

Information, Overconfidence and Trading:  
Do the Sources of Information Matter?

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## Abstract

We investigate how the strength of the positive association between frequency of trading and information acquisition is dependent on investors' self-confidence and on the sources of information used by investors. Our results confirm that the more frequently individual investors invest in information, the more they trade in financial products. Our results also confirm previous findings that overconfident investors, who show a better than average bias, trade more frequently. In this paper, we add to this literature by investigating if the strong and positive relationship between investment in information and intensity of trading in financial assets is sensitive to the sources of information used by investors, and if this influence is different for overconfident and non-overconfident investors. We conclude that overconfident investors trade more frequently when they collect information directly using specialized sources and that non-overconfident investors trade less frequently when they use professional advice from the bank/account manager.

## 1. Introduction

The more often individual investors invest in information, the more they trade in securities. This strong and positive association between the frequency of individual investors trading and the financial information they collect is sustained by finance literature. Rational investors who invest more time in information receive more signals and can therefore be expected to trade more frequently.

On the other hand, recent literature in Behavioral Finance argues that overconfidence leads to higher trading volume. This idea was first presented by Barber and Odean (2001) who claim that gender is a good proxy for overconfidence (overconfidence among men is higher than among women), and find that men trade more than women. Statman et al. (2006) present empirical evidence for the US market and argue that trading volume is higher after high returns, as investment success increases the degree of overconfidence. This finding is consistent with the hypothesis that a higher degree of overconfidence leads to higher trading volume as long as we accept that high past returns are positively correlated with overconfidence. Glaser and Weber (2007) confirm this higher trading propensity for overconfident investors when they identify overconfident investors as those who think they are above average in terms of investment skills or past performance. The same conclusion doesn't hold when the authors use measures of miscalibration as proxies for overconfidence. This finding is consistent with other recent studies (see Deaves et al. (2009) and Graham et al. (2009)).

It has also been suggested that the quality of the information signals has an influence on investor trading behaviour. News from a trustworthy source should lead to more trades (portfolio rebalancing) than news from a less reliable one (Epstein and Schneider, 2008). Fisher and Gerhardt (2007) argue that financial advice from professionals should lead to a better self-evaluation by investors of their own skills and, therefore, to more rational investment decisions, with a clear positive impact on trading. Ivkovic and Weisbenner (2007) claim that the word-of-mouth effect is a "broad phenomenon that affects financial decisions made by ... individual investors" for they "may seek to reduce search costs and circumvent their lack of expertise by relying on word-of-mouth communication with those around them". However, those predictions have never been tested and, as far as we know, there is no direct evidence of the impact of the sources of information as the foundation of investors' financial choices on the frequency of trading.

In this paper, we attempt to add to this literature by investigating how the strength of the positive association between information acquisition and frequency of trading is dependent on the

sources of information used by investors. Considering the importance of overconfidence on investors' trading behaviour, we also investigate whether this influence is different for overconfident and non-overconfident investors. We test the robustness of our results controlling for differences in investor profiles and characteristics. In fact, there is evidence that investors' behaviour with regard to information depends on socio-economic and psychological characteristics. Investor behaviour may vary according to age (DaSilva and Giannikos 2004), occupation (Christiansen et al. 2008) or the environment in which they live (Goetzmann et al. 2004). Peress (2004) shows that wealthier investors value information more and poor investors trade little even with very precise information. Graham et al. (2005) found that investors who feel competent trade more often. Calvet et al. (2007) provide evidence that active rebalancing is more pronounced for sophisticated households. Seemingly irrational behaviour diminishes substantially with investor wealth<sup>1</sup> or with investor sophistication. In short, investor's characteristics may have an impact on trading and on the acquisition of information. On the other hand, Verrecchia (1982) shows that risk-averse investors acquire less information. Irrational behaviour diminishes substantially with investor trading experience (Nicolasi et al. 2004). Peress (2004) shows very risk-averse investors benefit little from information because they would invest little in stocks even if they had very precise information.

We start by documenting how individual investor's frequency of investment in information is positively related with the frequency with which they trade, controlling for a set of investor characteristics and profiles. We then investigate whether the sources of information used by investors as the basis for their financial choices, combined with the level of overconfidence exhibited by investors, have an impact on trading behaviour. In the second part of our paper we confirm our key findings with a set of robustness tests. There we test whether portfolio size and risk, the way investors transmit their orders and financial knowledge, among other characteristics, influence our estimates and conclude that results are robust.

Our results confirm that the sources of information are most relevant to explain trading activity, and indeed influence the relationship between frequency of trading and frequency of information. The more frequently individual investors invest in information, the more they trade in financial products. Our results also confirm previous findings that overconfident investors, who show a better than average bias, trade more frequently. Our finding that the strong and positive

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<sup>1</sup> There might as well be a tendency for some wealthy investors, such as those who have inherited money, to invest irrationally since they don't value money as much as someone who worked hard to earn it.

relationship between investment in information and intensity of trading in financial assets is sensitive to the sources of information used by investors, and that this influence is different for overconfident and non-overconfident investors, is novel. Overconfident investors trade more frequently when they collect information directly using specialized sources than when they use word of mouth communication or information provided by financial advisors.

The remainder of the paper is organized as follows: Section 2 presents our data sources and characterizes our sample. Section 3 presents our results on the importance of the investment in financial information on the trading behaviour of individual investors. This section also presents the results of tests we have undertaken to compare the behaviour of overconfident investors with non-overconfident ones, and to investigate whether the sources of information used by investors as the basis for their financial choices, combined with the frequency of information, have a different impact on their trading behaviour. Section 4 presents the results of the robustness tests. Section 5 concludes.

## 2. Data Source and Sample characterization

Our main data source comes from a survey conducted by CMVM to identify the characteristics of individual Portuguese investors.<sup>2</sup> The most recent one was conducted in 2000, and was publicly released in May 2005 on the CMVM website.

More than fifteen thousand individuals who were responsible or co-responsible for family investment decisions were contacted between 2 October and 22 December 2000 using the direct interview technique. 1,559 investors in securities were identified. All of these investors were interviewed using a structured questionnaire.<sup>3</sup> Each questionnaire included socio-economic questions, questions related to the nature and type of the assets held<sup>4</sup> and investor experience, as well as questions related to trading behaviour (frequency of transactions, acquisition of information, etc.) and to investors' information about markets and their agents, and sources of information used.

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<sup>2</sup> The survey identifies an investor in securities as one holding one or more of the following assets: stocks, bonds, mutual funds, participation certificates and derivatives.

<sup>3</sup> However, non-investors in securities were not all interviewed: a different questionnaire was used with 1200 non-investors only.

<sup>4</sup> Unfortunately, there are no questions related to the size of the portfolio, nor the amounts invested in each type of asset.

Our database has information for 1559 investors in securities. However, some of them did not answer all the survey questions. The trading question, for example, was answered by 1,150 investors. The vast majority of the respondents (85.1%) trade occasionally. Of the rest, 8.9% trade once a month, 4.8% buy or sell financial assets once a week, and 1.2% trade two or three times a week.

Table 1 compares our sample of investors who trade occasionally with investors who buy or sell securities at least once a month. There we can see that investors who are informed on a daily basis are more likely to trade more often and that investors who are occasionally or never informed are more likely to buy or sell securities infrequently (Panel C). Table 1 also shows that investors who diversify more (i.e. with a higher number of different stocks in their portfolio) also trade more often (Panel B), and that investors who convey their orders by fax, telephone or the internet trade more often (panel D). The top panel of Table 1 shows that investors who buy or sell securities more frequently are male, young, have higher income, live in the Porto metropolitan area and are investors with more financial knowledge. Finally, we can see that investors who are more prone to take risks and overconfident investors trade more frequently (although the difference is not statistically significant for the overconfident investors).<sup>5</sup>

Table 1 - Sample characterization: Who trades?<sup>\*)</sup>

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<sup>5</sup> See the Annex for a description of the variables used in the paper.

	Frequency of trading			
	Occasionally	At least 1 X a month	Difference	T-stat
<b>A. Investors' characteristics</b>				
Male	0.675	0.801	-0.126	-3.31 ***
Age	42.285	36.509	5.776	4.93 ***
Education				
Basic	0.464	0.544	-0.080	-1.93 *
Intermediate	0.220	0.099	0.121	3.63 ***
High	0.312	0.357	-0.045	-1.15
Employment				
Unemployed	0.097	0.164	-0.067	-2.60 **
Skilled	0.367	0.310	0.057	1.44
Highly skilled	0.534	0.526	0.008	0.23
Income				
Low	0.345	0.246	0.099	2.56 **
Middle	0.355	0.380	-0.025	-0.62
High	0.089	0.175	-0.086	-3.47 ***
Residence				
Lisbon	0.196	0.170	0.026	0.81
Porto	0.081	0.333	-0.252	-9.82 ***
Risk aversion	3.896	3.440	0.456	3.98 ***
Overconfidence	0.307	0.347	-0.040	1.03
Financial Knowledge	0.013	0.244	-0.231	-3.04 ***
<b>B. Portfolio composition</b>				
Number of stocks	1.663	2.439	-0.776	-7.04 ***
Weight of risky assets	1.251	1.216	0.035	0.87
<b>C. Frequency of information</b>				
Occasionally or never	0.192	0.018	0.174	5.72 ***
Monthly	0.113	0.111	0.002	0.08
Weekly	0.427	0.427	0.000	0.00
Daily	0.268	0.444	-0.176	-4.72 ***
<b>D. Placement of trading orders</b>				
Personally	0.831	0.576	0.255	7.76 ***
Phone/Fax	0.102	0.253	-0.151	-5.54 ***
Internet	0.066	0.171	-0.105	-4.62 ***

\*) Basic: indicates the investor has only up to eight years of education. Intermediate: indicates the investor has up to twelve years of education. High: indicates the investor has a higher degree. Inactive: includes students and unemployed. Skilled: includes liberal professionals, independent workers and office clerks. Highly skilled: includes business owners, senior and middle managers and technical, scientific and artistic professions. Low income: includes investors with net annual income below €14,964. Middle income: includes investors with net annual income between €14,964 and €37,410. High income: includes investors with net annual income higher than €37,410. Other variables: see Annex.

### 3. Information acquisition and trading behaviour

In this section we present the initial results on the influence of investment in financial information on the trading behaviour of individual investors. Table 2 presents the results using the OLS method. A quick look at the first six rows of Table 2 shows that in the two models there is a positive correlation between the investment in information and the frequency of trading. This means that the more individual investors invest in information, the more they trade in financial products. Model 1 shows that this positive correlation holds when we control for investors' socio-economic characteristics, including gender, age, family size, marital status, place of residence, social status<sup>6</sup>, income, occupation and education. Using the results of this model, we conclude that younger investors as well as those living in Porto (the second largest city) trade more. These results are consistent with the literature, which finds that younger investors are more prone to take on risk and trade more (Barber and Odean 2001, Dorn and Huberman 2005). Investors in Porto trade more and this could be explained by the fact that wealthier investors tend to live in the largest cities.

In the Model [2] of Table 2, we control for other factors that are likely to influence investors' trading behaviour. There we control for the trading experience and investment style (i.e. whether assets are held for shorter/longer periods of time) of the investor. In fact, one could argue that the more experienced investors are more sophisticated and thus churn their portfolios less (Dorn and Huberman 2005), and those investors that hold their assets for shorter periods of time are expected to trade more. We also control for self-reported risk aversion. Risk-loving investors are more prone to take on risk and are expected to trade more (Dorn and Huberman 2005). We conclude that neither experience nor investment style have any impact on trading, and that risk-loving investors trade more.

The results we present thus far show that individual investors who invest more in information trade more often.<sup>7</sup> This finding is robust to a large set of investor characteristics, such as socio-economic variables, experience, investment style and self-reported risk aversion.

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<sup>6</sup> This is a close proxy for wealth. The social status variable is based on the education and occupation variables. For example, independent workers, business owners, senior and middle managers with an intermediate or university degree are included in the highest status; unskilled workers with less than 4 years of schooling are included in the lowest status.

<sup>7</sup> Argentesi et al. (2006) have a slightly different perspective: "The fact that more information is collected by investors does not necessarily imply that more trade will follow (for instance, because information may just suggest that it is optimal not to trade)" – p.3.



Table 2 – Determinants of the trading behaviour of individual investors <sup>a)</sup>

	[1]	[2]
Frequency of information		
Monthly	0.284 **	0.258
<i>2.04</i>		<i>1.73</i>
Weekly	0.313 ***	0.284 ***
<i>4.24</i>		<i>3.81</i>
Daily	0.597 ***	0.563 ***
<i>4.96</i>		<i>4.54</i>
Male	0.063	0.044
<i>0.60</i>		<i>0.37</i>
Age	-0.007 **	-0.008
<i>-2.11</i>		<i>-1.90</i>
Household size	0.087 **	0.089 **
<i>1.98</i>		<i>1.99</i>
Married	-0.037	-0.036
<i>-0.28</i>		<i>-0.25</i>
Lisbon	-0.069	-0.062
<i>-0.62</i>		<i>-0.51</i>
Porto	0.581 **	0.617 **
<i>2.53</i>		<i>2.38</i>
Social Status		
Intermediate	-0.027	-0.016
<i>-0.26</i>		<i>-0.14</i>
High	0.182	0.211
<i>1.27</i>		<i>1.46</i>
Income		
Middle	0.053	0.038
<i>0.46</i>		<i>0.31</i>
High	-0.083	-0.109
<i>-0.42</i>		<i>-0.52</i>
Employment		
Highly Skilled	-0.022	0.018
<i>-0.11</i>		<i>0.09</i>
Skilled	0.044	0.071
<i>0.20</i>		<i>0.32</i>
Education		
High	0.059	0.071
<i>0.44</i>		<i>0.49</i>
Intermediate	0.054	0.058
<i>0.45</i>		<i>0.44</i>
Years of Experience		
Between 2 and 5		-0.058
<i>-0.44</i>		<i>-0.44</i>
5 or more		0.065
<i>0.39</i>		<i>0.39</i>
Investment Style		
Short		0.032
<i>0.13</i>		<i>0.13</i>
Medium		0.025
<i>0.10</i>		<i>0.10</i>
Long		-0.128
<i>-0.48</i>		<i>-0.48</i>
Risk aversion		-0.083 **
<i>-2.58</i>		<i>-2.58</i>
N	1,129	1,041
R2adj	0.036	0.038

a) The dependent variable is the number of trades per month. The frequency of information/ social status/ income/ employment/ education/ experience/ investment style dummy variables left out is never or occasionally/ low/ low/ inactive/ basic/ low/ very short term, which includes investors that do not invest in information or get informed occasionally/ with the lowest status/ with net annual income below €14,964/ that are students or unemployed/ with up to eight years of education/ that have been investing in the securities market for less than two years/ that hold assets for a maximum period of one month. See the Annex for a complete description of the variables. Results computed by OLS, with White consistent standard errors. The model includes a constant as well. T-values are in *italics*. \*\* and \*\*\* denote significance at 5% and 1% respectively.

### 3.1. Trading, sources of information and overconfidence

Table 3 presents the results of tests we have undertaken to investigate whether the sources of information used by investors as the basis for their financial choices, combined with the frequency of information, have an impact on trading behaviour. Moreover, we investigate whether overconfidence has any impact on the trading behaviour of individual investors.

It has been argued that overconfidence is a major driver of trading (Odean 1999, Guiso and Jappelli 2006, Glaser and Weber 2007). The illusion of knowledge, in particular, makes investors believe that they know more than they actually do and that more information leads to better decisions. Thus, it is important to test if overconfidence is driving our results on the impact of information on trading.

All of the models are estimated using the controls in Model 2 of the previous Table 2. However, in the interest of space we omit these controls. We report only the results on our key variables (frequency of information and sources of information), and split the sample by overconfident investors. Models 3 to 5 (Table 3) report the results obtained with this methodology.

Table 3: Trading, Overconfidence and Sources of Information

	[3]	[4]	[5] Non- Overconfi- dent Investors	[6] Overcon- fident Investor s
Frequency of information				
Monthly	0.243 <i>1.64</i>	0.222 <i>1.48</i>	0.143 <i>0.85</i>	0.446 <i>1.42</i>
Weekly	0.31 *** <i>3.90</i>	0.282 *** <i>3.63</i>	0.130 <i>1.70</i>	0.729 *** <i>3.42</i>
Daily	0.567 *** <i>4.57</i>	0.532 *** <i>4.32</i>	0.457 *** <i>3.23</i>	0.835 *** <i>2.94</i>
Sources of information				
Bank	-0.178 <i>-1.50</i>	-0.191 <i>-1.60</i>	-0.319 ** <i>-2.51</i>	-0.011 <i>-0.04</i>
Friends	-0.277 ** <i>-2.46</i>	-0.281 ** <i>-2.44</i>	-0.112 <i>-0.86</i>	-0.794 *** <i>-2.77</i>
Press	-0.273 ** <i>-2.10</i>	-0.278 ** <i>-2.14</i>	-0.235 <i>-1.69</i>	-0.332 <i>-1.36</i>
Overconfidence		0.227 ** <i>1.97</i>		
N	1041	1038	714	324
R2adj	0.046	0.049	0.046	0.077

The dependent variable is the number of trades per month. Results computed by OLS, with White consistent standard errors. The model includes a constant and the controls in Model 2. T-values are in *italics*. \*\* and \*\*\* denote significance at 5% and 1% respectively.

The results of Model 3 confirm that the sources of information used by investors to gather information related to the stock market are most relevant to explain trading frequency. In fact, everything else constant, investors who get financial advice from the bank or use specialized sources of information trade more frequently than those who interact socially and are informed via friends and family, or who use non-specialized media. This result suggests that the advice individual investors get from professionals leads them to trade more often (which in itself may raise questions related to conflicts of interest) and that the credibility of the information collected via specialized sources of information and their more in-depth analysis of stock market determinants and prospects may justify the more frequent trading by individual investors.

Our results also confirm the hypothesis that investors spread information about the stock market directly to one another through social interaction (word-of-mouth communication). Hong et al. (2004) posit that social interaction by individual investors may partly induce stock market participation. Hong et al. (2005) find that mutual fund managers are more likely to trade a particular stock if other fund managers trade that same stock. Brown et al. (2008) also find evidence of causal community effects in the context of stock market participation. Ivkovic and Weisbenner (2007) find a positive relation between a household's stock purchases and those made by neighbours, and these results could be attributed to word-of-mouth effects, similarities in preferences, or common reactions to news. Feng and Sesholes (2004) do not find evidence of word-of-mouth effects among Chinese investors. Kaustia and Knupfer (2009) find that the neighbourhood return effect on individual investor's stock market participation decision is asymmetric, and only positive returns increase the participation in the stock market. However, no direct evidence of the word-of-mouth impact on trading by individual investors is presented in this literature. Our results provide such evidence, which can be interpreted as a sign that individuals interact in order to decrease search costs and circumvent their lack of expertise in trading financial instruments. However, compared with the use of specialized sources of information and with the professional advice investors get from the bank/account manager, the word-of-mouth communication leads to less trading frequency.

We also conclude that overconfidence is most relevant. In Model 4 we see that overconfident investors trade more. The effect of the investment in information remains robust, which means that investors who invest more in information trade more often.

Guiso and Jappelli (2006) claim that "overconfident investors are less willing to rely on information provided by financial advisors, banks or brokers and [are] more likely to collect

information directly.” (p.19). Thus, they may collect information on the stock market directly from specialized sources. Furthermore, it could also be argued that if investors get financial advice from professionals then this would lead to a better self-evaluation of their own skills and more rational investment decisions (Fisher and Gerhardt 2007). We use the above-mentioned source of information variable (bank) as a proxy for advice. One must notice, however, that although being a professional, a bank/account manager may have conflicts of interest. If his/her recommendation is not to trade he/she is forfeiting commissions for the institution he/she works for.

We split the sample into overconfident (Model 6) and not overconfident investors (Model 5) in order to test this prediction. We find that the two types of investors do not rely on the same sources of information, and that the impact of the investment in information is not similar as well. In fact, the positive impact of the frequency of the information variable for non-overconfident investors is only noticeable for the case of daily acquisition on information, but overconfident investors trade more when they collect information on a weekly or daily basis. Moreover, the influence of the investment in information on the frequency of trading is more relevant from overconfident investors than for non overconfident investors. This difference, which is equal to 0.378 trades per month (0.835-0.457) in the case of the daily acquisition of information, is economically relevant, for it is equivalent to 0.75 times the average number of trades in our sample.

As for the sources of information, overconfident investors trade less when they use the word of mouth communication to gather information related to the stock market. This means that, comparing the word of mouth communication and the collection of information directly using specialized sources, the use of specialized sources of information leads overconfident investors to trade more frequently. On the other hand, compared with the information provided by financial advisors, the collection of information directly using specialized sources increases the frequency of trading, although this effect is not statistically significant. These results run in favor of the Guiso and Jappelli (2006) argument. Non overconfident investors also trade more when they collect information from specialized sources. However, compared with the use of specialized sources, the advice of family and friends leads to slightly lower trading frequency, and the use of professional advice from the bank/account manager leads non overconfident investors to trade less frequently.

#### 4. Robustness issues

This section presents the results of tests we have undertaken to investigate the robustness of our key findings.

#### 4.1 Trading, portfolio size and the weight of risky assets in the portfolio

One could argue that investor trading behaviour is driven by the size and riskiness of the portfolio. In fact, the value of information increases with the amount invested and the risk of the portfolio; investors acquire more information, increasing the precision of their signal and inducing more informed individuals to hold more stocks (Peress 2004). Glaser (2003) reports a positive correlation between portfolio size and trading by online investors.

We now test these predictions. Models 7 to 10 contain the results of these tests (Table 4). Once again, these tests were estimated using the controls in Model 2 of the Table 2 but we omit these controls and report only the results on our key variables (frequency and sources of information) and the new controls we consider in each test. In Models 7 and 9 we control for the number of stocks in the portfolio (as a proxy for portfolio size) and find that trading increases with portfolio size only for the case of non overconfident investors. In Models 8 and 10 we control for the relevance of risky assets<sup>8</sup> in investors' portfolios, and find that this variable is not significant. Nevertheless, our main result of the positive correlation between investment in information and trading holds, and that the relevance of the information sources for overconfident and non overconfident investors still holds true.

Table 4: Trading, portfolio size and the weight of risky assets in the portfolio

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<sup>8</sup> Securities are considered the risky asset (vis-a-vis real estate, bank deposits and other assets).

	Non Overconfident Investors		Overconfident investors	
	[7]	[8]	[9]	[10]
Frequency of information				
Monthly	0.142 <i>0.84</i>	0.137 <i>0.79</i>	0.403 <i>1.26</i>	0.402 <i>1.23</i>
Weekly	0.106 <i>1.34</i>	0.101 <i>1.28</i>	0.655 *** <i>3.16</i>	0.613 ** <i>2.58</i>
Daily	0.395 *** <i>2.98</i>	0.391 *** <i>2.89</i>	0.707 ** <i>2.35</i>	0.722 ** <i>2.37</i>
Sources of information				
Bank	-0.318 ** <i>-2.51</i>	-0.317 ** <i>-2.47</i>	-0.033 <i>-0.12</i>	-0.05 <i>-0.21</i>
Friends	-0.181 <i>-1.35</i>	-0.182 <i>-1.34</i>	-0.780 *** <i>-2.71</i>	-0.89 *** <i>-2.82</i>
Press	-0.252 <i>-1.82</i>	-0.240 <i>-1.73</i>	-0.359 <i>-1.43</i>	-0.33 <i>-1.28</i>
Number of stocks	0.119 *** <i>2.73</i>	0.119 *** <i>2.71</i>	0.146 <i>1.40</i>	0.132 <i>1.24</i>
Weight of risky assets		-0.065 <i>-0.69</i>		0.231 <i>0.72</i>
N	714	708	324	319
R2adj	0.056	0.054	0.084	0.082

The dependent variable is the number of trades per month. Results computed by OLS, with White consistent standard errors. The model includes a constant and the controls in Model 2. T-values are in *italics*. \*\* and \*\*\* denote significance at 5% and 1% respectively.

#### 4.2. Trading, the 'platform' of trading and financial knowledge

The internet may influence investor behaviour. Glaser (2003), for instance, finds that online investors trade frequently. Barber and Odean (2002) report that trading volume increases after investors go online. Choi et al. (2002) find that trading frequency increases after the introduction of an internet-based trading channel in two corporate 401(k) retirement savings plans.

In the following table we present the results of our controls. In Models 11 and 13 we control for the way investors transmit the respective orders to the broker. The three possibilities are the internet, the telephone or fax, and going to the bank (the base category). We conclude that trading by non overconfident investors is not influenced by the way orders are placed, but overconfident investors who use the fax/telephone to give their orders trade more often.

Another robustness test is performed on the level of financial knowledge exhibited by investors. Here, we test whether more financially knowledgeable investors trade differently than less knowledgeable ones. If trading is due to behavioural biases arising from inadequate knowledge, one would expect trading to be negatively related with financial knowledge. We find

instead a positive correlation between these two variables in the case of non overconfident investors (Table 5 - Model 12)<sup>9</sup>. Nevertheless, we conclude that the investment in information still has a strong positive effect on trading, particularly in the case of overconfident investors. As to the sources of information, our previous results are robust to these new controls.

Table 5: Trading, the platform of trading, and financial knowledge

	Non Overconfident Investors		Overconfident investors	
	[11]	[12]	[13]	[14]
Frequency of information				
Monthly	0.158 <i>0.90</i>	0.124 <i>0.72</i>	0.422 <i>1.30</i>	0.45 <i>1.46</i>
Weekly	0.131 <i>1.65</i>	0.055 <i>0.70</i>	0.708 *** <i>3.22</i>	0.723 *** <i>3.31</i>
Daily	0.453 *** <i>3.20</i>	0.359 *** <i>2.77</i>	0.816 *** <i>2.67</i>	0.827 *** <i>2.95</i>
Sources of information				
Bank	-0.286 ** <i>-2.15</i>	-0.350 *** <i>-2.73</i>	-0.006 <i>-0.02</i>	-0.015 <i>-0.06</i>
Friends	-0.117 <i>-0.89</i>	-0.191 <i>-1.42</i>	-0.726 ** <i>-2.56</i>	-0.795 *** <i>-2.76</i>
Press	-0.216 <i>-1.46</i>	-0.291 ** <i>-2.20</i>	-0.213 <i>-0.95</i>	-0.336 <i>-1.14</i>
Placement of orders				
Phone/fax	0.110 <i>0.48</i>		0.946 ** <i>2.03</i>	
Internet	0.459 <i>1.70</i>		0.039 <i>0.08</i>	
Financial Knowledge		0.173 *** <i>2.80</i>		0.032 <i>0.19</i>
N	708	714	318	324
R2adj	0.051	0.059	0.090	0.074

The dependent variable is the number of trades per month. Results computed by OLS, with White consistent standard errors. The model includes a constant and the controls in Model 2. T-values are in *italics*. \*\* and \*\*\* denote significance at 5% and 1% respectively.

#### 4.4. Other robustness issues

Dorn and Sengmueller (2009) find that investors who enjoy gambling turn over their portfolio more rapidly than their peers, even after controlling for overconfidence, and Grinblatt and Keloharju (2009) find that investors who are more prone to sensation seeking trade more frequently (“the mere act of trading and the monitoring of a constant flow of ‘fresh stocks’ in

<sup>9</sup> Dorn and Huberman (2005) also report a positive correlation between actual knowledge and portfolio turnover.

one's portfolio may create a more varied and novel experience than a buy and hold strategy"- p.556). Thus it would be relevant to control for this psychological trait.

Two possibilities arise here. One may consider the fact that some investors trade but do not use any source of information (i.e., they are not informed about the stock market), and assume that those investors who trade without information do so for entertainment. As an alternative, one may consider the fact that some investors claim that the reason behind a concrete investment in a particular stock is because they love risk. Using these proxies we find (results not shown) that sensation seeking investors do not appear to trade more often because the coefficient of the variable, although positive in all cases, is never significant. Nevertheless, the positive correlation between information and trading, and the differences between overconfident and non overconfident investors, still hold.

Two other robustness tests were performed. In the first case, and given the characteristics of the dependent variable, we estimate an ordered *probit*. In the second case, we correct for selectivity. In both cases we estimate the base Model 2. The results (not shown) do not significantly change.

## 5. Conclusion

Our results show that the more frequently individual investors invest in information, the more they trade in financial products. This finding is robust to a large set of investor characteristics, such as socio-economic variables, experience, investment style and self-reported risk aversion. This work confirms previous findings of a positive relation linking those two variables. We also confirm previous findings from behavioral finance arguing that overconfident investors, who show a better than average bias, trade more frequently.

Our findings that this strong and positive relationship between investment in information and intensity of trading in financial assets is sensitive to the sources of information used by investors is novel. Moreover we show that overconfident and non-overconfident investors do not rely on the same sources of information. Overconfident investors trade more frequently when they collect information directly using specialized sources than when they use word of mouth communication or information provided by financial advisors. For non-overconfident investors, the advice of family and friends leads to slightly lower trading frequency than the direct collection of



information from specialized sources. The use of professional advice from the bank/account manager also leads non overconfident investors to trade less frequently.

These findings have been controlled for the portfolio size and risk, the platform of trading, investor's level of financial literacy, and overconfidence. Despite the fact that some of these variables matter for the transaction-information relationship and change the intensity of the positive association between the frequency of information acquisition and trading, the conclusions put forth in the previous paragraph still hold.

Annex - Definition of variables constructed from survey responses:

*Trading* - Based on the question: “How often do you buy or sell financial assets?” Answers were transformed into the variable “number of trades per year”. They were alternatively coded “occasionally”, “once a month”, “once a week” and “2 or 3 times a week”.

*Frequency of information* – Based on the question: “How often do you get information regarding the evolution of stock indexes and prices?” Answers coded as “do not get information or get information only occasionally” (the base category), “get informed on a monthly basis” (Monthly), “on a weekly basis” (Weekly), or “on a daily basis” (Daily). Table A1 reports the sample distribution of the answers.

Table A1

Frequency of information	No time /			
	Ocasionaly	Monthly	Weekly	Daily
% of investors	17.10	11.70	42.40	28.20
% with stocks	12.80	9.40	38.00	27.00
frequency of trading	0.13	0.43	0.50	0.78

*Sources of information* – Based on the question: “List the sources of information you usually resort to when you want to get information regarding the stock market”. The following information sources were mentioned by investors: bank/account manager (Bank); friends/family (Friends); specialized press and the stock exchange bulletin of quotations (Specialized); other written press, television and radio (Other press); none. Table A2 reports the sample distribution of the answers.

Table A2

Sources of information	None	Bank	Friends	Specialized	Other press
% of investors	10.0	53.0	14.9	33.2	51.7
% with stocks	7.8	47.2	13.5	30.4	46.5
% mainly with stocks in the portfolio	8.5	42.1	11.3	25.1	38.5

*Placement of orders* – Based on the question: “How do you give your buy/sell orders?”. Answers coded as “using the telephone or the fax” (Phone/fax), “going personally to my bank” (Personally) and “using the internet” (Internet). Table A3 reports the sample distribution of the answers.

Table A3

Placement of orders	Phone/Fax	Personally	Internet
% of investors	12.30	79.70	8.00
frequency of trading	1.02	0.39	0.97

*Financial knowledge* - We use the survey questions number 7, 11A and 13 to build up a proxy for investor’s level of financial knowledge. Question 7: “name companies (up to a maximum of 5) with shares or bonds listed”. Responses are marked from 0 to 5 (0 means that investors fail to mention the name of any company, and 5 means that they refer to the name of 5 companies). Question 11: “Do you know any of the following entities: BVLP, Interbolsa, CMVM, Credit Institutions, Dealers”. Answers are marked from 0 to 5 (0 means that investors do not know any of these entities, 5 means that they know them all). Question 13: “If you wish to file a complaint about a financial intermediary, an issuer or any other entity related with the securities markets, to whom would you address it?” Answers are marked with 5, if CMVM is mentioned and with 0 if any other entity (or no entity at all) is mentioned. The arithmetical average of the answers obtained to these questions is used as a proxy for the investor’s financial literacy (financial knowledge), higher values meaning a better knowledge of financial markets. However, given the degree of collinearity between this variable and the socio-economic variables, we orthogonalize the financial knowledge variable vis-à-vis the socio-economic ones.

*Number of stocks (in the portfolio)* – Based on the question: “Identify the names of the issuers of the stocks included in your portfolio”. Number of stocks ranges from 0 to 8, meaning that the most diversified portfolio has 8 different stocks. On average, each portfolio has 1.72 different stocks, but a significant number of investors (42.51%) hold only one stock.

*Weight of risky assets (in the portfolio)* - Based on the question: “Classify, by decreasing order of relevance in your wealth, the value invested in each type of investment - real estate, bank deposits, securities (treasury bonds, stocks, bonds, mutual funds, participation certificates and derivatives) and other assets”. Answers were coded in the scale 1 (most important) to 4 (least important).

*Investor's experience* – Based on the question: “How long have you been investing in the securities market?” Answers were coded: i) less than 2 years, ii) between 2 and 5 years; and iii) 5 years or more.

*Investment style* - Investors were classified as very short-term (if they hold assets for a maximum period of one month), short-term (assets held from one month to one year), medium-term (assets held from 1 to 3 years) and long-term (assets held for more than 3 years). The variables VERY SHORT, SHORT, MEDIUM and LONG are binary variables, taking the value of 1 for very-short term, short-term, medium-term or long-term investors, respectively.

*Overconfidence*: Based on the question: “How do you rate, on a 1 (very low) to 7 (very high) scale, your own knowledge of financial assets and markets?” (Self-evaluation). Answers to this question were compared with the financial knowledge variable measured in the 1 to 7 scale as well. If the difference between self-reported and actual knowledge is positive and greater than 0.9 then overconfidence =1.<sup>10</sup>

*Risk aversion* – Based on the question: “How do you consider yourself, in the 1 to 7 scale, regarding the investment in the stock market: very risk adverse (7), risk lover (1)”.

*Invest because love risk* – Based on the question: “What are the reasons behind a concrete investment in a particular stock?” Equal to 1 if the answer is “because I love risk”.

The socio-economic variables are the following:

1. Male (1 if male);
2. Age (investor's age, in years, at the time of the survey);
3. Married (1 if married);
4. Household size: number of persons in the household;
5. Education. This variable is considered under 3 categories: High=1, if the maximum educational level is an intermediate or university degree; Intermediate=1, if the maximum educational level is the 9th or 12th grade; and Basic=1, if the maximum educational level is below the 9th grade;

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<sup>10</sup> Different definitions were used, the results were robust.

6. Net annual household income. Three categories are considered: Low=1, if net annual household income is below €14,964; Middle=1, if equal to or above €14,964, but below €37,410; and High=1, if net annual household income is above €37,410;
7. Investor's area of residence. Three geographical locations are considered: PORTO=1, if living in the Porto metropolitan area; LISBON=1, if living in the Lisbon metropolitan area; Other=1, if living elsewhere;<sup>11</sup>
8. Investor's employment. Three categories are considered: Highly Skilled=1, if the investor is the owner/boss, a senior or middle manager, or if the investor's profession is a technical, scientific or artistic one; Skilled=1, if the investor is a liberal professional, an independent worker or an office clerk; and Inactive=1, if the investor is inactive (student or unemployed);
9. Investor's social status. We consider three categories: High=1, if the investor has a type A status (the highest); Intermediate=1, if the investor has a type B or C status (that is, an intermediate social status); Low=1, if the investor has a type D or E status (E is the lowest).<sup>12</sup>

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<sup>11</sup> We speculate that investors located in the big cities (Lisbon and Porto) have access to more and better quality information, and as such trade more.

<sup>12</sup> The social status variable is based on the education and employment variables. For example, owners, senior and middle managers, independent workers, with an intermediate or university degree are included in the highest status. Less skilled workers with less than 4 years of schooling are included in the lowest status. Therefore, status could be related to wealth but is not a perfect proxy for wealth.

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