turnover has to be taken with a grain of salt, since it can be very high without having any economic meaning. This is the reason why we winsorize turnover with a 1% cutoff in our empirical work reported in Section 3.

[22] Nevertheless, our retail investors had to choose from the three languages available on the online trading platform: French, Dutch or English.

Table 1
Statistics on monthly investor trading activity and portfolios.

	Mean	Q1	Median	Q3
Panel A: **Trade-based variables**				
#trades	0.89	0.09	0.29	0.82
Monetary volume (in €)	8647	210	885	3197
Panel B: **Portfolio-based variables**				
Portfolio size (#stocks)	7.66	3.04	5.61	9.96
Portfolio value (in €)	55,114	5702	16,539	41,779
Turnover	4.02	0.02	0.05	0.13
Panel C: **Portfolio returns**				
Realized gross return (%)	−1.23	−1.83	−0.92	−0.31
Realized net return (%)	−1.38	−1.97	−1.00	−0.39
Volatility	0.2320	0.0652	0.0906	0.1374
Skewness	−0.0213	−0.7641	−0.2791	0.3681

This table reports cross-sectional statistics about monthly investor trading activity and portfolios. Panel A provides information about the number of trades executed on stocks and the corresponding monthly monetary volume (in €). Panel B refers to portfolio size, expressed as either the number of different stocks or a monetary value, and monthly turnover. The latter is defined as the average of the absolute values of all purchases and sales in a particular month divided by the average of the portfolio values at the beginning and the end of that month. Panel C provides statistics about portfolio returns, computed using an approximation of the modified Dietz method as follows: $R_t = \frac{EMV_t - EMV_{t-1} - P_t + S_t}{EMV_{t-1} + P_t}$, where R_t is the portfolio gross return for month t, EMV_t is the end-of-month portfolio value at month t, EMV_{t-1} is the end-of-month portfolio value at month $t-1$, and P_t and S_t are the aggregate monetary value of all purchases and sales executed during month t. For net returns, transaction costs paid during month t are subtracted from the aggregate monetary trading value (in the numerator). Realized returns per investor are annualized returns based on the geometric average of monthly returns. Volatility is computed as the standard deviation of monthly returns, and skewness refers to the skewness of monthly returns.

ment objectives and financial situation. Such items are usually covered in the IPSs used in portfolio management delegation. Hence, the MiFID Suitability questionnaire can arguably be viewed as a kind of regulated IPS that is required whenever a retail investor requests financial advice and/or portfolio management services. All retail investors in our sample completed the MiFID Suitability questionnaire to be granted free access to a financial tool that provides general information on stocks, analysts reports, and professional recommendations.[23] In practice, investors completed an online risk-return profile survey on their own with no help from a financial intermediary. Once the survey was fully completed, they were assigned a given investment profile, depending on their total score. No automated portfolio was created or proposed to investors, who were fully responsible for their trades.

Since the survey data do not report the date on which each investor completed the MiFID questionnaire, we assume that all investors in our sample did so in early 2008 (MiFID came into force in November 2007). As we focus on investors holding stocks over the entire 51-month period from January 2008 to March 2012, only two situations are possible. The investor either traded before 2008 or started trading in January 2008 at the very latest. Checking in our brokerage database that traces trading accounts back to January 2003, we find that all the investors had already traded before 2008 (i.e., none started trading only in January 2008). Among them, we identify a set of 2746 investors holding stocks over the two-year pre-sample period, that is, from January 2006 to December 2007. Consequently, we complement our trading data for these 2746 investors who were accustomed to trading and had considerable experience (covering at least 24 months) before completing the MiFID questionnaire. These additional trading data enable us to look at how these investors behaved and performed before they completed the MiFID questionnaire. We come back to this issue later in Table 4.

In this study, we focus on five key items included in the MiFID Suitability questionnaire: return objective, financial literacy, risk tolerance, annual net income, and investment horizon.[24] The return objective, the measure of interest in this paper, refers to "the annual yield investors expect on their investments." Investors had to select one level on a scale of 5, wherein level 1 corresponds to "a yield without any risk of capital loss," level 2 to "the inflation rate + 2 to 4% per year," level 3 to "the inflation rate + 5 to 7% per year," level 4 to "the inflation rate + 8 to 12% per year," and level 5 to "the inflation rate + more than 12% per year" (see Table A.1 in the appendix). Consistent with the IPS-like context, there is no negative value

[23] Over the period under scrutiny, the brokerage house that provided us with the data did not offer portfolio management delegation services.

[24] Note that we were involved in neither the design of the MiFID questionnaire nor the wording of the questions. The survey data at hand have strengths and weaknesses that are not further discussed here, as this is not the objective of this paper. Recent finance research shows that asking questions in terms of returns (as opposed to prices) can affect the level of returns but not necessarily the ranking across individuals (e.g., Glaser et al., 2019).

Table 2
Statistics about individual return objectives.

Return objective		# investors	% investors	# men	% men	# women	% women
Level 1	0%	289	7	255	7	34	9
Level 2	2 to 4% above inflation	597	14	537	14	60	16
Level 3	5 to 7% above inflation	1686	41	1530	41	156	41
Level 4	8 to 12% above inflation	1050	25	957	25	93	24
Level 5	+12% above inflation	518	12	478	13	40	10
	Total	4140	100	3757	100	383	100

This table reports the distribution of investors by return objective and gender. The return objective refers to the annual yield that investors expect on their investments (see Table A.1 in the appendix). Investors had to select one proposal on a scale of 5 levels, wherein level 1 corresponds to "a yield without any risk of capital loss," level 2 to "the inflation rate + 2 to 4% per year," level 3 to "the inflation rate + 5 to 7% per year," level 4 to "the inflation rate + 8 to 12% per year," and level 5 to "the inflation rate + more than 12% per year."

on the scale, and the lowest level corresponds to no risk of capital loss. This item in the MiFID Suitability questionnaire arguably intends to elicit the investor's return objective.

As explained in the introduction, the self-reported return objectives used in this paper are unique. They obviously differ from the individual portfolio return expectations that have been investigated in past research. To the best of our knowledge, the elicitation of investors' return expectations for their own portfolios almost always relies on a survey especially designed for the purpose of the study. Most of the time, participants in these bespoke surveys are repeatedly requested to provide numerical estimates (such as best-high-low estimates with a given confidence interval) of future returns on their investments for the coming months. Such estimates allow researchers to calculate numerical return expectations as well as implicit expected volatility (e.g., Weber et al., 2013; Merkle and Weber, 2014; Merkle, 2017; Merkle, 2020). In some cases, investors are asked to provide qualitative estimates and have to rate the returns that they expect from their own portfolios over the coming months on a seven-point Likert scale aiming to elicit individual perceptions or optimism (e.g., Hoffmann et al., 2013; Weber et al., 2013; Merkle and Weber, 2014; Hoffmann et al., 2015; Merkle et al., 2015; Merkle, 2020). In this paper, all investors in the sample were asked to select the annual return expected on their investments on the preset scale ranging from 0% to 12% above inflation. This task is less cognitively demanding than providing several numerical return estimates within a given confidence interval, as requested in the surveys eliciting return expectations. In addition, this task was one-shot since the MiFID questionnaire had to be completed only once and no regular updates were required during the sample period. This implies much less effort for investors than providing monthly or quarterly requests for return estimates. Furthermore, investors knew that their return selection would contribute to the determination of their risk-return profile (as in an IPS).

Table 2 provides the distribution of investors across return objectives. Among our investors, 41% (regardless of gender) selected an annual return of 5 to 7% above inflation, which suggests a nominal return ranging from 7 to 9% when inflation fluctuates by approximately 2%. Approximately 25% of investors reported annual returns of 8 to 12% above inflation. Approximately 12% of investors (13% among men and 10% among women) opted for more than 12% above inflation. At first glance, our sample of retail investors exhibits return objectives that are consistent overall with those reported in the Natixis 2016 Global Survey or the Schroders Global Investor Study 2020.

In the MiFID questionnaire, investors self-reported their knowledge of financial markets on a scale ranging from 0 (no knowledge) to 5 (very good knowledge). The details of this item are available in Table A.1 in the appendix. Since this item requires self-assessment, we refer to it as subjective financial literacy, as in Bellofatto et al., 2018.[25] Table 3 shows that the average investor in our sample displays high financial literacy, with a score of 3.36 (out of 5). Average financial literacy appears slightly higher among men than among women. The quartiles confirm this gender difference in investors' self-assessed financial literacy.

Investors also had to self-report their attitude toward risk on a scale ranging from 1 (high risk aversion) to 5 (high risk tolerance). The details of this item are provided in Table A.1 in the appendix. Since investors rated themselves on the scale, this item delivers a measure of subjective risk tolerance.[26] This item in the MiFID questionnaire aims at eliciting the investor's general predisposition toward financial risk, similarly to the risk tolerance measure in Hoffmann et al. (2013) and Hoffmann et al. (2015), although it relies on both a different question and a different scale. Table 3 shows that our average investor is risk tolerant, with a score of 3.92 (out of 5), with only minor differences between men and women.

[25] When measured with a set of questions addressing the fundamental concepts at the root of saving and investment decisions (i.e., compounding, inflation, and diversification), financial literacy is labeled *objective* because actual knowledge is revealed through correct answers. By contrast, *subjective* financial literacy relies on questions asking people to self-assess their financial knowledge and expertise. While the correlation between objective and subjective financial literacy may not be taken for granted (Lusardi and Mitchell, 2014), several contributions report a positive relationship between subjective financial literacy and the actual level of knowledge (e.g., Dorn and Huberman, 2005; van Rooij et al., 2011). These findings suggest that retail investors tend to have a relatively reliable perception of their own knowledge.

[26] For a review of how financial risk tolerance should be evaluated, see Grable (2017). Similar to financial literacy, risk tolerance is considered objective or subjective depending on how it is assessed. Any measure based on individuals rating themselves on a scale of risk tolerance is referred to as *subjective* risk tolerance. In contrast, *objective* risk tolerance refers to people's actual investment behavior.

Table 3
Statistics about subjective individual characteristics.

	Mean	Q1	Median	Q3
Panel A: **All investors**				
Financial literacy	3.36	3	3	4
Risk tolerance	3.92	4	4	5
Income	2.49	2	2	3
Horizon	3.57	3	4	5
Panel B: **Men**				
Financial literacy	3.38	3	4	4
Risk tolerance	3.92	4	4	5
Income	2.51	2	2	3
Horizon	3.58	3	4	5
Panel C: **Women**				
Financial literacy	3.17	2	3	4
Risk tolerance	3.86	3	4	5
Income	2.24	2	2	3
Horizon	3.47	3	3	5

This table reports descriptive statistics about subjective individual investor characteristics. Panel A is based on the full sample, while Panels B and C refer to men and women, respectively. We provide the cross-sectional mean, median, and lower and upper quartiles for all characteristics under scrutiny. Each is defined as an ordinal variable on a scale ranging from 1 (level 1) to 5 (level 5). With respect to financial literacy, investors were required to self-assess their knowledge of financial markets on a scale ranging from 0 (no knowledge – level 1) to 5 (very good knowledge – level 5). When considering risk tolerance, investors had to self-report their attitude toward risk on a scale ranging from 1 (high risk aversion – level 1) to 5 (high risk tolerance – level 5). For annual net income, investors had to select one of the five categories available: lower than € 20,000 (level 1), € 20,000-€ 40,000, € 40,000-€ 75,000, € 75,000-€ 150,000, and greater than € 150,000 (level 5). Regarding investment horizon, five proposals were available, from less than 2 years (shortest horizon – level 1) to more than 7 years (longest horizon – level 5). The details of all these items are reported in Tables A.1 and A.2, available in the appendix.

The last two items from the MiFID questionnaire are the annual net income and the investment horizon. The details of these items are available in Table A.2 in the appendix. For income, investors selected one of the five categories available: lower than € 20,000, € 20,000-€ 40,000, € 40,000-€ 75,000, € 75,000-€ 150,000, and greater than € 150,000. Table 3 reports an average income of 2.49, meaning that our average investor earns between € 20,000 and € 75,000 after tax per year. For the investment horizon, five proposals were available, from less than 2 years (shortest horizon) to more than 7 years (largest horizon). Table 3 shows that the average score for horizon is 3.57, which suggests that our average investor has an investment horizon of between 3 and 7 years.

Since both past returns and experience impact financial decision-making and behavior (e.g., Gervais and Odean, 2001; Griffin et al., 2006; Statman et al., 2006; Glaser and Weber, 2009; Hoffmann and Post, 2014; Hoffmann and Post, 2017), Panel A of Table 4 provides information about trading behavior and portfolio returns over the two-year presample period (i.e., from January 2006 to December 2007) for the subset of 2746 investors who were accustomed to trading and had acquired considerable experience (covering at least 24 months) before completing the MiFID questionnaire. No clear pattern emerges for either trade- or portfolio-based variables by return objective. Trading activity (in number of trades or monetary volume) fluctuates across the return objective levels without any specific trend. The results are similar for portfolio-based variables, which suggests considerable heterogeneity in past behavior across investors and return objective levels. For past returns, median realized gross returns tend to increase with the return objective. This increase is, however, not monotonic, despite the lowest median past realized return being associated with the lowest return objective. Regarding volatility and skewness of monthly portfolio returns, we also notice the absence of an obvious upward or downward trend.

Panel B of Table 4 refers to the behavior of the typical investor over the period from January 2008 to March 2012. Trade-based variables show that trading activity (in number of trades or monetary volume) increases with the return objective, although the increase is not monotonic. For portfolio-based variables, there is no clear pattern, which again suggests enormous heterogeneity in behavior across investors and return objectives. For portfolio returns, the median realized return tends to increase with the return objective. However, all the median realized returns are strongly negative. These poor returns are mostly due to the 2008 financial crisis and are consistent with the findings of Hoffmann et al. (2013) showing that

Table 4
Return objectives, portfolios and individual characteristics.

Return objective	Individual characteristics		Trade-based variables		Portfolio-based variables			Portfolio returns		
	Financial literacy	Risk tolerance	# trades	Volume	Size	Value	Turnover	Gross return	Volatility	Skewness
			Panel A: Presample period [January 2006–December 2007]							
Level 1			7	16,311	4.52	7022	0.19	−0.79	0.07	0.22
Level 2			6	17,068	4.52	6831	0.13	1.99	0.06	0.16
Level 3			8	20,181	4.75	7272	0.15	0.81	0.06	0.15
Level 4			7	15,019	4.58	6358	0.19	1.28	0.07	0.31
Level 5			7	18,739	3.71	5213	0.20	0.00	0.09	0.55
			Panel B: Sample period [January 2008–March 2012]							
Level 1	2	2	13	35,974	5.71	12,117	0.05	−12.65 (0.86)	0.09	−0.24
Level 2	3	4	11	33,432	5.61	16,273	0.04	−9.49 (4.10)	0.08	−0.31
Level 3	3	4	14	39,209	5.90	16,902	0.05	−9.80 (3.95)	0.08	−0.32
Level 4	4	4	17	51,867	5.62	17,162	0.06	−10.03 (3.13)	0.09	−0.28
Level 5	4	4	23	88,151	4.77	16,683	0.09	−9.62 (1.50)	0.10	−0.06

This table reports statistics for the typical investor (i.e., median investor) by the return objective. The latter refers to the annual yield that investors expect on their investments. Investors had to select one proposal on a 5-level scale, wherein level 1 corresponds to "a yield without any risk of capital loss," level 2 to "the inflation rate + 2 to 4% per year," level 3 to "the inflation rate + 5 to 7% per year," level 4 to "the inflation rate + 8 to 12% per year," and level 5 to "the inflation rate + more than 12% per year." Financial literacy refers to investor self-assessed knowledge of financial markets on a scale ranging from 0 (no knowledge – level 1) to 5 (very good knowledge – level 5). Risk tolerance refers to investor self-reported attitude toward risk on a scale ranging from 1 (high risk aversion – level 1) to 5 (high risk tolerance – level 5). # trades gives the total number of trades executed. Volume provides the total monetary volume traded (in €). Size gives the number of different stocks held in portfolio. Value refers to the end-of-month portfolio monetary value (in €). Turnover is the monthly average portfolio turnover, defined as the sum of all purchases and sales in a particular month divided by the average of the portfolio values at the beginning and the end of that month. Gross return refers to the annualized return based on the geometric average of monthly gross portfolio returns. Volatility is computed as the standard deviation of monthly portfolio gross returns, and skewness refers to the skewness of monthly portfolio gross returns. Panel A refers to the two-year presample period (January 2006–December 2007), while Panel B refers to the sample period (January 2008–March 2012). In Panel B, gross returns in brackets are computed over the period July 2009–March 2012 to exclude the 2008 financial crisis. The statistics in Panel A are computed across the 2746 investors who were accustomed to trading and had acquired considerable experience (covering at least 24 months) before completing the MiFID questionnaire. The statistics in Panel B are computed across the full sample of 4140 investors.

investors were hit hard by this crisis. Considering the median realized return outside this crisis period (reported in brackets), the typical investor achieves much better returns. These range from 0.86% for a level-1 return objective to 4.10% for a level-2 return objective. Both the volatility and the skewness of portfolio returns tend to slightly increase with the return objective. Although the increase is not monotonic, both the highest volatility and the highest skewness are associated with the highest return objective level.

Interestingly, Panel B of Table 4 also shows that the return objective level increases along with both financial literacy and risk tolerance.[27] The median score of financial literacy monotonically increases across return objective levels (from 2 for level 1 to 4 for level 5). This indicates that investors with higher subjective financial literacy declare higher return objectives. This pattern raises the question of whether return objectives are significantly related to financial literacy. We also observe some patterns regarding risk tolerance. The median score is 2 for a level-1 return objective and 4 for the other levels. Investors with the lowest subjective risk tolerance declare lower return objectives. Since investors self-report their financial literacy and risk tolerance along with their return objectives in the MiFID questionnaire, these subjective individual characteristics are used as control variables in Section 3.

3. Empirical study

3.1. Determinants of return objectives

Our first research question is to what extent individual past behavior and realized returns drive the return objectives self-reported by retail investors. Past returns and experience are well known to affect financial decision-making. Prior literature shows that past trading behavior and, in particular, past investment success or failure may significantly impact the future behavior of investors, depending on whether the experience bolsters or undermines overconfidence (e.g., Gervais and Odean, 2001; Griffin et al., 2006; Statman et al., 2006; Deaves et al., 2009; Glaser and Weber, 2009; Grinblatt and Keloharju, 2009). There is also empirical evidence that investors tend to extrapolate their recently experienced returns when updating their beliefs and preferences (e.g., Hoffmann et al., 2013; Hoffmann and Post, 2014; Hoffmann and Post, 2017; Merkle, 2017). In this growing body of literature, beliefs generally refer to return expectations and risk perceptions, while preferences are associated with risk tolerance. In this paper, we contribute to this stream of literature by examining a new facet of these two constructs, namely, individual return objectives. Since our data trace trading activity back to January 2003 for the subset

[27] The Spearman correlation between financial literacy and risk tolerance is 0.389. The Spearman correlation between the return objective and financial literacy (risk tolerance) is 0.265 (0.297).

of 2746 investors who had traded for at least two years before completing the MiFID questionnaire, we are able to check whether either their past behavior or their past returns are important determinants of their return objectives.

For this purpose, we estimate a multinomial ordered logit model wherein the dependent variable captures the level of return objective. This model is based on one underlying latent variable with a different match from the latent variable, Y_i^*, to the observed one (Y_i= 1, 2., 5), with $Y_i^* = x_i\beta + \epsilon_i$ and $Y_i = j$ if $\gamma_{j-1} < Y_i^* \leq \gamma_j$, for unknown γ_j with $\gamma_0 = -\infty$, $\gamma_1 = 0$, and $\gamma_5 = \infty$.[28] In this model, x_i is a vector of the k explanatory variables (excluding intercepts),[29] and β is a vector of k coefficients (excluding intercepts), so that we have in our baseline specification (Model 1):

$$\begin{aligned} cx_i\beta = {} & \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Language_i + \beta_4 Education_i \\ & + \beta_5 Return\_P2Y_i + \beta_6 Turnover\_P2Y_i + \beta_7 Ptf\_size\_P2Y_i + \beta_8 Experience_i \end{aligned} \tag{2}$$

In Eq. (2), the first set of four explanatory variables includes sociodemographic indicators that are usual control variables. $Gender_i$ is a dummy variable set to 1 if investor i is a man (and 0 otherwise). Age_i is the age of investor i at the end of 2008. $Language_i$ is a dummy variable set to 1 if investor i is Dutch speaking (and 0 otherwise). $Education_i$ refers to the level of education of investor i, which is set to 1 when investor i holds a university degree (and 0 otherwise). In the literature, gender, age and education are recognized as major drivers of financial decision-making (Barber and Odean, 2001; Bernasek and Shwiff, 2001; Ackert et al., 2002; Shum and Faig, 2006; Goetzmann and Kumar, 2008; Korniotis and Kumar, 2011; Charness and Gneezy, 2012; Hackethal et al., 2012). According to Grinblatt and Keloharju (2001), investor behavior is also affected by native language.

The second set of explanatory variables in Eq. (2) is intended to characterize investor experience and actual trading behavior during the period preceding the declaration of return objectives, that is, before January 2008. In particular, we include a measure of experience and three other variables built on either trading behavior or portfolio returns over the two-year presample period (i.e., from January 2006 to December 2007). Since there is empirical evidence that individual past returns influence investor behavior (Glaser and Weber, 2009) as well as beliefs and preferences (Hoffmann and Post, 2017), $Return\_P2Y_i$ refers to investor i's annualized monthly realized gross portfolio return computed over the period January 2006–December 2007. Similarly, building on past research, we characterize investor past behavior using portfolio turnover as a measure of trading intensity (Dorn and Huberman, 2005; Kumar and Lee, 2006; Goetzmann and Kumar, 2008; Hoffmann et al., 2013; Hoffmann and Post, 2017) as well as portfolio size as a proxy for diversification (Bellofatto et al., 2018; Dorn and Huberman, 2005; Goetzmann and Kumar, 2008). Specifically, $Turnover\_P2Y_i$ and $Ptf\_size\_P2Y_i$ measure investor i's monthly portfolio turnover and size over the last two years, respectively. The last behavioral variable captures investor trading experience, which is also known to affect behavior (Glaser and Weber, 2009; Nicolosi et al., 2009; Koestner et al., 2017). Accordingly, $Experience_i$ is a measure of investor i's trading experience, defined as the duration (in number of years) between the first trade and January 1, 2008.

Because the results might depend on the time window on which the aforementioned variables (except experience) are measured, we consider four other versions of the above logit model: Model 2, wherein realized returns, portfolio turnover and size are all computed over the last year before January 2008 (i.e., from January 2007 to December 2007); Model 3, wherein realized returns, portfolio turnover and size are all computed over the last six months before January 2008 (i.e., from July to December 2007); Model 4, wherein realized returns, portfolio turnover and size are all computed over the last three months before January 2008 (i.e., from October to December 2007);[30] and Model 5, wherein these variables are computed for the period from investor i's first trading month to December 2007. With these five models, we cover past behavior and returns at both long and short horizons.[31]

Individual subjective characteristics such as financial literacy and risk tolerance as self-reported in the MiFID questionnaire might also come into play in determining the return objective, as suggested in Table 4. Past research provides evidence that financial literacy contributes to explaining trading behavior (Balloch et al., 2014; Bellofatto et al., 2018; Graham et al., 2009; van Rooij et al., 2011). Furthermore, some prior studies show that including risk tolerance leads to a better understanding of the actual behavior of investors (Dorn and Huberman, 2005; Hoffmann et al., 2015). Therefore, we consider another specification of the above logit model wherein we include the other subjective individual characteristics declared in

[28] Consequently, the probability that alternative j is chosen is the probability that the latent variable Y_i^* is between two boundaries γ_{j-1} and γ_j.

[29] Intercepts are omitted for the sake of brevity.

[30] When computed over the recent past (i.e., over the six or the three months preceding January 2008), realized returns and portfolio turnover are both winsorized with a 1% cutoff. The potential impact of outliers is indeed more important at such short horizons.

[31] We check whether including a measure of investor risk-taking affects the results. To do so, we add the standard deviation of investor i's monthly portfolio returns over the last two years in Eq. (2). We consider investor risk-taking over only the last two years because the standard deviation requires the higher number of observations corresponding to this sample period. The findings show that (1) the coefficient estimate of this additional explanatory variable is not statistically significant and (2) all the other coefficient estimates are still very close to those reported in Tables 5 and 6, with their significance unaffected. This is consistent with the findings of Hoffmann and Post (2017), who find that investors' beliefs and preferences are not impacted by their risk experiences. These unreported results are available upon request.

the MiFID questionnaire as additional control variables. Extending Eq. (2), our second logit model specification (Model 6) is based on:

$$\begin{aligned} cx_i\beta = {} & \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Language_i + \beta_4 Education_i \\ & + \beta_5 Return\_P2Y_i + \beta_6 Turnover\_P2Y_i + \beta_7 Ptf\_size\_P2Y_i + \beta_8 Experience_i \\ & + \beta_9 High\_Income_i + \beta_{10} Medium\_Literacy_i + \beta_{11} High\_Literacy_i \\ & + \beta_{12} Med\_Risk\_Tolerance_i + \beta_{13} High\_Risk\_Tolerance_i + \beta_{14} LT\_Horizon_i \end{aligned} \quad (3)$$

Compared to Eq. (2), Eq. (3) includes a third set of explanatory variables based on self-reported individual characteristics. $Medium\_Literacy_i$ and $High\_Literacy_i$ are dummy variables characterizing investor i's financial literacy: $Medium\_Literacy_i$ is set to 1 when self-reported financial literacy is at the third or fourth level on the scale, while $High\_Literacy_i$ is set to 1 for investors who select the highest level (see Table 3). Similarly, to capture investor i's risk tolerance, we define two additional dummies: $Med\_Risk\_Tolerance_i$ equals 1 when investor i selects the third or fourth level on the scale (see Table 3), and $High\_Risk\_Tolerance_i$ is set to 1 for investors who choose the highest level (i.e., the highest risk tolerance). The last two explanatory variables are $High\_Income_i$ and $LT\_Horizon_i$. The former is a dummy variable that equals 1 when investor i declares an annual net income higher than € 40,000 (and 0 otherwise),[32] while the latter is another dummy set to 1 for investors who declare an investment horizon of at least three years.

Table 5 reports the coefficient estimates for the five versions of the baseline logit model (Eq. (2)). Regardless of the model considered, the results for the sociodemographic variables in Panel A indicate that higher return objectives are more likely for younger or French-speaking investors. Neither gender nor education display significant coefficient estimates. Our variables of interest in Panel B are never significant when computed over the largest time windows (i.e., over the two-year or one-year period preceding January 2008 or over the period from the investor's first trading month to December 2007). Only portfolio turnover in the recent past (i.e., when computed over the last six or three months before January 2008) is positively related to the return objective level at the 5% or the 1% level.[33] All things being equal, higher return objectives are reported by investors who traded a great deal over the six (or three) months preceding their completion of the MiFID questionnaire. Such a result indicating that recent turnover stands out in explaining individual return objectives is in line with the finding of Hoffmann and Post (2017), who report that turnover significantly impacts beliefs and preferences. However, while these authors also find a significant relationship between returns and beliefs (return expectations and risk perceptions), we do not find that past returns help better explain individual return objectives.

The results for the five versions of the extended logit model (Eq. (3)) are provided in Table 6. All the subjective individual variables in Panel C exhibit positive coefficient estimates that are significant at the 1% level (except for income). Both subjective financial literacy and subjective risk tolerance are strongly related to the return objective. All things being equal, investors with higher subjective financial literacy or with higher subjective risk tolerance declare higher return objectives. Investment horizon and income (to a lesser extent) are also positively related to the level of return objective. Moreover, Panel B shows that our behavioral variables and past portfolio returns are still never significant, except for portfolio turnover over the recent past. The latter again exhibits a positive coefficient estimate that is significant at the level of 5% or 1%. Regarding Panel A on sociodemographics, age and language are still negatively related to the return objective at the 1% level, as in Table 5. The only change relates to education, for which we notice a negative relationship with the return objective at the 10% significance level.

Since each model in Table 6 is an extension of its corresponding version in Table 5, we can compare the R^2 values and compute likelihood ratio tests for nested models. Both (available in Table 6) indicate that adding subjective individual characteristics significantly improves the explanatory power of the models. Hence, we conclude that return objectives are essentially driven by subjective individual characteristics (such as financial literacy and risk tolerance), some sociodemographic traits (age, education, and spoken language), and recent trading intensity (measured by portfolio turnover). Neither past returns nor past portfolio diversification (or experience) determine individual return objectives. This result corroborates the finding that retail investors learn poorly or slowly from their experiences (Gervais and Odean, 2001; Seru et al., 2010). Regarding realized returns, the most likely explanation for the results is the failure of retail investors to correctly assess their past realized stock portfolio returns (Glaser and Weber, 2007). If retail investors are not aware of their past realized returns, these are unlikely to affect investors' setting of their return objectives.[34]

As a side analysis, we investigate whether past behavior and realized returns are drivers of subjective financial literacy and risk tolerance. To do so, we estimate additional multinomial ordered logit models wherein the dependent variable captures either the level of financial literacy or the level of risk tolerance. For each dependent variable, we keep the same approach as above and estimate five versions of the model (based on Eq. (2)) to consider various horizons in the past. The results are available in the appendix, in Table A.3 for financial literacy and Table A.4 for risk tolerance. Regarding financial literacy, we find a positive relationship (at the 1% level) with gender, language, and education. This means that men, Dutch-speaking investors, and highly educated investors are more likely to declare a high level of knowledge. Among the ex-

[32] This corresponds to the median annual net income in the sample (see Table 3). The value € 40,000 is actually the upper bound of level 2 on the scale.

[33] The realized return over the last six months displays a positive but very small coefficient estimate that is significant at the 10% level.

[34] Liu and Palmer (2021) document that perceived past returns matter more than objective measures of past returns because they better predict investment decisions.

Table 5
Determinants of return objectives (1).

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Panel A: **Sociodemographic variables**					
Gender	0.187	0.189	0.180	0.177	0.188
Age	−0.026***	−0.026***	−0.026***	−0.026***	−0.026***
Language	−0.204***	−0.206***	−0.197***	−0.197***	−0.206***
Education	−0.004	−0.007	−0.001	0.007	−0.006
Panel B: **Behavioral variables & past returns**					
Return_P2Y	0.001				
Turnover_P2Y	0.000				
Ptf size_P2Y	0.033				
Return_P1Y		0.000			
Turnover_P1Y		0.000			
Ptf size_P1Y		0.039			
Return_P6M			0.000*		
Turnover_P6M			0.070**		
Ptf size_P6M			0.047		
Return_P3M				0.000	
Turnover_P3M				0.139***	
Ptf size_P3M				0.043	
Return_PallY					−0.001
Turnover_PallY					0.000
Ptf size_PallY					0.061
Experience	0.046	0.045	0.041	0.037	0.049
N	2746	2746	2746	2746	2746
McFadden pseudo-R^2	0.010	0.011	0.012	0.012	0.011

This table reports the coefficient estimates for five versions of a multinomial ordered logit model wherein the dependent variable captures the investor's level of return objective presented in Table 2. The set of explanatory variables consists of two panels. Panel A contains sociodemographic variables. *Gender* is a dummy variable set to 1 for men. *Age* is investor age at the end of 2008. *Language* is a dummy variable set to 1 for Dutch-speaking investors. *Education* refers to the level of education and is set to 1 for investors who hold a university degree. Panel B refers to behavioral variables and past returns computed over different periods. *Return_P2Y* refers to investor annualized monthly realized portfolio return computed over the period from January 2006 to December 2007. *Return_P1Y* refers to investor annualized monthly realized portfolio return computed over the period from January 2006 to December 2007. *Return_P6M* and *Return_P3M* refer to investor annualized monthly realized portfolio return computed over the period from July to December 2007 and the period from October to December 2007, respectively. *Return_PallY* refers to investor annualized monthly realized portfolio return computed over the period from the investor's first trading month to December 2007. Computed over the same five time periods for each investor, *Turnover_P2Y*, *Turnover_P1Y*, *Turnover_P6M*, *Turnover_P3M Turnover_PallY*, and *Ptf_size_P2Y*, *Ptf_size_P1Y*, *Ptf_size_P6M*, *Ptf_size_P3M Ptf_size_PallY* measure monthly portfolio turnover and size. When computed over the six or three months preceding January 2008, realized return and portfolio turnover are both winsorized with a 1% cutoff. *Experience* is a measure of investor trading experience, defined as the duration (in number of years) between the first trade and January 1, 2008. ***, **, and * indicate significance at 1%, 5% and 10%, respectively.

planatory variables characterizing past behavior, both portfolio size and experience display positive and strongly significant coefficient estimates. All things equal, investors who held more diversified portfolios or investors with more trading experience are more likely to report higher financial literacy. Overall, these results are consistent with the literature suggesting that retail investors have a relatively reliable perception of their own financial knowledge (Bellofatto et al., 2018; Dorn and Huberman, 2005; van Rooij et al., 2011). In Table A.4 on risk tolerance, sociodemographic traits do not exhibit significant coefficient estimates.[35] Similar to financial literacy, past portfolio size is positively related to the level of risk tolerance at both short and long horizons. This means that investors who hold more diversified portfolios are more likely to declare a high risk tolerance. They may be willing to bear more risk thanks to their more diversified (or larger) portfolios. Furthermore, portfolio turnover in the recent past displays a positive coefficient estimate that is significant at the 5% or the 1% level. All things being equal, investors trading more intensively over the last six or three months view themselves as more risk tolerant. This result is consistent with that of Hoffmann and Post (2017), who report a positive relationship between turnover and the level of risk tolerance.

[35] In their panel data analyses, Hoffmann and Post (2017) use individual fixed effects (instead of sociodemographic characteristics) when investigating the determinants of the level of risk tolerance. They include sociodemographic characteristics as explanatory variables only when they examine updates in risk tolerance. In this case, they do not find any significant relationship with gender, age, or experience. Their measure of risk tolerance reflects investors' general predisposition toward (like or dislike of) financial risk, as in Hoffmann et al. (2013).

Table 6
Determinants of return objectives (2).

Variable	Model 6	Model 7	Model 8	Model 9	Model 10
Panel A: **Sociodemographic variables**					
Gender	0.082	0.082	0.074	0.068	0.084
Age	−0.026***	−0.026***	−0.026***	−0.026***	−0.026***
Language	−0.306***	−0.309***	−0.302***	−0.302***	−0.306***
Education	−0.149*	−0.152*	−0.148*	−0.142*	−0.149*
Panel B: **Behavioral variables & past returns**					
Return_P2Y	0.000				
Turnover_P2Y	0.000				
Ptf size_P2Y	−0.041				
Return_P1Y		0.000			
Turnover_P1Y		0.000			
Ptf size_P1Y		−0.035			
Return_P6M			0.000		
Turnover_P6M			0.069**		
Ptf size_P6M			−0.033		
Return_P3M				0.000	
Turnover_P3M				0.130***	
Ptf size_P3M				−0.037	
Return_PallY					−0.000
Turnover_PallY					0.000
Ptf size_PallY					−0.020
Experience	−0.005	−0.006	−0.010	−0.014	−0.007
Panel C: **Subjective individual variables**					
High income	0.139*	0.140*	0.146*	0.149*	0.136*
Medium literacy	0.942***	0.942***	0.943***	0.940***	0.945***
High literacy	1.789***	1.791***	1.778***	1.774***	1.791***
Med risk tolerance	1.458***	1.452***	1.450***	1.447***	1.452***
High risk tolerance	2.095***	2.087***	2.081***	2.077***	2.090***
LT horizon	0.272***	0.278***	0.290***	0.298***	0.268***
N	2746	2746	2746	2746	2746
McFadden pseudo-R^2	0.062	0.062	0.063	0.063	0.062
LR Test	405.69***	404.85***	404.31***	405.74***	403.72***

This table reports the coefficient estimates for five versions of a multinomial ordered logit model wherein the dependent variable captures the investor's level of return objective presented in Table 2. The set of explanatory variables consists of three panels. Panel A contains sociodemographic variables. *Gender* is a dummy variable set to 1 for men. *Age* is investor age at the end of 2008. *Language* is a dummy variable set to 1 for Dutch-speaking investors. *Education* refers to the level of education and is set to 1 for investors who hold a university degree. Panel B refers to behavioral variables and past returns computed over different periods. *Return_P2Y* refers to investor annualized monthly realized portfolio return computed over the period from January 2006 to December 2007. *Return_P1Y* refers to investor annualized monthly realized portfolio return computed over the period from January 2006 to December 2007. *Return_P6M* and *Return_P3M* refer to investor annualized monthly realized portfolio return computed over the period from July to December 2007 and the period from October to December 2007, respectively. *Return_PallY* refers to investor annualized monthly realized portfolio return computed over the period from the investor's first trading month to December 2007. Computed over the same five time periods for each investor, *Turnover_P2Y*, *Turnover_P1Y*, *Turnover_P6M*, *Turnover_P3M Turnover_PallY*, and *Ptf_size_P2Y*, *Ptf_size_P1Y*, *Ptf_size_P6M*, *Ptf_size_P3M Ptf_size_PallY* measure monthly portfolio turnover and size. When computed over the six or three months preceding January 2008, realized return and portfolio turnover are both winsorized with a 1% cutoff. *Experience* is a measure of investor trading experience, defined as the duration (in number of years) between the first trade and January 1, 2008. Panel C refers to subjective individual variables. *High_income* is a dummy variable set to 1 for investors who declare an annual net income higher than € 40,000. *Medium_literacy* is a dummy variable set to 1 when investor self-reported financial literacy is at the third or fourth level on the scale, while *High_Literacy* is a dummy variable set to 1 for investors who select the highest level (see Table 3). Similarly, *Med_Risk_Tolerance* is a dummy variable set to 1 for investors who select the third or fourth level on the scale (see Table 3), and *High_Risk_Tolerance* is a dummy variable set to 1 for investors who choose the highest level of risk tolerance. *LT_Horizon* is a dummy variable set to 1 for investors who declare an investment horizon of at least three years. ***, **, and * indicate significance at 1%, 5% and 10%, respectively. LR test refers to the likelihood ratio test for nested models, wherein each model of this table is compared to its corresponding version in Table 5.

3.2. Return objectives versus actual performance

The psychology literature on goal-setting effects reveals that "specific, challenging" goals affect both performance and risk-taking (Locke and Latham, 1990; Heath et al., 1999; Larrick et al., 2009).[36] In particular, "specific, challenging" goals have a larger positive impact on performance and risk-taking than less challenging or "do your best" goals. Do retail investors with higher return objectives earn higher realized returns than those with lower return objectives? Retail investors who declare higher subjective financial literacy or higher subjective risk tolerance also report higher return objectives. Do they earn higher returns than their counterparts?

To address the above questions, we run an OLS regression (Regression 1), wherein the dependent variable captures, for each investor, the annualized monthly realized gross return over the period January 2008–March 2012, that is, after the completion of the MiFID questionnaire. To control for a large number of covariates, the set of explanatory variables includes all the variables used in Eq. (3), except the realized return. In addition, we add $N-1$ dummies (*Return_objective_L2*, *Return_objective_L3*, *Return_objective_L4*, and *Return_objective_L5*) to control for the return objective level (see Table 2). Each dummy is set to 1 only for investors who select the corresponding return objective level (i.e., *Return_objective_L2* is equal to one for investors who choose level 2 on the scale). We also include two additional portfolio-based variables to control for actual investor risk-taking: the standard deviation and skewness of monthly portfolio returns over the 51-month period (*STD_Return* and *Skewness_Return*, respectively). The former allows us to control for portfolio volatility (Hoffmann et al., 2013), while the latter is intended to control for gambling (i.e., skewness-seeking). Retail investors' attention is indeed well known to be attracted by lottery-like stocks, which are low-priced, high-idiosyncratic volatility and high-skewness stocks (Kumar, 2009; Han and Kumar, 2013). The desire for positive skewness can also impact diversification choices (Brunnermeier and Parker, 2005; Brunnermeier et al., 2007; Barberis and Huang, 2008). Furthermore, to exclude the detrimental impact of the 2008 financial crisis on individual returns (see Table 4), we replicate the model with the period July 2009–March 2012 (Regression 2).[37]

Table 7 reports the results for both OLS regression models.[38] Regression 1 provides results consistent with the extant literature for the sociodemographic characteristics (in Panel A) as well as for the behavioral and portfolio-based variables (in Panel C). Women and older investors as well as highly educated investors earn higher returns (Barber and Odean, 2001; Bellofatto et al., 2018). Realized returns significantly increase with portfolio size, consistent with portfolio concentration hurting returns (Goetzmann and Kumar, 2008; Von Gaudecker, 2015). Realized returns are also positively related to investor experience (Bellofatto et al., 2018; Hoffmann and Shefrin, 2014; Koestner et al., 2017) and the standard deviation (Bianchi, 2018) and skewness of monthly portfolio returns.

For the subjective variables in Panel B of Table 7, Regression 1 displays significant and positive coefficient estimates for the $N-1$ return objective levels. Compared to investors who select the benchmark level (no risk of capital loss, that is, 0%), investors with higher return objectives earn higher realized returns. This result provides support for the aforementioned goal-setting effects, meaning that more challenging return objectives lead to higher realized returns. In contrast with prior empirical evidence showing that less literate investors tend to exhibit lower portfolio performance (Bellofatto et al., 2018; Bianchi, 2018; Von Gaudecker, 2015), we do not find a significant relationship between financial literacy and realized returns. However, when estimating the model without the dummies related to the $N-1$ return objective levels, we do find that realized returns are higher for investors with the highest financial literacy (at the 10% significance level).[39] This suggests that return objectives and subjective financial literacy might act as substitutes, albeit imperfect ones (since they are not highly correlated).

Interestingly, Regression 1 in Table 7 also reveals a strong and negative relationship between realized returns and the highest risk tolerance. Empirical evidence on the relationship between subjective risk tolerance and realized returns is scarce in the literature.[40] To the best of our knowledge, the only paper that includes a measure of risk tolerance (referred to as risk appetite)[41] to explain realized returns is Hoffmann and Shefrin (2014). While they focus on how technical analysis impacts the portfolios of individual investors, these authors find a positive but weak relationship between realized returns and risk appetite. By contrast, our findings provide new insights indicating that investors who declare the highest risk tolerance achieve lower realized returns than other investors, all things being equal (including risk-taking that is controlled for with both the standard deviation and skewness of monthly portfolio returns).

When we restrict the analysis to the period July 2009–March 2012 (see Regression 2 in Table 7), the return objective level is no longer significant, while investors with the highest risk tolerance still exhibit significantly lower realized returns. For

[36] Heath et al. (1999) and Larrick et al. (2009) focus on "mere" goals, which are defined as specific levels of performance with no discrete and discontinuous payoff. According to Heath et al. (1999), risk-taking in situations wherein people have goals tied to discrete and discontinuous external rewards (e.g., a promotion or bonus) can be easily explained by basic economic calculations. By contrast, increased risk-taking in response to mere goals is a fundamental psychological phenomenon.

[37] In this case, both the dependent variable and the explanatory behavioral and portfolio-based variables are computed for the period under scrutiny.

[38] In both regressions, all the variance inflation factors (VIFs) are below 5, meaning that multicollinearity is not an issue.

[39] For the sake of brevity, this version of the model and its results are unreported in Table 7 but are available upon request.

[40] Previous studies mainly focus on the link between subjective risk aversion and actual risk-taking behavior (e.g., Dorn and Huberman, 2010; Ehm et al., 2014; Hoffmann et al., 2015; Hermansson, 2018).

[41] This variable is based on the investor's self-reported risk-taking tendency on a seven-point scale ranging from "I am a very conservative investor" to "I am a very speculative investor."

Table 7
Determinants of actual portfolio returns.

Variable	Regression 1	Regression 2
Panel A: **Sociodemographic variables**		
Gender	−1.816***	−2.098***
Age	0.035**	0.059***
Language	−0.564	0.185
Education	1.258**	1.783***
Panel B: **Subjective individual variables**		
Return objective L2	2.013*	1.471
Return objective L3	2.550**	1.596
Return objective L4	2.462**	1.167
Return objective L5	2.310*	1.853
High income	−0.065	0.178
Medium literacy	0.526	0.324
High literacy	1.738	1.642
Med risk tolerance	−1.360	−0.858
High risk tolerance	−3.033***	−2.592**
LT horizon	0.592	1.184*
Panel C: **Behavioral & portfolio-based variables**		
Turnover	−0.001	−0.001
Ptf size	3.489***	3.808***
Experience	0.453***	−0.110
STD_Return	3.643***	11.895***
Skewness_Return	2.547***	3.874***
N	4140	4111
R^2	0.176	0.338
Adjusted R^2	0.172	0.335

This table reports the coefficient estimates for OLS regressions, wherein the dependent variable is the investor's annualized monthly realized gross return. The first regression covers the period January 2008–March 2012, while the second one excludes the crisis period (i.e., July 2009–March 2012). The set of explanatory variables consists of three panels. Panel A contains sociodemographic variables. *Gender* is a dummy variable set to 1 for men. *Age* is investor age at the end of 2008. *Language* is a dummy variable set to 1 for Dutch-speaking investors. *Education* refers to the level of education, which is set to 1 for investors who hold a university degree. Panel B refers to subjective individual variables. *Return_objective_L2*, *Return_objective_L3*, *Return_objective_L4*, and *Return_objective_L5* are four dummy variables built on the return objective levels presented in Table 2. Each dummy is set to 1 only for investors who select the corresponding level of return objective (i.e., *Return_objective_L2* is equal to one for investors who choose level 2 on the scale). *High_Income* is a dummy variable set to 1 for investors who declare an annual net income higher than € 40,000. *Medium_Literacy* is a dummy variable set to 1 when investor self-reported financial literacy is at the third or fourth level on the scale, while *High_Literacy* is a dummy variable set to 1 for investors who select the highest level (see Table 3). Similarly, *Med_Risk_Tolerance* is a dummy variable set to 1 for investors who select the third or fourth level on the scale (see Table 3), and *High_Risk_Tolerance* is a dummy variable set to 1 for investors who choose the highest level of risk tolerance. *LT_Horizon* is a dummy variable set to 1 for investors who declare an investment horizon of at least three years. Panel C refers to behavioral and portfolio-based variables. *Turnover* and *Ptf_size* measure investor monthly portfolio turnover and size over the period under scrutiny. *Experience* is a measure of investor trading experience, defined as the number of years between the first trade and January 1, 2008. *STD_Return* and *Skewness_Return* are the standard deviation and the skewness of investor monthly portfolio returns computed over the period under scrutiny. ***, **, and * indicate significance at 1%, 5% and 10%, respectively. Standard errors are corrected for heteroskedasticity.

Table 8
Risk-adjusted performance across return objective levels.

Variable	Level 1	Level 2	Level 3	Level 4	Level 5
Panel A: **Over the entire sample period** (January 2008–March 2012)					
α	0.0044	0.0049	0.0007	0.0065*	0.0119**
MRP	0.9397***	0.9459***	0.8227***	0.8437***	0.8106***
Size	0.4587**	0.2475*	0.2002***	0.3616***	0.3441**
BM	0.2381	0.2407	0.3224***	0.2089	0.2855
MOM	−0.1921	−0.1158	−0.1904***	−0.1823*	−0.1647
N	289	597	1686	1050	518
R^2	0.007	0.006	0.008	0.005	0.005
Panel B:**Without the crisis period** (July 2009–March 2012)					
α	0.0056	0.0011	−0.0025	0.0043	0.0075
MRP	0.8187***	1.0592***	0.8201***	0.8533***	0.8268***
Size	0.4471	0.1914	0.3188***	0.5170**	0.4686
BM	0.2564	−0.1659	0.2625***	0.1251	0.1217
MOM	−0.0986	−0.3476	−0.1084***	−0.0735	−0.0834
N	289	597	1686	1050	518
R^2	0.001	0.003	0.007	0.001	0.001

This table reports the coefficient estimates for a panel data regression model wherein the dependent variable is the risk premium of the portfolio gross return of investor i in month t. The risk-free rate is the 10-year Belgian Treasury bond rate in month t. The set of explanatory variables includes the Fama–French–Carhart factors in month t for the European market, namely, market risk premium (*MRP*), size (*Size*), book-to-market (*BM*), and momentum (*MOM*). The model is estimated for each return objective level presented in Table 2. *N* gives the number of investors. Panel A provides the results when the model is estimated for the whole sample period (i.e., from January 2008 to March 2012). Panel B provides the results when the model is estimate without the crisis period (i.e., from July 2009 to March 2012). ***, **, and * indicate significance at 1%, 5% and 10%, respectively. Standard errors are clustered by month.

the other explanatory variables, Regression 2 displays consistent results with those of Regression 1, except for experience. Although experience seems positively related to realized returns over the entire sample period, this relationship is no longer significant when the crisis period is disregarded. As expected, Regression 2 (without the crisis) exhibits stronger explanatory power than Regression 1 (with the crisis), which suggests that the turbulent market conditions of that period introduce some noise into the estimations.

Our previous results provide empirical evidence of a positive link between individual return objectives and realized gross returns over the entire sample period with controls for a large set of covariates, including portfolio turnover and actual risk-taking. However, since realized gross returns do not control for differences in investment risk, we further consider investor risk-adjusted performance using the Fama–French–Carhart four-factor model as in Hoffmann and Shefrin (2014).[42] For this purpose, we estimate the following panel data model to compare performance across return objective levels while controlling for exposure to market, size, book-to-market, and momentum factors:

$$r_{i,t} - R_{Ft} = \alpha + \beta_1 MRP_t + \beta_2 Size_t + \beta_3 BM_t + \beta_4 MOM_t + \epsilon_{i,t} \quad (4)$$

In Eq. (4), the dependent variable is the risk premium of the portfolio gross return of investor i in month t ($r_{i,t}$). The risk-free rate is the 10-year Belgian Treasury bond rate in month t (R_{Ft}). The set of explanatory variables includes the Fama–French–Carhart factors in month t for the European market, namely, market risk premium (MRP_t), size ($Size_t$), book-to-market (BM_t), and momentum (MOM_t).[43] When estimating this panel data regression model, we cluster standard errors by month, similarly to Bhattacharya et al. (2017).[44] For each level of return objective, we estimate this model twice, that is, over the period January 2008–March 2012 (with the crisis) and over the period July 2009–March 2012 (without the crisis).

The results are reported in Table 8.[45] They show that over the entire sample period (see Panel A), investors with the two highest levels of return objective (i.e., levels 4 and 5) outperform when we control for the usual market factors. For these investors, we obtain a positive and statistically significant alpha (at the 10% level for investors at level 4 and at the 5% level for investors at level 5). This means that their realized returns over this 51-month period are not merely compensation for risk.[46] By contrast, the alphas are never significant for the lower levels of return objective. Nevertheless, no alphas are

[42] Barber and Odean (2000) and Shu et al. (2004), for their part, use the Fama-French three-factor model, while Koestner et al. (2017) focuses on Jensen's alpha based on a single-factor model.

[43] Market factors for the European market are provided by Eurofidai (http://www.eurofidai.org).

[44] The main objective is to address potential issues due to cross-sectional correlation (Seasholes and Zhu, 2010).

[45] We also estimate the panel data model by investor. Next, we calculate the average coefficient estimates for each level of return objective and check whether they statistically differ from zero. The results (available upon request) are overall consistent with those reported here.

[46] We also estimate the model using the portfolio returns net of transaction costs. The results still show a positive and statistically significant alpha (at the 5% level) for investors who declare the highest level of return objective. These unreported results are available upon request.

significant when the crisis period is disregarded (see Panel B). These findings based on risk-adjusted performance are overall in line with the results obtained for realized gross returns. We can also note that Panel A of Table 8 displays positive and significant coefficient estimates on the market and size factors, consistent with the tilt toward small stocks documented in Barber and Odean (2000).

3.3. Return objective – actual performance gap

The last research question addressed in this paper is whether retail investors are able to achieve their return objectives. To assess this capability, we build on Merkle (2017), who uses the difference between the expected[47] and realized portfolio return as an empirical measure of overconfidence. Unlike this author, whose main objective is to construct measures capturing the three types of overconfidence (i.e., overestimation, overplacement, and overprecision) and analyze their short-term dynamic interactions with trading behavior,[48] we are interested in measuring the gap, that is, the distance between the investor's return objective declared in the MiFID questionnaire and the actual gross realized return. This gap primarily delivers relevant information about the investor's capacity to achieve his or her return objective. The lower the gap, the more able the investor is to match his or her return objective (or even surpass it when the gap is negative). Hence, we can also see the gap as providing indirect information about the investor's ability to declare a realistic return objective. From this perspective, a positive (negative) gap may suggest either overconfidence (underconfidence) in one's own skills or overoptimism (overpessimism) about the future. Our purpose here is to identify the main determinants of this gap within our large set of covariates.[49] Intuitively, the gap is expected to be higher for investors with higher return objectives than for their counterparts who select the benchmark level (no risk of capital loss, that is, 0%).

We compute the gap for each investor as the difference between his or her self-reported return objective and annualized monthly realized gross return over the period January 2008–March 2012. Since each return objective level is defined with a range of values (see Table 2), we use the floor of each range to measure the gap. Next, we estimate two OLS regression models wherein the dependent variable captures, for each investor, this divergence from the return objective. As in Section 3.2, we still control for a large set of covariates, which consists of sociodemographic traits, subjective individual variables, and behavioral and portfolio-based variables. The first model (Regression 1) is estimated for the whole sample period, while the second model (Regression 2) excludes the crisis period.

Table 9 reports the results for the aforementioned regressions.[50] The findings are consistent overall with those provided in Table 7, although their interpretations differ slightly. In Panel B, the coefficient estimates for the three highest levels of return objective (i.e., equal to or above 5% plus inflation) are all positive and statistically significant. These coefficient estimates even monotonically increase and become more significant along the levels. This confirms that the divergence from the return objective is significantly higher for investors who report higher return objectives. Put differently, the capacity to reach the return objective decreases as the level of return objective increases. Moreover, we find no significant relationship with subjective financial literacy or risk tolerance, except again for investors with the highest level of risk tolerance. The ability to achieve the return objective is significantly lower for investors who declare the highest risk tolerance. This is not surprising since we previously found that these investors earn worse realized returns than other investors. These results still hold when we exclude the crisis period in Regression 2. Again, the latter displays the strongest explanatory power because it does not cover the crisis period.

Additionally, consistent with the findings reported in Section 3.2, the divergence from the return objective decreases with age, education, portfolio size, experience, and portfolio risk (measured by both the standard deviation and skewness of monthly returns). In other words, all things being equal (including the return objective level), the investors most likely to achieve or surpass their return objectives are older investors, highly educated investors, investors with more diversified portfolios, and investors who hold riskier portfolios. Of particular interest is that our results show that women come significantly closer to their return objectives. Since we find that (1) women earn higher realized returns than men and (2) gender is not a significant determinant of individual return objectives, we conclude that women are better at setting more realistic return objectives. This result is consistent with the literature documenting that men are more prone to overconfidence (Barber and Odean, 2001).

4. Conclusion

We investigate the determinants of retail investors' declared return objectives as well as their capacity to achieve those objectives. We also examine whether retail investors with higher return objectives perform better than other investors. The return objectives used in this paper are self-reported in the MiFID Suitability questionnaire. This is an online risk-return profile survey wherein each investor is requested to select the level of return that he or she expects on his or her

[47] This author relies on quarterly return expectations and risk perceptions regarding the UK stock market and individual portfolios. In practice, participants were repeatedly asked to provide three estimates (best-high-low) of the returns that would accrue by the end of the next three months.

[48] For a comprehensive review of the literature on overconfidence, its different types, and its dynamics in investment behavior, please refer directly to Merkle (2017).

[49] This is another difference from Merkle (2017), whose approach mainly consists of using the various measures of overconfidence to explain some aspects of trading behavior.

[50] In both regressions, all the VIFs are below 5, meaning that multicollinearity is not an issue.

Table 9
Determinants of the divergence from the return objective.

Variable	Regression 1	Regression 2
Panel A: **Sociodemographic variables**		
Gender	1.816***	2.098***
Age	−0.035**	−0.059***
Language	0.564	−0.185
Education	−1.258**	−1.783***
Panel B: **Subjective individual variables**		
Return objective L2	−0.013	0.529
Return objective L3	2.450**	3.404***
Return objective L4	5.538***	6.833***
Return objective L5	9.690***	10.147***
High income	0.065	−0.178
Medium literacy	−0.526	−0.324
High literacy	−1.738	−1.642
Med risk tolerance	1.360	0.858
High risk tolerance	3.033***	2.592**
LT horizon	−0.592	−1.184*
Panel C: **Behavioral & portfolio-based variables**		
Turnover	0.001	0.001
Ptf size	−3.489***	−3.808***
Experience	−0.453***	0.110
STD_Return	−3.643***	−11.895***
Skewness_Return	−2.547***	−3.874***
N	4140	4111
R^2	0.205	0.353
Adjusted R^2	0.201	0.350

This table reports the coefficient estimates for OLS regressions wherein the dependent variable captures, for each investor, the gap between his or her self-reported return objective and his or her annualized monthly realized gross return after completion of the MiFID questionnaire. The first regression covers the period January 2008–March 2012, while the second one excludes the crisis period (i.e., July 2009–March 2012). The set of explanatory variables consists of three panels. Panel A contains sociodemographic variables. *Gender* is a dummy variable set to 1 for men. *Age* is investor age at the end of 2008. *Language* is a dummy variable set to 1 for Dutch-speaking investors. *Education* refers to the level of education and is set to 1 for investors who hold a university degree. Panel B refers to subjective individual variables. *Return_objective_L*2, *Return_objective_L*3, *Return_objective_L*4, and *Return_objective_L*5 are four dummy variables built on the levels of return objective presented in Table 2. Each dummy is set to one only for investors who select the corresponding level of return objective (i.e., *Return_objective_L*2 is equal to one for investors who chose level 2 on the scale). *High_Income* is a dummy variable set to 1 for investors who declare an annual net income higher than € 40,000. *Medium_Literacy* is a dummy variable set to 1 when investor self-reported financial literacy is at the third or fourth level on the scale, while *High_Literacy* is a dummy variable set to 1 for investors who select the highest level (see Table 3). Similarly, *Med_Risk_Tolerance* is a dummy variable set to 1 for investors who select the third or fourth level on the scale (see Table 3), and *High_Risk_Tolerance* is a dummy variable set to 1 for investors who choose the highest level of risk tolerance. *LT_Horizon* is a dummy variable set to 1 for investors who declare an investment horizon of at least three years. Panel C refers to behavioral and portfolio-based variables. *Turnover* and *Ptf_size* measure investor monthly portfolio turnover and size over the period under scrutiny. *Experience* is a measure of investor trading experience, defined as the duration (in number of years) between the first trade and January 1, 2008. *STD_Return* and *Skewness_Return* are the standard deviation and the skewness of investor monthly portfolio returns computed over the period under scrutiny. ***, **, and * indicate significance at 1%, 5% and 10%, respectively. Standard errors are corrected for heteroskedasticity.

investments. The selected return is arguably a goal or an outcome toward which the investor is assumed to strive when making investment decisions. The availability of data on individual return objectives allows us to contribute to the body of literature on the beliefs and preferences of retail investors.

To address our research questions, we combine detailed trading data with sociodemographic and individual subjective characteristics for a large set of 4140 retail investors holding stocks over the period January 2008–March 2012 after completing the MiFID questionnaire. For the subset of 2746 investors who had traded for at least two years before declaring their return objectives, our brokerage database enables us to trace their trading activity back to January 2003. These additional data give us the opportunity to look at how these investors behaved and performed in the past, that is, before declaring their return objectives.

To analyze whether either past behavior or experienced returns are important determinants of individual return objectives, we use multinomial logit models wherein the dependent variable captures the level of return objective. These models allow us to control for a large set of covariates, including sociodemographic traits (gender, age, spoken language, and education), subjective individual characteristics (financial literacy, risk tolerance, income, and investment horizon), and trade- and portfolio-based variables (realized gross return, portfolio turnover and size, and experience). The latter are computed over various time windows before January 2008 to characterize investor past behavior and realized returns at both long and short horizons. Our results show that past realized returns are never a significant driver of individual return objectives. The most plausible explanation for this finding is the failure of retail investors to correctly assess their past realized portfolio returns (Glaser and Weber, 2007). Regarding past behavior, only portfolio turnover in the recent past is positively related to the return objective level. This finding is in line with the results of Hoffmann and Post (2017), who show that turnover carries some power in explaining beliefs and preferences. For the other covariates, investors with higher financial literacy or higher risk tolerance declare higher return objectives. Higher return objectives are also more likely for high-income investors, investors with longer investment horizons, younger investors, French-speaking investors, and highly educated investors. We conclude that return objectives are essentially driven by subjective individual characteristics (such as financial literacy and risk tolerance), some sociodemographic characteristics (age, education, and spoken language), and recent trading intensity. Neither past realized returns nor past portfolio diversification (or experience) help explain individual return objectives.

To check whether higher return objectives are related to higher actual returns, we run OLS regressions that allow us to control for a large set of covariates including the level of return objective. We find that investors with higher return objectives earn higher realized gross returns than investors who want to avoid any risk of capital loss. This result provides support for the goal-setting effects documented in the psychology literature, namely, the phenomenon whereby setting more challenging goals lead to higher performance than setting less challenging or "do your best" goals (Locke and Latham, 1990; Heath et al., 1999; Larrick et al., 2009). Interestingly, we also find a strong negative relationship between portfolio realized returns and the highest level of subjective risk tolerance. This provides new insights indicating that investors who declare the highest risk tolerance achieve lower returns than their counterparts, all things being equal (including actual risk-taking). Moreover, consistent with the literature, our findings show that realized returns significantly increase with age, education, portfolio size, investor experience, and actual risk-taking. We also find that women earn higher realized returns. When we restrict the analysis to the period July 2009–March 2012 to exclude the impact of the 2008 financial crisis, the results are still qualitatively similar, except for those for the level of return objective and experience, which are no longer significant. When we further compare risk-adjusted performance across levels of return objective using a panel data model controlling for the usual market factors, we confirm that the investors who declare the highest return objectives outperform over the entire sample period. Unlike other groups, these investors exhibit a positive and statistically significant alpha, meaning their realized returns over the 51-month period are not merely compensation for risk. This alpha is, however, no longer significant when the crisis period is disregarded.

Another important contribution of this paper is to assess whether retail investors can achieve their return objectives. To address this issue, we measure, for each investor, the divergence from his or her return objective as an indicator of capacity to achieve this objective. This gap also provides indirect information about the investor's ability to declare a realistic return objective. Accordingly, a positive (negative) gap may suggest either overconfidence (underconfidence) in one's own skills or overoptimism (overpessimism) about the future. Using regression models allowing us to control for a large set of covariates, we show that the gap is significantly higher for investors with higher return objectives. In other words, the investor's ability to achieve the return objective decreases as the level of return objective increases. In addition, we provide evidence that the ability to achieve the return objective is significantly lower for investors who declare the highest risk tolerance. This is consistent with our previous results revealing that these investors earn lower realized returns than other investors. We also find that the divergence from the return objective decreases with age, education, portfolio size, trading experience, and actual risk-taking. All these findings still hold when we exclude the crisis period. Finally, it is also worth noting that women come significantly closer to their return objectives than men, all things else being equal. Since we previously found that gender is not a significant determinant of the level of return objective and that women achieve higher realized returns than men, we conclude that women are better at setting more realistic return objectives. This might further confirm that women are less prone to overconfidence than men (Barber and Odean, 2001).

Overall, we provide innovative evidence that return objectives are mainly explained by individual characteristics. Our findings also show that in addition to actual behavior, some of these individual characteristics significantly help explain actual performance and the capacity to achieve these objectives. This empirical evidence offers new insights into how perceptions and beliefs affect financial decision-making. For policy makers, investment firms and brokers, this paper shows

that MiFID questionnaires carry relevant and valuable information, helping us better understand retail investors' return objectives and actual behavior. This further confirms the usefulness of MiFID questionnaires in the risk-return profiling of retail investors. In particular, our results reveal that a simple question regarding subjective risk tolerance contributes to providing a significantly better understanding of investors' return objectives and performance. MiFID data are relevant and therefore deserve more attention.

Our empirical results also point to the very high return objectives declared by retail investors. Although higher return objectives are associated with higher performance, some retail investors fail to achieve these objectives. Our findings about the capacity to achieve the return objectives provide relevant insights for investment firms and brokers, whose role is to warn clients who set unrealistic goals. Again, some of the individual characteristics available in the MiFID questionnaire might be very helpful for identifying the investors who are the least likely to achieve their return objectives. More broadly, all our results offer support for any recommendations advising practitioners to elicit their clients' beliefs and preferences to provide them with corrective feedback when needed.

As a potential limitation of our empirical work, we note that our sample period starts in January 2008, when the MiFID questionnaires are assumed to have been completed. Ignoring the accurate date at which each questionnaire was completed might be seen as a shortcoming of our study. Moreover, our MiFID data were collected through a one-shot questionnaire, and no updates were made during the 51-month period under scrutiny. Return objectives, subjective financial literacy and risk tolerance were self-reported once by investors and are therefore considered stable over the whole period. This is another shortcoming of this study since these individual characteristics might evolve over time, as some other beliefs and preferences do. Some retail investors in our sample were hit very hard by the 2008 financial crisis, which might have impacted their subjective risk tolerance (Hoffmann et al., 2013) and/or their subjective financial literacy (Hoffmann and Post, 2014).

This paper paves the way for further research on individual return objectives. First, future research should examine whether our main findings can be generalized across time, especially in noncrisis periods. Investigating whether there is substantial variation in return objectives would be of particular interest. In addition, future research could consider more heterogeneous samples of investors to deal with multiasset portfolios (instead of only stock holdings) or very short-term investors (such as day traders).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

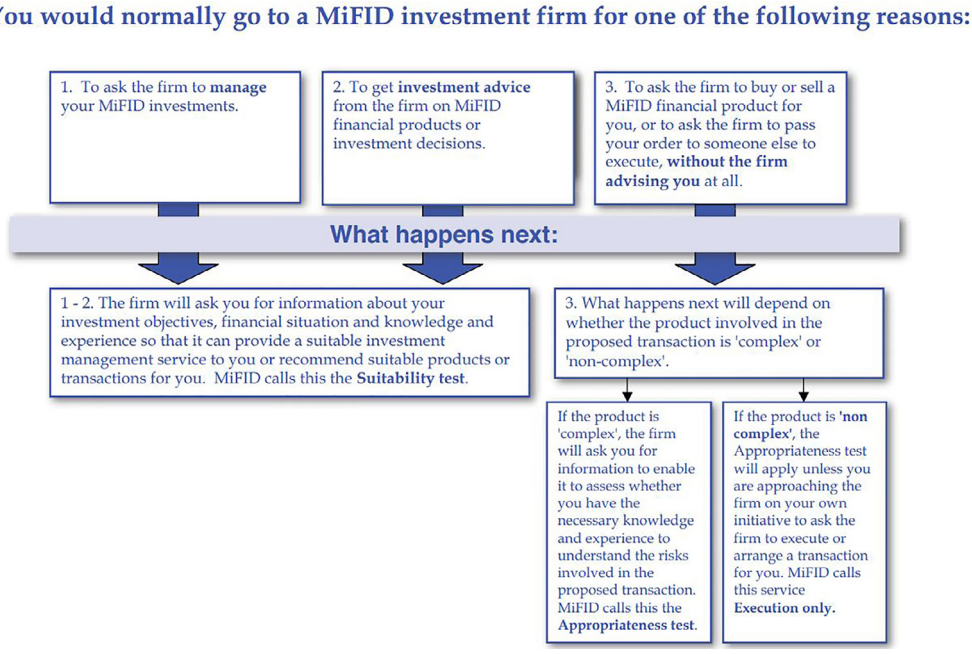

Fig. A.1. MiFID services. This figure exhibits the three types of services regulated under MiFID and the information that retail investors need to provide accordingly. Source: Committee of European Securities Regulators (2008).

Table A.1
Items from the MiFID Suitability questionnaire – Part 1.

(Return objective) Taking into account the current interest rates, what is the yield you expect of your investments?	
Level 1	A yield without any risk of capital loss
Level 2	The inflation rate increased with 2 to 4% per year
Level 3	The inflation rate increased with 5 to 7% per year
Level 4	The inflation rate increased with 8 to 12% per year
Level 5	The inflation rate increased with more than 12% per year
(Financial literacy) What is your knowledge of the financial markets?	
Level 1	I know very little about it and I am not really interested in it.
Level 2	I am not familiar with investments, but I am interested in it.
Level 3	I have sufficient experience to acknowledge the importance of risk diversification.
Level 4	I have a good knowledge of the financial markets. I am aware that the financial markets can strongly fluctuate, that sector and asset categories have different characteristics regarding revenue, growth and risk profile.
Level 5	I consider myself as an experienced investor who thoroughly masters all the aspects of the financial markets.
(Risk tolerance) What would you do if you noticed that 6 months after having invested, this investment (in line with the market situation), shows a drop of 20%?	
Level 1	A total disaster! The security of my investments is my most important criterion. I do not want to take any risks!
Level 2	You will sell at a loss and transfer the money in safer investments.
Level 3	You are anxious but will not move until the situation improves.
Level 4	This was a calculated risk. You leave your investments as they are and will wait until the situation improves.
Level 5	You take advantage of the market situation (low prices) to invest even more. By doing so you reduce your average buy price.

This table reports the details on some questions in the MiFID Suitability test. These questions aim to elicit the investor's return objective, financial literacy, and risk tolerance.

Table A.2
Items from the MiFID Suitability questionnaire – Part 2.

(Income) What is your total annual net income (all income sources taken into account)?	
Level 1	Less than € 20,000
Level 2	€ 20,000 up to € 40,000
Level 3	€ 40,000 up to € 75,000
Level 4	€ 75,000 up to € 150,000
Level 5	More than € 150,000
(Horizon) During how many years can you manage without the amount you will invest?	
Level 1	Less than 2 years
Level 2	Between 2 and 3 years
Level 3	Between 3 and 5 years
Level 4	Between 5 and 7 years
Level 5	More than 7 years

This table reports the details for some questions in the MiFID Suitability test. These questions aim to elicit the investor's annual net income and investment horizon.

Table A.3
Determinants of financial literacy.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Panel A: **Sociodemographic variables**					
Gender	0.649***	0.656***	0.650***	0.647***	0.643***
Age	−0.002	−0.002	−0.001	−0.001	−0.002
Language	0.358***	0.359***	0.364***	0.362***	0.355***
Education	0.597***	0.598***	0.601***	0.606***	0.596***
Panel B: **Behavioral variables & past returns**					
Return_P2Y	0.001				
Turnover_P2Y	−0.000				
Ptf size_P2Y	0.230***				
Return_P1Y		−0.000			

(*continued on next page*)

Table A.3 (*continued*)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Turnover_P1Y		−0.000			
Ptf size_P1Y		0.209***			
Return_P6M			0.000		
Turnover_P6M			0.018		
Ptf size_P6M			0.195***		
Return_P3M				−0.000	
Turnover_P3M				0.090	
Ptf size_P3M				0.179***	
Return_PallY					0.000
Turnover_PallY					−0.001
Ptf size_PallY					0.249***
Experience	0.132***	0.134***	0.131***	0.127***	0.147***
N	2746	2746	2746	2746	2746
McFadden pseudo-R^2	0.025	0.024	0.023	0.023	0.025

This table reports the coefficient estimates for five versions of a multinomial ordered logit model wherein the dependent variable captures the investor's level of financial literacy presented in Table 3. The set of explanatory variables consists of two panels. Panel A contains sociodemographic variables. *Gender* is a dummy variable set to 1 for men. *Age* is investor age at the end of the year 2008. *Language* is a dummy variable set to 1 for Dutch-speaking investors. *Education* refers to the level of education, which is set to 1 for investors who hold a university degree. Panel B refers to behavioral variables and past returns computed over different periods. *Return_P2Y* refers to investor monthly realized portfolio performance computed over the period from January 2006 to December 2007. *Return_P1Y* refers to investor monthly realized portfolio performance computed over the period from January 2006 to December 2007. *Return_P6M* and *Return_P3M* refers to investor monthly realized portfolio performance computed over the period from July to December 2007 and the period from October to December 2007, respectively. *Return_PallY* refers to investor monthly realized portfolio performance computed over the period from the investor's first trading month to December 2007. Computed over the same five time periods for each investor, *Turnover_P2Y*, *Turnover_P1Y*, *Turnover_P6M*, *Turnover_P3M Turnover_PallY*, and *Ptf_size_P2Y*, *Ptf_size_P1Y*, *Ptf_size_P6M*, *Ptf_size_P3M Ptf_size_PallY* measure monthly portfolio turnover and size, respectively. When computed over the six or three months preceding January 2008, realized performance and portfolio turnover are both winsorized with a 1% cutoff. *Experience* is a measure of investor trading experience, defined as the duration (in number of years) between the first trade and January 1, 2008. ***, **, and * indicate significance at 1%, 5% and 10%, respectively.

Table A.4
Determinants of risk tolerance.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Panel A: **Sociodemographic variables**					
Gender	0.028	0.034	0.031	0.033	0.028
Age	−0.002	−0.002	−0.002	−0.003	−0.002
Language	0.040	0.036	0.039	0.036	0.036
Education	0.053	0.050	0.050	0.060	0.051
Panel B: **Behavioral variables & past returns**					
Return_P2Y	0.001				
Turnover_P2Y	0.001				
Ptf size_P2Y	0.114**				
Return_P1Y		0.000*			
Turnover_P1Y		0.000			
Ptf size_P1Y		0.119***			
Return_P6M			0.000*		
Turnover_P6M			0.066**		
Ptf size_P6M			0.137***		
Return_P3M				0.00003	
Turnover_P3M				0.144***	
Ptf size_P3M				0.149***	
Return_PallY					0.000
Turnover_PallY					0.001
Ptf size_PallY					0.132***
Experience	0.058	0.058	0.056	0.051	0.065*
N	2746	2746	2746	2746	2746
McFadden pseudo-R^2	0.003	0.004	0.004	0.004	0.003

This table reports the coefficient estimates for five versions of a multinomial ordered logit model, wherein the dependent variable captures the investor's level of risk tolerance presented in Table 3. The set of explanatory variables consists of two panels. Panel A contains sociodemographic variables. *Gender* is a dummy variable set to 1 for men. *Age* is investor age at the end of 2008. *Language* is a dummy variable set to 1 for Dutch-speaking investors. *Education* refers to the level of education and is set to 1 for investors who hold a university degree. Panel B refers to behavioral variables and past returns computed over different periods. *Return_P2Y* refers to investor monthly realized portfolio performance computed over the period from January 2006 to December 2007. *Return_P1Y* refers to investor monthly realized portfolio performance computed over the period from January 2006 to December 2007. *Return_P6M* and *Return_P3M* refers to investor monthly realized portfolio performance computed over the period from July to December 2007 and the period from October to December 2007, respectively. *Return_PallY* refers to investor monthly realized portfolio performance computed over the period from the investor's first trading month to December 2007. Computed over the same five time periods for each investor, *Turnover_P2Y*, *Turnover_P1Y*, *Turnover_P6M*, *Turnover_P3M Turnover_PallY*, and *Ptf_size_P2Y*, *Ptf_size_P1Y*, *Ptf_size_P6M*, *Ptf_size_P3M Ptf_size_PallY* measure monthly portfolio turnover and size. When computed over the six or three months preceding January 2008, realized performance and portfolio turnover are both winsorized with a 1% cutoff. *Experience* is a measure of investor trading experience, defined as the duration (in number of years) between the first trade and January 1, 2008. ***, **, and * indicate significance at 1%, 5% and 10%, respectively.

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