DO RETAIL INVESTORS BITE OFF MORE THAN THEY CAN CHEW? A CLOSE LOOK AT THEIR RETURN OBJECTIVES

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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 information self-reported by retail investors in a risk-return profiling survey, we investigate the determinants of individual return objectives as well as the capacity of investors to reach 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 sociodemographics (age, education), as well as recent past trading intensity. Retail investors with higher return objectives perform better, compared to their counterparts who want to avoid any risk of capital loss. The capacity to reach the return objective however decreases as the level of return objectives increases.

Keywords: Return objectives, Risk tolerance, Financial literacy, Retail investors, MiFID

JEL Classification: G11, G40

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1 Introduction

The 2016 Global Survey of Individual Investors published by Natixis Global Asset Management offers an overview of the expectations of 7,100 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, the respondents in the 2020 Schroders Global Investor Study² answered they expect an average annual total return of 10.92% over the next five years, which is 1.02% higher than what was reported two years ago. Despite some significant differences across countries, Schroders' conclusion is unambiguous: people are overoptimistic.

Broadly speaking, return objectives are key information that investment firms are used to rely on for portfolio management services. Such a best practice has become mandatory in the EU member states since the implementation of MiFID³ in November 2017. This piece of regulation has made compulsory for investment firms to collect specific information about their retail clients' needs and preferences through the so-called MiFID questionnaires (or MiFID tests). Specifically, return objectives have to be elicited in the MiFID Suitability questionnaire, which is required for any retail investor who asks for financial advice and/or portfolio management services.⁴

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

²The 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 people 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.

³MiFID stands for the Markets in Financial Instruments Directive. MiFID I (2004/39/EC) is known as the first version of this directive, while a review of it was implemented in January 2018 (known as MiFID II (2014/65/UE)). 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).

⁴Retail investors who ask for execution only, must complete the Appropriateness test when they want to trade “complex” instruments. This specific test aims at ensuring that the investor has the necessary experience and knowledge to understand the risks involved in “complex” financial instruments before investing. Appropriateness is a lighter form of suitability. The Appropriateness test is sometimes part of the Suitability questionnaire.

The purpose of this questionnaire is to ensure that the instruments and services offered by the investment firm meet the investor’s knowledge and experience, his/her investment objectives as well as his/her financial capacity. Because such items are usually covered in Investment Policy Statements (IPS) used in portfolio management delegation, the MiFID Suitability questionnaire can arguably be viewed as a kind of regulated IPS.⁵

To what extent individual past behavior and realized returns drive the return objectives declared by retail investors in the MiFID questionnaire? Do retail investors with higher return objectives earn higher realized returns than their counterparts? Are retail investors able to reach their return objectives? Combining hard and soft data, we address these three research questions in this paper.

Our primary dataset consists of the trading accounts of 4,140 retail investors who hold stocks over the period January 2008-March 2012. In addition, we have matched individual characteristics that are either sociodemographic or survey-based. 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 the investors who were used to trade before completing the MiFID questionnaire. In particular, these additional trading data enable us to look at how a subset of 2,746 investors behaved and performed over the two-year pre-sample period, i.e., from January 2006 to December 2007. One of the strengths of this paper is 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, in 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. On the one hand, saving motives have

⁵An Investment Policy Statement (IPS) is “a document drafted between a portfolio manager and a client that outlines general rules for the manager. This statement provides the general investment goals and objectives of a client and describes the strategies that the manager should employ to meet these objectives” (Investopedia). The following items are primordial for an IPS: goals and objectives, fears and concerns, investment time frame, expected outside mortality, retirement time frame, short-term financial needs, risk tolerance attitudes, and risk capacity (Boone and Lubitz, 2004).

a positive impact on the likelihood of saving regularly (Fisher and Montalto, 2010). On the other hand, speculative motives lead to higher turnover and riskier portfolios (Hoffmann and Shefrin, 2014). However, whether individuals who share the same investment motives differ in their return objectives remains unclear.

In this paper, we know for each retail investor in the sample what is the return objective he/she self-reported in the MiFID questionnaire.⁶ Practically speaking, this questionnaire is an online risk-return profiling survey that investors fill in on their own, without any financial intermediary. This survey contains one specific item about “the annual yield investors expect on their investments”,⁷ 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 available scale⁸ and the lowest level corresponds to no risk of capital loss, that is 0%. This item arguably intends to elicit to the investor’s “return objective”.

The self-reported return objectives used in this paper are unique. They differ from the “return expectations” that have been investigated in the 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.⁹ By contrast, the return objective is conceptually linked to the investor’s own portfolio or total investments (i.e., in that sense, 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 a specific survey, almost especially designed for the purpose of the study. Most of the time, the participants in the bespoke survey must repeatedly provide

⁶Over the period under scrutiny, the brokerage house that provided us with the data did not offer portfolio management delegation services. All the retail investors in our sample completed the MiFID Suitability questionnaire to be granted with free access to a financial tool on stocks. More information are available in Section 2.

⁷We 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.

⁸This would make no sense for an investor to declare a negative return objective in the risk-return profiling survey (i.e., to make investment decisions with the purpose of losing money).

⁹Some 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)).

numerical estimates (like best-high-low estimates, with a given confidence interval) of future returns on their investments for the next months, which allows 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 they expect from their own portfolios over the next months on a seven-point Likert scale aiming 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)).¹⁰ In this paper, both the piece of information collected and the context differ. As mentioned earlier, all the investors in the sample were asked to select the annual return they expect on their investments on the preset scale ranging from 0% to 12% above inflation. This one-shot task requires much less effort, compared to the repeated request for several estimates for the next few months. Of utmost importance too, investors knew that this information contributes to the determination of their risk-return profile (like in an IPS).¹¹ This return objective is arguably seen as a goal or an outcome towards which the investor strives (or is supposed to strive) when making investment decisions.

Our contribution to the literature is threefold in this paper. First, we contribute to the growing body of empirical evidence about 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 as beliefs (Hoffmann et al., 2013; Hoffmann and Post, 2017) while preferences are rather associated with risk tolerance (Hoffmann et al., 2013; Hoffmann and Shefrin, 2014; Hoffmann and Post, 2017). In this paper, we examine a new facet, that is individual return objectives. Since our data trace trading activity back for the subset of 2,746 investors who were used to trade 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

¹⁰For example, in Merkle et al. (2015), investors are surveyed about their required portfolio returns for being happy or unhappy, and after their realization, for a rating of these returns on a seven-point scale from 'Extremely bad' to 'Extremely good'. In comparison, Hoffmann et al. (2015) use another seven-point scale reflecting how optimistic investors are about their investment portfolios and their returns in the upcoming month.

¹¹Once 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.

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 psychological literature (Locke and Latham, 1990; Heath et al., 1999; Larrick et al., 2009). Third, measuring the gap, i.e., distance, between the investor’s return objective declared in the MiFID questionnaire and the actual gross realized return he/she achieves afterwards, we investigate whether retail investors are able to reach their return objectives. In particular, we identify the main determinants of this gap among a large set of covariates including sociodemographics, individual subjective characteristics as well as 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, compared to 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.¹² This sample is not representative of retail investors.¹³ For instance, Merkle (2017) reports an average number of different securities held in portfolio close to 16 (with a median of 12) as well as an average portfolio value of £314,663 (with a median of £41,687). Such values are obviously high, and not consistent with the underdiversification well-documented in the literature about retail investors. In most empirical studies, the typical retail investor holds between 3 and 7 stocks in portfolio (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 sociodemographics such as education and age (e.g., Calvet et al. (2009), Dhar and Zhu (2006)). In this paper, we rely on a sample 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

¹²The survey, which was conducted in cooperation with Barclays Wealth, took place every three months from September 2008 to December 2010. Among the total of 617 investors, 394 participated multiple times. The minimum number of observations is 130 for each of the nine rounds (Merkle, 2017).

¹³As Merkle and Weber (2014) explicitly mention, “our 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”.

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 that combines brokerage records of 1,376 clients of the largest discount broker of the Netherlands with matching monthly questionnaire data that were 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 any selection bias.

Beyond the return objectives at the core of this paper, we use other items available in the MiFID questionnaire, namely, subjective financial literacy, subjective risk tolerance, level of annual net income, and length of investment horizon. These subjective individual characteristics self-reported by investors are valuable control variables, which are complementary to the usual sociodemographics and other trade-based and portfolio-based variables characterizing investor actual behavior. By relating such self-reported information to past behavior as well as to actual behavior after the completion of the MiFID questionnaire, our empirical work overall contributes to the literature addressing the capacity of questionnaires to contribute to a better understanding of 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 both past behavior and 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 level of return objectives. Neither past realized returns nor past portfolio diversification (or experience) determine individual return objectives. This is valid whatever the time window used to characterize investor past behavior and returns, i.e., on both long and short horizons. Our large set of covariates reveals that higher return objectives are more likely for investors with higher financial literacy, investors with higher risk tolerance, high income investors, investors with longer investment horizon, younger investors, French-speaking investors, and high education investors. Consequently, return objectives are mainly related to subjective individual characteristics (such as financial literacy and risk tolerance), some sociodemographics (age, education, spoken language), as well as recent trading intensity. These findings support that retail investors poorly or slowly learn from their experiences (Gervais and Odean, 2001; Seru et al., 2010). They 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 to control for the level of return objectives, we find that investors with higher return objectives earn higher realized returns, compared to their counterparts who want to avoid any risk of capital loss. This provides empirical evidence for the aforementioned goal-setting effects, i.e., more challenging return objectives lead to higher realized returns. Besides, our results provide new insights indicating that the investors who declare the highest risk tolerance achieve lower returns than their counterparts. Consistent with past research, we also show that 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 levels of return objectives with a panel data model that allows us to control for exposure to market, size, book-to-market, and momentum factors, we confirm that the 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 reach their return objectives, we measure the gap from the return objective and show that this gap is significantly higher for investors with higher return objectives. In other words, the capacity to reach the return objective decreases as the level of return objectives increases. We also provide evidence that the ability to reach the return objective is significantly lower for the investors who declare the highest risk tolerance, which is consistent with the lower realized returns they achieve. The gap from the return objective also decreases with age, education, portfolio size, experience, and actual risk-taking. Women fall also significantly closer to their return objectives than men, suggesting that women are better at setting more realistic return objectives. Such a 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 4,140 retail investors who hold stocks – and only stocks – over the entire sample period from January 2008 to March 2012, i.e., 51 months. We focus on investors who only trade common stocks because their portfolio returns are perfectly equal to their actual realized returns.¹⁴ Hence, for these investors, we can directly compare realized portfolio returns to the return objectives declared in the MiFID questionnaire.¹⁵ Moreover, our investors hold at least one stock in each month of the full sample period. By construction, we disregard short-lived investors who could execute only a few trades or/and hold stocks for a few months. This filter makes comparisons of investor realized returns more meaningful.¹⁶ Our retail investors are long-lasting investors who always have some exposure to market risk, even during the 2008 financial crisis.

For each investor, we have detailed trading records (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 prices¹⁷ 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

¹⁴When investors also invest in other assets (such as bonds, mutual funds, or derivatives), obtaining the corresponding historical market asset prices is often difficult, although the latter are necessary to compute investor realized aggregate portfolio returns.

¹⁵In an unreported robustness check, we extend the sample to include investors who hold stocks over the entire sample period but also invest in other assets such as funds and options. This extension leads to adding more sophisticated individuals in the sample since they are more likely to be active participants in the derivatives markets (Hsiao and Tsai, 2018). We replicate all our analyses on this extended sample of 6,662 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 they earn on their aggregate trading activities. These unreported findings are available upon request.

¹⁶Comparing realized returns achieved by long-lasting investors to those obtained by short-lived investors (who hold stocks either from time to time or over only a few months) would introduce noise because of a lot of monthly portfolio returns equal to zero.

¹⁷We collect historical prices from either Eurofidai for European stocks (www.eurofidai.org) or Bloomberg for US stocks and non-European stocks.

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:

$$R_t = \frac{EMV_t - EMV_{t-1} - P_t + S_t}{EMV_{t-1} + P_t} \quad (1)$$

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.¹⁸ 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. Medians and quartiles, however, exhibit lower values, suggesting that the sample counts some large investors who drive means upward. Panel B of Table 1 reports that our average investor holds a seven-stock portfolio (five-stock portfolio for the median investor). The average end-of-month portfolio value is €55,144 (with a median value of approximately €16,539). Compared to what is 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 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 turnover¹⁹ is high (4.02), while the corresponding median is low (0.05).

¹⁸ Most of the trading activity in our sample pertains to Belgian stocks, US stocks, and French and Dutch stocks. This feature is due to the small size of the Belgian stock market (i.e., approximately 150 stocks are listed on the Euronext Brussels Stock Exchange in comparison with more than 4,000 domestic companies listed in the US).

¹⁹The monthly portfolio turnover is calculated as in Hoffmann et al. (2013), i.e., the sum of all the purchases and sales in a particular month, divided by the average of the portfolio values at the beginning and the end of this particular month. It turns out that the average portfolio value can sometimes be very small, which can lead to extreme values for turnover. Therefore, the 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.

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). Such results are not surprising since our sample period includes the 2008 financial crisis, meaning that most investors are likely to have been hit hard by this crisis (Hoffmann et al., 2013).

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 €)	8,647	210	885	3,197
Panel B : Portfolio-based variables				
Portfolio size (#stocks)	7.66	3.04	5.61	9.96
Portfolio value (in €)	55,114	5,702	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 either as 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 the purchases and sales in a particular month divided by the average of the portfolio values at the beginning and the end of this particular month. Panel C provides statistics about portfolio returns, which are 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.

In addition to trading and portfolio data, we use matched individual data that we classify

as either sociodemographic or survey-based. Sociodemographics encompass gender, age, level of education, and spoken language. Our sample counts 383 females (i.e., 9.25%), and the average (median) investor is 48 (47) years old in 2008. Three levels of education are available: no degree, secondary school/high school degree, and university degree (or equivalent). The majority of our retail investors (2,896, i.e., 70%) have the highest level of education. As far as spoken language is concerned, Belgium has three official languages (French, Dutch and German), among which French and Dutch are spoken the most.²⁰ Our sample consists of 2,553 Dutch-speaking and 1,587 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 piece of 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, their investment objectives and their financial capacity. Such items are usually covered in IPS used in portfolio management delegation. Hence, the MiFID Suitability questionnaire can arguably be viewed as a kind of regulated IPS that is required when any retail investor asks for financial advice and/or portfolio management services. All the retail investors in our sample completed the MiFID Suitability questionnaire to be granted with free access to a financial tool on stocks, which provides them with general information on stocks, analysts reports, and professional recommendations.²¹ In practice, investors filled in an online risk-return profiling survey on their own, without any 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 in charge of their trades.

Since the survey data do not report the date at which each investor completed the MiFID questionnaire, we assume that all the investors in our sample did so in early 2008 (MiFID came into force in November 2007). As we focus on investors who hold stocks over the entire 51-month

²⁰Nevertheless, our retail investors had to choose from the three languages available on the online trading platform: French, Dutch or English.

²¹Over the period under scrutiny, the brokerage house that provided us with the data did not offer portfolio management delegation services.

period from January 2008 to March 2012, only two situations are possible. Either the investor already traded before 2008 or he/she 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 already traded before 2008 (i.e., none just started trading in January 2008). Among them, we identify a set of 2,746 investors who hold stocks over the two-year pre-sample period, i.e., from January 2006 to December 2007. Consequently, we complement our trading data for these 2,746 investors who were used to trade and have acquired enough experience (24 months at least) before completing the MiFID questionnaire. These additional trading data enable us to look at how these investors behaved and performed in the past, i.e., before the completion of the MiFID questionnaire. We will come back to this later with 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.²² The return objective, which is of particular 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 appendix). Consistent with the IPS-like context, there is no negative value on the available scale and the lowest level corresponds to no risk of capital loss. This item in the MiFID Suitability questionnaire arguably intends to elicit to 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 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 always relies on a survey almost especially designed for the purpose of the study. Most of the time, the participants in the bespoke survey are repeatedly requested to provide numerical estimates (like best-high-low estimates, with a given confidence

²²It is noteworthy that we were involved neither in the design of the MiFID questionnaire nor in the wording of the questions. The survey data at hand have strengths and weaknesses that are not further discussed in the paper. 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)).

interval) of future returns on their investments for the next months. Such estimates allow 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 they expect from their own portfolios over the next months on a seven-point Likert scale aiming at eliciting 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, both the piece of information collected and the context differ. As mentioned earlier, all the investors in the sample were asked to select the annual return they expect on their investments on the preset scale ranging from 0% to 12% above inflation. This one-shot task requires much less effort, compared to the repeated request for several estimates for the next few months. Furthermore, investors knew that this information contributes to the determination of their risk-return profile (like in an IPS). This return objective is therefore seen as a goal or an outcome towards which the investor strives (or is supposed to strive) when making investment decisions.

Table 2 provides the distribution of investors across return objectives. Of 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 around 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 overall consistent with those reported in the 2016 Natixis Global Survey or the 2020 Schroders Global Investor Study.

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	1,686	41	1,530	41	156	41
Level 4	8 to 12% above inflation	1,050	25	957	25	93	24
Level 5	+12% above inflation	518	12	478	13	40	10
Total		4,140	100	3,757	100	383	100

This table reports the distribution of investors depending on their return objectives, with a distinction between men and women. The return objective refers to the annual yield investors expect on their investments (see Table A.1 in 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'.

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 appendix. Since this item requires self-assessment, we refer to it as subjective financial literacy as in Bellofatto et al. (2018).²³ Table 3 shows that the average investor in our sample displays high financial literacy, with a score of 3.36 (out of 5). The average financial literacy appears slightly higher among men than among women. Regardless of gender, the quartiles reveal that investors consider themselves financially literate.

Investors also had to self-report their attitude towards 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 appendix. Since investors rated themselves on the available scale, this item delivers a measure of

²³When 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 as *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 literacy may not be taken for granted (Lusardi and Mitchell, 2014), several contributions report a positive relationship between subjective literacy and the actual level of knowledge (e.g., Dorn and Huberman (2005), van Rooij et al. (2011)). Such findings suggest that retail investors tend to have a relatively reliable perception of their knowledge.

subjective risk tolerance.²⁴ This item in the MiFID questionnaire aims at eliciting the investor’s general predisposition toward financial risk as 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.

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 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 larger 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 declares an investment horizon between 3 and 7 years.

²⁴For a review of how financial risk tolerance should be evaluated, see Grable (2017). Like for 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, lower and upper quartiles for all the 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 towards 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 larger 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 (largest horizon - level 5). The details of all these items are reported in Tables A.1 and A.2 available in appendix.

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 : Pre-Sample period [January 2006-December 2007]										
Level 1			7	16,311	4.52	7,022	0.19	-0.79	0.07	0.22
Level 2			6	17,068	4.52	6,831	0.13	1.99	0.06	0.16
Level 3			8	20,181	4.75	7,272	0.15	0.81	0.06	0.15
Level 4			7	15,019	4.58	6,358	0.19	1.28	0.07	0.31
Level 5			7	18,739	3.71	5,213	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) depending on the return objective. The latter refers to the annual yield 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 towards 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 the purchases and sales in a particular month divided by the average of the portfolio values at the beginning and the end of this particular 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 pre-sample 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. Statistics in Panel A are computed across the 2,746 investors who were used to trade and have acquired enough experience (24 months at least) before completing the MiFID questionnaire. Statistics in Panel B are computed across the full sample of 4,140 investors.

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 pre-sample period (i.e., from January 2006 to December 2007) for the subset of 2,746 investors who were used to trade and have acquired enough experience (24 months at least) before completing the MiFID questionnaire. No clear pattern emerges for both trade-based and portfolio-based variables depending on return objectives. Trading activity (in number of trades or in monetary volume) fluctuates across the levels of return objectives without any specific trend. It is pretty similar for portfolio-based variables, which suggests considerable heterogeneity in past behavior across investors and levels of return objectives. For past returns, the median realized gross returns tend to increase with return objectives. This increase is however not monotonic, despite the lowest median past realized return is associated with the lowest level of return objectives. 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 sample period, i.e., from January 2008 to March 2012. Trade-based variables show that trading activity (in number of trades or in monetary volume) increases with return objectives, although the increase is not monotonic. For portfolio-based variables, there is no clear pattern, which suggests again huge heterogeneity in behavior across investors and return objectives. For portfolio returns, the median realized return tends to increase with the level of return objectives. However, all the median realized returns are strongly negative. Such poor returns are mostly due to the 2008 financial crisis and are consistent with the findings of Hoffmann et al. (2013) showing that investors were hit hard by this crisis. When considering the median realized returns outside this crisis period (reported in brackets), the typical investor achieve much better returns. The latter range from 0.86% for level 1 of return objectives to 4.10% for level 2 of return objectives. Both the volatility and the skewness of portfolio returns tend to slightly increase with return objectives. Although the increase is not monotonic, both the highest volatility and the highest skewness are associated with the highest level of return objectives.

Interestingly, Panel B of Table 4 also shows that the level of return objectives increases

along with both financial literacy and risk tolerance.²⁵ The median score of financial literacy monotonically increases across levels of return objectives (from 2 for level 1 to 4 for level 5). This indicates that investors with higher subjective 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 level 1 of return objectives 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. The 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 it 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)). On the other hand, 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, that is individual return objectives. Since our data trace trading activity back to January 2003 for the subset of 2,746 investors who were used to trade for at least two years before completing the MiFID questionnaire, we are able to check whether both their past behavior and their past returns are important determinants of their return objectives.

²⁵The Spearman correlation between financial literacy and risk tolerance is 0.389. The Spearman correlation between return objectives and financial literacy (risk tolerance) is 0.265 (0.297).

For that purpose, we estimate a multinomial ordered logit model wherein the dependent variable captures the level of return objectives. This model is based on one underlying latent variable with a different match from the latent variable, Y_i^* , to the observed one ($Y_i = 1, 2, \dots, 5$), 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 $\gamma_5 = \infty$.²⁶ In this model, x_i is a vector of the k explanatory variables (excluding intercepts),²⁷ and β is a vector of k coefficients (excluding intercepts), so that we have in our baseline specification (Model 1):

$$x_i\beta = \beta_1\textit{Gender}_i + \beta_2\textit{Age}_i + \beta_3\textit{Language}_i + \beta_4\textit{Education}_i + \beta_5\textit{Return_P2Y}_i + \beta_6\textit{Turnover_P2Y}_i + \beta_7\textit{Ptf_size_P2Y}_i + \beta_8\textit{Experience}_i \quad (2)$$

In Equation 2, the first set of four explanatory variables includes sociodemographics that are usual control variables. $\textit{Gender}_i$ is a dummy variable set to 1 if investor i is a man (and 0 otherwise). $\textit{Age}_i$ is the age of investor i at the end of 2008. $\textit{Language}_i$ is a dummy variable set to 1 if investor i is Dutch speaking (and 0 otherwise). $\textit{Education}_i$ refers to the level of education of investor i , 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 Equation 2 is intended to characterize investor experience and actual trading behavior during the period that precedes the declaration of return objectives, i.e., 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 pre-sample 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), $\textit{Return_P2Y}_i$ 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

²⁶ 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 .

²⁷Intercepts are omitted for the sake of brevity.

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 (Dorn and Huberman, 2005; Goetzmann and Kumar, 2008; Bellofatto et al., 2018). 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, which is defined as the duration (in number of years) between the first trade and the 1st of January 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: the second one (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), the third one (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), the fourth one (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),²⁸ and the last one (Model 5), wherein these variables are computed on the period going from investor i 's first trading month to December 2007. With these five models, we cover past behavior and returns on both long and short horizons.²⁹

Individual subjective characteristics such as financial literacy and risk tolerance self-reported

²⁸When 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 on such short horizons.

²⁹We 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 Equation 2. We only consider investor risk-taking over the last two years because the standard deviation requires enough observations. 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 being unaffected. This is consistent with 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.

in the MiFID questionnaire along with the return objective might also come into play as suggested in Table 4. Past research provides evidence that financial literacy contributes to explain trading behavior (Graham et al., 2009; van Rooij et al., 2011; Balloch et al., 2014; Bellofatto et al., 2018). On the other hand, 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 the MiFID questionnaire as additional control variables. Extending Equation 2, our second logit model specification (Model 6) is based on:

$$\begin{aligned}
x_i\beta = & \beta_1\textit{Gender}_i + \beta_2\textit{Age}_i + \beta_3\textit{Language}_i + \beta_4\textit{Education}_i \\
& + \beta_5\textit{Return_P2Y}_i + \beta_6\textit{Turnover_P2Y}_i + \beta_7\textit{Ptf_size_P2Y}_i + \beta_8\textit{Experience}_i \\
& + \beta_9\textit{High_Income}_i + \beta_{10}\textit{Medium_Literacy}_i + \beta_{11}\textit{High_Literacy}_i + \\
& \beta_{12}\textit{Med_Risk_Tolerance}_i + \beta_{13}\textit{High_Risk_Tolerance}_i + \beta_{14}\textit{LT_Horizon}_i
\end{aligned} \tag{3}$$

Compared to Equation 2, Equation 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 (see Table 3): *Medium_Literacy_i* is set to 1 when self-reported literacy falls in the third or fourth level on the scale, while *High_Literacy_i* is set to 1 for investors who selected the highest level. Similarly, to capture investor *i*'s risk tolerance, we define two additional dummies: *Med_Risk_Tolerance_i* equals 1 when investor *i* selected the third or fourth level on the scale (see Table 3), and *High_Risk_Tolerance_i* is set to 1 for investors who chose 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),³⁰ 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 sociodemographic variables in Panel A indicate that higher return objectives are more likely for younger investors or French-speaking investors.

³⁰This corresponds to the median level of annual net income in the sample (see Table 3). €40,000 is actually the upper bound of level 2 on the scale.

Neither gender nor education display significant coefficient estimates. As for our variables of interest in Panel B, they are never significant when computed over the largest time windows (i.e., over the two-year or the one-year period preceding January 2008, or over the period going from the investor’s first trading month to December 2007). Only portfolio turnover over the recent past (i.e., when computed over the last six or three months before January 2008) is positively related to the level of return objectives at the 5% or the 1% level.³¹ All things being equal, higher return objectives are reported by the investors who have been trading a lot over the six (or three) months that precede the completion of the MiFID questionnaire. Such a result indicating that recent turnover stands out to explain individual return objectives is in line with 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 literacy and subjective risk tolerance are strongly related to return objectives. All things being equal, investors with higher subjective 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 objectives. 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 exhibits again a positive coefficient estimate that is significant at the level of 5% or 1%. Regarding Panel A devoted to sociodemographics, age and language are still negatively related to return objectives at the 1% level as in Table 5. The only change refers to education, for which we notice a negative relationship with return objectives at the 10% significance level.

Since each model in Table 6 is an extension of its corresponding version in Table 5, we can compare R^2 and compute Likelihood Ratio tests for nested models. Both (available in Table 6) indicate that adding subjective individual characteristics significantly improve the explanatory power of the models. Hence, we conclude that return objectives are essentially driven by

³¹Realized return over the last six months displays a positive but very small coefficient estimate significant at the 10% level.

subjective individual characteristics (such as financial literacy and risk tolerance), some sociodemographics (age, education, spoken language), as well as recent trading intensity (measured by portfolio turnover). Neither past returns nor past portfolio diversification (or experience) determine individual return objectives. This finding support that retail investors poorly or slowly learn from their experiences (Gervais and Odean, 2001; Seru et al., 2010). Regarding realized returns, the most likely reason is the failure of retail investors to correctly assess their past realized stock portfolio returns (Glaser and Weber, 2007), i.e., if they are not aware of their past realized returns, the latter are unlikely to affect them when setting their return objectives.³²

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 other 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 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 high education investors are more likely to declare a high level of knowledge. Among the explanatory variables characterizing past behavior, both portfolio size and experience display positive and strongly significant coefficient estimates. All things being equal, the investors who held more diversified portfolios or the investors who had more trading experience are more likely to report a higher financial literacy. Overall, these results are consistent with the literature suggesting that retail investors have a relatively reliable perception of their financial knowledge (Dorn and Huberman, 2005; van Rooij et al., 2011; Bellofatto et al., 2018). In Table A.4 devoted to risk tolerance, sociodemographics do not exhibit significant coefficient estimates.³³ Like for financial

³²Liu and Palmer (2021) document that perceived past returns matter more than objective measures of past returns because they better predict investment decisions.

³³In their panel data analyses, Hoffmann and Post (2017) use individual fixed effects (instead of sociodemographics) when investigating the determinants of the level of risk tolerance. They only include sociodemographics as explanatory variables when they examine updates in risk tolerance. In that case, they do not find any significant relationship with gender, age, and experience. Their measure of risk tolerance reflects investors' general predisposition (like or dislike) towards financial risk as in Hoffmann et al. (2013).

literacy, past portfolio size is positively related to the level of risk tolerance, on both short and long horizons. This means that the investors who held more diversified portfolios are more likely to declare a high risk tolerance. They might appear to be ready to bear more risk thanks to their more diversified (or larger) portfolios. Furthermore, portfolio turnover over the recent past displays a positive and significant coefficient estimate at the 5% or the 1% level. All things being equal, the investors who have been trading more intensively over the last six or three months view themselves as more risk tolerant. This result is consistent with Hoffmann and Post (2017) who report a positive relationship between turnover and the level of risk tolerance.

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 return					
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
<i>N</i>	2,746	2,746	2,746	2,746	2,746
<i>McFadden pseudo - R²</i>	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 objectives 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 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 return 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* refers 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, respectively. 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 the 1st of January 2008. ***, **, and * indicate significance at 1%, 5% and 10%, respectively.

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 return					
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***
<i>N</i>	2,746	2,746	2,746	2,746	2,746
<i>McFadden pseudo – R²</i>	0.062	0.062	0.063	0.063	0.062
<i>LR Test</i>	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 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 return 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* refers 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, respectively. 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 the 1st of January 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 dummy variable set to 1 when investor self-reported literacy falls in the third or fourth level available on the scale, while *High_Literacy* is complementary dummy variable set to 1 for investors who selected the highest level (see Table 3). Similarly, *Med_Risk_Tolerance* is a dummy variable set to 1 for investors who selected the third or fourth level available on the scale (see Table 3), and *High_Risk_Tolerance* is the complementary dummy variable set to 1 for investors who chose 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 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 literature on goal-setting effects in psychology reveals that “specific, challenging” goals affect both performance and risk-taking (Locke and Latham, 1990; Heath et al., 1999; Larrick et al., 2009).³⁴ In particular, “specific, challenging” goals have a larger positive impact on performance and risk-taking than less challenging goals 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 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, i.e., 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 Equation 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 level of return objectives (see Table 2). Each dummy is set to 1 only for investors who selected the corresponding level of return objectives (i.e., *Return_objective_L2* is equal to one for investors who chose level 2 on the available scale). We also include two additional portfolio-based variables to control for investor actual risk-taking, that are the standard deviation and the 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, i.e., low priced, high idiosyncratic volatility and 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 on the period

³⁴Heath 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 as discrete and discontinuous external rewards (e.g., promotion or bonus), can be easily explained by basic economic calculations. By contrast, increased risk-taking in response to mere goals is a fundamentally psychological phenomenon.

July 2009–March 2012 (Regression 2).³⁵

Table 7 reports the results for both OLS regression models.³⁶ Regression 1 provides results consistent with the extant literature for sociodemographics (in Panel A) and behavioral- and portfolio-based variables (in Panel C). Women and older investors earn higher returns (Barber and Odean, 2001; Bellofatto et al., 2018) as well as high education investors. Realized returns significantly increase with portfolio size, which is consistent with portfolio concentration hurting returns (Goetzmann and Kumar, 2008; Von Gaudecker, 2015). Realized returns are also positively related to investor experience (Hoffmann and Shefrin, 2014; Koestner et al., 2017; Bellofatto et al., 2018), standard deviation (Bianchi, 2018) and skewness of monthly portfolio returns.

For subjective variables in Panel B of Table 7, Regression 1 displays significant and positive coefficient estimates for the N-1 levels of return objectives. Compared to the investors who selected the benchmark level (no risk of capital loss, that is 0%), investors with higher return objectives do earn higher realized returns. This result provides support for the aforementioned goal-setting effects, i.e., 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 levels of return objectives, we do find that realized returns are higher for investors with the highest literacy (at the 10% significance level).³⁷ This suggests that return objectives and subjective financial literacy might act as substitutes, though imperfect (since not highly correlated).

Interestingly, Regression 1 in Table 7 also reveals a strong and negative relationship between realized returns and the highest risk tolerance. The empirical evidence about the relationship

³⁵In that case, both the dependent variable and the explanatory behavioral and portfolio-based variables are computed over the period under scrutiny.

³⁶In both regressions, all the Variance Inflation Factors (VIF) are below 5, meaning that multicollinearity is not an issue.

³⁷For the sake of brevity, this version of the model and its results are unreported in Table 7, while they are available upon request.

between subjective risk tolerance and realized returns is scarce in the literature.³⁸ To the best of our knowledge, the only paper that includes a measure of risk tolerance (referred to as risk appetite)³⁹ 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 the investors who declare the highest risk tolerance achieve lower realized returns than their counterparts, all things being equal (including risk-taking that is controlled for with both standard deviation and skewness of monthly portfolio returns).

When restricting the analysis to the period July 2009-March 2012 (see Regression 2 in Table 7), the level of return objectives is no longer significant, while investors with the highest risk tolerance still exhibit significantly lower realized returns. For 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 a stronger explanatory power than Regression 1 (with the crisis), which suggests that turbulent market conditions introduce some noise into the estimations.

³⁸Previous 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)).

³⁹This 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***
<i>N</i>	4,140	4,111
<i>R</i> ²	0.176	0.338
<i>Adjusted R</i> 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 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 subjective individual variables. *Return_objective_L2*, *Return_objective_L3*, *Return_objective_L4*, and *Return_objective_L5* are four dummy variables built on the levels of return objectives presented in Table 2. Each dummy is set to 1 only for investors who selected the corresponding level of return objective (i.e., *Return_objective_L2* is equal to one for investors who chose level 2 on the available 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 dummy variable set to 1 when investor self-reported literacy falls in the third or fourth level available on the scale, while *High_Literacy* is complementary dummy variable set to 1 for investors who selected the highest level (see Table 3). Similarly, *Med_Risk_Tolerance* is a dummy variable set to 1 for investors who selected the third or fourth level available on the scale (see Table 3), and *High_Risk_Tolerance* is the complementary dummy variable set to 1 for investors who chose 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 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.

Our previous results provide empirical evidence of a positive link between individual return objectives and realized gross returns over the entire sample period, while controlling 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-Cahart four-factor model as in Hoffmann and Shefrin (2014).⁴⁰ For that purpose, we estimate the following panel data model to compare performance across levels of return objectives 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 Equation 4, the dependent variable is the risk premium of the portfolio gross return of investor i at month t ($r_{i,t}$). The risk-free rate is the 10-year Belgian Treasury bond rate at month t (R_{Ft}). The set of explanatory variables includes the Fama-French-Carhart factors at month t for the European market, namely, Market risk premium (MRP_t), Size ($Size_t$), Book-to-Market (BM_t), and Momentum (MOM_t).⁴¹ When estimating this panel data regression model, we cluster standard errors by month as in Bhattacharya et al. (2017).⁴² For each level of return objectives, we estimate this model twice, that is, over the period January 2008-March 2012 and over the period July 2009-March 2012 (without the crisis).

The results are reported in Table 8.⁴³ They show that, over the entire sample period (see Panel A), investors in the two highest levels of return objectives (i.e., levels 4 and 5) outperform when controlling for the usual market factors. For these investors, we get a positive and statistically significant alpha (at the 10% level for investors in level 4 and at the 5% level for investors in level 5). This means that their realized returns over that 51-month period are not

⁴⁰In comparison, Barber and Odean (2000) and Shu et al. (2004) use the Fama-French three-factor model, while Koestner et al. (2017) focuses on the Jensen's Alpha based on a single factor model.

⁴¹Market factors for the European market are provided by Eurofidai (www.eurofidai.org).

⁴²The main objective is to address potential issues due to cross-sectional correlation (Seasholes and Zhu, 2010).

⁴³We also estimate the panel data model per investor. Next, we calculate the average coefficient estimates in each level of return objectives and check whether they statistically differ from zero. The results (available upon request) are overall consistent with those reported here.

merely a compensation for risk.⁴⁴ By contrast, alphas are never significant for the lower levels of return objectives. Nevertheless, no alpha is 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 notice that Panel A of Table 8 display positive and significant coefficient estimates on the market and size factors, which is consistent with the tilt toward small stocks documented in Barber and Odean (2000).

Table 8: Risk-adjusted performance across levels of return objectives

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	1,686	1,050	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	1,686	1,050	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 at month t . The risk-free rate is the 10-year Belgian Treasury bond rate at month t . The set of explanatory variables includes the Fama-French-Carhart factors at 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 level of return objectives presented in Table 2. N gives the number of investors. Panel A provides the results when the model is estimated over 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.

⁴⁴We also estimate the model using the portfolio returns net of transaction costs. The results still show an alpha positive and statistically significant (at the 5% level) for the investors who declare the highest level of return objectives. These unreported results are available upon request.

3.3 Determinants of the gap from the return objective

The last research question addressed in this paper is whether retail investors are able to reach their return objectives. To assess this capacity, we build on Merkle (2017) who uses the difference between expected portfolio return⁴⁵ 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, overprecision) and analyze their short-term dynamic interactions with trading behavior,⁴⁶ we are interested in measuring the gap, i.e., the distance, between the investor’s return objective declared in the MiFID questionnaire and the actual gross realized return he/she achieve afterwards. Such a gap primarily delivers relevant information about the investor’s capacity to reach his/her return objective. The lower the gap, the more the investor is able to match his/her return objective (or even surpass it when the gap is negative). Hence, we can also see the gap as indirect information about the investor’s ability to declare a realistic return objective. In that 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 what are the main determinants of this gap among our large set of covariates.⁴⁷ Intuitively, the gap is expected to be higher for investors with higher return objectives, compared to their counterparts who selected the benchmark level (no risk of capital loss, that is 0%).

We compute the gap for each investor as the difference between his/her self-reported return objective and his/her annualized monthly realized gross return over the period January 2008-March 2012, i.e., after the completion of the MiFID questionnaire. Since each level of return objectives 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 gap from the return objective. As in Section 3.2, we still control for a large set of covariates, which consists of sociodemographics, subjective individual variables,

⁴⁵This 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 by the end of the next three months.

⁴⁶For a comprehensive review of the literature devoted to overconfidence, its different types, and its dynamics with investment behavior, please directly refer to Merkle (2017).

⁴⁷It is another difference with Merkle (2017) whose approach mainly consists in using the various measures of overconfidence to explain some aspects of trading behavior.

as well as behavioral and portfolio-based variables. The first model (Regression 1) is estimated over the whole sample period, while the second model (Regression 2) excludes the crisis period.

Table 9 reports the results for the aforementioned regressions.⁴⁸ The findings are overall consistent with those provided in Table 7, although interpretations slightly differ. In Panel B, the coefficient estimates for the three highest levels of return objectives (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 these levels. This confirms that the gap 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 objectives increases. Moreover, we find no significant relationship with subjective literacy or risk tolerance, except again for investors with the highest level of risk tolerance. The ability to reach the return objective is significantly lower for the investors who declare the highest risk tolerance. This is not surprising since we previously found that these investors earn worse realized returns than their counterparts. 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.

Also consistent with the findings reported in Section 3.2, the gap from the return objective decreases with age, education, portfolio size, experience, and portfolio risk (measured by both standard deviation and skewness of monthly returns). In other words, all things being equal (including the level of return objectives), the investors the more likely to reach or surpass their return objectives are older investors, high education investors, investors with more diversified portfolios, and investors who hold more risky portfolios. Of particular interest, our results show that women fall significantly closer to their return objectives. Since we earlier found 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).

⁴⁸In both regressions, all the Variance Inflation Factors (VIF) are below 5, meaning that multicollinearity is not an issue.

Table 9: Determinants of the gap 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***
<i>N</i>	4,140	4,111
<i>R</i> ²	0.205	0.353
<i>Adjusted R</i> ²	0.201	0.350

This table reports the coefficient estimates for OLS regressions, wherein the dependent variable captures, for each investor, the gap as the difference between his/her self-reported return objective and his/her annualized monthly realized gross return after the 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 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 subjective individual variables. *Return_objective_L2*, *Return_objective_L3*, *Return_objective_L4*, and *Return_objective_L5* are four dummy variables built on the levels of target returns presented in Table 2. Each dummy is set to one only for investors who selected the corresponding level of target return (i.e., *Return_objective_L2* is equal to one for investors who chose level 2 on the available 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 dummy variable set to 1 when investor self-reported literacy falls in the third or fourth level available on the scale, while *High_Literacy* is the complementary dummy variable set to 1 for investors who selected the highest level (see Table 3). Similarly, *Med_Risk_Tolerance* is a dummy variable set to 1 for investors who selected the third or fourth level available on the scale (see Table 3), and *High_Risk_Tolerance* is the complementary dummy variable set to 1 for investors who chose the highest level of risk tolerance. *LT_Horizon* is a dummy variable which is 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 the 1st of January 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.

4 Conclusion

In this paper, we investigate the determinants of the return objectives declared by retail investors as well as the capacity of investors to reach these return objectives. We also examine whether retail investors with higher return objectives perform better than their counterparts. The return objectives used in this paper are self-reported in an online risk-return profiling survey (i.e., the Suitability MiFID questionnaire), wherein each investor is requested to select the level of return he/she expect on his/her investments. These return objectives arguably differ from the return expectations that have been investigated in past research, mainly because investors did not provide repeatedly several numerical or subjective estimates for the return they expect for the next months. The availability of individual return objectives makes us contribute to the body of literature devoted to beliefs and preferences of retail investors.

To address our research questions, we combine detailed trading data with sociodemographics and individual subjective characteristics for a large set of 4,140 individual investors who hold stocks over the period January 2008-March 2012, i.e., after the completion of the MiFID questionnaire. For the subset of 2,746 investors who were used to trade 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, i.e., before declaring their return objectives.

To analyze whether both past behavior and experienced returns are important determinants of individual return objectives, we use multinomial logit models wherein the dependent variable captures the level of return objectives. These models allow to control for a large set of covariates including sociodemographics (gender, age, spoken language, education), subjective individual characteristics (financial literacy, risk tolerance, income, investment horizon), as well as trade-based and portfolio-based variables (realized gross return, portfolio turnover and size, experience). The latter are computed over various time windows before January 2008 to characterize investor past behavior and realized returns on 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 is the failure of retail investors to correctly assess their past realized portfolio returns (Glaser and Weber, 2007), i.e., if they are unaware of their past returns, the latter are unlikely to affect them when setting their return objectives. Regarding past behavior,

only portfolio turnover over the recent past is positively related to the level of return objectives. This finding is in line with Hoffmann and Post (2017) who show that turnover carries some explanatory power in explaining beliefs and preferences. As for the other covariates, investors with higher financial literacy or with higher risk tolerance declare higher return objectives. Higher return objectives are also more likely for high income investors, investors with longer investment horizon, younger investors, French-speaking investors, and high education investors. We conclude that return objectives are essentially driven by subjective individual characteristics (such as financial literacy and risk tolerance), some sociodemographics (age, education, spoken language), as well as recent trading intensity. Neither past realized returns nor past portfolio diversification (or experience) help explain individual return objectives.

To address whether higher return objectives are related to higher actual returns, we run OLS regressions that allow to control for a large set of covariates including the level of return objectives. We find that investors with higher return objectives do earn higher realized gross returns, compared to the investors who want to avoid any risk of capital loss. This result provides support for the goal-setting effects documented in the psychological literature, i.e., more challenging goals lead to higher performance than 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 the 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 restricting 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 the level of return objectives and experience that are no longer significant. When we further compare risk-adjusted performance across levels of return objectives 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 their counterparts, 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. 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 are able to reach their return objectives. To address that issue, we measure, for each investor, the gap from his/her return objective as an indicator of this investor's capacity to reach his/her return objective. This gap also delivers 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 that again allow 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 capacity to reach the return objective decreases as the level of return objectives increases. In addition, we provide evidence that the ability to reach the return objective is significantly lower for the investors who declare the highest risk tolerance. This is consistent with the above results revealing that these investors earn lower realized returns than their counterparts. We also find that the gap from the return objective decreases with age, education, portfolio size, experience, and actual risk-taking. All these findings still hold when we exclude the crisis period. Finally, it is also worth noting that women fall 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 objectives 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).

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Table A.1: Items from the MiFID Suitability questionnaire - part 1

<i>(Return objective)</i> 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
<i>(Financial literacy)</i> 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.
<i>(Risk tolerance)</i> 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 for some questions in the MiFID Suitability test under scrutiny. These questions aim at eliciting the investor's return objective, financial literacy, and risk tolerance, respectively.

Table A.2: Items from the MiFID Suitability questionnaire - part 2

<i>(Income)</i> 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
<i>(Horizon)</i> 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 under scrutiny. These questions aim at eliciting the investor's annual net income and investment horizon, respectively.

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 return					
Return_P2Y	0.001				
Turnover_P2Y	-0.000				
Ptf size_P2Y	0.230***				
Return_P1Y		-0.000			
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***
<i>N</i>	2,746	2,746	2,746	2,746	2,746
<i>McFadden pseudo - R²</i>	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 return 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 return					
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*
<i>N</i>	2,746	2,746	2,746	2,746	2,746
<i>McFadden pseudo - R²</i>	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 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 return 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.