Investor attention allocation and portfolio performance: who benefits from what information?

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Abstract

We explore a unique dataset on individual investors' online trading accounts to examine the determinants of their attention allocation and its relation to portfolio performance. In particular, we investigate what individual characteristics affect investor attentiveness what information type drives investment performance. We find distinct differences in investors' attentiveness and provide evidence that paying attention has differential impact on performance depending on the type of information. General attention to portfolio monitoring and financial literacy is positively related to performance, while attention to analytical information is detrimental to performance. Attention to technical information also is negatively related to performance but only for actively trading investors. Overall, our results provide additional evidence to suggest that attention to financial literacy rather than analytical information is the key for investment success.

Keywords: Investor attention; financial literacy; portfolio performance; information type

1. Introduction

Investors have access to vast amount of information from various sources. However, as the seminal study of Kahneman (1973) shows that people are restricted in allocating their limited cognitive resources, paying attention to the right information may play an important role in determining investment performance. Hence, it is not surprising that a vast stream of literature focuses on the effects of investor attention on asset prices. For example, Vlastakis and Markellos (2012), Andrei and Hasler (2015) and Da et al. (2015) document that investor attention to stocks increases the volatility. Majority of these studies investigate broad market effects of investor attention to financial information utilizing search engine volumes (such as, for example, Google) as a proxy for investor attentiveness. More recent studies have, however, turned towards investigating the effects of investor attention on individual portfolio outcomes. Sicherman et al. (2016) present evidence on how household trading is related to investor attention, while Gargano and Rossi (2018) find that investor attention is associated with better performance. Despite extensive literature on the effects of attention on investment performance, it still remains largely unclear what affects allocation of individual investors' attention across different types of information and more importantly, attention to what type of information is most beneficial for investment performance.

Besides general attention to information, financial literacy is another factor that may affect investment outcomes of individual investors as more literate investors are supposedly better understand analytical and technical information. Lusardi and Mitchell (2014) define financial literacy as "…people's ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions." Thus, investor attention allocation may be affected by the level of financial knowledge as investors are presumably do not pay attention to information that they do not understand. An interesting

question in this regard is whether paying attention to educational information has any impact on investment performance.

In this paper, we aim to extend previous literature by investigating how investor attention to different types of information, including financial literacy, affects portfolio performance. We employ an extensive and exclusive dataset of retail investors from the large Swedish bank 'Avanza'. Essentially, Avanza is a fully digital platform for savings and investments, which is accessed by retail customers through a web page. Such feature allows us to track behavior of individual customers once they are accessing the platform. Apart from traditional brokerage services Avanza also provides its clients with financial news and analysis as well as educational material. In particular, it prepares "Guide pages" for each stock, which summarize information on stock prices and dividends, relevant trading recommendations, latest news on the company and other company-related discussions. We refer to the views of these Guide pages as a proxy for investor attention to analytical information.

Besides Guide pages customers can also access technical analysis with the set of technical analysis on underlying stocks by clicking corresponding links. We extract the number of these clicks to measure investor attention to technical analysis. In addition, Avanza provides extensive educational material for their clients, which is accessible from so-called 'Avanza Academy' pages. These pages include information on basic concepts of investing such as risk, diversification principles, securities and assets characteristics. We refer to the views of Avanza Academy pages as a proxy for investor attention to financial literacy. Finally, we track the number of times a customer accesses the platform as a proxy for general attention to his or her investment portfolio.

By employing these novel measures, we examine whether investor attention in general and in particular to analytical information, technical analysis and financial literacy affects the portfolio performance. Our dataset also includes information on investor demographics and portfolio turnover, allowing us to analyze the determinants of investor attentiveness. Website analytics and portfolio performance data are available for more than 500,000 individual investors that were recorded in 2017, making this study less prone to selection bias problem.

By focusing on investor attention to different types of information, our study contributes to two different strands of literature: First, our study adds to the research on financial literacy and investment outcomes. Closely related to our study, Bianchi (2018) combines survey data with investors' portfolio choices and finds that households who are more literate earn higher risk-adjusted returns. Our study complements findings of Bianchi (2018) by studying the relationship between investor attention to financial literacy and portfolio performance. Von Gaudecker (2015) also finds that households who are more financially literate or rely on professional advices in trading decisions achieve better investment outcomes. Collectively, these empirical findings suggest that financial literacy may influence investment performance of individual investors. However, none of these studies distinguish between attention to financial information and to financial knowledge. In this paper, we are able to examine the importance of investor attention to financial literacy besides attention to financial information because we have access to the volume of views of corresponding web pages.

Second, the data enable us to identify investor attention to technical analysis, which is very popular among retail investors and receives a wide coverage in the media. It is a compelling method for investors to improve their investment performance as there is evidence that simple technical trading rules can be profitable in certain times (e.g. Brock et

al., 1992; Szakmary et al., 2012; Szakmary and Lancaster, 2015). However, the attractiveness of technical analysis is challenged by Hoffmann and Shefrin (2014) who find evidence that the use of technical analysis is detrimental to investment performance. We contribute to this stream literature by empirically examining the effect of investor attention to technical analysis on portfolio performance.

In our study, we test two hypotheses that are novel to the literature. Our first hypothesis is that investor performance increases with investor attention to financial literacy. This hypothesis is in line with the theoretical research regarding financial knowledge as an investment in human capital leading to better performance (see Lusardi and Mitchell, 2014). Following the previous evidence by Hoffmann and Shefrin (2014), we also hypothesize that investor attention to technical analysis is detrimental to investor performance.

Our results demonstrate that investor attention has a differential impact on investor performance depending on the type of information. We find that investor performance deteriorates with more attention to analytical information, while general attention to portfolio and specifically to financial literacy is associated with better investment performance. Thus, our study confirms the results of Gargano and Rossi (2018), who also find that more portfolio attention is associated with better investment performance. We extend these findings and show that investors who pay more attention to financial literacy than analytical information perform better. Our results on investor attention to technical analysis are also in line with the previous literature, which documents that the use of technical analysis is associated with poorer investment performance (Hoffmann and Shefrin, 2014). However, we find this relationship to be significant only in case of more active investors.

The remainder of our study is organized as follows. We present and discuss the data in Section 2. We continue with presenting our methods and empirical results in Sections 3 and 4. Section 5 concludes our study.

2. Data

In this study, we are using the data from the Swedish Internet-based bank 'Avanza'[1] for the year 2017. The data shows the information on investors' portfolio annual performance, their demographics and attention to different types of financial information.

The data on portfolio performance consists of four portfolio characteristics[2]: portfolio turnover, annual returns, standard deviation and Sharpe ratio.. We use these variables to filter out investors, who may bring any potential bias in our further analysis. In particular, we removed all investors without available Sharpe ratios, returns or standard deviations as well as the investors with extreme Sharpe ratios[3] and/or negative turnover ratios. It leaves us with total of 518 432 individual investors[4].

Investors' demographics data include information on gender, age and account tenure in days. The *account tenure* variable is the number of days the investor has an account with Avanza as of December 31, 2017. We consider *account tenure* as a proxy for investor experience. It is a relevant control variable as several studies show that it can explain investment outcomes. For example, Nicolosi et al. (2009) show that more investment experience is associated with better performance. Feng and Seasholes (2005) and Da Costa Jr

[1] Davydov et al. (2017) also use the data from the same source.
[2] We are not able to obtain information on portfolio values as in Davydov et al. (2017) due to the new European General Data Protection Regulation (GDPR); Portfolio values can potentially identify individual investors as data on investment income are public information in Sweden.
[3] Extreme Sharpe ratios are those that are above 99.5 percentile or below 0.5 percentile of all the Sharpe ratios in the sample
[4] Investors can have multiple accounts. If an investor has multiple accounts, we use the aggregate value for these accounts to have the data per investor.

et al. (2013) also find that more experienced investors are less affected by the disposition effect, which is the tendency of investor to hold on to their losing stocks more than hold on to their winning stocks.

Finally, the data on investors' attention includes the number of log-ins in days during 2017, Avanza Academy page views, Guide page views, and technical analysis views on Guide pages. Avanza Academy pages present the information on basic concepts of investing, diversification and different financial instruments. This variable is used as a proxy for attention to financial literacy. Guide pages summarize different information about stock such as dividend dates, recommendations from different banks as well as buying and selling statistics. This variable is used as a proxy for attention to analytical information. For technical analysis views, we form a variable on the volume of technical analysis use within Guide pages.

Table 1 presents descriptive statistics of the sample. The statistics for *Turnover* and *Logins* show that at least 25% of the investors neither traded nor logged in into their accounts in 2017. Thus, a relatively significant fraction of the sample investors is rather inactive. Such investor inertia is much more moderate than in Dahlquist, Martinez and Söderlind (2017) who study Swedish pension plan investors and find that 69% of non-coordinated investors in their sample made no changes during the 2000-2010 period. On the other hand, the statistics of the same variables show that at least 25% of the investors have a turnover ratio of more than 315% and logged in into their accounts on average 194 out of 365 days in 2017. Such distribution implies high level of heterogeneity among individual investors in our sample.

(INSERT TABLE 1 HERE)

Table 1 also shows that the median sample investor earned 9% p.a. in returns, obtaining a Sharpe ratio of 1.09. The investors are in general relatively experienced and mature as the median *account tenure* and *age* are 2 042 days (more than 5 years) and 41

years, respectively. It should be noted that the median *account tenure* and *age* in our sample are significantly lower than in the sample of Gargano and Rossi (2018) where they are 7.52 years and 51 years, respectively.

Panel B of Table 1 presents the descriptive statistics for attention allocation. During 2017 at least one third of all of the considered investors visited Guide pages with the medium amount of views being 146 pages. The visits to Avanza Academy were more moderate and only 24.23% of the investors viewed in median 2 pages. The lowest attention was to technical analysis where 6.74% of the investors used technical analysis tool on Guide pages with median of 7 visits. While some investors possess more financial knowledge before investing with the brokerage, these results indicate that retail investors pay little attention to financial literacy relative to analytical information.

3. Methodology

The main variables of interest in our study are the variables for investor attention allocation: (1) *Logins* is the natural logarithm of number of days the investor was logged in into the investment account in 2017 and it is a proxy for investor general attention to portfolio, (2) *AcademyViews* is the natural logarithm of the number of Avanza Academy page views by investor and it is a proxy for investor attention to financial literacy, (3) *GuideViews* is the natural logarithm of the number of Avanza Guide page views and it is a proxy for investor attention to analytical information, and (4) *TAviews* is the natural logarithm of the number of technical analysis views on Avanza Guide pages. our *Logins* variable is similar to the portfolio attention variable of Sicherman et al. (2016), and Gargano and Rossi (2018) employ an investor attention variable to research which is similar to our GuideViews variable. However, our

variables for investor attention to financial literacy and technical analysis,*AcademyViews* and *TAviews,* are novel to the literature.

We begin our empirical analysis by estimating the following equation to test the determinants of investor attention to various types of information:

$$Attention_i = \alpha_i + Demographic_i + Activity_i, + \varepsilon_i, \quad (1)$$

where the dependent variable *Attention* is the attention allocation variable *Logins, AcademyViews, GuideViews* or *TAviews*; *Demographic* includes the natural logarithm of variable for investor age and a dummy variable for investor's gender (male=1). *Activity* includes the natural logarithms of variables for portfolio turnover and account tenure for an investor *i*. The purpose of the analysis of Equation (1) is to determine which demographic and investor activity characteristics are associated with attention allocation.

We proceed with our empirical analysis by testing the hypotheses oy our study by estimating the following equation:

$$Measure_i = \alpha_i + Demographic_i + Activity_i, + Attention_i + \varepsilon_i, \quad (2)$$

where the dependent variable *Measure* is either the Sharpe ratio, standard deviation of returns, or average return for an investor *i*; *Demographic* includes the natural logarithm of variable for investor age and the dummy variable of whether an investor is male or female (male=1); *Activity* includes the natural logarithm of variables for portfolio turnover and account tenure for an investor *i*, and *Attention* includes the attention behavior variables for *Logins, AcademyViews, GuideViews* and *TAviews.*

3. Results

Table 2 presents the results for the univariate tests for attention behavior. The results for Academy page views show that investor attention to financial literacy is associated with higher returns and overall better performance. For instance, investors, who read at least one page of

Avanza Academy, earn on average 2% more in annual returns. It is noteworthy that while investors who view Academy pages have higher return, they do not appear to take more risk. Investor attention to technical analysis and analytical information appear to be associated with poorer performance, higher risk and lower returns. For example, investors who view Guide pages receive on average 2% less in annual return comparred to those who do not view Guide pages: Additionally, investors who use Technical analysis receive 3% less on average.

(INSERT TABLE 2 HERE)

Table 3 presents the regression analysis estimates of Equation (1) with the variables of investor attention to financial situation, financial literacy, analytical information and technical analysis as the dependent variables. Different values of the adjusted R^2 suggest that investor characteristics explain the variability in attention to portfolio information and financial literacy variables better than in others models. It is noteworthy that the adjusted R^2 is highest, 38.5%, in explaining *Logins* and lowest, 4.5%, in explaining *TAviews*. These numbers suggest that investor characteristics better explain attention to portfolio information than attention to financial literacy and analytical information.

(INSERT TABLE 3 HERE)

Regarding the results in Table 3, *Age* seems to have differential impact on different measures of investor attention. In particular, the impact of *Age* on *TAviews* is negative and statistically significant at the 1% level, while the impacts of *Age* on *Logins*, *AcademyViews* and *GuideViews* are positive and statistically significant at the 1% level. These results suggest that older investors pay more attention to portfolio information, financial literacy and analytical information but they are less likely to use technical analysis. These results extend prior literature which shows that older investors are less financially literate (e.g., Finke, Howe and Houston, 2016) and potentially are seeking to fulfill their knowledge gap.

AccountTenure, in turn, has a negative impact on *AcademyViews* suggesting that more experience investors demand less information on financial literacy. In addition, it is noteworthy that *AccountTenure* has a negative impact on *Logins* suggesting that more experienced investors monitor less their trading accounts. This finding is in line with rational inattention hypothesis (see Sims, 2003), which states that more experienced investors better understand that attention is costly and consequently pay less attention.

The results in Table 3 for *Gender* show that males pay more attention regardless of the type of information. This finding is consistent with the extensive evidence suggesting that men are more financially engaged than women and appear to engage more in searching financial information(e.g. Lusardi, Mitchell and Curto, 2010; Lusardi and Mitchell, 2009; Lusardi and Tufano 2009). This result is also interesting with respect to Hibbert et al. (2013) who find that knowledge of finance mitigates gender differences in risk taking, while we show that it can be challenging as females tend to pay less attention to financial literacy. Alternatively, the findings of Barber and Odean (2001) suggest that males are more overconfident in comparison to females and tend to trade more, which may translate in higher consumption of different financial information. For *Age* and *Gender*, we also find that males and older investors are more attentive which is consistent with the results of Gargano and Rossi (2018). It is also notable that there is a positive relation between *Gender* and *TAviews* which is in line with Hoffman and Shefrin (2014) who find that male investors use technical analysis more than female investors.

Table 4 presents the estimates of Equation (2) with the Sharpe ratio, return and standard deviation as the dependent variables. Comparing our results for the portfolio attention variable (*Logins)* with the measure of total attention spent on the brokerage website from Gargano and Rossi (2018), we find consistent evidence that more attention is associated with better investment performance. Specifically, the statistically significant coefficients for *Logins* show

that portfolio attention is associated with higher Sharpe ratio and return and lower standard deviation. However, unlike Gargano and Rossi (2018), who find that attention to research pages is positively related to portfolio performance, we document that investor attention to analytical information, as measured by views of Guide pages, has a negative and statistically significant coefficient in explaining Sharpe ratio of investor returns. The coefficient value is -0.15 meaning that every additional Guide page view on average is associated with a decrease in Sharpe ratio by roughly 0.1.[5]

(INSERT TABLE 4 HERE)

Turning to the first hypothesis of our study on that *investor performance increases with investor attention to financial literacy,* the results in Table 4 provide strong support for this hypothesis. The coefficient for *AcademyViews* in explaining the Sharpe ratio is positive and statistically significant, indicating that more attention to the financial literacy is associated with better investor performance. The results in case of standard deviation and return also suggest that more investor attention to financial literacy is associated with higher returns and lower standard deviation. One potential explanation for these results could be that financial literacy helps investors to invest in investments with higher expected returns but they also diversify leading to a higher Sharpe ratio via both the nominator and denominator of the Sharpe ratio. Having said that, the result for higher returns can be explained by the findings of Bianchi (2018) on that more literate households earn higher returns by holding riskier assets when expected returns are higher. Collectively, our results and findings of Bianchi (2018) suggest that more literate households better diversify their portfolios. This conclusion is also in line with the findings of Abreu and Mendes (2010) and Von Gaudecher (2015).

[5] As the variables of views are taken natural logarithm of the effect of increase in each logged variable by 1 is $\beta \log(2)$

The results in Table 4 are also interesting with regard to the literature on technical analysis. In a related study, Hoffman and Shefrin (2014) find that technical analysis use by individual investors is associated with poorer investment performance. Our results in Table 4 on the hypothesis that *investor attention to technical analysis is detrimental to investor performance* are too a large extent in line with the study of Hoffman and Shefrin (2014). The results on *age* and *gender* are consistent with the evidence of Barber and Odean (2001) and Davydov et al. (2017) that older investors and women take less risk and perform better. Additionally, we find positive and statically significant coefficient for *AccountTenure* in explaining the Sharpe ratio, confirming the finding of Nicolosi et al. (2009) that more investment experience is associated with better performance.

Reported so far results may potentially be driven by a certain group of active or inactive investors. To ensure robustness of our analysis, we re-estimate Equation (2) by four turnover categories: (1) no portfolio turnover, (2) portfolio turnover is more than zero but less than or equal to its 33 percentile; (3) portfolio turnover is over its 33 percentile but less than or equal to its 66 percentile; (4) portfolio turnover is over its 66 percentile. Table 5 presents these estimations results. These results are primarily qualitatively similar to the results reported in Table 4, but there is a noteworthy difference in explaining the Sharpe ratio. Coefficient for *TAviews* in these models is statistically significant only in case of investors whose portfolio turnover is over 66 percentile. Thus, these findings provide partial support for our second hypothesis suggesting that following technical analysis by less active traders is not associated with poorer investment performance. Regarding the analysis of the standard deviation, the coefficient for *TAviews* is negative and statistically significant for investor group with portfolio turnover in the second quintile of distribution. This result, which is distinct to this investor group, implies that the use of technical analysis is associated with lower risk if used by investors whose trading activity is moderate. These investors may be able to reduce their

portfolio risk by using technical analysis. On the other hand, the effect of decreased risk does not seem to translate into higher Sharpe ratios.

(INSERT TABLE 5 HERE)

Our findings on technical analysis shed new light on the use of technical analysis by individual investors. Hoffman and Shefrin (2014) compare users and non-users of technical analysis finding evidence that the use of technical analysis is detrimental to investment performance, but we also find that it is not the case for investors with moderate trading activity. In addition, our findings show that the use of technical analysis by some investors can be associated with lower risk.

To check whether our results are different across different levels of investors' experience, we re-run Equation (2) by low, medium and long account tenure categories. We categorize investor experience as (1) if *AccountTenure* is more than zero but less than or equal to its 33 percentile; (2) *AccountTenure* is over its 33 percentile but less than or equal to its 66 percentile; (3) *AccountTenure* is over its 66 percentile. Table 6 presents the estimation results of this analysis. It is noteworthy that the explanatory power of the model decreases with account tenure. For example, the explanatory power in explaining the Share ratio is 7.6% in case of low account tenure, while it is 3.3% in case of long account tenure. An explanation for this result could be that investors' individual experience becomes more dominant driver of their investment behavior and success after they gather more investment experience. Nevertheless, it is interesting that the results on how *Logins*, *Academy*, *Guide* and *TAviews* explain the risk and performance variables is not qualitatively altered by investor experience.

(INSERT TABLE 6 HERE)

To study the relationship between the attention to financial literacy we subsample all of the investors in four broad groups: those with zero views, those with views below 33

percentile, but above zero; investors who viewed more than 33 percentile, but above 66 percentile and finally investors with more than 66 percentile of views. The groups have natural interpretation as no attention to financial literacy and low, moderate and high attention respectively. Then we re-run Equation (2) on different subsamples, while excluding the variable for financial literacy. The results of such regressions are presented in Table 7

(INSERT TABLE 7 HERE)

The insignificant coefficients for gender show that the difference in annual returns between males and females disappears for groups with moderate and high attention to financial literacy. On the other hand, significant and positive coefficients in standard deviation regressions suggests that standard deviations of portfolios are on average higher by 50 and 40 basis points for males who are moderately and highly attentive to financial literacy. The result suggest that attention to financial literacy has potential to mitigate previously documented gender differences in investment and risk taking.

The effect of attention to financial literacy becomes even more pronounced in age. The coefficient for investors with zero views of Avanza Academy appear to have negative and significant coefficient in returns and sharpe ratios, but positive in risk. On the other hand, the signs flip for investors who pay attention to financial literacy and become larger in magnitude as attention increases. The results suggests that investors with zero attention to financial literacy take higher risk and have lower returns comparing to investors who are attentive to financial literacy.

The results for *Logins* show that even though amount of logins are positively related to investor returns and decrease portfolio standard deviation; the estimate for Sharpe ratio is negative and significant for investors, who have zero views of Avanza Academy pages. On the other hand, investors, who are financially attentive, increase their Sharpe ratios on average,

when they login more frequently to their account. In particular, it seems that investors, who are attentive to financial literacy, on average make better financial decisions and take lower amount of risk..

Finally, it appears that the effect of *AccountTenure* decreases as investor shows higher attention to financial literacy. In particular, the effect on return becomes insignificant from zero among investors with highest attention to financial literacy, whereas the highest effect on returns are pronounced among investors with no attention to financial literacy.

4. Conclusion

In this study, we examine how investor attention to portfolio information, analytical information, technical analysis and financial literacy affect portfolio performance. We confirm the results by Gargano and Rossi (2018) that portfolio attention is associated with better investment performance. However, when we consider investor attention to analytical information, we find that investor performance decreases with this investor attention, which is the opposite result to what Gargano and Rossi (2018) find using a similar variable.

As a novel feature to the previous literature, our data enables us to measure investor's page views of educational information, which measures investor attention to financial literacy. We find that more investor attention to financial literacy is associated with better investor performance. Overall, our evidence consistent with the extensive previous evidence (e.g. Abreu and Mendes, 2010; Von Gaudecher, 2015; Bianchi, 2018) showing that financial literacy is important for more favorable investment outcomes:

In addition, we are able to distinguish investor attention to technical analysis from investor attention to analytical information. In relation to the evidence of Hoffman and Shefrin (2014) that investors who use technical analysis perform poorly, we find that technical analysis is detrimental to investor performance only in case of active traders. Indeed, the question of

whether the use of technical analysis affects investment performance may depend on who uses these analytics.

The main lesson of our study is that investors appear to benefit more from reading financial literacy and following their own portfolio instead of paying too much attention to analytical information. For practitioners, our study encourages brokerages and financial market intermediaries to make financial literacy more available and encourage investors to use it. As our results partly differ from the results of Gargano and Rossi (2018), more evidence across countries and different types of investment accounts is needed in order to provide more conclusive evidence on how investor attention affects portfolio performance. We leave this analysis for future research.

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Table 1. Descriptive Statistics

Panel A. Descriptive statistics of full sample

	mean	std	min	25%	50%	75%	max
Age (years)	43.31	16.78	1	31	41	55	107
Account tenure (days)	2543.27	1850.05	394	951	2042	3756	6659
Logins per year (days)	103.52	108.54	0	9	55	194	362
Turnover ratio	31676.15	4201946.02	0	0	62	315	1745576600
Annual Sharpe ratio	0.88	1.11	-1.64	0.00	1.09	1.69	7.72
Annual return	0.06	0.37	-1.00	-0.00	0.09	0.14	33.2
Annual standard deviation	0.19	0.29	0.00	0.08	0.10	0.19	20.29

Panel B. Descriptive statistics by group

	% of sample	mean	std	min	25%	50%	75%	max
Avanza Academy page views	24.23%	5.42	10.77	1	1	2	6	741
Guide pages views	34.64%	1000.38	2960.94	13	42	146	674	182270
Technical analysis views	6.74%	173.4	1538.91	1	2	7	33	163774
Total Sample			518432					
%, Male			69.83%					

The table shows the descriptive statistics of the variables used in the research. Panel A shows the descriptive statistics of the whole sample, whereas Panel B shows the descriptive statistics of subsamples assuming the investors with zero views (or usage) were excluded. The labels of the columns stand for mean, standard deviation, minimum, 25th, 50th and 75th percentile and maximum value of the sample

Table 2. Univariate Statistics

	Control Sample			Grouped Sample		
	Return	StDev	Sharpe	Return	StDev	Sharpe
Avanza Academy page views	0.05	0.19	0.87	0.07***	0.19	0.88**
Guide pages views	0.06	0.17	0.97	0.04***	0.22***	0.70***
Technical analysis views	0.06	0.18	0.89	0.03***	0.24***	0.63***

The table shows average returns, standard deviations and Sharpe ratios of the investors univariately divided in two groups: Control and Grouped sample. For example, in case of Views of Academy pages investors are divided in those who read (Grouped Sample) and those who do not read (Control Sample) Academy pages. Similarly in case of Usage of Technical Analysis investors are divided in two groups: those who use (Grouped Sample) and those who do not use (Control Sample) technical analysis. The stars identify the significance, where *,** and *** stand for 10%, 5% and 1% significance with H_0 hypothesis that the estimated mean of the Grouped Sample is not statistically different from the estimated means in Control Sample.

Table 3. Determinants of Attention Behavior

	Logins	Academy Views	Guide Views	TA usage
Intercept	1.29***	0.38***	-0.85***	-0.06***
	(88.25)	(30.65)	(-33.44)	(-6.12)
Gender	0.17***	0.02***	0.13***	0.04***
	(114.35)	(16.12)	(58.9)	(52.04)
Age	0.88***	0.07***	0.10***	-0.08***
	(117.25)	(19.11)	(12.21)	(-27.22)
AccountTenure	-0.82***	-0.27***	0.16***	0.05***
	(-127.56)	(-47.65)	(13.61)	(10.76)
Turnover	0.33***	0.04***	0.23***	0.04***
	(422.19)	(57.63)	(173.77)	(81.67)
Logins	-	0.17***	0.44***	0.07***
		(191.23)	(237.86)	(108.35)
Adj. R^2	38.5%	10.1%	22.7%	4.5%

The table shows the regression of Logins together with views of Academy and Guide pages and usage of Technical analysis on different investor characteristics. **Gender** is a dummy variable, which takes value 1 for males; **Age** is logarithm of investor age; **AccountTenure** is the log of days from the time investor became a client up to December 31, 2017; **Turnover** is logged portoflio turnover; **Logins** are the log of days investor logged in to Avanza trading platform. The values in parentheses represent t-values and *,** and *** stand for 10%, 5% and 1% significance level with the null hypothesis that the parameter estimate is not statistically significant from zero

Table 4. Investor Performance and Attention

	Sharpe ratio			Returns			St. Deviation		
Intercept	-0.66***	-0.83***	-1.07***	-0.17***	-0.19***	-0.22***	0.62***	0.65***	0.7***
	(-18.11)	(-22.74)	(-29.27)	(-13.68)	(-15.17)	(-17.48)	(65.75)	(68.01)	(73.15)
Gender	-0.20***	-0.22***	-0.21***	-0.02***	-0.02***	-0.02***	0.06***	0.06***	0.06***
	(-61.88)	(-67.99)	(-63.19)	(-18.34)	(-21.05)	(-19.36)	(77.34)	(80.59)	(76.05)
Age	0.12***	0.00	-0.01	-0.01	-0.02***	-0.02***	-0.01***	0.01*	0.01***
	(8.92)	(0.02)	(-0.72)	(-1.51)	(-5.19)	(-5.87)	(-5.0)	(1.87)	(2.59)
AccountTenure	0.80***	0.91***	1.02***	0.12***	0.14***	0.15***	-0.23***	-0.25***	-0.27***
	(49.05)	(54.82)	(61.1)	(20.96)	(22.79)	(25.19)	(-52.71)	(-55.6)	(-60.4)
Turnover	-0.20***	-0.24***	-0.22***	-0.01***	-0.02***	-0.02***	0.03***	0.04***	0.03***
		(-119.46)	(-104.81)	(-21.94)	(-27.54)	(-23.38)	(55.24)	(58.86)	(48.53)
Logins		0.14***	0.16***		0.02***	0.02***		-0.02***	-0.03***
		(40.66)	(45.52)		(19.06)	(18.23)		(-25.78)	(-30.69)
AcademyViews			0.28***			0.04***			-0.06***
			(64.11)			(26.54)			(-47.46)
GuideViews			-0.15***			-0.01***			0.03***
			(-64.17)			(-16.84)			(47.66)
TAviews			-0.05***			-0.01***			0.01***
			(-9.05)			(-5.98)			(8.74)
Adj. R^2	4.3%	4.6%	5.8%	0.3%	0.3%	0.5%	2.5%	2.6%	3.4%

The table shows the regression of Sharpe ratio, Portfolio returns and Standard Deviation on different investor characteristics. **Gender** is a dummy variable, which takes value 1 for males; **Age** is logarithm of investor age; **AccountTenure** is the log of days from the time investor became a client up to December 31, 2017; **Turnover** is logged portfolio turnover; **Logins** are the log of days investor logged in to Avanza trading platform; **AcademyViews** is the logarithm of views of Academy pages; **GuideViews** is the logarithm of views of Guide pages and **TAviews** is the logarithm of times investor used technical analysis. The values in parentheses represent t-values and *,** and *** stand for 10%, 5% and 1% significance level with the null hypothesis that the parameter estimate is not statistically significant from zero

Table 5. Analysis of Investor Performance by Turnover

	Turnover=0			Q1			Q2			Q3		
	Sharpe	Returns	StDev	Sharpe	Returns	StDev	Sharpe	Returns	StDev	Sharpe	Returns	StDev
Intercept	0.99***	-0.17***	0.55***	-2.70***	-0.17***	0.78***	-2.88***	-0.37***	0.78***	-1.86***	-0.23***	0.87***
	(16.25)	(-9.09)	(36.6)	(-34.36)	(-6.57)	(52.93)	(-35.92)	(-15.55)	(40.66)	(-21.99)	(-6.01)	(29.93)
Gender	-0.23***	-0.02***	0.05***	-0.12***	-0.01**	0.05***	-0.18***	-0.02***	0.06***	-0.22***	-0.02***	0.08***
	(-46.88)	(-16.92)	(44.68)	(-17.14)	(-2.56)	(37.56)	(-23.61)	(-8.90)	(36.47)	(-26.09)	(-8.06)	(28.36)
Age	-0.31***	-0.04***	0.05***	0.09***	-0.02***	0.00	0.39***	0.01	-0.05***	0.5***	-0.01	-0.12***
	(-18.48)	(-11.38)	(14.25)	(2.81)	(-2.97)	(0.50)	(10.25)	(0.40)	(-4.97)	(10.8)	(-0.68)	(-8.9)
AccountTenure	0.28***	0.14***	-0.22***	1.51***	0.11***	-0.29***	1.36***	0.16***	-0.26***	1.07***	0.13***	-0.27***
	(9.83)	(16.36)	(-31.27)	(42.07)	(8.95)	(-40.57)	(37.9)	(13.66)	(-32.55)	(28.61)	(7.81)	(-20.8)
Logins	0.17***	0.01***	-0.04***	0.18***	0.03***	-0.01***	0.15***	0.06***	-0.00	-0.17***	0.01**	0.04***
	(41.02)	(6.21)	(-32.98)	(19.93)	(12.65)	(-7.65)	(12.22)	(17.11)	(-1.54)	(-12.6)	(2.15)	(6.86)
AcademyViews	0.27***	0.04***	-0.06***	0.28***	0.04***	-0.04***	0.27***	0.04***	-0.05***	0.31***	0.05***	-0.08***
	(31.03)	(16.1)	(-26.07)	(29.51)	(14.89)	(-25.58)	(32.03)	(16.78)	(-27.03)	(35.89)	(12.71)	(-25.49)
GuideViews	-0.33***	-0.04***	0.06***	-0.1***	-0.02***	0.02***	-0.10***	-0.01***	0.02***	-0.16***	-0.02***	0.04***
	(-53.43)	(-16.87)	(36.33)	(-23.7)	(-10.21)	(22.23)	(-21.93)	(-7.98)	(19.95)	(-36.25)	(-9.58)	(24.59)
TAviews	0.02	-0.01	-0.01	-0.00	-0.01	-0.00	0.01	-0.00	-0.005***	-0.09***	-0.02***	0.02***
	(0.90)	(-1.30)	(-0.83)	(-0.09)	(-1.50)	(-0.81)	(0.64)	(-0.79)	(-2.66)	(-11.03)	(-4.20)	(6.50)
Adj. R^2	4%	0.8%	2.9%	3%	0.4%	3.2%	3%	0.7%	2.6%	4%	0.3%	2.4%
N. Obs	180064	180064	180064	113129	113129	113129	112508	112508	112508	112731	112731	112731

The table shows the regression of Sharpe ratio, Portfolio returns and Standard Deviation on investors grouped by Turnover ratio. **Gender** is a dummy variable, which takes value 1 for males; **Age** is logarithm of investor age; **AccountTenure** is the log of days from the time investor became a client up to December 31, 2017; **Logins** are the log of days investor logged in to Avanza trading platform; **AcademyViews** is the logarithm of views of Academy pages; **GuideViews** is the logarithm of views of Guide pages and **TAviews** is the logarithm of times investor used technical analysis. Turnover = 0 represents the group of investors with no trades, whereas Q1, Q2 and Q3 stand for the group of investors with more than zero less or equal 33%, more 33% but less 66% and more than 66% portfolio turnover. The values in parentheses represent t-values and *,** and *** stand for 10%, 5% and 1% significance level with the null hypothesis that the parameter estimate is not statistically significant from zero

Table 6. Analysis of Investor Performance by Account Tenure

	Q1			Q2			Q3		
	Sharpe	Returns	StDev	Sharpe	Returns	StDev	Sharpe	Returns	StDev
Intercept	0.89***	0.04***	0.16***	0.91***	0.11***	0.15***	1.58***	0.15***	0.16***
	(26.75)	(4.11)	(20.4)	(26.48)	(10.18)	(21.67)	(35.66)	(13.05)	(16.27)
Gender	-0.23***	-0.03***	0.08***	-0.21***	-0.02***	0.05***	-0.15***	-0.01***	0.04***
	(-39.91)	(-15.45)	(54.46)	(-37.61)	(-11.28)	(43.90)	(-27.15)	(-5.17)	(28.32)
Age	0.09***	-0.01	0.01	0.18***	-0.02***	-0.01	-0.3***	-0.04***	-0.02***
	(3.96)	(-1.35)	(0.99)	(7.69)	(-3.47)	(-1.64)	(-10.44)	(-6.03)	(-3.08)
Turnover	-0.31***	-0.02***	0.04***	-0.18***	-0.01***	0.03***	-0.14***	-0.01***	0.02***
	(-86.16)	(-18.02)	(36.19)	(-52.42)	(-10.34)	(24.31)	(-39.07)	(-12.01)	(21.42)
Logins	0.18***	0.04***	-0.03***	0.12***	0.01***	-0.03***	0.13***	0.01***	-0.02***
	(24.37)	(18.75)	(-16.67)	(19.26)	(8.25)	(-17.34)	(25.35)	(5.75)	(-13.07)
AcademyViews	0.3***	0.05***	-0.06***	0.27***	0.04***	-0.05***	0.29***	0.04***	-0.05***
	(41.58)	(16.83)	(-33.46)	(35.84)	(13.37)	(-23.16)	(33.46)	(15.05)	(-23.96)
GuideViews	-0.11***	-0.01***	0.03***	-0.17***	-0.02***	0.03***	-0.16***	-0.02***	0.03***
	(-26.24)	(-5.55)	(22.18)	(-42.36)	(-11.94)	(30.54)	(-40.45)	(-11.39)	(28.3)
TAviews	-0.03***	-0.01**	0.01***	-0.06***	-0.02***	0.02***	-0.06***	-0.01***	0.02***
	(-2.73)	(-2.32)	(3.59)	(-6.70)	(-4.88)	(5.71)	(-6.20)	(-3.37)	(5.61)
Adj. R^2	7.6%	0.5%	3.7%	5.4%	0.4%	2.9%	3.3%	0.4%	2%
N. Obs	172871	172871	172871	172754	172754	172754	172807	172807	172807

The table shows the regression of Sharpe ratio, Portfolio returns and Standard Deviation on investors grouped by time as a client. **Gender** is a dummy variable, which takes value 1 for males; **Age** is logarithm of investor age; **Turnover** is the log of portfolio turnover; **Logins** are the log of days investor logged in to Avanza trading platform; **AcademyViews** is the logarithm of views of Academy pages; **GuideViews** is the logarithm of views of Guide pages and **TAviews** is the logarithm of times investor used technical analysis. Q1, Q2 and Q3 stand for the group of investors with less or equal 33%, more 33% but less 66% and more than 66% days as a client. The values in parentheses represent t-values and *,** and *** stand for 10%, 5% and 1% significance level with the null hypothesis that the parameter estimate is not statistically significant from zero

Table 7. Analysis of Investor Performance by Avanza Academy page views

	AcademyViews=0			Q1			Q2			Q3		
	Sharpe	Returns	StDev	Sharpe	Returns	StDev	Sharpe	Returns	StDev	Sharpe	Returns	StDev
Intercept	-0.96***	-0.25***	0.71***	-1.83***	-0.25***	0.69***	-2.17***	-0.24***	0.65***	-2.09***	-0.19***	0.67***
	(-23.02)	(-17.22)	(64.31)	(-15.99)	(-6.16)	(23.98)	(-11.57)	(-4.05)	(14.79)	(-14.71)	(-3.73)	(16.73)
Gender	-0.23***	-0.02***	0.06***	-0.15***	-0.01***	0.05***	-0.12***	-0.00	0.05***	-0.08***	0.00	0.04***
	(-61.86)	(-20.73)	(67.97)	(-14.69)	(-3.87)	(26.81)	(-7.01)	(-0.89)	(16.27)	(-6.43)	(0.07)	(14.87)
Age	-0.12***	-0.03***	0.02***	0.6***	0.04**	-0.08***	0.72***	0.03	-0.09***	1.04***	0.10***	-0.13***
	(-8.16)	(-7.96)	(7.45)	(10.35)	(2.04)	(-6.88)	(7.43)	(0.92)	(-3.99)	(14.3)	(4.18)	(-6.81)
Turnover	-0.22***	-0.02***	0.03***	-0.22***	-0.02***	0.03***	-0.22***	-0.02***	0.04***	-0.23***	-0.02***	0.03***
	(-92.71)	(-20.02)	(41.36)	(-34.62)	(-10.49)	(21.13)	(-21.03)	(-5.43)	(14.61)	(-26.37)	(-6.85)	(9.69)
Logins	-0.15***	0.02***	-0.03***	0.4***	0.07***	-0.05***	0.44***	0.07***	-0.04***	0.52***	0.08***	-0.04***
	(40.94)	(16.24)	(-27.84)	(20.3)	(12.07)	(-10.33)	(11.9)	(6.26)	(-5.49)	(16.76)	(10.31)	(-4.68)
AccountTenure	1.06***	0.17***	-0.28***	0.84***	0.1***	-0.21***	0.89***	0.09***	-0.19***	0.56***	-0.00	-0.17***
	(54.98)	(25.01)	(-55.1)	(17.31)	(5.84)	(-16.91)	(11.1)	(3.29)	(-9.06)	(9.2)	(-0.06)	(-11.18)
GuideViews	-0.14***	-0.02***	0.03***	-0.2***	-0.02***	0.04***	-0.18***	-0.02***	0.03***	-0.16***	-0.01***	0.02***
	(-51.57)	(-13.46)	(38.11)	(-33.15)	(-11.23)	(25.68)	(-17.25)	(-4.04)	(11.74)	(-18.0)	(-3.02)	(6.82)
TAviews	-0.08***	-0.03***	0.02***	-0.04***	-0.01**	0.01***	-0.05***	-0.02***	0.02***	-0.03***	-0.00	0.01***
	(-8.36)	(-7.74)	(5.42)	(-3.73)	(-2.38)	(3.02)	(-3.04)	(-3.25)	(4.02)	(-2.83)	(-0.90)	(3.52)
Adj. R^2	5.9%	0.0%	3.3%	6.8%	0.0%	4.6%	5.9%	0.0%	4.3%	5.3%	5.3%	2.4%
N. Obs	392798	392798	392798	63087	63087	63087	23676	23676	23676	38871	38871	38871

The table shows the regression of Sharpe ratio, Portfolio returns and Standard Deviation on investors grouped by Turnover ratio. **Gender** is a dummy variable, which takes value 1 for males; **Age** is logarithm of investor age; **Account tenure** is the log of days from the time investor became a client up to December 31, 2017; **Turnover** is the logarithm of portfolio turnover; **Logins** are the log of days investor logged in to Avanza trading platform; **GuideViews** is the logarithm of views of Guide pages and **TAviews** is the logarithm of times investor used technical analysis. AcademyViews=0 stands for investors, who do not read Avanza Academy pages, whereas Q1, Q2 and Q3 stand for the group of investors with more than zero less or equal 33%, more 33% but less 66% and more than 66% Avanza Academy page views. The values in parentheses represent t-values and *,** and *** stand for 10%, 5% and 1% significance level with the null hypothesis that the parameter estimate is not statistically significant from zero