Institute for Strategy and Business Economics
University of Zurich

Working Paper Series
ISSN 1660-1157

Working Paper No. 98

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September 2009

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First version: February 2009

This version: September, 7 2009

Abstract

This paper contributes to the existing literature on media content and asset prices by analyzing the relationship between the adoption of media guidance and a person's propensity to buy stocks. We provide empirical evidence on this relationship while controlling for a broad range of individual characteristics and preferences. The approach is based on a recent study that suggests that investors are characterized by limited attention and use media as a heuristic when deciding which assets to buy. In line with this view, it turns out that the link between media guidance and the propensity of individuals to buy stocks is extremely robust. However, our results contradict previous findings insofar as this relationship is not moderated by a person's degree of attention allocation to investment aspects. As the literature shows stocks with media coverage to underperform those without coverage, we conclude that the adoption of this heuristic can be very costly to investors.

JEL classification: C25, D83, G11, G14

Keywords: media, investor behavior, limited attention, selection model

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Abstract

This paper contributes to the existing literature on media content and asset prices by analyzing the relationship between the adoption of media guidance and a person's propensity to buy stocks. We provide empirical evidence on this relationship while controlling for a broad range of individual characteristics and preferences. The approach is based on a recent study that suggests that investors are characterized by limited attention and use media as a heuristic when deciding which assets to buy. In line with this view, it turns out that the link between media guidance and the propensity of individuals to buy stocks is extremely robust. However, our results contradict previous findings insofar as this relationship is not moderated by a person's degree of attention allocation to investment aspects. As the literature shows stocks with media coverage to underperform those without coverage, we conclude that the adoption of this heuristic can be very costly to investors.

1 Introduction

Many individual investors spend a considerable amount of time and money learning about promising investment opportunities from various information sources, such as media, colleagues, brokers and family members (e.g., Lease, Lewellen & Schlarbaum, 1974). At first glance, such behavior might seem wasteful and without impact on asset prices as informationally efficient financial markets prevent this strategy from earning superior returns. Indeed, it turns out that the group of individual investors actually loses money trading (Odean, 1999; Barber & Odean, 2000, 2001, 2002). However, we continue to see empirical evidence on the impact of media content on stock prices (e.g., Fang & Peress, 2009; Fehle, Tsyplakov & Zdorovtsov, 2005; Huberman & Regev, 2001; Tetlock, 2007). In particular, the expansion of media coverage of business news was previously named by Shiller (2000) as one of the factors that "propelled the market bubble" (Bhattacharya & Yu, 2008).

In spite of this well-documented relationship between media content and stock prices on an aggregate level and its great economic relevance, surprisingly little empirical work has been carried out on the individual level. Furthermore, we are currently unaware of any study analyzing the connection between the adoption of media guidance and a person's propensity to buy stocks. This paper contributes to the existing literature by providing what we believe to be the first empirical evidence on this relationship while controlling for a broad range of individual characteristics and preferences. We document that the relationship between media guidance and the propensity of individuals to buy stocks is extremely robust. However, our results contradict previous findings insofar as this relationship is not moderated by a person's degree of attention allocation to investment aspects.

The theoretical approach within this paper follows Barber & Odean (2008), who adopt the view that investor attention is scarce and that individuals rely on attention-grabbing events to

shrink the set of potential investment choices when contemplating which stocks to buy. Using media content as a guide to making investments thus serves as a decision heuristic in the presence of limited attention. In line with this argument, individual investors have been found to be net buyers of stocks appearing on the news[1].

This paper puts these findings under scrutiny. The empirical strategy differs from previous studies in its use of survey data, which are particularly suited for this type of analysis as only questionnaires contain a rich set of personal information with respect to behavioral patterns of which the individuals themselves may be unaware. It permits testing of a broad range of theoretical predictions in a naturalistic environment. The fact that a finite amount of attention is a salient feature of *all* human beings, and individual investors in particular, has important consequences for the design of our questionnaire and data set. In particular, it permits us to rely on a student sample with more than 300 observations. Furthermore, it leads us to combine current non-investors and investors within our sample (see also below).

Our empirical analysis begins by testing whether media guidance has any impact on a person's propensity to buy stocks. For a rational investor who believes in the efficient market, the media guidance should not have an impact on the propensity to buy stocks.. In this case, the investor should not base investment decisions on published media content as this should already be reflected in prices. Thus, a person's propensity to buy stocks should not be influenced by the adoption of media guidance (H1). The empirical results clearly reject this hypothesis.[2] To determine whether this result is in line with the notion of a decision heuristic for investors with limited attention, we first test the robustness of this effect. Media guidance

[1] The reader should note the difference between their research question and ours. Whereas Barber & Odean (2008) are concerned with stock characteristics (i.e., the presence of attention-grabbing events) and buying behavior, we are interested in the (general) relationship between media guidance and a person's propensity to buy.

[2] The reader should note that this finding *does not* imply that financial markets are not information efficient. It just implies that individuals within our sample do not behave as if they believed in informationally efficient markets, but these markets may nevertheless *be* efficient.

should *remain statistically significant independent of any controls on investors' backgrounds*, i.e., personal preferences and/or financial experience (H2), because a certain degree of limited attention is a salient feature of all human beings, which renders the adoption of a decision heuristic advantageous. Our results support the hypothesis. Our findings also show that the influence of alternative attention-grabbing information resources (friends, banks, family, coworkers, teachers) on a person's propensity to buy is positive (H3a, H3b).

Although Barber & Odean (2008) acknowledge the possibility that additional attention-grabbing resources may impact individual trading behavior, they suggest that media is the most efficient resource insofar as "an attention-grabbing event is likely to be reported in the news. Investors' attention could be attracted through other means, such as chat rooms or word of mouth, but an event that attracts the attention of many investors is usually newsworthy" (p. 3). This leads us to test whether the impact from media guidance is indeed larger than the impact from any other information resource (H4). This hypothesis tends to be supported by the data, although the statistical significance is only at the 10% level.

In an important extension of previous studies, we also test whether individuals who follow financial information in print media on a regular basis exhibit a different propensity to buy stocks (H5)[3]. Based on a subsample for all regular newspaper readers of the finance and/or economics section, we find that media guidance becomes relatively more important than alternative information resources, which supports the hypothesis. This result provides the first evidence supporting a dynamic view of the media heuristic and reveals its self-enforcing impact through increased exposure over time.

[3] Note that the ex-ante effect of regular exposure on stock buying behavior is not clearcut. On the one hand, regular media exposure facilitates the individual's access to attention-grabbing events. Attention-grabbing events will thus not escape the individual's attention, thereby reducing the complexity of the investment decision considerably. Under this scenario, we would expect regular media exposure to increase a person's propensity to buy (H5a). On the other hand, regular exposure to attention-grabbing events might enlarge a person's set of potential investments, which would be counterproductive in the presence of limited attention. If the set gets too large, individuals might suffer from the complexity of the investment task and buy less often (H5b).

To test the previous explanation in the literature that various degrees of attention limitation explain different trading patterns across groups, we construct an ex-ante distinction between individuals who allocate differing degrees of attention to investment tasks; almost by definition, this can be achieved by combining current non-investors and investors within our sample. Note that there may be variation in current non-investors' propensity to buy stocks; all that is known from the data is that their threshold level that triggers buying decisions has not been exceeded so far, but the extent to which this is true is unobserved. We adopt a sample selection model to make the effects comparable for these two groups of individuals. In line with the existing empirical evidence by Barber & Odean (2008), we hypothesize that the impact of media on investors should be smaller than its impact on current non-investors (H6) had they become investors and relied on media guidance, as the latter devote less attention and time to investment decisions. The associated empirical findings clearly reject this hypothesis, rendering the media heuristic surprisingly robust.

The results of our paper are related to a variety of bodies of literature, such as the literature on inattention in finance (Barber & Odean, 2008; Cohen & Frazzini, 2009; DellaVigna & Pollet, 2009; Dyck & Zingales, 2003; Fehle, Tsyplakov & Zdorovtsov, 2005; Hirshleifer & Teoh, 2003; Hong & Stein, 1999; Huberman & Regev, 2001; Peng & Xiong, 2006) and economics (Falkinger, 2007, 2008; Gabaix et al., 2006), as well as the literature on the relationship between media coverage and asset pricing (Tetlock, 2007; Fang & Peress, 2009). From this perspective, our key findings are that (1) the connection between media content as a heuristic in the presence of limited attention and individual propensity to buy stocks is very robust, even to varying degrees of personal attention allocation for investments, and (2) its relative impact is increasing with media exposure over time. By connecting these results to the empirical literature on the relationship between media coverage and asset pricing, it is revealed that the adoption of this heuristic can be extremely costly to individuals because stocks with media coverage underperform those without coverage (Fang & Peress, 2009).

The remainder of this paper is structured as follows. Section 2 reviews the most relevant literature and formulates testable predictions. The data and methodology are discussed in Section 3. In Section 4, the corresponding empirical results are presented and alternative explanations considered. Conclusions are given in the final section.

2 Related Literature and Hypotheses

Rational Investors and Media Content

This section discusses two alternative views of why media content should not affect the behavior of rational investors in the first place: namely, the traditional literature on informationally efficient markets and the more recent literature on the noninformation content of media.

For a long time, researchers held the view that financial markets are informationally efficient (Fama, 1970). The assumption was that market prices reflect most available (historical and public but not private) information about the underlying fundamental value and that returns, given today's available information, are unpredictable. As a result, it is not possible to earn superior returns from, e.g., print media information because this is only published a day after it has become known to the market.

Since then, however, empirical findings have questioned the informational efficiency of financial markets[4], leading researchers to reconsider the relationship between news coverage and asset prices. Tetlock (2007) analyzes the relationship between content in the Wall Street Journal's (WSJ) column "Abreast of the Market" and market behavior, finding "that statistical tests reject [...] the hypothesis that media content is a sideshow with no relation to asset markets" (p.1140). He finds (i) high levels of media pessimism to robustly predict downward

[4] See, e.g., the collection of papers in Shleifer (2000).

market pressure on market prices, which is resolved over subsequent days, (ii) that unusually high or low levels of media pessimism forecast high market trading volume, and (iii) that low market returns lead to high media pessimism. Altogether, his findings suggest that measures of media content serve as a proxy for investor sentiment or noninformational trading.

Based on these branches in the literature, we formulate the following hypothesis regarding the overall impact of media usage on stock purchasing decisions.

Hypothesis 1: *If investors either believe financial markets to be informationally efficient or that media content proxies for noninformation, their propensity to buy stocks will not depend on their use of media information for investment decisions.*

Limited Attention

This section discusses the concept of limited attention and explains how it may lead to a connection between media content and stock prices.

Limited attention and its impact on human behavior have long been studied in the psychological literature (e.g., Pashler & Johnston, 1998). Cohen & Frazzini (2008) summarize the field's findings as follows: "this literature suggests that individuals have a difficult time processing many tasks at once. Attention is a scarce cognitive resource and attention to one task necessarily requires a substitution of cognitive resources from other tasks (Kahneman, 1973). Given the vast amount of information available and their limited cognitive capacity, investors may choose to select only a few sources of salient information."

Following the psychological literature, financial researchers framed the concept of investor inattention. In particular, Merton (1987) introduced the so-called investor recognition hypothesis (IRH). Fehle, Tsyplakov & Zdorovtsov (2005) provide a nice summary of the IRH (p. 629): "The IRH argues that incomplete information diffusion across investors affects their

trading behavior and hence security values. Due to incomplete information diffusion, investors are not aware of some securities and thus do not own them in their portfolios. Therefore, investors are insufficiently diversified and demand a premium for taking on idiosyncratic risk. This premium causes the stock's required rate of return to depend on its ownership structure. In the IRH setting, if a company achieves increased visibility and thereby increases its investor base, there should be a decrease in the cost of capital and a simultaneous increase in the stock's market value". We emphasize, however, that this "rational investment aspect" due to a change in cost of capital is in conflict with the short-term reversal of media impact, as documented by Tetlock (2007).

More recent studies in the field of investor attention in finance include Cohen & Frazzini (2008), DellaVigna & Pollet (2008), Dyck & Zingales (2003), Hirshleifer & Teoh (2003), Hong & Stein (1999), Peng & Xiong (2006), Huberman & Regev (2001) and Barber & Odean (2008), of which we will discuss the latter two in more detail.

Huberman & Regev (2001) were among the first to show that newspaper content can affect stock prices even if the content does not provide genuine information. They studied the case of EntreMed, a biopharmaceutical company that develops multi-mechanism drugs for the treatment of cancer and inflammatory diseases. The authors revealed that EntreMed's stock price soared after the re-release of information in the *New York Times* that had already been published in *Nature* and the *New York Times* itself five months earlier. The main difference between the two *Times* articles lay in their relative positioning in the newspaper: whereas the first article had been located somewhere inside the paper, the second appeared on the front page. Thus, the authors conclude investor attention to be a driving force behind this result.

Recently, Barber & Odean (2008) have shown that investors' stock purchasing behavior can be associated with attention-grabbing events. They argue that limited attention only affects individual investors' purchasing decisions because they are usually not allowed to short sell

stocks. They regard limited attention to be less of a problem for institutional investors as it is their profession to invest money, which means that more attention is shifted to investment decisions in general. Based on a large data set with information on individual and institutional investors, they show that individual investors tend to be net buyers on high attention days by using three different proxies for attention, namely (i) a stock's appearance in the day's news, (ii) extreme returns, and (iii) unusually high trading volume. The impact of such events is smaller for institutional investors. The positive impact of attention-grabbing events on buying behavior is not restricted to positive attention-grabbing events but also includes negative events.

Regarding the role of news, the authors state that "An attention-grabbing event is likely to be reported in the news. Investors' attention could be attracted through other means, such as chat rooms or word of mouth, but an event that attracts the attention of many investors is usually newsworthy" (p. 3).

As limited attention can be assumed to be a common feature of *all* human beings, we formulate the following hypothesis:

Hypothesis 2: *If investors rely on media guidance as a heuristic in the presence of limited attention, the impact of media on the propensity to buy stocks should remain statistically significant independent of any controls on investors' backgrounds.*

From the line of reasoning above, we further derive the following hypotheses:

Hypothesis 3a: *If an investor uses media guidance as a heuristic in the presence of limited attention, the investor's propensity to buy stocks increases.*

Hypothesis 3b: *Alternative information resources (family, friends, banks, colleagues) that investors may use as heuristics in the presence of limited attention increase investors' propensity to buy stocks.*

Hypothesis 4: *As the media is, of all information resources, the most likely to contain attention-grabbing events, it will increase investors' propensity to buy stocks more than any other information resource.*

We further extend previous studies through the incorporation of two additional important aspects. First, we analyze the impact of regular media exposure on a person's propensity to buy stocks, which provides a first treatment of the dynamic aspects of the media heuristic over time. Regular media exposure facilitates the individual's access to attention-grabbing events while considerably reducing the complexity of the investment decision. Under this scenario, we expect regular media exposure to increase a person's propensity to buy.

Hypothesis 5a: *Given limited investor attention, regular media exposure to financial information will increase an individual's propensity to buy stocks.*

On the other hand, regular exposure to attention-grabbing events might enlarge a person's set of potential investments, which would again exacerbate the problem of limited attention. If this set gets too large, individuals might suffer from the complexity of the investment task and buy less often.

Hypothesis 5b: *Given limited investor attention, regular media exposure to financial information will decrease a person's propensity to buy stocks.*

We are also interested in testing the explanation that individual differences in the influence of the attention-grabbing heuristic can be attributed to investors' differing degrees of attention allocation. Therefore, we combine observations of current non-investors, who – by definition – should be less interested in investment decisions – and investors, for whom financial mistakes due to inattention are more costly. Based on the existing evidence, we expect the impact of the media on the propensity to buy stocks to be lower for investors than for current

non-investors had they become active investors and relied on media guidance.[5] Thus, we formulate:

Hypothesis 6*: The marginal effect of media usage on the propensity to buy stocks is smaller in the investor sample.*

Testing this hypothesis therefore amounts to an indirect test of the plausibility of the authors' explanation for the finding that institutional traders seem to be less affected by the media heuristic than individual investors.

Individual Trading Behavior

This last section illustrates why a detailed analysis of the relationship between media usage and an individual's propensity to buy stocks needs to control for personal investment preferences, i.e., a person's investment motives and preferred asset classes, gender, financial experience, and income.

Two of the first studies on individual trading behavior were presented by Lease, Lewellen & Schlarbaum (1974) and Lewellen, Lease & Schlarbaum (1977). Based on a combination of survey data and information on personal trading activity with a large national retail brokerage house, Lewellen et al. (1977) reported that "strong indications of systematic changes in investment objectives and risk preferences across age brackets - and, to milder extent income classes [...]. These are mirrored in differences in investment tactics, portfolio composition, and environmental attitudes" (p. 320).

In addition, the authors present evidence "that men spend more time and money on security analysis, rely less on their brokers, make more transactions, believe that returns are more

[5] The empirical strategy for this test will be discussed in section 3.2.

highly predictable, and anticipate higher possible returns than do women" (see Barber & Odean, 2001; p. 265).

Barber & Odean (2001) associate these findings with the notion that men tend to be more overconfident than women. Combining evidence from the economics and psychological literatures, they motivate gender as a natural choice for separating more overconfident and less overconfident investors from each other. Based on data from a large brokerage firm, they find that (i) men trade more often than women and (ii) men reduce their expected utility by excessive trading more than women do.

But gender also proxies for an individual's risk attitude: As mentioned by Eckel & Grossman (2008), women are also less likely to engage in risky behavior. In the context of investment decisions made by females, " women are found to choose less risky investment portfolios than men [...], and to have a lower propensity towards financial risk than men."

Further, individual financial experience is an important factor influencing investment behavior. For example, studying the link between past initial public offering (IPO) returns and future subscriptions at the investor level in Finland, Kaustia & Knuepfer (2008) found strong empirical evidence that past successes increase an individual's propensity to subscribe to new IPOs in the future. As a theoretical basis for their findings, the authors rely on the theory of reinforcement learning (RLT). This theory can be contrasted with more traditional rational models of learning, e.g., Bayesian belief-learning, insofar as the first predicts "that personally experienced outcomes have a greater effect on behavior than, say, just reading about the same information without personal involvement" (Kaustia & Knuepfer, 2008; p. 2679).

Based on this literature review, we conclude that the relationship between media usage and an individual’s propensity to buy stocks may be affected by a person’s investment motives, preferred asset classes, gender, financial experience, and income. Note that most investors

within our sample are men (see section 3.1), who have been found to be more overconfident than women. As overconfident individuals trade more often and believe more in their personal capabilities, the relationship between media usage (likely to be deemed unnecessary by overconfident individuals) and buying behavior might well be weaker in such samples. Not controlling for investor gender might thus result in omitted variable bias. Similar arguments can be constructed for the other groups of regressors.

3 Data and Methodology

3.1 Data

Our empirical analysis is based on survey data from a questionnaire that was distributed in 2008. The sample consists of 479 students from various fields of study. Based on the insights from our literature review, we collected information on stock market activity, stock market tenure, preferred asset classes, trading motives, personal education, income, age and gender from each participant. A detailed overview of the relevant survey questions and the corresponding variable names and values can be found in Table A.1 in Appendix I.

Obviously, not all of these variables can be obtained from all individuals. For example, information on recent stock purchases is only available for participants who are active on the stock market. Therefore, in Table 1 we present descriptive statistics separately for active investors and current non-investors.

Table 1 reveals that more than half (55%) of our investing individuals had made stock purchasing decisions in the previous two months. Moreover, the average trader in our sample relies on three different information resources, trades on the stock exchange for two different reasons and invests in two to three different asset classes.

- Insert Table 1 about here -

The average active time on the stock market is three to four years, which lowers the likelihood that an individual first became an active investor through the purchasing decision made in the previous two months. In fact, out of those individuals exhibiting stock market tenures of less than one year, only 9% had made stock purchases in the previous two months. Thus, we are confident that the variables ACTIVE STX (which measures whether the individual is currently an investor on the stock market) and STX2MONTHS (which indicates whether the individual made stock purchases in the last two months) refer to different situations for individual investors.

During their active time on the stock market, investors have, on average, had some successful and unsuccessful experiences, as reflected in the mean amounts of money won (2.5) and lost (2.7).

More than 50% of the investors classified their investment style as rather risky: on a seven item scale, roughly 53% chose an investment type of 3 or below, which is also reflected in an average value of about 3.5 in Table 1.

Economic and/or financial education was found to be a common characteristic of investors. While about 84% of active investors had previously taken financial courses at the university, economics students accounted for roughly 80% of traders. Graduate or master's degree students accounted for 59% of investing individuals.

Finally, Table 1 reveals that a large majority of traders were male (84%), on average 24 years old and had a monthly income of 1,500 – 2,499 Swiss Francs.

Comparing these values to the average individual within the total sample, one can see that active investors had a slightly higher income, tended to be mostly males, economics students,

graduate or master's degree students, and had more often taken financial courses at the university. All of these results seem intuitively plausible.

3.2 Methodology

Recall that we want to compare the impact of media on the propensity of individuals to buy stocks for investors and current non-investors. This requires us to adopt a sample selection model because there may be variation in the propensity of current non-investors to buy stocks. However, all that is observable from the data is that their threshold level that triggers buying decisions has not been exceeded so far – the extent to which this is true is unobserved. The problem thus is that although the two groups of individuals have varying propensities to buy stocks, which are of interest to us, the buying activity is only observed for investing individuals. Therefore, estimating the impact of media guidance on the propensity to buy stocks on a pure investor sample might not give us a value relevant to a current non-investor had he become an investor and used the media for investment guidance because individuals clearly self-select into investors and current non-investors. It seems likely that the probability that a person is an active investor is affected by his unobserved characteristics, which also influence his trading frequency. Technically, the unobserved factors determining active investor status in the stock market and trading in the past two months may well be correlated with media usage and each other and thus may alter the estimated effect of media guidance. It is by virtue of the adoption of a sample selection model that we can take this interrelation into account. Let us briefly explain the underlying idea behind this estimation approach[6]: Adjusting the notation slightly to fit our empirical setting, the basic structure of a *bivariate sample selection model* (also called a Type 2 Tobit Model by Amemiya, 1985) comprises a

[6] We follow the exposition in Cameron & Trivedi (2005, p. 547f) to discuss the assumptions of a limit probability model (LPM) with sample selection.

participation equation that denotes whether an individual is currently active on the stock exchange or not:

$$y_{i1} = \begin{cases} 1 & y_{i1}^* > 0 \\ 0 & else \end{cases} \qquad \text{(ACTIVE)}$$

and a resultant binary outcome equation that takes the value 1 if the individual purchased any stocks in the previous two months and zero otherwise:

$$y_{i2} = \begin{cases} 1_{[y_{i2}^* > 0]} & y_{i1}^* > 0 \\ - & else \end{cases}. \qquad \text{(PURCHASE)}$$

Within this study, y_{i1} is a dummy variable equal to 1 if a person is active on the stock exchange and 0 otherwise, i.e., $y_{i1} \equiv$ ACTIVE STX. Denoting by y_{i2} information on whether an individual has purchased stocks within the previous two months, i.e., $y_{i2} \equiv$ STX2MONTHS, it is immediately clear that y_{i2} is only observed if $y_{i1}^* > 0$, whereas y_{i2} need not take on any meaningful value if $y_{i1}^* \leq 0$.

Following the standard approach in the literature, we specify y_{i1}^* and y_{i2}^* as follows:

$$y_1^* = x_1'\beta_1 + \varepsilon_1 \qquad (1)$$

$$y_2^* = x_2'\beta_2 + \varepsilon_2, \qquad (2)$$

where y_{i1}^* and y_{i2}^* may be interpreted as an individual's propensities to invest in financial markets generally and to buy stocks, respectively. The crucial part here is that we want to allow for correlation between ε_1 and ε_2.

Heckman (1976, 1979) proposed a two-step estimator for this estimation problem and derived its asymptotic distribution.[7] The intuition behind his estimator, based on all individuals within our sample, is to first estimate the probability for an individual to belong to the group of investors. In the second step, this estimated probability is entered as an additional right-hand side variable for equation (2), which can then be estimated by OLS. For the problem at hand, the adoption of this estimation procedure thus corresponds to the specification of a linear probability model (LPM) that adjusts for sample selection[8].

Following our literature review from section 2, we model a person's propensity to become an investor, y_{i1}^{*}, as a function of the individual's gender (motivated by Barber & Odean, 2001), age, monthly income (both motivated by Lewellen et al., 1977), education (economics students and participants from financial courses may be more confident about their knowledge) and investment motives (traders might in general be less risk averse), i.e.,:

$$\begin{aligned} y_{i1}^{*} &= \beta_{1,0} + \beta_{1,1} MALE + \beta_{1,2} AGE + \beta_{1,3} ECONOMICS + \beta_{1,4} GRADUATE/MASTER + \\ &+ \beta_{1,5} INCOME + \beta_{1,6} FINCOURSES + \gamma_1 MOTIVES_{i1}^{'} + \varepsilon \end{aligned} \quad , (3)$$

where *MOTIVES*' is a row vector containing all investment motives displayed in Table 1, except for "BE PRESENT AT MARKET", which serves as the reference category within our estimations.

An individual's propensity to buy stocks is explained by the media heuristic, other information resources available to that investor (more resources might lead to better informed traders), investment motives (more motives might lead to more opportunities that appear

[7] For a more detailed analysis of sample selection models, see also Heckman (1990). The interested reader is also referred to Greene (2003) and the references therein.

[8] We are aware of the existence of the probit model with sample selection as introduced by Van de Ven & Van Praag (1981). However, we prefer the LPM because it is computationally more robust in connection with bootstrapped standard errors that adjust for clustering when the number of clusters and cluster sizes are small. For the computation of the LPM estimates, we choose the two-step procedure over the full maximum likelihood specification for the very same reason. The coefficients from the MLE model with cluster adjusted standard errors (see also below) are virtually identical to the ones from the LPM and are available from the authors upon request.

promising), preferred asset classes (individuals trading more asset classes might trade more often), financial experience (as motivated by Kaustia & Knüpfer (2008)) and, again, income, age and gender:

$$\begin{aligned} y_{i2}^{*} &= \beta_{2,0} + \beta_{2,1} MEDIA + \beta_{2,2} INFORESOURCES_{i2} + \beta_{2,3} MOTIVES_{i2} + \\ &+ \beta_{2,4} ASSETCLASSES'_{i2} + \beta_{2,5} FINANCEEXP_{i,2} + \beta_{2,6} AGE_{i,2} + \beta_{2,7} MALE_{i,2} + \\ &+ \beta_{2,8} INCOME_{i,2} + \varepsilon_{i,2} \end{aligned} \quad (4)$$

Here, *INFORESOURCES*, *ASSETCLASSES* and *FINANCEEXP* are row vectors containing all information resources (except media), preferred asset classes and measures of financial experiences, respectively. The corresponding reference categories for *INFORESOURCES* and *ASSETCLASSES* are given by *PERSONAL STUDIES* and *OPTIONS*.

To determine whether individuals rely on media and other information resources as a heuristic in the presence of limited attention, we are primarily concerned with the influences of *MEDIA* and *INFORESOURCES* on *STX2MONTHS*, i.e., we want to know whether individuals trading on specific information resources are in general more likely to buy stocks.

Table 3 summarizes our choice of elements for x_1 and x_2 in detail and displays reference groups.

- Insert Table 3 about here -

Regarding the calculation of standard errors, we adjust standard errors by clustering[9]. For data collection, we relied on 42 students to reach a stratified, random sample of students from different fields of study. It was required that at least 20% of the interviewed students had practical experience in the stock market. It might be that information that was collected by the

[9] Estimation results are effectively based on 39 clusters, which is quite a small number of clusters. Angrist & Pischke (2009) documented several methods by which to adjust clustered standard errors when the number of clusters is small; see also McCaffrey & Bell (2002), Donald & Lang (2007) and Cameron, Gelbach & Miller (2008). We follow the latter and base standard errors on nonparametric bootstrap replications that take clustering into account. Standard errors that have been obtained from Stata's "cluster" option are given for comparison purposes.

same person is correlated. We view our sample as consisting of several groups, where each group can uniquely be identified by the person who collected the information.

4 Empirical Results

4.1 Findings

The core estimation results for the outcome equation are given in Table 4[10].

- Insert Table 4 about here -

The first specification (Model 1) clearly rejects Hypothesis 1 as MEDIA significantly affects the stock buying propensity of individuals ($z_1 = 4.81$). According to this result, individuals in our sample seem neither to believe in informationally efficient markets nor to be aware of the finding by Tetlock (2007) that media content proxies for noninformation or investor sentiment. The reader should note, however, that this finding is not equivalent to the non-existence of efficient financial markets. It just implies that, for whatever reason, individuals within our sample do not behave as if they believed in informationally efficient markets.

Evidence on Hypothesis 2 is displayed in Models 2 – 5. Each model introduces various sets of controls, based on the literature review in section 2. The results support the notion that the statistical significance of MEDIA in Model 1 is not inherently driven by unobserved personal characteristics as MEDIA remains statistically significant in all models ($z_2 = 4.29$; $z_3 = 4.78$; $z_4 = 4.66$ and $z_5 = 4.48$, respectively). Therefore, the results support H2, i.e.,

[10] For the interpretation of the marginal effects, the reader needs to keep in mind that we always control for an individual's total number of information resources considered; marginal effects on information resources thus do not refer to an increase in total information resources, but to a substitution between two information resources. For example, for an individual who relies on personal analysis only, the marginal effect on the media corresponds to a change from personal analysis to media information for investment guidance. The reader should note that we decided to drop the specifications including INCOME and AGE as these variables never turned out to be statistically significant in the outcome equation. Performing Wald tests, the null hypothesis of joint insignificance could not be rejected.

MEDIA remains statistically significant independent of any controls on investors' backgrounds.

The results further support Hypothesis 3a by showing that MEDIA raises the stock buying propensity of individuals ($p<0.01$). One might be surprised that the impact of MEDIA on stock buying propensity increases across the different specifications (from 61% to 75%) in spite of the fact that the number of controls is rising. The additional controls lead *de facto* to a greater degree of homogeneity in the group under study. In Model 4, the impact of MEDIA on stock buying propensity (+73%) is based on the assumption that a person's investment motives and preferences and financial experiences are fixed. We also emphasize that the effect is very stable in models 2 to 5, suggesting that a person's decision to rely on MEDIA guidance is not correlated with his preferred asset classes, financial experience, and gender once his investment motives have been taken into account.

Hypothesis 3b stated that all other information resources that might be applied as a heuristic should also increase a person's propensity for stock purchases. Only for FAMILY, this hypothesis cannot be rejected ($p<0.05$ in all models). As for all other information resources, it seems as if their influence is inherently driven by certain characteristics of the individuals who choose to rely on them.

Our fourth hypothesis, H4, suggesting that the impact of MEDIA on the propensity to buy stocks is greater than the impacts of any other information resources that might serve as heuristics, is rejected for all Models. In each specification, slope equality for MEDIA and FAMILY cannot be rejected at the 5% level of significance, although a tendency toward statistical support for our hypothesis can be observed[11].

11 Equality is rejected for Model 4 and Model 5 on a 10% level of significance.

To test the impact of regular media exposure on an individual's propensity to buy stocks, we split our sample into two groups: individuals who regularly read the newspaper sections on finance and economics (*econfinancesection*=1) and individuals who do not (*econfinancesection*=0). The estimation results for regular readers are displayed in Panel B of Table 5.

- Insert Table 5 about here -

In line with Hypothesis 5a, the impact of media guidance on a person's propensity to buy stocks is greater for regular readers than for the full sample, although this difference is not statistically significant at any customary level of significance. However, we find statistically significant changes with respect to the *relative* impacts of the various information resources: for individuals who regularly read the newspaper sections on finance and economics, slope equality for FAMILY and MEDIA can clearly be rejected at a 5% level of significance (chi2(1) = 4.62). This suggests that regular media exposure leads to a self-reinforcing impact over time, as it increases the relative importance of MEDIA for the personal propensity to buy stocks.

Although not the main focus of our analysis, detailed information on the estimation results for the various control variables can be found in Table A.2. The main result is that the more information resources an individual uses, the less likely he is to buy stocks. A possible explanation might be finding contradictory information within different information resources or, perfectly in line with the view that information processing capabilities are limited, information overload.

- Insert Table A.2 about here -

Finally, to test the hypothesis that MEDIA impacts investors less than individuals in general, we investigated how the specification of a standard linear probability model (LPM) without sample selection would have changed our empirical findings (see Tables 6 and A.4).

- Insert Tables 6 and A.4 about here -

It is immediately apparent that we cannot reject coefficient equality for MEDIA across Tables 4 and 6. In other words, it does not seem to be the case that MEDIA affects investors any differently from how current non-investors would have been affected had they decided to become investors. In light of our theoretical reasoning, this finding is somewhat surprising. Note that it is also reflected in the non-rejection of statistical independence of our selection and outcome equations (in all models).

In sum, we emphasize that the result that MEDIA impacts the propensity to buy stocks in both models equally should be viewed as further support for the interpretation of MEDIA as a decision heuristic: because limited attention is a genuine characteristic of human beings, it seems to affect non-professional investors as much as currently non-investing (economic) actors. Based on this evidence, it could be argued that the results of Barber & Odean (2008) for institutional and individual investors might also be caused by characteristics other than their differing amounts of attention allocation.

4.2 Alternative Explanations

Instead of viewing media impact as a decision heuristic in the presence of limited investor attention, several alternative theoretical explanations for our findings might come to the reader's mind. Within this section, we briefly comment on what we believe to be the most plausible explanations.

Informed vs. Uninformed Investors. At first glance, a simple explanation for our results might lie in the possibility that individuals relying on media content have more information than those who do not rely on the media. However, this explanation is ruled out by our specification of the outcome estimation equation as we control for the total number of information resources applied. The documented marginal effects thus refer to a mere substitution across information resources considered and not to the employment of more information resources (see also footnote 14).

Ease of Availability. A further explanation for our results might be seen in the broad availability of media information**.** Individuals might thus decide to rely on media information to economize on search costs[12]. Lower search costs, in turn, might induce rational individuals to trade more often as transaction costs are now lower, rendering more investment opportunities profitable. However, this argument is weakened by the findings on returns for stocks with media coverage by Fang & Peress (2009), to which we now turn.

Portfolio Management Following Tetlock (2007) or Fang & Peress (2009). The study by Tetlock (2007) suggests that media pessimism can predict stock market returns. As a consequence, people might buy more often on pessimistic news. However, his trading strategy to exploit this finding neglects margin and capital requirements, which may significantly reduce its benefits for individual investors.

Recently, Fang & Peress (2009) studied the returns of stocks appearing on the news. They found "stocks with no media coverage to earn higher returns than stocks with high media coverage even after controlling for well-known risk factors." An immediate implication of this result is that investors should sell media-covered stocks to finance the purchase of non-

[12] Note that this explanation is closely related – although not identical - to the use of media guidance as a heuristic in the presence of limited investor attention: here, individuals invest in media-covered stocks because it is more profitable, not because they need help to decide which firm to invest in.

covered stocks. As a result, we should find increased buying behavior for investors with media exposure because they buy *uncovered* stocks, not those that catch their attention. However, this explanation suffers from the fact that it requires individual investors to short sell stocks with media coverage, which, as already mentioned by Barber & Odean (2008), is highly unusual for individual investors[13].

The Dyck & Zingales (2003) view. These authors study the relationship between media and asset prices and document several reasons for media's impact on stock prices. Most of their arguments are related to search costs or changes in investor information. As these explanations have already been dismissed as driving factors for our findings, we focus on their statement that "media provides credibility. It is different if I read news on a random web site or if I read news in the *New York Times*." Although we admit that there is some truth to this statement, it partly suffers from the Fang & Peress (2009) finding: how many people would continue[14] to find an information resource credible that leads to the purchase of underperforming stocks? We will come back to this question in the next section.

Investors are already willing to buy and thus turn to media. This is perhaps the strongest objection to our findings. It suggests that the estimated effect of the media heuristic is overstated because only individuals who have already decided to purchase stocks refer to the media to decide which stocks to buy. Although this procedure is perfectly in line with the concept of media guidance as a decision heuristic, it would imply that our specification is subject to an omitted variable bias. However, based on the broad range of individual characteristics within our sample, it is hard to think of an influence factor that is correlated with the adoption of media as a heuristic but does not belong to any of our control groups

[13] Within their dataset for investors of a large discount brokerage, only 0.30% of positions were short positions.
[14] Recall that the average experience of the investors in our sample is 3-4 years.

(motives, preferred asset classes, risk tolerance, experience, and gender). Therefore, we are not too concerned about this argument.

5 Conclusion

Several empirical studies document that media content is an important influence factor for asset prices. However, much less is known about the reasons why investors rely on media guidance for investment purposes and, perhaps even more importantly, which individuals tend to turn to this information resource for guidance. A recent study suggests that media guidance serves as a decision heuristic for investors, who are characterized by limited cognitive resources. Limited attention is an immediate consequence of this assumption. In such a scenario, it may be appropriate for individuals to buy attention-grabbing stocks, e.g., those that appear on the news, to reduce the complexity of the investment task.

This paper puts this explanation under close scrutiny by incorporating a broad range of personal characteristics, such as investment motives, preferred asset classes, financial experience, and gender, into the econometric analysis. Based on a sample selection model, we show that (i) media usage increases a person's propensity to buy stocks, (ii) media guidance tends to affect stock purchasing decisions more than any other information channel, (iii) this effect cannot be explained by individual investment preferences, e.g., risk attitudes or personal experience, and (iv) regular media exposure increases the relative importance of this information resource for the personal propensity to buy. In contrast to previous results, we find that the relation between media guidance and the propensity to buy stocks is robust to various degrees of attention allocation to investment tasks: investors are not less affected by this type of information than current non-investors (who may also be getting informed about investment opportunities, i.e., they too have certain propensities to buy stocks), in spite of the

fact that attention should be a less scarce resource for investors when it comes to stock buying decisions because this group suffers more from losses due to inattention.

From a practical point of view, our results have several implications. First, they provide complementary support for previous findings on the impact of attention-grabbing events and subsequent stock price patterns for firms (Fehle, Tsyplakov & Zdorovtsov, 2005). Such effects are larger for small investors, who are the main group of interest within our study. As shown by Nofsinger (2001) and Fehle & Zdorovtsov (2003), news visibility is more important for such individuals. The finding by Frieder & Subrahmanyam (2005) that individual investors tend to invest in firms with easily-recognized brands also reveals the importance of attention effects for individuals and puts our findings on solid ground.

Second, and more importantly, one should be concerned about the financial consequences of adopting this heuristic. In a recent paper, Fang & Peress (2009) showed that stocks with (high) media coverage underperform those without media coverage. This means that investors actually lose money by trading on this heuristic. Note that this effect can be quite substantial (about 2.4% on an annual basis).

Some interesting questions emerge from our findings. First, the result that family guidance plays a comparably important role for many investors in our sample raises the question of whether media and family both derive their influence from the trust of those who follow their lead. A second question relates to the obvious non-existence of learning effects for investors. This is a consequence of the result that investors with average investment experience of three to four years do not respond differently to media content than current non-investors would had they decided to become investors and use media guidance for investments.

Both of these findings could be rationalized if, for example, investors were unaware of the underperformance of media covered stocks, e.g., because they are satisfied with earning

positive returns on the chosen stocks and fail to consider whether higher returns could have been obtained from alternative investment strategies. This might be an additional consequence of the existence of investor inattention. In particular, it would give rise to a lock-in effect for individuals as once they decided to rely on media guidance, limited attention would hinder them from switching to more profitable decision heuristics. Considering such interactions of limited attention effects is therefore an interesting direction for future research and will help to validate the new findings from our analysis.

Acknowledgements

An earlier version of this paper was circulated under the title *How Media Make People Buy Stocks: Market Homogeneity and Bubbles*. We are grateful to Ulrich Kaiser, Harald Lohre, Stephan Nüesch, Andrew Oswald, Erwin Verbeek, Vladimir Zdorotsov, session participants at the 2009 Western Economic Association Meeting in Vancouver, and seminar participants at the University of Zurich for helpful comments and suggestions. All errors remain our own responsibility.

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Tables

Table 1: Descriptive Statistics: Investors and Current Non-Investors

	NON-INVESTORS			ACTIVE INVESTORS			
Variable	Mean	Std.Dev.	N	Mean	Std.Dev.	N	t-Stat.
Buying/Investment Behavior							
STX2MONTHS	-	-	-	0.550	0.500	109	-
ACTIVE STX	-	-	-	1	0	109	-
Information							-
Resources:							
MEDIA	-	-	-	0.844	0.364	109	-
FRIENDS	-	-	-	0.358	0.482	109	-
ACADEMIC STUDIES	-	-	-	0.505	0.502	109	-
BANK	-	-	-	0.312	0.465	109	-
AT WORK	-	-	-	0.193	0.396	109	-
FAMILY	-	-	-	0.349	0.479	109	-
PERSONAL STUDIES	-	-	-	0.450	0.500	109	-
CHANCE/LUCK	-	-	-	0.229	0.422	109	-
No. OF INFO RESOURCES	-	-	-	3.239	1.604	109	-
Investment Motives:							
EARN MONEY	0.658	0.476	225	0.752	0.434	109	-1.81
SPARE MONEY	0.551	0.498	225	0.505	0.502	109	0.80
PLAY/RISK	0.222	0.417	225	0.339	0.476	109	-2.20*
ECON. INTEREST	0.338	0.474	225	0.541	0.501	109	-3.54**
BE PRESENT AT MARKET	0.031	0.174	225	0.064	0.245	109	-1.26
No. OF MOTIVES	1.800	0.813	225	2.202	1.016	109	-3.61**
Preferred Asset Classes:							
STOCKS	0.773	0.420	225	0.890	0.314	109	-2.84*
MUTUAL FUNDS	0.604	0.490	225	0.569	0.498	109	0.62
BONDS	0.324	0.469	225	0.220	0.416	109	2.06*
LEVER. PRODUCTS	0.093	0.292	225	0.257	0.439	109	-3.53**
CERTIFICATES	0.071	0.258	225	0.147	0.356	109	-1.98*
OPTIONS	0.409	0.493	225	0.477	0.502	109	-1.17
No. OF CLASSES	2.276	1.024	225	2.560	1.220	109	-2.10
Financial Experience:							
STX TENURE	-	-	-	3.000	1.672	109	-
LOST MONEY	4.789	0.714	223	2.716	1.081	109	18.19**
WON MONEY	4.704	0.855	223	2.459	0.948	109	20.91**
INVESTMENT TYPE	-	-	-	3.459	1.531	109	-
Education:							
FIN. COURSES	0.547	0.499	225	0.835	0.373	109	-5.90**
ECONOMICS	0.631	0.484	225	0.807	0.396	109	-3.54**
GRADUATE/MASTER	0.449	0.498	225	0.587	0.495	109	-2.39*
Sociodemographic:							
MALE	0.587	0.494	225	0.835	0.373	109	-5.12**
AGE	23.884	2.267	225	24.330	2.732	109	-1.48
INCOME	1.604	0.755	225	2.000	0.913	109	-3.92**

Note: * and ** denote statistical significance on the 5% and 1% levels, respectively.

Table 2: Descriptive Statistics: Stock Purchases in Previous Two Months

	PURCHASE = 0			PURCHASE = 1			
Variable	Mean	Std.Dev.	N	Mean	Std.Dev.	N	t-Stat.
Buying/Investment Behavior							
STX2MONTHS	-	-	-	1	0	60	-
ACTIVE STX	1	0	49	1	0	60	-
Information							
Resources:							
MEDIA	0.796	0.407	49	0.883	0.324	60	-1.22
FRIENDS	0.429	0.500	49	0.300	0.462	60	1.38
ACADEMIC STUDIES	0.531	0.504	49	0.483	0.504	60	0.49
BANK	0.286	0.456	49	0.333	0.475	60	-0.53
AT WORK	0.204	0.407	49	0.183	0.390	60	0.27
FAMILY	0.245	0.434	49	0.433	0.500	60	-2.10*
PERSONAL STUDIES	0.571	0.500	49	0.350	0.481	60	2.34*
CHANCE/LUCK	0.224	0.422	49	0.233	0.427	60	-0.11
No. OF INFO RESOURCES	3.286	1.658	49	3.200	1.571	60	0.27
Investment Motives:							
EARN MONEY	0.816	0.391	49	0.700	0.462	60	1.42
SPARE MONEY	0.388	0.492	49	0.600	0.494	60	-2.24*
PLAY/RISK	0.367	0.487	49	0.317	0.469	60	0.55
ECON. INTEREST	0.653	0.481	49	0.450	0.502	60	2.15*
BE PRESENT AT MARKET	0.061	0.242	49	0.067	0.252	60	-1.26
No. OF MOTIVES	2.286	1	49	2.133	1.033	60	0.78
Preferred Asset Classes:							
STOCKS	0.918	0.277	49	0.867	0.343	60	0.87
MUTUAL FUNDS	0.469	0.504	49	0.650	0.481	60	-1.90
BONDS	0.163	0.373	49	0.267	0.446	60	-1.32
LEVER. PRODUCTS	0.265	0.446	49	0.250	0.437	60	0.18
CERTIFICATES	0.122	0.331	49	0.167	0.376	60	-0.65
OPTIONS	0.531	0.504	49	0.433	0.500	60	1.01
No. OF CLASSES	2.469	1.243	49	2.633	1.207	60	-0.69
Financial Experience:							
STX TENURE	2.653	1.601	49	3.283	1.688	60	-1.99*
LOST MONEY	2.571	1.118	49	2.833	1.044	60	-1.25
WON MONEY	2.306	1.004	49	2.583	0.889	60	-1.51
INVESTMENT TYPE	3.020	1.561	49	3.817	1.420	60	-2.76**
Education:							
FINCOURSES	0.878	0.331	49	0.800	0.403	60	1.10
ECONOMICS	0.816	0.391	49	0.800	0.403	60	0.21
GRADUATE/MASTER	0.633	0.487	49	0.550	0.502	60	0.87
Sociodemographic:							
MALE	0.857	0.354	49	0.817	0.390	60	0.57
AGE	24.510	2.012	49	24.183	3.213	60	0.65
INCOME	2	0.791	49	2	1.008	60	0

Note: * and ** denote statistical significance on the 5% and 1% levels, respectively.

Table 3: Overview of Chosen Explanatory Variables

Variable	x_1	x_2
Information Resources:		
MEDIA	-	X
FRIENDS	-	X
ACADEMIC STUDIES	-	X
BANK	-	X
AT WORK	-	X
FAMILY	-	X
PERSONAL STUDIES	-	(Reference Category)
CHANCE/LUCK	-	X
No. OF INFO RESOURCES	-	X
Investment Motives:		
EARN MONEY	X	X
SPARE MONEY	X	X
PLAY/RISK	X	X
ECONOMIC INTEREST	X	X
BE PRESENT AT MARKET	(Reference Category)	(Reference Category)
No. of MOTIVES	X	X
Preferred Asset Classes:		
STOCKS	-	X
MUTUAL FUNDS	-	X
BONDS	-	X
LEVERAGED PRODUCTS	-	X
CERTIFICATES	-	X
OPTIONS	-	(Reference Category)
No. OF CLASSES	-	X
Financial Experience:		
STX TENURE	-	X
LOST MONEY	-	X
WON MONEY	-	X
INVESTMENT TYPE	-	X
Education:		
FINCOURSES	X	-
ECONOMICS	X	-
GRADUATE/MASTER	X	-
Sociodemographic:		
MALE	X	X
AGE	X	-
INCOME	X	-

Table 4: Linear Probability Model (LPM) With Sample Selection: Stock Purchases Within Previous Two Months (Heckman's Two-Step Estimator)

Variable	**Model 1** dy/dx	**Model 2** dy/dx	**Model 3** dy/dx	**Model 4** dy/dx	**Model 5** dy/dx
Influential information resources generally considered for investing:					
MEDIA	0.668**	0.715**	0.767**	0.730**	0.751**
	(0.139)	(0.167)	(0.161)	(0.156)	(0.168)
FRIENDS	0.104	0.165	0.176	0.191	0.191
	(0.130)	(0.139)	(0.158)	(0.162)	(0.165)
ACAD. STUDIES	0.281*	0.282*	0.252	0.223	0.201
	(0.120)	(0.135)	(0.143)	(0.144)	(0.150)
BANKS	0.302*	0.275	0.202	0.122	0.122
	(0.153)	(0.162)	(0.174)	(0.183)	(0.181)
AT WORK	0.300	0.258	0.226	0.192	0.181
	(0.177)	(0.197)	(0.226)	(0.200)	(0.208)
FAMILY	0.510**	0.512**	0.527**	0.428*	0.418*
	(0.121)	(0.130)	(0.158)	(0.182)	(0.178)
CHANCE/LUCK	0.345*	0.369*	0.343*	0.352	0.352
	(0.155)	(0.169)	(0.170)	(0.158)	(0.194)
	Controls:				
Total Number of Information Resources	Yes	Yes	Yes	Yes	Yes
Individual Trading Motives	No	Yes	Yes	Yes	Yes
Preferred Asset Classes	No	No	Yes	Yes	Yes
Personal Financial Experience	No	No	No	Yes	Yes
Gender	No	No	No	No	Yes
N(Total)	335	335	335	334	334
N(Uncensored)	110	110	110	109	105
Chi^2	42.77	52.12	61.24	86.88	238.58

Note: Estimation results were obtained from a linear probability model with sample selection. The selection equation determines whether an individual is invested in the stock exchange (Yes=1) and includes gender, investment motives, education, and monthly income as explanatory variables. The outcome equation determines whether an invested individual has purchased stocks in the previous two months (Yes =1). Displayed are marginal effects on an investor's propensity to have purchased stocks in the last two months. For the displayed dummy variables, marginal effects refer to a discrete change from 0 to 1. Standard errors, which have been adjusted for clustering and heteroskedasticity, are given in parentheses. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Table 5: Probit Model With Sample Selection: Estimation Results on Subsamples (Heckman's Two-Step Estimator)

Variable	dy/dx	**Std. Error**
PANEL A: Full Sample		
MEDIA	0.751**	(0.168)
FRIENDS	0.191	(0.165)
ACAD. STUDIES	0.201	(0.150)
BANKS	0.122	(0.181)
AT WORK	0.181	(0.208)
FAMILY	0.418*	(0.178)
CHANCE/LUCK	0.352	(0.194)
N (Total)		334
N (Uncensored)		109
PANEL B: Regular readers of finance and economics section in newspapers		
MEDIA	0.898**	(0.213)
FRIENDS	0.194	(0.187)
ACAD. STUDIES	0.138	(0.186)
BANKS	0.119	(0.204)
AT WORK	0.l76	(0.219)
FAMILY	0.422*	(0.197)
CHANCE/LUCK	0.340	(0.215)
N (Total)		251
N (Uncensored)		98

Note: Estimation results were obtained from a linear probability model (LPM) with sample selection. The selection equation determines whether an individual is invested in the stock exchange (Yes=1) and includes gender, investment motives, education, and monthly income as explanatory variables. The outcome equation determines whether an invested individual has purchased stocks in the previous two months (Yes=1). Displayed are marginal effects on an investor's propensity to have purchased stocks in the last two months. For the displayed dummy variables, marginal effects refer to a discrete change from 0 to 1. Standard errors, which have been adjusted for clustering and heteroskedasticity, are given in parentheses. * and ** denote statistical significance on the 5% and 1% levels, respectively.

Table 6: Linear Probability Model (LPM) Without Sample Selection: Stock Purchases Within Previous Two Months

Variable	**Model 1** dy/dx	**Model 2** dy/dx	**Model 3** dy/dx	**Model 4** dy/dx	**Model 5** dy/dx
Influential information resources generally considered for investing:					
MEDIA	0.614**	0.679**	0.737**	0.719**	0.751**
	(0.135)	(0.164)	(0.152)	(0.148)	(0.159)
	[0.125]	[0.153]	[0.140]	[0.132]	[0.143]
FRIENDS	0.119	0.167	0.186	0.194	0.191
	(0.132)	(0.140)	(0.156)	(0.159)	(0.155)
	[0.128]	[0.137]	[0.152]	[0.149]	[0.148]
ACAD. STUDIES	0.266*	0.268	0.239*	0.215	0.203
	(0.128)	(0.139)	(0.145)	(0.140)	(0.146)
	[0.124]	[0.133]	[0.138]	[0.134]	[0.138]
BANKS	0.351*	0.294	0.217	0.129	0.121
	(0.150)	(0.154)	(0.164)	(0.176)	(0.169)
	[0.148]	[0.146]	[0.159]	[0.163]	[0.158]
AT WORK	0.284	0.236	0.209	0.186	0.182
	(0.169)	(0.191)	(0.210)	(0.201)	(0.193)
	[0.159]	[0.182]	[0.204]	[0.162]	[0.164]
FAMILY	0.562**	0.533**	0.547**	0.436*	0.418*
	(0.123)	(0.123)	(0.155)	(0.176)	(0.177)
	[0.120]	[0.119]	[0.147]	[0.168]	[162]
CHANCE/ LUCK	0.362*	0.381*	0.359*	0.359*	0.352*
	(0.154)	(0.172)	(0.162)	(0.178)	(0.178)
	[0.147]	[0.158]	[0.156]	[0.173]	[0.173]
	Controls:				
Total Number of Information Resources	Yes	Yes	Yes	Yes	Yes
Individual Trading Motives	No	Yes	Yes	Yes	Yes
Preferred Asset Classes	No	No	Yes	Yes	Yes
Personal Financial Experience	No	No	No	Yes	Yes
Gender	No	No	No	No	Yes
N(Total)	110	110	110	109	109
Chi^2	45.46	62.12	74.36	110.95	112.45
F-Statistic	7.21	9.34	13.48	17.19	21.12

Note: Estimation results were obtained from a linear probability model (LPM) without sample selection. The estimation equation determines whether an invested individual has purchased stocks in the previous two months (Yes =1). Displayed are marginal effects on an investor's propensity to have purchased stocks in the last two months. For the displayed dummy variables, marginal effects refer to a discrete change from 0 to 1. Standard errors, which are based on 2000 nonparametric bootstrap replications and take clustering in the data into account, are given in round brackets, and square brackets contain cluster-adjusted standard errors from Stata's cluster command. * and ** denote statistical significance on the 5% and 1% levels based on bootstrapped standard errors, respectively.

Appendix I:

Table A.1: Selected Survey Questions and Corresponding Variables

Question	Variable/ Values
1. Are you active on the stock exchange?	ACTIVE STX (Yes=1)
2. Have you purchased any stocks within the last two months?	STX2MONTHS (Yes=1)
3. How do you inform yourself about investments and the stock exchange?	MEDIA (Yes =1) FRIENDS (Yes =1) ACADEMIC STUDIES (Yes=1)
(Multiple answers possible)	BANK (Yes =1) AT WORK/COLLEAGUES (Yes = 1) FAMILY (Yes =1) PERSONAL STUDIES (Yes =1) CHANCE/LUCK (Yes=1)
4. Have you taken courses about financial markets?	FINCOURSES (Yes =1)
5. Your main course of studies is economics	ECONOMICS (Yes =1)
6. You are a graduate/master's student	GRADMASTER (Yes =1)
7. For what reasons are you/would you be active on the stock exchange?	EARN MONEY (Yes = 1) INVEST „SPARE MONEY" (Yes=1) PLAY/RISK INSTINCT (Yes =1)
(Multiple answers possible)	ECONOMIC INTEREST (Yes =1) „BE PRESENT AT MARKET" (Yes =1)
8. In which asset classes do you/would you invest?	STOCKS (Yes =1) MUTUAL FUNDS (Yes =1)
(Multiple answers possible)	BONDS (Yes =1) LEVERAGED PRODUCTS (Yes =1) CERTIFICATES (Yes =1) OPTIONS (Yes =1)
9. How long have you been active on the stock exchange?	STX TENURE: 1: < 1yr 2: 1-2 yrs 3: 3-4 yrs 4: 4-5 yrs 5: 5-6 yrs 6: > 6 yrs
10. Are you a.... ?	INVESTMENT TYPE: 1 = RISK SEEKING INVESTOR 2 = ... 3 = ... 4 = MODERATE INVESTOR 5 = ... 6 = ... 7 = RISK-AVERSE INVESTOR

Question	Variable/ Values
11. Have you ever won [lost] money on the stock exchange?	WON MONEY [LOST MONEY]: 1 = Yes, a lot. 2 = ... 3 = ... 4 = ... 5 = No, never.
12. What is your monthly income (in Swiss Francs)?	INCOME: 1: < 1500 2: 1500 – 2499 3: 2500 – 3499 4: 3500 – 5: No answer
13. Personal characteristics	MALE (Yes = 1) AGE

Appendix II

Table A.2: Linear Probability Model (LPM) With Sample Selection: Estimation Results on Controls

Variable	Model 1 dy/dx	Model 2 dy/dx	Model 3 dy/dx	Model 4 dy/dx	Model 5 dy/dx
No. OF INFO RESOURCES	-0.262***	-0.274***	-0.266***	-0.233*	-0.230*
	(0.075)	(0.094)	(0.101)	(0.110)	(0.110)
EARN MONEY	-	-0.326	-0.215	-0.164	-0.157
		(0.302)	(0.345)	(0.385)	(0.388)
SPARE MONEY	-	0.010	0.069	0.171	0.188
		(0.287)	(0.325)	(0.348)	(0.355)
RISK	-	-0.142	-0.034	0.052	0.072
		(0.271)	(0.313)	(0.349)	(0.355)
ECONOMIC INTEREST	-	-0.264	-0.202	-0.126	-0.116
		(0.264)	(0.298)	(0.311)	(0.315)
No. OF MOTIVES	-	0.157	0.044	-0.038	-0.062
		(0.254)	(0.298)	(0.320)	(0.327)
STOCKS	-	-	-0.142	-0.207	-0.224
			(0.195)	(0.186)	(0.186)
MUTUAL FUNDS	-	-	0.055	0.031	0.042
			(0.136)	(0.146)	(0.157)
BONDS	-	-	0.203	0.046	0.054
			(0.152)	(0.163)	(0.168)
LEVERAGED PRODUCTS	-	-	0.040	0.045	0.063
			(0.177)	(0.196)	(0.203)
CERTIFICATES	-	-	0.025	-0.075	-0.060
			(0.217)	(0.255)	(0.263)
No. OF CLASSES	-	-	0.017	0.070	0.061
			(0.115)	(0.125)	(0.129)
STX TENURE	-	-	-	0.062	0.061
				(0.032)	(0.032)
LOST MONEY	-	-	-	-0.000	-0.001
				(0.057)	(0.058)
WON MONEY	-	-	-	0.055	0.057
				(0.064)	(0.064)
INVESTMENT TYPE	-	-	-	0.082*	0.084*
				(0.038)	(0.039)
MALE	-	-	-	-	-0.098
					(0.166)

Note: Estimation results were obtained from a probit model with sample selection. The selection equation determines whether an individual is invested in the stock exchange (Yes=1) and includes gender, investment motives, education, and monthly income as explanatory variables. The outcome equation determines whether an invested individual has purchased stocks in the previous two months (Yes =1). Displayed are marginal effects on an investor's propensity to have purchased stocks in the last two months. For the displayed dummy variables, marginal effects refer to a discrete change from 0 to 1. Standard errors, which are based on 2000 nonparametric bootstrap replications and take clustering in the data into account, are given in parentheses. * and ** denote statistical significance on the 5% and 1% levels, respectively.

Table A.3: Linear Probability Model (LPM) with Sample Selection: Stock Purchases Within Previous Two Months (MLE estimator)

Variable	Model 1 dy/dx	Model 2 dy/dx	Model 3 dy/dx	Model 4 dy/dx	Model 5 dy/dx
Influential information resources generally considered for investing:					
MEDIA	0.669**	0.711**	0.766**	0.730**	0.751**
	(0.122)	(0.145)	(0.130)	(0.115)	(0.125)
FRIENDS	0.108	0.166	0.177	0.191	0.191
	(0.117)	(0.124)	(0.133)	(0.131)	(0.132)
ACAD. STUDIES	0.281*	0.281*	0.251*	0.223*	0.201
	(0.111)	(0.123)	(0.122)	(0.112)	(0.117)
BANKS	0.296*	0.276	0.201	0.122	0.122
	(0.140)	(0.141)	(0.147)	(0.147)	(0.143)
AT WORK	0.305	0.259	0.227	0.193	0.181
	(0.168)	(0.177)	(0.192)	(0.147)	(0.143)
FAMILY	0.506**	0.513**	0.528**	0.427**	0.418**
	(0.112)	(0.114)	(0.133)	(0.149)	(0.144)
CHANCE/ LUCK	0.350*	0.372*	0.346*	0.352*	0.352*
	(0.140)	(0.146)	(0.140)	(0.156)	(0.157)
	Controls:				
Total Number of Information Resources	Yes	Yes	Yes	Yes	Yes
Individual Trading Motives	No	Yes	Yes	Yes	Yes
Preferred Asset Classes	No	No	Yes	Yes	Yes
Personal Financial Experience	No	No	No	Yes	Yes
Gender	No	No	No	No	Yes
N(Total)	335	335	335	334	334
N(Uncensored)	110	110	110	109	109
Chi^2	62.47	105.65	163.70	404.24	-[1]

Note: Estimation results were obtained from a linear probability model with sample selection. The selection equation determines whether an individual is invested in the stock exchange (Yes=1) and includes gender, investment motives, education, and monthly income as explanatory variables. The outcome equation determines whether an invested individual has purchased stocks in the previous two months (Yes=1). Displayed are marginal effects on an investor's propensity to have purchased stocks in the last two months. For the displayed dummy variables, marginal effects refer to a discrete change from 0 to 1. Standard errors, which have been adjusted for clustering and heteroskedasticity, are given in parentheses. * and ** denote statistical significance on the 5% and 1% levels, respectively.

[1]: For this specification, the number of explanatory variables exceeded the number of clusters, which is why we do not put any emphasis on these results.

Table A.4: Linear Probability Model (LPM) Without Sample Selection: Estimation Results on Controls

Variable	**Model 1** dy/dx	**Model 2** dy/dx	**Model 3** dy/dx	**Model 4** dy/dx	**Model 5** dy/dx
No. OF INFO RESOURCES	-0.281**	-0.280**	-0.272**	-0.235*	-0.229*
	(0.073)	(0.092)	(0.097)	(0.107)	(0.102)
EARN MONEY	-	-0.297	-0.191	-0.149	-0.158
		(0.289)	(0.324)	(0.353)	(0.353)
SPARE MONEY	-	0.033	0.100	0.190	0.186
		(0.276)	(0.304)	(0.316)	(0.312)
RISK	-	-0.126	-0.020	0.064	0.070
		(0.267)	(0.297)	(0.321)	(0.318)
ECONOMIC INTEREST	-	-0.260	-0.199	-0.122	-0.116
		(0.258)	(0.290)	(0.299)	(0.295)
No. OF MOTIVES	-	0.123	0.017	-0.054	-0.059
		(0.244)	(0.278)	(0.288)	(0.291)
STOCKS	-	-	-0.139	-0.207	-0.223
			(0.192)	(0.181)	(0.185)
MUTUAL FUNDS	-	-	0.080	0.036	0.041
			(0.138)	(0.146)	(0.143)
BONDS	-	-	0.213	0.050	0.054
			(0.135)	(0.154)	(0.159)
LEVERAGED PRODUCTS	-	-	0.059	0.054	0.061
			(0.169)	(0.185)	(0.195)
CERTIFICATES	-	-	0.067	-0.062	-0.062
			(0.198)	(0.239)	(0.242)
No. OF CLASSES	-	-	-0.004	0.063	0.062
			(0.106)	(0.123)	(0.126)
STX TENURE	-	-	-	0.062*	0.061
				(0.030)	(0.032)
LOST MONEY	-	-	-	0.002	-0.001
				(0.054)	(0.054)
WON MONEY	-	-	-	0.061	0.057
				(0.058)	(0.060)
INVESTMENT TYPE	-	-	-	0.083*	0.084*
				(0.035)	(0.036)
MALE	-	-	-	-	-0.094
					(0.131)

Note: Estimation results were obtained from a linear probability model (LPM) without sample selection. The estimation equation determines whether an invested individual has purchased stocks in the previous two months (Yes =1). Displayed are marginal effects on an investor's propensity to have purchased stocks in the last two months. For the displayed dummy variables, marginal effects refer to a discrete change from 0 to 1. Standard errors, which are based on 2000 nonparametric bootstrap replications and take clustering in the data into account, are given in parentheses. * and ** denote statistical significance on the 5% and 1% levels, respectively.