When does it pay to pay attention?*

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Abstract

This paper investigates the combined effect of financial attention and financial literacy on investors' performance. Our empirical analysis, based on a large and unique brokerage dataset, suggests that highly literate investors can benefit by paying financial attention, whereas attention can be counterproductive for investors with low financial literacy. Moreover, when investors, both highly and lowly literate, are overconfident about their financial literacy, the impact of financial attention on their performance is reinforced.

Keywords: Financial attention, financial literacy, MiFID directive, overconfidence, investors performance
JEL Codes: D53, D91, G11, G41, G53

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1 Introduction

Over time, financial markets have been experiencing different legal reforms. An example is the Markets in Financial Instruments Directive (MiFID). The MiFID is the Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004. Its updated version is the Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014, on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU. These directives aim to enhance investors protection and improve markets transparency [1]. The MiFID imposes that investment firms are required to assess clients' knowledge to determine if recommended products are appropriate. In order to assess this knowledge (financial literacy), investment firms develop a multiple choice questionnaire. This is a key concept introduced by MiFID to improve the investor protection through the suitability and appropriateness ("Know Your Customer") principles. The principle of "Know Your Customer" applies to all market intermediaries and all financial instruments covered by MiFID, and distinguishes among the execution of orders, provision of financial advice, and supply of portfolio management services. Rules based on the suitability assessment are binding since retail investors request financial advice and/or portfolio management services. By contrast, when retail investors ask for the "order execution only", they are fully in charge of their trades, and the appropriateness assessment is to ensure that investors have the necessary knowledge to understand the risks involved in (complex) financial instruments before investing. The result of the appropriateness assessment is not binding. Moreover, it is common practice that financial institutions require the appropriateness assessment also for the "order execution only" of non complex financial products with random returns (i.e., stocks), referring to the precautionary principle (D'Hondt et al., 2021; Inghelbrecht and Tedde, 2024). The questionnaire used for the empirical analysis can be identified as an appropriateness questionnaire applied to stocks.

The increased disclosure regulation may lead to the production of a large amount of information in financial markets, stressing how important it is for investors to pay attention to the right information. Financial attention has been proven to have a positive impact on investment decisions, however, there is a gap in the literature about the interplay between financial atten-

[1] The corresponding US securities regulation encompasses the 1934 Securities Exchange Act, the FINRA rules (Financial Industry Regulatory Authority of 2007) and the Reg NMS (Regulation of the National Market System of 2005).

tion and financial literacy. This paper investigates the combined effect of financial attention and financial literacy on investors' performance, specifically focusing on performance of highly and lowly literate investors. We prove that it does not pay to pay attention for investors with low financial literacy. The rationale behind this result is that, because of low financial literacy, these investors are not able to correctly understand financial information that they gather paying attention. On the other hand, investors with high financial literacy take advantage from paying financial attention because they have the knowledge to properly employ information into the decision-making process.

The contribution of this research to the existing literature is recognizable in several aspects. First, we start from the study of Inghelbrecht and Tedde (2024), but further develops it by incorporating financial attention and financial literacy categorized into high and low. In line with the existing literature (see, e.g., Inghelbrecht and Tedde, 2024; Bellofatto et al., 2018b; D'Hondt et al., 2021), we measure financial literacy using data from the MiFID questionnaires. We clearly associate the score achieved in the first attempt at filling in the MiFID questionnaire[2] to either high or low objective financial literacy and then we investigate the effect of financial attention on performance for these two groups of investors. The score achieved in the MiFID questionnaire at the first attempt represents our proxy for objective, or real, financial literacy. Using a novel and huge brokerage dataset, we prove that a highly literate investor can take advantage by paying financial attention, whereas the effect of attention on performance of a lowly literate investors is negative.

Second, adhering to the overconfidence definition of Inghelbrecht and Tedde (2024), we classify the investors who refuse their first score and redo the questionnaire (until they reach the score they believe to deserve) as overconfident about their financial literacy. The score reached at the last attempt at completing the MiFID questionnaire represents the subjective, or self-perceived, financial literacy. We measure investors' overconfidence as the difference between the score reached at the last attempt at filling in the MiFID questionnaire and the score achieved at the first attempt, and this aspect represents an innovation with respect to the study of Inghelbrecht and Tedde (2024).

Third, our research underscores how the positive effect of financial attention on performance

[2]As underscored by Inghelbrecht and Tedde (2024), it's worth noting that the directive allows investors to fill in the MiFID questionnaire multiple times, and even to invest if the questionnaire is not passed, since its result is not binding.

for highly literate investor can be reinforced in case of overconfidence. This beneficial effect of overconfidence on investment performance represents a new finding, which enriches the existing literature and deserve to be investigated more in details in further research.

Finally, we prove how the combined effect of overconfidence in financial literacy and financial attention can have a detrimental impact on performance of investors with a low level of financial literacy. This relationship has been largely overlooked by the existing literature and the research offers a valuable contribution providing a more comprehensive understanding of the behavioral bias of overconfidence in financial decision-making.

The remainder of this paper is organized as follows. The related literature is revised in Section 2. Section 3 describes the data used in the empirical analysis. The main empirical findings are discussed in Section 4, and Section 5 draws some general conclusions.

2 Literature Review

This study builds upon the existing literature on financial attention, financial literacy and investors' overconfidence. Although it is undisputed that financial attention leads to an improvement in investors performance (see, e.g., Gargano and Rossi, 2018), there seems to be a gap in the existing literature about the impact that financial attention has on performance for investors with either low or high financial literacy. Under these circumstances, it appears that it does not always pay to pay attention, since performance of low financially literate investors can be negatively affected by financial attention, and this damaging effect is even worse if investors are overconfident about their financial literacy.

2.1 Financial Attention and Investors Performance

The literature on rational inattention states that attention is costly and because of this it is convenient to pay attention only if it generates a positive cost-benefit trade-off (see, e.g., Sims, 2003; Huang and Liu, 2007; Abreu and Mendes, 2012; Abel et al., 2013). The costs of attention include information-gathering and information-processing costs, time, resources and opportunity costs, while the main benefit is the potential gain from trading (Brunnermeier and Parker, 2005). In their research, Li and Yu (2012) show how the limited investors' attention leads to a specific category-learning behavior, which pushes investors to either under or over-

react to information, preventing them to properly predict aggregate stock market returns. This behavior is also discussed by Peng and Xiong (2006), who model investors learning process, demonstrating how important news are not reflected by prices until investors pay attention to them. This is mainly due to the fact that investors with limited attention tend to process more market- and sector-wide information than firm-specific information.

Nowadays, modern technologies offer us an easy access to a huge amount of information from various sources, but also allow us rapidly changing in content, which reduces our capacity to pay attention. The seminal study of Kahneman (1973) shows that people are restricted in allocating their limited cognitive resources, and because of this to be able to devote our attention to the right information, is an essential feature. When we have to deal with too many things, such as attend to many events or perform many tasks, we need to scale our priorities. According to this dynamic, people tend to heavily orient their judgments on topics covered by more recent information, forming new opinions that are erroneously conditioned by the latest news. Kahneman and Tversky (1973) and Kahneman (2003), drawing their map of bounded rationality, stressed as a pitfall of human being the limited attention.

In financial markets, the ability to properly address attention may play an important role in driving investors trading behavior and in determining investment performance. Investors who dedicate more attention to their portfolio seem to be able to better calibrate profits and losses, improving their final gains. Ding and Hou (2015) prove how a high level of financial attention leads to an increase in market liquidity and to a larger shareholder base, which can be interpreted with the investors recognition hypothesis (Merton et al., 1987).

Many authors have investigated the link between financial attention, investors' socio-demographic characteristics and their trading behavior (see, e.g., Grinblatt and Keloharju, 2001; Goetzmann and Kumar, 2008; Charness and Gneezy, 2012; Calcagno and Monticone, 2015; Tauni et al., 2015; Hoechle et al., 2017; Dierick et al., 2019). According to Gargano and Rossi (2018) and to Bernasek and Shwiff (2001), for instance, males tend to pay more attention than females and attention increases with investors' age. The link between personality traits of investors and their financial attention is also discussed by Bellofatto et al. (2019). The authors prove that investors who show a greater appetite for information, meant as an endogenous information acquisition, tend to perform better than investors who pay low attention to financial information.

The voluntary request for information seems to reveal a specific trait of these investors.

Moreover, the demand for different typologies of financial information seems to be driven by specific demographic and personal features of investors (Tauni et al., 2015; Sicherman et al., 2016). One pivotal investors' characteristic is financial literacy. Wang et al. (2011) and Yuan (2015) discuss how investors who possess superior knowledge and pay more attention to assets that they are familiar with tend to suffer from the familiarity bias, having a false confidence to fully know those assets. Davydov et al. (2021), Glaser (2003) and Collins (2012) underline a positive relation between financial attention, education and investors performance. They stress how attention to financial education is essential to properly process financial information. However, the effect of financial attention on performance of either low or high financially literate investors is still not investigated by the existing literature.

2.2 Overconfidence and Financial Literacy

This research enriches the scarce existing literature related to investors' overconfidence on their own financial literacy (Xia et al., 2014; Barber et al., 2020; Inghelbrecht and Tedde, 2024).

The behavioral literature shows that investors often ignore relevant information and base their financial decisions on different psychological biases, such as overconfidence, suggesting that paying more attention may imply sub-optimal trading behavior, which can harm rather than improve performance (see, e.g., Moore and Healy, 2008; Moore and Schatz, 2017; Barber and Odean, 2008; Barberis and Thaler, 2003; Odean, 1998; Barber and Odean, 2001). It has been proved that, in case of investors' overconfidence, high financial attention is associated with more frequent trading, less delegation of portfolio decisions and less diversified portfolios (Guiso and Jappelli, 2007). Overconfident investors who pay more attention seem to engage in more buying activities than selling. Barber and Odean (2008) and Barber et al. (2022) assert that this is due to the fact that in order to buy, investors need to search across many stocks, whereas when they want to sell, they select from stocks that they already own. According to these authors, it seems that attention is not always rewarding for investors, since, under specific circumstances, too much attention may entail excessive trading, which may lead to bad performance.

This study sheds light on the detrimental effects that financial attention can have on per-

formance for an overconfident investor who has low financial literacy. Illiterate investors who overestimate their financial literacy may misinterpret information that they gather or follow an herding behavior, selecting the wrong trading strategy. On the other hand, it will be demonstrated that overconfidence can improve performance of a highly literate investor, since overconfident investors can benefit from the first-mover advantage or are prone to take risk.

Bellofatto et al. (2018b) define financial literacy as the ability to properly use own knowledge, experience and skills to manage financial resources effectively, whereas Lusardi and Mitchell (2014), Lusardi and Klapper (2015), Lusardi (2019), and Lusardi and Mitchell (2023) emphasize the role of financial literacy to process economic information and make informed decisions. Generally speaking, financial literacy can be seen as the combination of awareness, knowledge, skills, attitudes and behaviors necessary to make sound financial decisions and achieve a good level of individual financial well-being. There has been a considerable effort by scholars in order to understand financial literacy and its role in financial markets (see, e.g., Lusardi, 2008; Lusardi and Mitchell, 2008, 2011; Marinelli and Mazzoli, 2010; Linciano and Soccorso, 2012; D'Hondt et al., 2021; Bajo et al., 2015; Bellofatto et al., 2017; Broihanne and Orkut, 2022; D'Hondt and Roger, 2017), however not enough research has been carried on about the combined effect of financial literacy, its overestimation, and financial attention on investors performance.

3 Data and Sample

3.1 Variables

For the empirical analysis, we use the data detailed by Inghelbrecht and Tedde (2024), offered by one of the largest discount broker in Belgium. The dataset includes data on more than 65,000 clients for a period of time that goes from January 2014 to December 2016 and is divided in five files.

The customer data file includes clients' demographic characteristics as gender and age, and information about the account. Specifically, it indicates if the account is single and held by one person, is double and held by two individuals[3] or is held by a legal entity (like public limited companies or limited liability companies). The research only considers single and double

[3]When dealing with double accounts, we consider only the trading behavior of the primary client associated with the account.

accounts, because its aim is to analyze retail investors trading behavior.

The account file collects data about cash (i.e., account value) and the end-of-day value of the investments (i.e., portfolio value) held on account. The research only focuses on stock investments. The portfolio value is used as proxy for investors wealth. To compute the investors monthly net return over the holding period, as already done by Inghelbrecht and Tedde (2024), we calculate the monthly change over the holding period in the market value of all stocks in an account, net of transaction costs. To account for deposits and withdrawals during the month, we use the modified Dietz method, a modified version of the Simple Dietz method introduced by Dietz (1966). The formula for the net return is:

$$r_t^{net} = \frac{V_t - V_{t-1} - DW_t}{V_{t-1} + \sum_{i=1}^{n} w_i \times DW_{it}}, \tag{1}$$

where V_t represents the portfolio value at the end of month t and DW_t denotes the net deposits and withdrawals. To minimize the impact of extreme values, we apply winsorization to net returns every month at both 1% and 99% percentiles. Moreover, in order to take into account variations in investment risk, we estimate the monthly risk-adjusted returns (individual alphas) over the holding period. We implement the Carhart (1997) four-factor model, and use the factors for developed markets from Kenneth French's website and convert these factors to Euros, as explained in Glück et al. (2020). Following Hoffmann and Shefrin (2014), in order to avoid potentially biased estimates, estimating the factor model we impose a minimum number of return observations of 36 months per investor[4]. Both monthly risk-adjusted and monthly net returns are expressed in % and used as proxy for investors performance.

The trade file reports data of all transactions and all orders placed, executed and non-executed. Since the research focuses on active investors, we only include investors who have executed at least two orders during the sample period[5]. This file is used to evaluate the stock portfolio's diversification, which is based on the number of stocks within the portfolio and the concentration level, as measured by the Herfindahl–Hirschman index. Portfolio concentration is used as control variable in the baseline regressions. Moreover, this file stores data related

[4]We impose a minimum number of return observations of 36 months per investor also for the net return and regression results, reported in Appendix C, are robust.

[5]In line with Odean (1999), active investors have at least one trade. Moreover, restricting the sample to investors who execute at least 25 trades (12,385 non overconfident investors and 1,950 overconfident investors), results are robust and available under request.

to financial attention. Specifically, the file reports the duration of the login sessions, which measures the amount of time that investors spend on the trading platform between January 2014 and December 2016. Duration is expressed in days on a monthly basis and is used to create the proxy for financial attention employed in the main analysis.

The login file offers information related to the other variable used to create the proxy for financial attention: the number of clicks. This measure counts the amount of clicks registered on investors' account when they are logged in on the platform to check for financial information, between January 2014 and December 2016. Also this variable is evaluated on a monthly basis and, divided by the duration, is used as proxy for financial attention in the regressions, indicating the number of clicks per hour registered on investors' account when they are logged in on the platform to check for financial information[6].

Finally, the questionnaire file offers all the answers of investors to a multiple choice test, the MiFID questionnaire, which is needed to assess investors' financial literacy. The questionnaire used in this study includes 10 questions for a maximum score of 18 and the broker requires that investors score at least 10 out of 18 to pass the test, whereas MiFID requires investors to reach at least 50% of the total score in order to succeed the questionnaire[7].

The empirical analysis is based on a sample of 17,159 non-overconfident investors (investors who complete the MiFID questionnaire only once) and a sample of 1,954 overconfident investors (investors who complete the MiFID questionnaire multiple times). To totally fulfill the definition of overconfidence about own financial literacy, the sample considers only investors who accept a last score (subjective financial literacy) higher than the first (objective financial literacy)[8].

3.2 Descriptive Statistics

Table 1 and table 2 present demographic and account information in Panel A, summary statistics regarding financial attention in Panel B and regarding financial literacy in Panel C, information about portfolio diversification in Panel D, and details regarding the number of months

[6]To ensure comparability among investors, the proxy variable for financial attention is normalized by the number of months an investor owned a stock portfolio.

[7]The questionnaire related to MiFID I is included in Appendix A. 8 questions account for 2 points each, and 2 questions account for 1 point each.

[8]We exclude investors with multiple attempts who accept a last score lower than the first, since they do not align with our overconfidence definition. These investors are 50.

with trades in Panel E. The first table reports these statistics for 17,159 non overconfident investors, analyzing separately high financially literate investors (10,385 investors who achieve a score equal or higher than 10 at their MiFID questionnaire) and lowly literate investors (6,774 investors who achieve a score equal or lower than 9), whereas the second table shows the same descriptive statistics for 1,954 overconfident investors (936 investors who achieve a score equal or higher than 10 at their first MiFID questionnaire and 1,018 investors who achieve a score equal or lower than 9 at their first MiFID questionnaire).

Panel A of table 1 shows that highly literate investors devote an average (median) amount of € 40,639 (€ 15,650) to their stock portfolio, compared to an average (median) of € 24,362 (€ 6,567) for low financially literate investors. As already found by Barber and Odean (2001) and Inghelbrecht and Tedde (2024), gender and age do not exhibit significant differences between the two groups, and investors are predominantly middle-aged males. Panel B reports summary statistics concerning the two variables used to build the proxy measure of financial attention, the total duration of time, evaluated in days per month, an investor has spent logged in to the trading platform, and the monthly number of clicks registered on investors' account when they are logged in on the platform to check for financial information, between January 2014 and December 2016. Both the duration and the number of clicks indicate that highly literate investors spend more time on the platform and are more active in looking for information. Highly literate investors spend a monthly average (median) of almost 9 (1 hour and half) hours logged in to the trading platform, during which they click to check financial information on average (median) 327 (11) times; whereas investors with low literacy seem to monitor their portfolio just for 6 (48 minutes) hours per month, and check (click) for information 287 (7) times. By contrast, the proxy variable for financial attention indicates that illiterate investors execute more clicks per hour to check for financial information with an average (median) of almost 48 (14) clicks registered, compared with an average (median) of 38 (11) clicks registered for literate investors. Panel C indicates the scores achieved in the MiFID questionnaire at the first attempt (measure of objective financial literacy). Intuitively, highly literate investors achieve significantly higher scores, with a median value of 16.00, compared to a median score of 6.00 for lowly literate investors. Panel D offers insights into the level of portfolio diversification. Investors with high financial literacy hold an average (median) of 6.17 (3.45) stocks, with

an average (median) portfolio concentration level of 0.37 (0.30), whereas investors with low financial literacy hold an average (median) of 4.29 (2.89) stocks, with an average (median) portfolio concentration level of 0.45 (0.39). Finally, Panel E presents the number of months with trades. It is evident from the data that highly literate investors engage in trading for a longer duration, with on average (median) of 21.99 (18.00) months, compared to lowly literate investors, who trade for on average (median) of 19.55 (16.00) months.

Table 2 presents the same descriptive statistics for overconfident investors. Overconfident investors, both highly and lowly literate, allocate to their portfolio an average amount higher compared to their respective non overconfident counterparts. Specifically, highly literate overconfident investors invest in stocks an average (median) of € 67,603 (€ 17,664), whereas lowly literate overconfident investors dedicate to their portfolio € 41,933 (€ 9,695). This result is in line with Odean (1998) and Inghelbrecht and Tedde (2024). Panel B reveals that lowly literate overconfident investors execute more clicks per hour to check for financial information than highly literate overconfident investors, and both groups are more attentive than their respective non overconfident counterparts. This evidence underscores why in case of overconfidence the effect of financial attention on performance is strengthened. Highly literate overconfident investors spend on the trading platform on average (median) almost 11 hours per month (almost 2 hours per month) and register on average (median) 343 (18) clicks, whereas lowly literate overconfident investors spend on average (median) almost 7 hours per month (almost 1 hour per month), registering on average (median) 336 (16) clicks. Statistics on financial literacy are presented in Panel C. Scores achieved in the MiFID questionnaire on the first attempt indicate an average level of objective financial literacy lower for overconfident investors than for non overconfident investors. Overconfident investors fill in the MiFID questionnaire on average two times. Scores improve in attempts, going from an average (median) of 13.58 (14.00) to 16.94 (15.00) for highly literate investors, and from an average of 4.08 (4.00) to 12.94 (14.00) for lowly literate investors. Panel D examines portfolio diversification. In line with Barber and Odean (2000), overconfident investors tend to hold underdiversified portfolios, compared with non overconfident investors. Highly literate overconfident investors hold an average (median) of 5.89 (3.04) stocks, with an average (median) portfolio concentration level of 0.41 (0.37), whereas lowly literate overconfident investors hold an average (median) of 3.81 (2.12) stocks,

with an average (median) portfolio concentration level of 0.52 (0.47). Finally, overconfident investors are active in trading more than non overconfident investors, both in case of high and low financial literacy. Highly and lowly literate overconfident investors trade on average (median) for 22.44 (19.00) and 21.71 (18.00) months, respectively.

Table 3 reports in Panel A descriptive statistics for the two variables and the measure of financial attention and for the proxy for objective financial literacy, whereas in Panel B correlations among these variables are presented. Table 4 presents descriptive statistics for the three variables of financial attention, the proxy for objective financial literacy and the proxy for overconfidence. Overconfidence is measured as the difference between the score reached at the last attempt at filling in the MiFID questionnaire (the investor's subjective financial literacy) and the score achieved at the first attempt (the investor's objective financial literacy). From these tables, it can be noticed that both samples (non overconfident and overconfident investors) present high heterogeneity in their financial attention as well as in their objective financial literacy. The proxy variable for overconfidence shows a quite high and negative correlation (-0.62) with the proxy for objective financial literacy and this is due to the fact that the measure of overconfidence includes by construction the objective financial literacy. The proxy variable for financial attention (number of clicks per hour) presents logically a high and negative correlation (-0.65) with the monthly duration and a high and positive correlation (0.66) with the monthly number of clicks. The two variables used to built the proxy for financial attention present a moderate level of correlation for both non overconfident and overconfident investors, with a correlation of 0.59 and 0.57, respectively. These values imply that the two variables capture financial attention but also other features. Duration tells us how many days per month an average investor spends on the trading platform, potentially checking his portfolio. However, it can be also possible that the investor stays logged in to his account but in the while being busy doing something else. This aspect represents a limitation of this variable. For this reason, the number of clicks seems to be better in capturing the level of financial attention paid by investors. At this regard, the number of clicks per month tells us how active are investors in searching for financial information. These are the main reasons why we have built the proxy number of clicks per hour to capture financial attention in the empirical analysis, and use the two variables as robustness check.

4 Empirical Analysis

The empirical analysis, based on data described in Section 3, tests the combined effect of financial attention and financial literacy on investors performance, by examining the risk-adjusted returns and the net returns. Section 4.1 examines the impact of financial attention on investors performance, both in case of high and low financial literacy, while Section 4.2 focuses on the effect of financial attention on performance including in the sample also the investors who are overconfident about their financial literacy.

4.1 Investors Performance: Financial Attention and Financial Literacy

4.1.1 Univariate Results

Table 5 presents univariate results (mean) for non overconfident investors performance (monthly risk-adjusted returns expressed in %)[9] according to different level of financial attention and objective financial literacy. Financial attention is measured according to different percentiles (i.e., P20, P40, P50, P60, P80)[10], whereas objective financial literacy is categorized in "very low" (a score equal or lower than 5 at the first attempt filling in the MiFID questionnaire, with 2,692 investors), "low" (a score between 6 and 9 included, with 4,082 investors), "high" (a score between 10 and 14 included, with 3,769 investors), "very high" (a score equal or higher than 15, with 6,616 investors)[11]. The last two columns report the differences in performance between P80 and P20 and the t-test. Rows 6-9 show the differences in performance according to these levels of objective financial literacy and the corresponding t-test. Highly literate investors benefit a rise in performance as their level of financial attention increases, whereas lowly literate investors suffer from their attention. Investors with very low financial literacy who pay high attention (P80 corresponds to a 35 clicks per hour to check for information)

[9] Median results for the risk-adjusted returns are robust and reported in Appendix B. Univariate results (mean and median) for the net returns are robust and available under request.

[10] Percentiles are chosen arbitrarily. Results are still consistent also using different values (e.g., considering intervals of 5, 10 and 25). The same reasoning holds for the sample that includes also overconfident investors.

[11] Cutoffs are selected arbitrarily. Results remain consistent even selecting alternative cutoffs, i.e., "very low" with a score between 0 and 6, or a score between 0 and 4; "low" with a score between 7 and 9, or a score between 5 and 9; "high" with a score between 10 and 13, or a score between 10 and 15; "very high" with a score between 14 and 18, or a score between 16 and 18. The same reasoning holds for the sample that includes also overconfident investors.

see a 0.06% monthly decline in performance respect to investors with very low literacy who pay less attention (P20 corresponds to a less than one click per hour), and this decrement is reduced to 0.01% per month for low financially literate investors. However, only the first result is statistically significant, at 10% level. Intuitively, these findings can be due to the fact that illiterate investors are not fully able to correctly understand financial information; they can misunderstand it and base their trading decisions on this wrong interpretation, hurting their performance. By contrast, highly literate investors who pay high attention perform monthly 0.07% better than those who devote low attention and this increment in performance rises to 0.09% per month for very high financially literate investors. Both results are significant at 5% level. These results imply that literate investors, who are able to correctly understand financial information, can take advantage by paying attention.

4.1.2 Regression Results

The empirical analysis employs also the OLS regression to examine the effect of financial attention on investors performance. The following model is estimated:

$$Y_i = \alpha + \beta FinancialAttention_i + \gamma Z_i + \epsilon_i. \tag{2}$$

The dependent variable Y_i represents the proxy for investors performance (i.e., risk-adjusted return). The variable is measured as monthly averages and is expressed in %. To examine the effect of financial attention on performance, the variable $FinancialAttention_i$ is used, which measures the total number of clicks per hour registered on investors account when they are logged in on the platform to check for financial information[12]. The vector Z_i is the vector of control variables, which includes a dummy for gender (equal to one if the investor is male), the age of the investor, the portfolio value (as proxy for investors wealth), which is expressed in logs, and the portfolio concentration (as proxy for diversification). Table 6 shows the OLS regression results, where Panel A presents the specification without control variables and Panel B reports the specification with control variables.

This table confirms conclusion of the univariate results: highly literate investors performance

[12]Appendix D presents regression results using as proxy variable for financial attention the total duration of the login session, expressed in days per month, and the total number of clicks per month.

is increasing in financial attention, whereas lowly literate investors performance is negatively affected by financial attention. Performance for a very low or low financially literate investor declines monthly by 0.09% and 0.07% respectively as the investor execute one more click in an hour. These results are highly significant. On the other hand, performance for a high or very high financially literate investor increases monthly by 0.06% and 0.05% respectively as the investor clicks one more time in an hour to check for information, and also these findings are highly significant. Panel B shows that the negative effect on the monthly risk-adjusted return of a one extra click per hour for investors with very low or low financial literacy is (slightly) reinforced, whereas the positive effect of attention for highly or very highly literate investors is (slightly) weaken. Consistent with the findings reported by Barber and Odean (2001), significantly lower risk-adjusted returns are associated with male investors. Age has a significant, even if weak, positive effect on performance. Wealth has a positive impact on risk-adjusted returns; however, this effect is small in magnitude and significant only for high and very high financially literate investors. As expected, portfolio concentration has a pronounced negative effect on investors performance. This supports the findings in the literature, such as Goetzmann and Kumar (2008) and Von Gaudecker (2015), who suggest that portfolio concentration is detrimental for returns.

Overall, empirical evidence confirms that high financially literate investors performance is positively affected by financial attention, whereas lowly literate investors performance declines in financial attention. The next section investigates the effect of financial attention on performance considering also investors who are overconfident about their financial literacy.

4.2 Investors Performance: Financial Attention, Financial Literacy and Overconfidence

4.2.1 Univariate Results

Table 7 reports the univariate results (mean) for overconfident investors monthly risk-adjusted returns. As already explained, financial attention is measured according to different percentiles (i.e., P20, P40, P50, P60, P80), and objective financial literacy is categorized in "very low" (a score equal or lower than 5 at the first attempt filling in the MiFID questionnaire, with 264 investors), "low" (a score between 6 and 9 included at the first attempt filling in the MiFID

questionnaire, with 754 investors), "high" (a score between 10 and 14 included at the first attempt filling in the MiFID questionnaire, with 393 investors), "very high" (a score equal or higher than 15 at the first attempt filling in the MiFID questionnaire, with 543 investors). Table 7 shows that overconfident investors with very low financial literacy experience a monthly drop of 0.02% in their performance when they pay high attention (P80 corresponds to 6 and half clicks per hour) respect to investors who pay less attention (P20 corresponds to less than one click), and this result is significant at 10% level. Conversely, overconfident investors with very high or high financial literacy exhibit a monthly rise of 0.10% in their risk-adjusted returns dedicating high attention to financial information respect to investors who dedicate lower attention, and these results are significant at 5% level.

Moreover, Table 8 shows the mean results comparing, for the different levels of financial attention and the different degrees of objective financial literacy, the non overconfident investors monthly risk-adjusted returns with the overconfident investors monthly risk-adjusted returns. Table 8 underscores that in case of very low and low financial literacy, overconfident investors perform slightly poorer than non overconfident investors. For instance, an overconfident investor with very low financial literacy who pay low attention (P20 corresponds to less than one click per hour) achieves a monthly risk-adjusted return 0.05% lower than an investor with very low literacy who does not overestimate his financial literacy. This finding implies that in case of low (or very low) financial literacy, the negative effect of financial attention on performance is reinforced by overconfidence. However, this result is significant at only 10% level. By contrast, highly and very highly literate overconfident investors perform better than their non overconfident counterparts. Results highlight, for instance, that an overconfident investor with very high financial literacy who pay high attention to financial information (P80 corresponds to 6 and half clicks per hour) reaches a monthly average risk-adjusted return 0.04% higher than his non overconfident counterpart, and this finding is significant at 10% level. This finding entails that in case of high (or very high) financial literacy, the positive effect of financial attention on performance is strengthened by overconfidence.

4.2.2 Regression Results

As already discussed in Section 4.1.2, the OLS regression is performed, adding to the sample the overconfident investors and the following models are estimated:

$$Y_i = \alpha + \beta FinancialAttention_i + \gamma Z_i + \epsilon_i \tag{3}$$

and

$$Y_i = \alpha + \beta FinancialAttention_i + \gamma Overconfidence_i + \delta FA_i \times Overconfidence_i + \lambda Z_i + \epsilon_i. \tag{4}$$

The dependent variable Y_i represents the monthly risk-adjusted return and the proxy variable $FinancialAttention_i$ captures the effect of attention on performance, as previously explained (see Section 4.1.2). The variable $Overconfidence_i$ examines how the level of overconfidence, measured by the difference between the score reached at the last attempt at filling in the MiFID questionnaire and the score achieved at the first attempt, affects performance[13]. The interaction term, $FA_i \times Overconfidence_i$ captures the additional effect of overconfidence on investor performance as the investor pays financial attention. The vector of control variables Z_i includes the same controls as in the previous model. Moreover, since overconfident investors took the test several times, their financial attention should be mechanically affected by their overconfidence, because retaking the test means more time spending on the platform and more clicks. In order to avoid bias estimates, the number of attempts at filling in the MiFID questionnaire is added as control variables. Table 9 shows the OLS regression results. Panel A presents the baseline specification including the variable $FinancialAttention_i$; Panel B includes the specification with the variable $Overconfidence_i$ and the interaction effect; Panel C includes the specification with the control variables. As expected, overconfident investors performance is negatively affected by financial attention in case of very low and low objective financial literacy, whereas is positively affected in case of high and very high objective financial literacy. Very low financially literate investors experience a monthly drop of 0.05% in performance if

[13] As robustness check, the overconfidence proxy has been normalized by the scores achieved in the MiFID questionnaire at the first attempt. Regression results are robust and available under request. Moreover, Appendix E reports regression results using as proxy for overconfidence a dummy, as discussed by Inghelbrecht and Tedde (2024). Results are robust.

they execute one more click per hour to check for financial information, and lowly literate investors experience a drop of 0.09%. Both results are significant at 1% level. These findings confirm the *a priori* expectations that illiterate investors are not able to properly understand financial information. On the other hand, highly and very highly literate investors reach a monthly risk-adjusted return 0.07% and 0.16% higher as they check for information one more time. Also these results are significant at 1%. Panel B underscores how overconfidence has a negative impact on performance, in line with the existing literature (Odean, 1998). Specifically, overconfident investors with very low financial literacy register a monthly 0.08% drop in their performance as their overconfidence increases of one unit. This result is significant at 5% level. This finding is intuitive: investors with the lowest objective financial literacy, completely ignorant about financial concepts, who overestimate their financial knowledge, tend to behave according to their self-perceived, or subjective, financial literacy incurring in potential financial losses. Moreover, the reduction in performance is equal to 0.01% in a month for lowly literate investors, and to 0.02% monthly for highly literate investors, and these results are significant at 10% and 5% level respectively. Interestingly, overconfidence seems to have a positive, even moderate, effect on performance for very high financially literate investors, with an increase of 0.03% per month. This result can be driven by different reasons: for instance, very highly literate investors, if overconfident, may prefer an active trading strategy, or may benefit from the first-mover advantage, or also might take more risk than investors with very high literacy but who are not overconfident. Further research should focus on this point. The coefficient of the interaction variable $FA_i \times Overconfidence_i$ supports the univariate results. In particular, for overconfident investors with very low financial literacy, the negative marginal effect of financial attention on performance is reinforced by the negative effect of overconfidence, and these investors experience an additional monthly decline of 0.10% in their risk-adjusted return as they make one more extra click per hour. These investors suffer an yearly decrement of 2.04% of their risk-adjusted return, almost double respect to the yearly decrease of 1.32% who endure illiterate investors who do not overestimate their financial literacy[14]. The additional marginal reduction corresponds to 0.06% monthly for overconfident investors who are lowly literate and these findings are both highly significant. Conversely, the negative effect of overconfidence is counteracted by the positive effect of financial attention on performance for high financially

[14]To express it on an annual basis, we must multiply the coefficients by 12.

literate investors. High financially literate investors experience a highly significant monthly rise of 0.04% in their performance for one more click per hour, despite their overconfidence. Finally, for overconfident investors with very high financial literacy, the positive marginal effect of financial attention on performance is reinforced by the positive effect of overconfidence, and these investors benefit an additional, highly significant, increase of 0.12% per month as they check for financial information one more time in an hour. These investors take advantage from their overconfidence, since their annual risk-adjusted return growths of 3%, whereas non overconfident investors with the same level of financial literacy can benefit only of an annual 0.36% increment. Panel C confirms the main results.

Overall, empirical evidence confirms, on one hand, that performance of high financially literate overconfident investors is positively affected by financial attention, and this positive effect is reinforced by overconfidence. On the other hand, findings underscore that performance for low financially literate overconfident investors declines in financial attention, and this negative effect gets stronger in overconfidence.

5 Conclusions

The aim of this study is to investigate the combined effect of financial attention and financial literacy on investors performance. Previous research (see, e.g., Gargano and Rossi, 2018; Bellofatto et al., 2018a; Dierick et al., 2019) has stressed how financial attention entails better financial decisions, which lead to better investment performance. However, financial attention in order to unleash its benefits requires investors to be high financially literate, to be able to correctly interpret financial information. But when does it pay to pay attention? In order to give an answer to this research question, we distinguish between very high, high, low and very low financially literate investors and investigate the impact of financial attention on performance for these four groups of investors.

The first part of the analysis concentrates on investors who are not overconfident about their financial literacy (investors who fill in the MiFID questionnaire just once and accept their first score), while the second part of the analysis includes also investors who fill in the questionnaire multiple times, in order to reach the score they believe to deserve. In line with Inghelbrecht and Tedde (2024), we consider those investors as overconfident about their financial literacy.

For empirical analysis, we run the OLS regression, using a novel brokerage dataset that includes investors' trading behavior variables and MiFID questionnaire scores. Results show that financial attention has a positive effect on investors performance only when investors are highly or very highly literate, whereas its impact is negative when the investors financial literacy is low or very low. The most intuitive reason for this is that only literate investors have the needed knowledge to fully understand and interpret information that they gather paying attention. Conversely, illiterate investors can misinterpret information leading to bad financial decisions, and so their level of attention should be low in order to minimize their losses (e.g., they should follow a passive trading strategy). Additionally, if investors are overconfident on their financial literacy, the positive effect of financial attention on performance for highly and very highly literate investors is even stronger than the case without overconfidence. Empirical findings underscore how overconfidence reinforces the positive effect of financial attention on performance. By contrast, the effect of financial attention on performance for lowly and very lowly literate overconfident investors is detrimental, since overconfidence strengthens the negative effect of financial attention on performance. In order to validate our results, we compute a comprehensive robustness check.

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Table 1: Descriptive statistics for non overconfident investors with high and low financial literacy

This table reports descriptive statistics on clients' demographic and account characteristics (Panel A), their financial attention (Panel B), their financial literacy (Panel C), the diversification of their portfolio (Panel D), and the number of months with trades (Panel E). These statistics are reported for respectively 10,385 non overconfident investors with high financial literacy (a score equal or higher than 10) and for 6,774 non overconfident investors with low financial literacy (a score equal or lower than 9), as explained in Section 3. The summary statistics in Panel A (Account Value and Portfolio Value) are calculated based upon the average across time for each client, on a monthly basis. Panel B reports summary statistics for the total duration in days per month of the login sessions, the number of clicks per month, and the number of clicks per hour. Panel C presents summary statistics for the MiFID test score during the first attempt. Panel D presents descriptive statistics for the number of stocks held per investor and portfolio concentration. Panel E reports statistics for the number of months with account, the number of months with orders and the number of months with transactions.

	High Literacy					Low Literacy				
	Mean	Median	Stdev	Min	Max	Mean	Median	Stdev	Min	Max
Panel A: Demographic and account information										
Male (in %)	88%					85%				
Age	55.26	55.00	12.71	26.00	100.00	55.79	55.00	13.64	26.00	99.00
Account value (in €)	52,563.76	15,583.29	181,156.46	-5.54	16,987,223.11	26,710.17	7,441.76	81,839.39	-12.05	2,132,225.14
Portfolio value (in €)	40,638.66	15,650.39	153,449.53	0.01	14,500,746.41	24,361.73	6,566.71	73,118.47	2.87	1,942,389.81
Panel B: Financial Attention										
Duration	0.36	0.04	0.96	0.01	17.88	0.25	0.02	0.79	0.01	13.43
# clicks	327.05	11.00	1,161.69	1.00	47,157.02	287.86	07.00	1,414.63	1.00	29,892.01
# clicks per hour	37.85	11.45	50.42	4.16	109.92	47.97	14.58	74.61	4.16	92.83
Panel C: Financial literacy										
Score first attempt	15.34	16.00	2.37	10.00	18.00	5.44	6.00	2.95	0.00	9.00
Panel D: Diversification										
# stocks	6.17	3.45	8.77	0.00	226.03	4.29	2.89	8.13	0.00	93.18
Portfolio concentration	0.37	0.30	0.26	0.00	1.00	0.45	0.39	0.27	0.00	1.00
Panel E: Number of months with trades										
# months account	32.03	36.00	10.58	3.00	36.00	30.36	36.00	9.25	2.00	36.00
# months orders	21.99	18.00	10.15	3.00	36.00	19.55	16.00	9.84	2.00	36.00
# months transactions	20.91	18.00	11.28	3.00	36.00	18.69	16.00	10.89	2.00	36.00

Table 2: Descriptive statistics for overconfident investors with high and low financial literacy

This table reports descriptive statistics on clients' demographic and account characteristics (Panel A), their financial attention (Panel B), their financial literacy (Panel C), the diversification of their portfolio (Panel D), and the number of months with trades (Panel E). These statistics are reported for respectively 936 overconfident investors with high financial literacy (a score equal or higher than 10 at their first attempt) and for 1,018 overconfident investors with low financial literacy (a score equal or lower than 9 at their first attempt), as explained in Section 3. The summary statistics in Panel A (Account Value and Portfolio Value) are calculated based upon the average across time for each client, on a monthly basis. Panel B reports summary statistics for the total duration in days per month of the login sessions, the number of clicks per month, and the number of clicks per hour. Panel C presents summary statistics for the MiFID test score during the first attempt, score during the last attempt, the number of attempts, and the proxy for overconfidence (the difference between the last score and the first score). Panel D presents descriptive statistics for the number of stocks held per investor and portfolio concentration. Panel E reports statistics for the number of months with account, the number of months with orders and the number of months with transactions.

	High Literacy					Low Literacy				
	Mean	Median	Stdev	Min	Max	Mean	Median	Stdev	Min	Max
Panel A: Demographic and account information										
Male (in %)	82%					81%				
Age	55.85	56.00	12.28	26.00	96.00	55.28	56.00	13.89	26.00	99.00
Account value (in €)	78,558.36	22,942.63	264,299.86	1.93	5,777,261.44	48,654.72	12,655.65	177,499.13	-24.23	5,690,597.32
Portfolio value (in €)	67,603.13	17,664.13	232,636.16	0.02	4,990,425.24	41,933.07	9,694.80	167,536.99	0.03	5,670,655.90
Panel B: Financial Attention										
Duration	0.43	0.06	1.27	0.01	12.17	0.29	0.03	1.04	0.01	14.02
# clicks	343.27	18.00	1,345.13	1.00	30,138.00	335.79	16.00	1,108.23	1.00	20,785.00
# clicks per hour	39.73	12.50	44.12	4.16	103.21	48.24	22.22	44.32	4.16	61.86
Panel C: Financial literacy										
Score first attempt	13.58	14.00	2.35	10.00	18.00	4.08	4.00	2.69	0.00	9.00
Score last attempt	16.94	15.00	2.37	11.00	18.00	12.94	14.00	4.56	1.00	18.00
# attempts	2.27	2.00	1.09	2.00	35.00	2.28	2.00	0.84	2.00	13.00
Panel D: Diversification										
# stocks	5.89	3.04	7.88	0.00	109.75	3.81	2.12	5.29	0.00	222.30
Portfolio concentration	0.41	0.37	0.27	0.00	1.00	0.52	0.47	0.28	0.00	1.00
Panel E: Number of months with trades										
# months account	33.19	36.00	9.44	5.00	36.00	31.48	36.00	11.69	3.00	36.00
# months orders	22.44	19.00	9.86	4.00	36.00	21.71	18.00	11.01	3.00	36.00
# months transactions	22.82	19.00	10.03	4.00	36.00	20.35	18.00	12.14	3.00	36.00

Table 3: Descriptive statistics for financial attention measures and objective financial literacy (non overconfident investors)

This table reports descriptive statistics on the amount of attention (duration, number of clicks, and number of clicks per hour) that non overconfident investors devote to their stocks portfolios and on their objective financial literacy (Panel A), and the correlations among these variables (Panel B). The sample consists of 17,159 non overconfident investors. Financial attention is measured by duration (the number of days per month the investor has spent logged in), the number of clicks per month registered on investors' account when they are logged in on the platform to check for financial information, and the number of clicks per hour. Objective financial literacy is measured by the score achieved by investors on the MiFID questionnaire at their first attempt.

	Financial Attention			Objective Financial Literacy
	Duration	# Clicks	# Clicks per Hour	Scores First Attempt
Panel A: Summary Statistics				
Mean	0.33	315.33	39.81	14.04
Median	0.04	10.00	10.41	16.00
Stdev	0.84	1,191.60	51,71	3.80
Min	0.01	1.00	4.16	0.00
Max	17.88	47,157.02	109.92	18.00
P20	0.01	0.00	0.04	12.00
P40	0.03	5.00	6.94	14.00
P60	0.08	34.00	17.70	16.00
P80	0.30	251.00	34.86	18.00
Panel B: Correlation				
Duration	1.00		-0.68	0.04
# Clicks	0.59	1.00	0.67	0.02

Table 4: Descriptive statistics for financial attention measures and objective financial literacy (overconfident investors)

This table reports descriptive statistics on the amount of attention (duration, number of clicks, and number of clicks per hour) that overconfident investors devote to their stocks portfolios, on their objective financial literacy, and on the level of overconfidence (Panel A), and the correlations among these variables (Panel B). The sample consists of 1,954 overconfident investors. Financial attention is measured by duration (the number of days per month the investor has spent logged in), the number of clicks per month registered on investors' account when they are logged in on the platform to check for financial information, and the number of clicks per hour. Objective financial literacy is measured by the score achieved by investors on the MiFID questionnaire at their first attempt. Overconfidence is measured by the difference between the score reached in the last attempt and the score achieved in the first attempt.

	Financial Attention			Objective Financial Literacy	Overconfidence
	Duration	# Clicks	# Clicks per Hour	Scores First Attempt	Differences in Scores
Panel A: Summary Statistics					
Mean	0.35	337.81	40.11	7.94	5.35
Median	0.04	16.00	16.67	8.00	5.00
Stdev	1.16	1,209.20	20.06	5.32	5.51
Min	0.01	1.00	4.16	0.00	1.00
Max	14.02	30,138.00	103.21	18.00	18.00
P20	0.01	0.01	0.04	2.00	1.00
P40	0.04	4.00	4,18	6.00	4.00
P60	0.21	34.00	6.80	10.00	6.00
P80	1.46	227.50	6.50	14.00	10.00
Panel B: Correlation					
Duration	1.00		-0.65	0.05	0.03
# Clicks	0.57	1.00	0.66	0.03	0.02
Objective Financial Literacy			-0.05	1.00	-0.62

Table 5: Univariate results (mean) for non overconfident investors risk-adjusted return according to financial attention (# clicks per hour) and objective financial literacy

This table reports the mean values for non overconfident investors performance (monthly risk-adjusted return in %) according to different levels of financial attention (number of clicks per hour) and to different degrees of objective financial literacy (the score achieved at the first attempt at completing the MiFID questionnaire). The sample consists of 17,159 non overconfident investors.

	Financial Attention (# clicks per hour)							
	Risk-adjusted return in % (mean)							
	All	$P20$	$P40$	$P50$	$P60$	$P80$	$P80$ minus $P20$	t-stat
Objective Financial Literacy								
All	0.18%	0.19%	0.20%	0.18%	0.19%	0.19%	0.00%	1.63
Very Low	0.17%	0.20%	0.24%	0.23%	0.18%	0.14%	-0.06%	-1.95
Low	0.20%	0.24%	0.27%	0.27%	0.28%	0.23%	-0.01%	-1.64
High	0.22%	0.25%	0.29%	0.29%	0.30%	0.32%	0.07%	1.96
Very High	0.20%	0.22%	0.27%	0.26%	0.32%	0.31%	0.09%	1.99
High minus Low	0.02%	0.01%	0.02%	0.02%	0.02%	0.09%		
t-stat	1.67	1.63	1.67	1.69	1.67	1.99		
Very High minus Very Low	0.03%	0.02%	0.03%	0.03%	0.14%	0.17%		
t-stat	1.73	1.65	1.66	1.67	1.98	2.06		

Table 6: Risk-adjusted return, financial attention (# clicks per hour) and objective financial literacy for non overconfident investors: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks per hour) on proxy for investors performance (monthly risk-adjusted return), according to different degrees of objective financial literacy (OFL). The samples consist of: 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total number of clicks per hour registered on investors' account when they are logged in on the platform to check for financial information. The specification in Panel A does not include control variables; the specification in Panel B includes the following control variables: gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Portfolio value is expressed in logs; risk-adjusted return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel A: Without Controls				
Intercept	1.33***	1.29***	1.23***	0.57***
	(0.20)	(0.12)	(0.31)	(0.11))
Financial attention (# clicks per hour)	-0.09***	-0.07***	0.06***	0.05***
	(0.03)	(0.02)	(0.02)	(0.01)
R^2	0.0187	0.0254	0.0209	0.0211

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: With Controls				
Intercept	1.29***	1.33***	1.15***	0.83***
	(0.37)	(0.31)	(0.25)	(0.15)
Financial attention (# clicks per hour)	-0.12***	-0.09***	0.04***	0.03***
	(0.03)	(0.03)	(0.01)	(0.01)
Gender	-0.08***	-0.04**	-0.05**	-0.09***
	(0.02)	(0.02)	(0.02)	(0.03)
Age	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	0.01	0.01	0.01**	0.01***
	(0.01)	(0.01)	(0.00)	(0.00)
Portfolio concentration	-0.56***	-0.83***	-0.70***	-0.65***
	(0.17)	(0.25)	(0.22)	(0.23)
R^2	0.0188	0.0228	0.0258	0.0260

Table 7: Univariate results (mean) for overconfident investors risk-adjusted return according to financial attention (# clicks per hour) and objective financial literacy

This table reports the mean values for overconfident investors performance (monthly risk-adjusted return in %) according to different levels of financial attention (number of clicks per hour) and to different degrees of objective financial literacy (the score achieved at the first attempt at completing the MiFID questionnaire). The sample consists of 1,954 overconfident investors.

	Financial Attention (# clicks per hour)							
	Risk-adjusted return in % (mean)							
	All	$P20$	$P40$	$P50$	$P60$	$P80$	$P80$ minus $P20$	t-stat
Objective Financial Literacy								
All	0.20%	0.17%	0.43%	0.32%	0.38%	0.17%	0.00%	1.63
Very Low	0.10%	0.15%	0.19%	0.23%	0.15%	0.13%	-0.02%	-1.73
Low	0.20%	0.23%	0.25%	0.27%	0.25%	0.23%	0.00%	1.54
High	0.23%	0.25%	0.29%	0.32%	0.36%	0.35%	0.10%	1.96
Very High	0.23%	0.25%	0.28%	0.34%	0.34%	0.35%	0.10%	1.97
High minus Low	0.03%	0.02%	0.04%	0.05%	0.11%	0.12%		
t-stat	1.75	1.66	1.76	1.79	1.99	2.24		
Very High minus Very Low	0.13%	0.10%	0.09%	0.11%	0.19%	0.22%		
t-stat	1.99	1.96	1.96	1.98	2.43	2.58		

Table 8: Univariate results (mean) for non overconfident versus overconfident investors risk-adjusted return according to financial attention (# clicks per hour) and objective financial literacy

This table reports the mean values for non overconfident versus overconfident investors performance (monthly risk-adjusted return in %) according to different levels of financial attention (number of clicks per hour) and to different degrees of objective financial literacy (the score achieved at the first attempt at completing the MiFID questionnaire). The sample consists of 17,159 non overconfident investors and 1,954 overconfident investors.

	Financial Attention (# clicks per hour)					
	Risk-adjusted return in % (mean)					
	All	*P*20	*P*40	*P*50	*P*60	*P*80
Objective Financial Literacy						
Very Low No Overconfidence	0.17%	0.20%	0.24%	0.23%	0.18%	0.14%
Very Low Overconfidence	0.10%	0.15%	0.19%	0.23%	0.15%	0.13%
Overconfidence minus No Overconfidence	-0.07%	-0.05%	-0.05%	0.00%	-0.03%	-0.01%
t-stat	-1.71	-1.69	-1.73	1.43	-1.73	-1.66
Low No Overconfidence	0.20%	0.24%	0.27%	0.27%	0.28%	0.23%
Low Overconfidence	0.20%	0.23%	0.25%	0.27%	0.25%	0.23%
Overconfidence minus No Overconfidence	0.00%	-0.01%	-0.02%	0.00%	-0.03%	0.00%
t-stat	1.60	-1.65	-1.67	1.48	-1.71	1.62
High No Overconfidence	0.22%	0.25%	0.29%	0.29%	0.30%	0.32%
High Overconfidence	0.23%	0.25%	0.29%	0.32%	0.36%	0.35%
Overconfidence minus No Overconfidence	0.01%	0.00%	0.00%	0.03%	0.06%	0.03%
t-stat	1.65	1.50	1.48	1.75	1.83	1.70
Very High No Overconfidence	0.20%	0.22%	0.27%	0.26%	0.32%	0.31%
Very High Overconfidence	0.23%	0.25%	0.28%	0.34%	0.34%	0.35%
Overconfidence minus No Overconfidence	0.03%	0.03%	0.01%	0.08%	0.02%	0.04%
t-stat	1.76	1.74	1.65	1.93	1.71	1.77

Table 9: Risk-adjusted return, financial attention (# clicks per hour) and objective financial literacy considering overconfidence: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks per hour) on proxy for investors performance (monthly risk-adjusted return), according to different degrees of objective financial literacy (OFL). The samples consist of: 264 overconfident and 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 754 overconfident and 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 393 overconfident and 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 543 overconfident and 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total number of clicks per hour registered on investors' account when they are logged in on the platform to check for financial information. The specification in Panel A presents the baseline model; the specification in Panel B presents the model with overconfidence and the interaction effect; Panel C presents the model with the following control variables: gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Overconfidence proxy is measured by the difference in score between the last and the first attempt at filling in the MiFID questionnaire; portfolio value is expressed in logs; risk-adjusted return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel A: Baseline Model				
Intercept	1.29***	1.03***	1.23***	0.57***
	(0.34)	(0.28)	(0.11)	(0.16)
Financial attention (# clicks per hour)	-0.05***	-0.09***	0.07***	0.16***
	(0.01)	(0.03)	(0.02)	(0.05)
R^2	0.0159	0.0173	0.0176	0.0161

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: Model with Overconfidence				
Intercept	0.50***	0.52***	0.37***	0.65***
	(0.16)	(0.14)	(0.08)	(0.18)
Financial attention (# clicks per hour)	-0.07***	-0.01***	0.12***	0.13***
	(0.02)	(0.00)	(0.04)	(0.04)
Overconfidence	-0.08**	-0.01*	-0.02**	0.03**
	(0.04)	(0.00)	(0.01)	(0.01)
FA × Overconfidence	-0.10***	-0.06***	0.04***	0.12***
	(0.03)	(0.02)	(0.01)	(0.04)
R^2	0.0211	0.0223	0.0229	0.0219

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel C: Model with Overconfidence and Controls				
Intercept	0.65***	0.93***	0.72***	0.81***
	(0.20)	(0.27)	(0.18)	(0.22)
Financial attention (# clicks per hour)	-0.08***	-0.02***	0.10***	0.12***
	(0.02)	(0.00)	(0.03)	(0.04)
Overconfidence	-0.10**	-0.07**	-0.02**	0.03***
	(0.05)	(0.03)	(0.01)	(0.01)
FA × Overconfidence	-0.11***	-0.06***	0.03***	0.10***
	(0.03)	(0.02)	(0.01)	(0.02)
# attempts	-0.02**	-0.04**	-0.02**	-0.10**
	(0.01)	(0.02)	(0.01)	(0.05)
Gender	-0.09**	-0.10**	-0.13***	-0.05**
	(0.04)	(0.05)	(0.03)	(0.02)
Age	0.02***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	0.01	0.01**	0.01***	0.01***
	(0.01)	(0.00)	(0.00)	(0.00)
Portfolio concentration	-0.43***	-0.27***	-0.36***	-0.24***
	(0.15)	(0.08)	(0.09)	(0.06)
R^2	0.0263	0.0273	0.0258	0.0227

Appendices

Appendix A portrays the full version of the questionnaire related to MiFID I, for the non-complex financial instruments. The questionnaire is used by the brokerage firm that offered data for the empirical analysis. Appendix B reports the univariate results (median) for the risk-adjusted return. Appendix C presents the OLS regression results using the alternative proxy for investors performance, the net return. Appendix D reports the OLS regression results about the effect that two alternative proxy variables for financial attention (the total duration and the total number of clicks) have on the proxy for investors performance (risk-adjusted return). Finally, Appendix E presents the OLS regression results about the effect of financial attention on performance, using a different proxy variable for overconfidence (a dummy equal to one if the investor is overconfident and fills in the MiFID questionnaire more than once; equal to zero otherwise).

A MiFID Questionnaires

This appendix reports the full questionnaire for non-complex financial instruments (appropriateness questionnaire) related to MiFID I. The empirical analysis is based on data related to this questionnaire. According to the MiFID, both I and II, every broker and financial institution has the discretionary power in designing the questionnaire. The aim of the two directives is to assess investors' financial literacy. At this regard, Directive (2004/39/EC) maintains: "investment firms have to ask the client to provide information regarding knowledge and experience... to assess whether the product is appropriate...", and again Directive /2014/65/EC) states: "investment firms have to ask the client to provide information regarding knowledge and experience in the investment field relevant to the specific type of product or service offered or demanded so as to enable the investment firm to assess whether the investment service or product envisaged is appropriate for the client". Both directives do not give any further specifications on how to do this. Generally speaking, MiFID questionnaire checks suitability and appropriateness of financial instruments offered to investors. The structure of the MiFID I questionnaire for non-complex instruments used by our brokerage firm is shown in Figure A.1.

Figure A.1: MiFID Questionnaire

MiFID Questionnaire - Non-Complex Financial Instruments

1022:
Due to the subprime crisis of 2008, there was a bear market. What did that mean?

1023:
The most important stock indicator of the Belgian stock market, the BEL 20 index, is discussed daily in the media. The BEL 20 is an index that shows the average price development of 20 shares, which are ……..

1024:
"You want to place a buy order. You can choose between giving a limit order and a market order. Which of the following statements is correct?
- Statement 1: A limit order is always guaranteed to be executed
- Statement 2: With a limit order, you know the maximum amount to be paid in advance."

1025:
In the order screen you will see different rates. You can see, among other things, the last price, the ask price and bid price and the closing price. What is the bid rate?
- The price of the best buyer. You can basically sell your securities at this price
- The price you (maximum) bid to buy certain securities
- The guaranteed price offered if there are no other interested parties
- I don't know

1026:
Various investment products can be traded on the stock exchange. For example, there are stocks and bonds. If we rank the different investment products of a Belgian listed company one after the other, starting with the product with the lowest risk and ending with the product with the highest risk, which order is generally correct?
- Stocks, Savings in a Savings Account, Bonds
- Bonds, Stocks, Saving in a Savings Account
- Saving on a savings account, bonds, stocks
- I don't know

1027:
What is a spread?
- The difference between the bid and ask price
- The time it takes to ship an order
- A form of portfolio diversification
- I don't know

1028:
The ECB decides to raise interest rates. You have bonds in your portfolio. What is happening?
- An interest rate change is often short-lived, so the price will recover on its own
- I make a profit because of the interest rate hike, because the bonds are worth more
- The interest rate hike will cause the price of my bonds to fall
- I don't know

1029:
If the EUR/USD rate goes down, then:
- Decreases the value of the euro against the dollar
- The value of the dollar falls against the euro
- The value of the euro falls against the dollar and the value of the dollar falls against the euro
- I don't know

1030:
Have you already invested in a listed product?
- Yes
- No

1031:
Are you looking for additional information if you have questions about a financial product?
- Yes
- No

B Univariate Results (median) for Risk-Adjusted Return

This appendix reports the univariate results (median) for the risk-adjusted return. Table B.1 presents the median results for the sample of non overconfident investors performance and table B.2 shows the median results for the sample of overconfident investors performance. Table B.3 pictures the median results making the comparison between performance for non overconfident and overconfident investors.

Table B.1: Univariate results (median) for non overconfident investors risk-adjusted return according to financial attention (# clicks per hour) and objective financial literacy

This table reports the median values for non overconfident investors performance (monthly risk-adjusted return in %) according to different levels of financial attention (number of clicks per hour) and to different degrees of objective financial literacy (the score achieved at the first attempt at completing the MiFID questionnaire). The sample consists of 17,159 non overconfident investors.

	Financial Attention (# clicks per hour)							
	Risk-adjusted return in % (median)							
	All	$P20$	$P40$	$P50$	$P60$	$P80$	$P80$ minus $P20$	p-value
Objective Financial Literacy								
All	0.13%	0.14%	0.15%	0.12%	0.17%	0.17%	0.03%	0.21
Very Low	0.11%	0.12%	0.11%	0.12%	0.12%	0.12%	0.00%	0.27
Low	0.11%	0.12%	0.14%	0.16%	0.12%	0.12%	0.00%	0.23
High	0.11%	0.13%	0.15%	0.16%	0.16%	0.14%	0.01%	0.15
Very High	0.11%	0.13%	0.12%	0.13%	0.13%	0.14%	0.01%	0.18
High minus Low	0.00%	0.01%	0.01%	0.00%	0.04%	0.02%		
p-value	0.19	0.14	0.12	0.21	0.09	0.13		
Very High minus Very Low	0.00%	0.01%	0.01%	0.01%	0.01%	0.02%		
p-value	0.23	0.17	0.15	0.21	0.14	0.09		

Table B.2: Univariate results (median) for overconfident investors risk-adjusted return according to financial attention (# clicks per hour) and objective financial literacy

This table reports the mean values for overconfident investors performance (monthly risk-adjusted return in %) according to different levels of financial attention (number of clicks per hour) and to different degrees of objective financial literacy (the score achieved at the first attempt at completing the MiFID questionnaire). The sample consists of 1,954 overconfident investors.

	Financial Attention (# clicks per hour)							
	Risk-adjusted return in % (median)							
	All	$P20$	$P40$	$P50$	$P60$	$P80$	$P80$ minus $P20$	p-value
Objective Financial Literacy								
All	0.01%	0.01%	0.02%	0.03%	0.05%	0.05%	0.04%	0.19
Very Low	0.06%	0.05%	0.07%	0.05%	0.03%	0.04%	-0.01%	0.14
Low	0.01%	0.05%	0.05%	0.07%	0.07%	0.04%	-0.01%	0.19
High	0.11%	0.15%	0.17%	0.18%	0.17%	0.16%	0.01%	0.17
Very High	0.13%	0.16%	0.17%	0.20%	0.21%	0.23%	0.07%	0.05
High minus Low	0.10%	0.10%	0.12%	0.11%	0.10%	0.12%		
p-value	0.08	0.03	0.03	0.07	0.02	0.09		
Very High minus Very Low	0.07%	0.11%	0.10%	0.15%	0.18%	0.19%		
p-value	0.09	0.05	0.06	0.07	0.05	0.02		

Table B.3: Univariate results (median) for non overconfident versus overconfident investors risk-adjusted return according to financial attention (# clicks per hour) and objective financial literacy

This table reports the mean values for non overconfident versus overconfident investors performance (monthly risk-adjusted return in %) according to different levels of financial attention (number of clicks per hour) and to different degrees of objective financial literacy (the score achieved at the first attempt at completing the MiFID questionnaire). The sample consists of 17,159 non overconfident investors and 1,954 overconfident investors.

	Financial Attention (# clicks per hour)					
	Risk-adjusted return in % (median)					
	All	$P20$	$P40$	$P50$	$P60$	$P80$
Objective Financial Literacy						
Very Low No Overconfidence	0.11%	0.12%	0.11%	0.12%	0.12%	0.12%
Very Low Overconfidence	0.06%	0.05%	0.07%	0.05%	0.03%	0.04%
Overconfidence minus No Overconfidence	-0.05%	-0.07%	-0.04%	-0.07%	-0.09%	-0.08%
p-value	0.08	0.06	0.10	0.07	0.05	0.06
Low No Overconfidence	0.11%	0.12%	0.14%	0.16%	0.12%	0.12%
Low Overconfidence	0.01%	0.05%	0.05%	0.07%	0.07%	0.04%
Overconfidence minus No Overconfidence	-0.10%	-0.07%	-0.09%	-0.09%	-0.05%	-0.08%
p-value	0.07	0.09	0.06	0.05	0.07	0.05
High No Overconfidence	0.11%	0.13%	0.15%	0.16%	0.16%	0.14%
High Overconfidence	0.11%	0.15%	0.17%	0.18%	0.17%	0.16%
Overconfidence minus No Overconfidence	0.00%	0.02%	0.02%	0.02%	0.01%	0.02%
p-value	0.17	0.12	0.10	0.11	0.18	0.13
Very High No Overconfidence	0.11%	0.13%	0.12%	0.13%	0.13%	0.14%
Very High Overconfidence	0.13%	0.16%	0.17%	0.20%	0.21%	0.23%
Overconfidence minus No Overconfidence	0.02%	0.03%	0.05%	0.07%	0.08%	0.09%
p-value	0.10	0.09	0.03	0.03	0.06	0.05

C Regression Results for Net Return

This appendix reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks per hour) on the alternative proxy for investors performance, the monthly net return expressed in %, according to different degrees of objective financial literacy. Table C.4 presents the OLS regression results for the non overconfident investors. Table C.5 pictures the OLS regression results including in the sample also the overconfident investors.

Table C.4: Net return, financial attention (# clicks per hour) and objective financial literacy for non overconfident investors: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks per hour) on proxy for investors performance (monthly net return), according to different degrees of objective financial literacy (OFL). The samples consist of: 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total number of clicks per hour an investor does to check for financial information when he is logged into the trading platform. The specification in Panel A does not include control variables; the specification in Panel B includes the following control variables: gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Portfolio value is expressed in logs; net return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel A: Without Controls				
Intercept	1.09***	1.21***	0.39***	1.78***
	(0.18)	(0.34)	(0.07)	(0.41)
Financial attention (duration)	-0.01***	-0.11***	0.17***	0.15***
	(0.00)	(0.03)	(0.05)	(0.05)
R^2	0.0184	0.0154	0.0146	0.0182

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: With Controls				
Intercept	0.09***	0.32**	0.37***	0.83***
	(0.01)	(0.15)	(0.11)	(0.24)
Financial attention (duration)	-0.09***	-0.14***	0.12***	0.10***
	(0.03)	(0.04)	(0.03)	(0.03)
Gender	-0.07**	-0.04***	-0.08**	0.03
	(0.03)	(0.01)	(0.03)	(0.03)
Age	0.02***	0.01***	0.01***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	-0.01	0.01	-0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Portfolio concentration	-0.29***	-0.84***	-0.22***	-0.33***
	(0.08)	(0.21)	(0.06)	(0.09)
R^2	0.0193	0.0238	0.0189	0.0247

Table C.5: Net return, financial attention (# clicks per hour) and objective financial literacy considering overconfidence: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks per hour) on proxy for investors performance (monthly net return), according to different degrees of objective financial literacy (OFL). The samples consist of: 264 overconfident and 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 754 overconfident and 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 393 overconfident and 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 543 overconfident and 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total number of clicks per hour an investor does to check for financial information when he is logged into the trading platform. The specification in Panel A presents the baseline model; the specification in Panel B presents the model with overconfidence and the interaction effect; Panel C presents the model with the following control variables: number of attempts at filling in the questionnaire, gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Overconfidence proxy is measured by the difference in score between the last and the first attempt at filling in the MiFID questionnaire; portfolio value is expressed in logs; net return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel A: Baseline Model				
Intercept	1.37***	2.35***	1.20***	1.91***
	(0.33)	(0.38)	(0.35)	(0.44)
Financial attention (duration)	-0.06***	-0.05***	0.03***	0.02***
	(0.02)	(0.01)	(0.01)	(0.00)
R^2	0.0118	0.0121	0.0158	0.0139

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: Model with Overconfidence				
Intercept	1.27***	1.02***	1.27***	1.66***
	(0.38)	(0.19)	(0.15)	(0.40)
Financial attention (duration)	-0.06***	-0.01***	0.13***	0.04***
	(0.02)	(0.00)	(0.04)	(0.01)
Overconfidence	-0.01***	-0.01**	-0.01	0.03***
	(0.00)	(0.00)	(0.01)	(0.01)
FA × Overconfidence	-0.05***	-0.01***	0.06***	0.06***
	(0.01)	(0.00)	(0.02)	(0.02)
R^2	0.0218	0.0221	0.0258	0.0239

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel C: Model with Overconfidence and Controls				
Intercept	0.97***	1.18***	0.84***	0.72***
	(0.33)	(0.36)	(0.19)	(0.24)
Financial attention (duration)	-0.07***	-0.01***	0.10***	0.06***
	(0.02)	(0.00)	(0.03)	(0.02)
Overconfidence	-0.03***	-0.01**	-0.01*	0.03***
	(0.00)	(0.00)	(0.00)	(0.01)
FA × Overconfidence	-0.05***	-0.01***	0.05***	0.07***
	(0.01)	(0.00)	(0.01)	(0.01)
# attempts	-0.03***	-0.03**	-0.03**	-0.09***
	(0.01)	(0.01)	(0.01)	(0.03)
Gender	-0.13**	0.15	-0.07**	-0.14**
	(0.06)	(0.12)	(0.03)	(0.07)
Age	0.03***	0.04***	0.02***	0.01***
	(0.01)	(0.01)	(0.00)	(0.00)
Wealth (portfolio value)	-0.01	0.01	-0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Portfolio concentration	-1.68***	-1.24***	-1.29***	-1.76***
	(0.25)	(0.20)	(0.17)	(0.30)
R^2	0.0264	0.0242	0.0199	0.0213

D Regression Results using Different Proxies for Financial Attention

This appendix reports the OLS regression results about the effect of two alternative proxy variables for financial attention on the proxy for investors performance (monthly risk-adjusted return[15]). The first alternative proxy variable for financial attention is given by the total duration of time, expressed in days on a monthly basis, that an investor has spent logged in on the trading platform; the second alternative proxy variable is given by the monthly number of clicks registered on investors' account when they are logged in on the platform and check for news and information. The sample for non overconfident investors consists of 17,159 investors, between January 2014 and December 2016, whereas the sample for overconfident investors includes 1,954 clients. Table D.6 presents the OLS regression results about the effect of the first alternative proxy variable for financial attention (duration) on monthly risk-adjusted return for non overconfident investors, whereas table D.7 reports regression results including in the sample also overconfident investors. Table D.8 reports the OLS regression results about the effect of the second alternative proxy variable for financial attention (number of clicks) on monthly risk-adjusted return for non overconfident investors, and table D.9 reports regression results for the bigger sample that also consider the overconfident investors.

[15]Regression results for net return are robust and available under request.

Table D.6: Risk-adjusted return, financial attention (duration) and objective financial literacy for non overconfident: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (duration) on proxy for investors performance (monthly risk-adjusted return), according to different degrees of objective financial literacy (OFL). The samples consist of: 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total duration of the log in session. The specification in Panel A does not include control variables; the specification in Panel B includes the following control variables: gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Portfolio value is expressed in logs; risk-adjusted return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low FL	Low FL	High FL	Very High FL
Panel A: Without Controls				
Intercept	0.28***	0.19***	0.30***	0.24***
	(0.06)	(0.05)	(0.04	(0.08))
Financial attention (duration)	-0.07**	-0.05**	0.05***	0.06***
	(0.03)	(0.02)	(0.01)	(0.01)
R^2	0.0013	0.0054	0.0066	0.0011

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: With Controls				
Intercept	0.10***	0.19**	0.16**	0.40***
	(0.02)	(0.08)	(0.08)	(0.11)
Financial attention (duration)	-0.11***	-0.08**	0.02**	0.03***
	(0.03)	(0.04)	(0.01)	(0.01)
Gender	-0.23***	-0.01	-0.06	-0.10***
	(0.07)	(0.02)	(0.06)	(0.03)
Age	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	0.01	0.01	0.01**	0.01***
	(0.01)	(0.01)	(0.00)	(0.00)
Portfolio concentration	-0.46***	-0.94***	-0.79***	-0.89***
	(0.15)	(0.23)	(0.05)	(0.26)
R^2	0.0188	0.0166	0.0220	0.0209

Table D.7: Risk-adjusted return, financial attention (duration) and objective financial literacy considering overconfidence: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (duration) on proxy for investors performance (monthly risk-adjusted return), according to different degrees of objective financial literacy (OFL). The samples consist of: 264 overconfident and 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 754 overconfident and 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 393 overconfident and 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 543 overconfident and 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total duration of the log in session. The specification in Panel A presents the baseline model; the specification in Panel B presents the model with overconfidence and the interaction effect; Panel C presents the model with the following control variables: number of attempts at filling in the questionnaire, gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Overconfidence proxy is measured by the difference in score between the last and the first attempt at filling in the MiFID questionnaire; portfolio value is expressed in logs; risk-adjusted return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low FL	Low FL	High FL	Very High FL
Panel A: Baseline Model				
Intercept	0.29***	0.27***	0.39***	0.19***
	(0.08)	(0.07)	(0.11)	(0.06)
Financial attention (duration)	-0.04**	-0.09**	0.07***	0.15**
	(0.02)	(0.03)	(0.02)	(0.07)
R^2	0.0119	0.0121	0.0126	0.0121

	Very Low FL	Low FL	High FL	Very High FL
Panel B: Model with Overconfidence				
Intercept	0.54***	0.57***	0.33***	0.63***
	(0.18)	(0.16)	(0.05)	(0.16)
Financial attention (duration)	-0.06**	-0.01***	0.11**	0.12***
	(0.03)	(0.00)	(0.05)	(0.03)
Overconfidence	-0.16***	-0.11**	-0.07**	0.03**
	(0.04)	(0.05)	(0.03)	(0.01)
FA × Overconfidence	-0.09**	-0.07***	0.02**	0.12***
	(0.04)	(0.02)	(0.01)	(0.03)
R^2	0.0243	0.0221	0.0251	0.0238

	Very Low FL	Low FL	High FL	Very High FL
Panel C: Model with Overconfidence and Controls				
Intercept	1.27***	1.21***	1.33***	0.88***
	(0.25)	(0.27)	(0.37)	(0.20)
Financial attention (duration)	-0.08***	-0.05***	0.03***	0.11***
	(0.01)	(0.01)	(0.01)	(0.02)
Overconfidence	-0.05**	-0.02***	-0.13**	0.07***
	(0.29)	(0.00)	(0.06)	(0.02)
FA × Overconfidence	-0.09**	-0.05***	0.02**	0.12***
	(0.04)	(0.01)	(0.01)	(0.03)
# attempts	-0.02**	-0.04**	-0.02**	-0.10**
	(0.01)	(0.02)	(0.01)	(0.05)
Gender	-0.12**	-0.10**	-0.11*	-0.07
	(0.06)	(0.05)	(0.06)	(0.08)
Age	0.02***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	-0.01	0.01**	0.01	0.01***
	(0.01)	(0.00)	(0.01)	(0.00)
Portfolio concentration	-0.77***	-0.49***	-0.86***	-0.17***
	(0.20)	(0.13)	(0.23)	(0.05)
R^2	0.0244	0.0245	0.0249	0.0263

Table D.8: Risk-adjusted return, financial attention (number of clicks) and objective financial literacy for non overconfident investors: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks) on proxy for investors performance (monthly risk-adjusted return), according to different degrees of objective financial literacy (OFL). The samples consist of: 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total number of clicks per month. The specification in Panel A does not include control variables; the specification in Panel B includes the following control variables: gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Portfolio value is expressed in logs; risk-adjusted return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel A: Without Controls				
Intercept	1.33***	1.45***	1.62***	0.40***
	(0.20)	(0.34)	(0.26)	(0.09))
Financial attention (number of clicks)	-0.09***	-0.05***	0.03***	0.02**
	(0.02)	(0.01)	(0.01)	(0.01)
R^2	0.0132	0.0167	0.0187	0.0127

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: With Controls				
Intercept	1.23***	1.41***	1.52**	0.73***
	(0.29)	(0.32)	(0.49)	(0.23)
Financial attention (number of clicks)	-0.16**	-0.13***	0.05**	0.01***
	(0.08)	(0.03)	(0.02)	(0.00)
Gender	-0.11***	-0.05	-0.09***	-0.13***
	(0.02)	(0.07)	(0.03)	(0.04)
Age	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	0.01***	0.01	0.01***	0.01
	(0.00)	(0.01)	(0.00)	(0.01)
Portfolio concentration	-0.83***	-0.24***	-0.62***	-0.54***
	(0.21)	(0.07)	(0.18)	(0.15)
R^2	0.0175	0.0195	0.0215	0.0230

Table D.9: Risk-adjusted return, financial attention (number of clicks) and objective financial literacy considering overconfidence: OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks) on proxy for investors performance (monthly risk-adjusted return), according to different degrees of objective financial literacy (OFL). The samples consist of: 264 overconfident and 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 754 overconfident and 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 393 overconfident and 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 543 overconfident and 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total number of clicks per month. The specification in Panel A presents the baseline model; the specification in Panel B presents the model with overconfidence and the interaction effect; Panel C presents the model with the following control variables: number of attempts at filling in the questionnaire, gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Overconfidence proxy is measured by the difference in score between the last and the first attempt at filling in the MiFID questionnaire; portfolio value is expressed in logs; risk-adjusted return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel A: Baseline Model				
Intercept	1.31***	1.29***	1.51***	0.27***
	(0.29)	(0.37)	(0.39)	(0.05))
Financial attention (number of clicks)	-0.05***	-0.07***	0.06***	0.12***
	(0.01)	(0.02)	(0.02)	(0.04)
R^2	0.0215	0.0235	0.0239	0.0193

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: Model with Overconfidence				
Intercept	1.44***	1.50***	1.21**	0.49***
	(0.34)	(0.36)	(0.27)	(0.11)
Financial attention (number of clicks)	-0.11***	-0.03**	0.07***	0.01***
	(0.02)	(0.02)	(0.02)	(0.00)
Overconfidence	-0.06***	-0.03***	-0.01***	0.05**
	(0.02)	(0.01)	(0.00)	(0.02)
FA × Overconfidence	-0.10***	-0.06**	0.05***	0.04***
	(0.03)	(0.03)	(0.01)	(0.01)
R^2	0.0215	0.0235	0.0239	0.0178

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel C: Model with Overconfidence and Controls				
Intercept	1.63***	1.59***	1.32**	0.38***
	(0.39)	(0.40)	(0.38)	(0.12)
Financial attention (number of clicks)	-0.13***	-0.05***	0.05***	0.02***
	(0.04)	(0.01)	(0.01)	(0.00)
Overconfidence	-0.09***	-0.04***	-0.01***	0.08***
	(0.03)	(0.01)	(0.00)	(0.02)
FA × Overconfidence	-0.13***	-0.05***	0.05***	0.09***
	(0.04)	(0.01)	(0.01)	(0.03)
# attempts	-0.03***	-0.03**	-0.05***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.02)
Gender	-0.11***	-0.03*	-0.07***	-0.10**
	(0.03)	(0.02)	(0.02)	(0.05)
Age	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	0.01**	0.01	0.01**	0.01***
	(0.00)	(0.01)	(0.00)	(0.00)
Portfolio concentration	-0.57***	-0.21***	-0.78***	-0.14***
	(0.15)	(0.07)	(0.23)	(0.04)
R^2	0.0147	0.0203	0.0192	0.0158

E Regression Results using Different Proxy for Overconfidence

This appendix reports the OLS regression results about the effect of our proxy variable for financial attention (number of clicks per hour) on the proxy for investors performance (monthly risk-adjusted return[16]), considering overconfidence and using a new proxy variable for overconfidence. The new proxy variable for overconfidence is given by a dummy, which is equal to one if the investor fills in the MiFID questionnaire two or more times; zero if the investor fills in the questionnaire only once (Inghelbrecht and Tedde, 2024). The sample for overconfident investors includes 1,954 clients.

Table E.10: Risk-adjusted return, financial attention (number of clicks per hour) and objective financial literacy considering overconfidence (dummy): OLS regression results

This table reports the OLS regression results about the effect of the financial attention proxy variable (number of clicks per hour) on proxy for investors performance (monthly risk-adjusted return), according to different degrees of objective financial literacy (OFL) and using a dummy as overconfidence proxy variable. The samples consist of: 264 overconfident and 2,692 non overconfident investors with very low financial literacy (a score equal or lower than 5); 754 overconfident and 4,082 non overconfident investors with low financial literacy (a score between 6 and 9); 393 overconfident and 3,769 non overconfident investors with high financial literacy (a score between 10 and 14); 543 overconfident and 6,616 non overconfident investors with very high financial literacy (a score equal or higher than 15). The financial attention proxy measures the total number of clicks per hour. The specification in Panel A presents the model with overconfidence and the interaction effect; Panel B presents the model with the following control variables: number of attempts at filling in the questionnaire, gender, age, portfolio value (as proxy for investors wealth), and portfolio concentration. Overconfidence proxy is measured by the difference in score between the last and the first attempt at filling in the MiFID questionnaire; portfolio value is expressed in logs; risk-adjusted return is expressed in %. Coefficients marked with ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. Standard errors are reported between brackets.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel A: Model with Overconfidence				
Intercept	1.14***	0.68***	1.33***	0.93***
	(0.35)	(0.21)	(0.22)	(0.19)
Financial attention (# clicks per hour)	-0.08***	-0.08***	0.04***	0.03***
	(0.02)	(0.02)	(0.01)	(0.01)
Overconfidence (dummy)	-0.02***	-0.03***	-0.03***	0.03***
	(0.00)	(0.01)	(0.01)	(0.01)
FA × Overconfidence	-0.05***	-0.06***	0.03***	0.05**
	(0.01)	(0.02)	(0.01)	(0.02)
R^2	0.0159	0.0204	0.0151	0.0113

[16]Regression results for net return are robust and available under request.

	Very Low OFL	Low OFL	High OFL	Very High OFL
Panel B: Model with Overconfidence and Controls				
Intercept	0.54***	1.28***	1.09***	0.31***
	(0.12)	(0.19)	(0.33)	(0.10)
Financial attention (# clicks per hour)	-0.03***	-0.02**	0.07***	0.02***
	(0.01)	(0.01)	(0.02)	(0.00)
Overconfidence (dummy)	-0.05***	-0.05***	-0.03***	0.01***
	(0.01)	(0.01)	(0.01)	(0.00)
FA × Overconfidence	-0.03***	-0.04***	0.03***	0.02***
	(0.01)	(0.01)	(0.01)	(0.00)
# attempts	-0.03***	-0.04**	-0.03***	-0.02**
	(0.01)	(0.02)	(0.00)	(0.01)
Gender	-0.08***	-0.10***	-0.12***	-0.10***
	(0.02)	(0.02)	(0.03)	(0.03)
Age	0.01***	0.01***	0.03***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Wealth (portfolio value)	0.01	0.01	0.01	0.01**
	(0.01)	(0.01)	(0.01)	(0.00)
Portfolio concentration	-0.29***	-0.28***	-0.22***	-0.19***
	(0.07)	(0.05)	(0.05)	(0.03)
R^2	0.0223	0.0242	0.0282	0.0210