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Original Paper

Overcoming home- and overconfidence bias: an effective guideline for private investors based on meta-analysis

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Abstract

Private investors' underperformance compared to institutional investors is attributed to a combination of factors, including home bias and overconfidence bias. Home bias refers to the tendency of private investors to overinvest in their domestic markets, which can result in missed opportunities for diversification and exposure to international markets. Institutional investors are less likely to exhibit this bias as they have the resources and expertise to invest globally. Overconfidence bias, on the other hand, refers to private investors' tendency to believe they have an informational advantage and can outperform the market. This can lead to excessive trading and suboptimal investment decisions. Institutional investors, with their experience and disciplined investment processes, are less likely to fall prey to overconfidence bias. Together, these biases contribute to the underperformance of private investors compared to institutional investors. The following abstract presents four strategies to overcome home- and overconfidence bias derived from the insights of this literature reviewed meta analysis.

Keywords

home bias, overconfidence bias, underperformance, strategy

1. Introduction

For some years now, the analysis of possible improvements in investment advice through the insights gained from Behavioural Economics and Finance has occupied a considerable part of empirical research (cf. Averbeck, 2010, p. 179; Bürger, 2014, p. 40; Chaudhary, 2013, p. 81; Averbeck, 2018, p. 89; Thaler, 2007, p. 1f., Shiller, 2012, p. 23). The content of the research is primarily the sensitisation of the customer to the rationality traps. Based on the results derivable from empirical research, investor typologies with their different orientations, risk perceptions and biases are also developed (cf. Zhu, 2018, p. 136; Peterson & Murtha, 2010, p. 49f.). In terms of a holistic approach to explaining market phenomena, the overall aim is to synthesize findings on individual effects with their market impact.

At this point, the approaches to explaining the development of stock market exaggerations, i.e.,

speculative bubbles, also play an important role (cf. Averbeck, ibid.). Moreover, the reverse path of shedding light on the influence of behaviour on market prices is the focus of further behavioral science research, through whose findings behavioral finance funds, for example, hope to profit (ibid.).

On the one hand, various determinants and their different influences on behaviour and markets are analysed. There are numerous studies that examine different behaviors of market participants depending on sociographic data such as age, gender, culture, religion, income and experience: for example, findings could be obtained that relate to the investment behaviour of women and men. Compared to men, women show a higher risk aversion. Men, in turn, tend to have greater overconfidence, which implies greater trading activity (cf. Barber & Odean, 2001, pp. 261-289; Peterson, 2007, pp. 275-279; and Frühwirth, 2013, p. 737).

In her dissertation Mazanek comes to the conclusion that the more intensively emotion acts as a parameter on investor behaviour, the more pronounced its influence on the investment decision (cf. Averbeck, 2018, p. 90; Mazanek, 2009, p. 162; Peterson & Murtha, 2010, pp. 69-98). The preference for shares in the home market, which can be derived from the emotional attachment to the company, has also been proven in numerous studies. According to them, the tendency of private investors to invest in shares of domestic companies is expressed in the so-called home bias, which still represents a central behavioural anomaly on stock markets (cf. Wendt et al., 2021, pp. 163-182; von Nitzsch, 2021, pp. 81ff.; Oehler & Wendt, 2016, pp. 219-229; Morszeck, 2010, p. 39; Russel, 2019, pp. 4-46).

2. Method

In a literature review with a nomological approach first a comprehensive review of the existing literature to identify empirical studies that have tested the relationships between the constructs is conducted. The focus is on studies that provide evidence of the nomological validity of the assumption that institutional investors outperform private investors at stock markets, which involves evaluating whether the relationships between the constructs are consistent with the assumptions predictions. In this case it allows furthermore the derivation of a guideline thrived by the results of the metastudy. Meta-analysis as a quantitative, epidemiological study design, allows the systematically assess of previous research studies to derive conclusions about the body and the context of research (Haidich, 2010, pp. 29-37), which is conducted to identify an effective measure catalogue to heal the two biases under view.

3. Empirical Proven: Private Investors Underperform

Due to the multitude of manifestations of institutional investors used in the literature (cf. Orth, 2000, p. 73ff., Baums, 1996, p. 324; Dietl, 1998, p. 44f.; Shleifer & Vishny, 1997, p. 675; Oehler, 1995, p. 5), there are several alternative definitions of the term. The derivation of a clear definition is therefore subject to a certain complexity.

“The Problem is the lack of fundamental guidelines for this empirical research. [...] Strange as it may

seem, the definition of the concept of the "institutional investor" is an unsound question. Thus when an American specialist refers to institutional investors, he is very likely thinking about pensions, and investment funds, whereas an Englishman may have in mind insurance companies, and a German may think about banks" (Garrido in Hopt & Wymeersch, 2003, p. 449, p. 452).

In the context of the work and the subject of the study, a brief working definition of institutional investors is therefore first elicited in order to be able to use this to delimit the private investors that are important for the present work. The focus is on differences in information acquisition and investment behaviour, as it is to be shown that these differences lead to a higher incidence of errors among private investors and that institutional investors act more rationally. According to the definition commonly offered by the OECD, institutional investors are defined as those investors who dispose of large assets by applying professional investment techniques (cf. OECD, 1999, p. 3). As shareholders, they tend to behave with restraint vis-à-vis the investee company as far as the exercise of the co-determination rights securitised by the shareholding is concerned. Rather, they have sound knowledge of their environment and also of the prospective development opportunities of the companies that are of interest to them (cf. Kaiser, 1998, p. 128) and in this way develop potential returns. Deutsche Bank groups institutional investors in the narrower sense as investment companies, insurance companies and pension funds, and in the broader sense as credit institutions and companies with significant investment volumes (cf. Deutsche Bank, 1998, p. 56; Oesterhelweg, 1998, p. 9).

Due to their legal status as legal entities, these business entities are subject to legal restrictions such as the German Banking Act or insider regulations. According to the German Securities Trading Act (WpHG) § 67 paragraph 2, institutional investors also have sufficient experience and expertise to be able to adequately assess the risks associated with an investment. Furthermore, they draw on a variety of information from different sources and implement a professional information search as well as information processing.

One of the two largest capacities worldwide in this regard is operated by the USD 8.7 trillion investment company BlackRock through its Aladdin software (cf. Schatzker, 2017, n.d.; Statista, 2020, n.d.).

"BlackRock's Aladdin has within its memory a vast history of the past 50 years - not just financial - but all kinds of events. What it does is constantly take things that happen in the present day and compares them to events in the past. Out of the millions and millions of correlations - Aladdin then spots possible disasters - possible futures - and moves the investments to avoid that future happening. I can't over-emphasise how powerful Blackrock's system is in shaping the world - it's more powerful in some respects than traditional politics" (Curtis in Haberly, MacDonald-Korth, Urban, & Wojcik, 2019, p. 167).

In this way, an AI-supported rationality on a Big Data basis is made possible, which is very different and distinguishable from the limited capabilities of private investors.

Furthermore, institutional investors fall back on proven investment strategies to avoid mistakes (beta

change, duration adjustment, change of asset allocation). In contrast to private investors, concrete rule-based investment strategies are consistently pursued and controlled ex post (cf. Albrecht & Maurer, 2016, p. 29). In this context, it is primarily the control mechanisms and adherence to rules that private investors often lack (cf. Fischer, 2013, p. 14ff.) Overall, an institutional investment process can be depicted as follows:

The investment volumes are largely generated from third-party property and usually represent high investment amounts (cf. Oehler, 1995, p. 5).

This is also an essential difference to private investors, who largely manage their own assets. At this point, we will therefore next show how they do this. Individual investors are typically natural persons who, in contrast to institutional investors, have no organisational ties, manage smaller investment volumes for their own account and form a large heterogeneous group (cf. Oehler, 1995, p. 6f.; Kirchhoff, 2009, p. 48). Their influence on capital markets is therefore limited, and the possibilities for obtaining information appear inferior to those of institutional investors. There is a lack of direct contact to companies (also to the management level).

Their decisions are based on a disadvantageous data basis, whereby the information processing competence varies greatly. This is because, in addition to professional investors, beginners and the economically illiterate can also be identified, pushing the average performance of private investors below that of institutional investors (cf. Wassermann, 2011, p. 53; Elliott, Hodge, & Jackson, 2008, p. 476; Oehler, 1995, p. 5). With reference to a meta-study conducted in 2016 by Zülch, Benary and Hottmann, three sources provide filtered information for private investors:

- Journalistic sources
- Assessments of external analyses
- newsletters or external conferences (cf. Zülch, Benary, & Hottmann, 2016, p. 1513f.).

There is a high affinity to secondary sources due to the limited information gathering possibilities (cf. ibid.). On average, primary sources such as annual financial statements or interim financial statements are accessed less frequently (cf. Kellner, 2020, p. 277).

The reason for this is the fact that original financial reporting is seen as helpful in checking filtered information as well as the fact that secondary sources contribute to easier interpretation patterns of primary sources (cf. Keller, 2019, p. 277; Zülch, Benary, & Hottmann, 2016, p. 1513f.).

In the study by Pellens and Schmidt, it is emphasised that it is primarily secondary sources such as newspapers, magazines or business formats on TV that occupy a significant position in the procurement of information (cf. 2014, p. 33).

Primary sources are then consulted, followed by third parties such as banks, consultants or acquaintances (cf. ibid.). This finding is confirmed in another study: „Retail investors use public media, advice by financial institutions, friends or family, and financial statements as information sources for their decisions as capital providers" (Cascino et al., 2014, p. 194).

In this context, filtered, processed and condensed information from third parties is relevant.

In particular, inexperienced private investors make disadvantageous investment decisions when primarily original sources are consulted (cf. Elliott, Hodge, & Jackson, 2008, p. 488). Thus, a striking discrepancy arises between the information gathering and processing skills of private and institutional investors.

The second level concerns the investment decisions that are made. Oehler uses written surveys to investigate motives and sources of information that are significant for private investors in the context of their investment decisions (cf. Oehler, 1995, p. 155; Kellner, 2020, p. 278). In analogy to the motives, banks, financial advisors, family and acquaintances, print and electronic media as well as brochures of the issuing companies are the most frequently used sources of information (cf. ibid.).

In all possible answer combinations (under the aspect of multiple answers), the media and financial intermediaries come first, followed by the consultation of family members and acquaintances (cf. ibid., p. 158). Oehler documents that decision-making behaviour is implicit, emotional and not goal-oriented (cf. Oehler, 1995, p. 5).

Several studies come to the unanimous conclusion that private investors on average lag behind the annual return of the overall market (cf. Barber, Lee, Liu, & Odean, 2004, pp. 1-41; Kyle, 1985, p. 1325f.; Grossmann & Stiglitz, 1980, p. 393f.; Grinblatt & Kelojaharju, 2011, p. 2121ff.).

At this point, randomly selected studies are presented, as they have a scientifically required population of empirical data and their relevance is therefore valid.

It should also be noted that there are, of course, counter-studies to these studies which deal with the fact that private investors are certainly able to outperform the market. However, these studies mainly confirm exceptional cases and therefore do not focus on the majority of private investors (cf. Coval, Hirshleifer, & Shumway, 2005, pp. 4-25; Barber & Odean, 2000, p. 801; Ivkovich & Weisbrenner, 2005, p. 267ff.). Due to the circumstance of deviation from the average behaviour, the focus on the following results becomes justifiable.

Overconfidence

A study by Anderson, for example, analysing 324,736 transactions by 16,381 Swedish private investors, shows that investment performance lags behind the market by 8.5 per cent, but this is partly due to high transaction costs caused by frequent trading (cf. Anderson, 2003, pp. 448-471).

In this context, Barber et al. (2004, p. 4ff.) examine the trading data of 925,841 traders in Taiwan and come to the same conclusion. “Heavy day traders earn gross profits, but their profits are not sufficient to cover transactions costs. Moreover, in the typical six month period, eight out of ten day traders lose money” (Barber et al., 2004, p. 1). The reason for the extremely high trading activity is the pronounced self-confidence of investors, which leads to an aggressive investment strategy (cf. ibid., p. 18). Anderson confirms: “On average, investors hold undiversified portfolios, show a strong preference for risk, and trade aggressively” (Anderson, 2003, p. 448).

Kim and Nofsinger make the same argument in their investment study by observing Japanese investors

during Bull (1984 to 1989) and Bear (1990 to 1999) market periods and focusing on investors' individual risk preferences and attitudes towards investment risk. They conclude that overconfident investors tend to hold riskier portfolios. Moreover, these investors would permanently underestimate investment risks (cf. Kim & Nofsinger, 2007, p. 138f.; Kyle & Wang, 1997, p. 1325; Odean, 1998, p. 1776ff.). Increased portfolio risk arises either from under-diversification itself, or from high-risk stocks, even if these may be sufficiently diversified (cf. Kim & Nofsinger, 2007, op. cit.).

In the German market, Weber and Glaser find that 3,000 investors underperform by 1.4 per cent. They find that investors with a high degree of self-confidence (overconfidence) trade much more often than rational investors (Weber & Glaser, 2003, pp. 1-55). "We find that investors who think that they are above average in terms of investment skills or past performance trade more" (Weber & Glaser, 2003, p. 3). Problematic in this context: the more often a transaction is processed, the lower the return development (cf. ibid., p. 13; Lorenzen, 2020, n.d.).

Another study by Barber and Odean, which examines the investment behaviour of 66,465 US private investors over a period of six years, comes to the same conclusion. They underperformed the market by an average of 6.5 per cent, which, as Weber and Glaser already found, is due to the investors' highly pronounced overconfidence. "Overconfidence can explain high trading levels and the resulting poor performance of individual investors. Our central message is that trading is hazardous to your wealth" (Barber & Odean, 2000, p. 773).

Daniel, Hirshleifer and Subrahmanyam also come to the conclusion in their study that private investors tend to strongly disregard relevant indicators due to their overestimation of themselves, primarily in times of high market valuation (cf. Daniel et al., 2001, p. 23; Schwarz & Seimayr, 2016, p. 85f.).

Chuang and Susmel also support the assumption of behavioral finance that overconfidence of private investors can be observed above all in volatile market upward and downward phases, the implicit risk (beta) is not taken into account and therefore trading is more aggressive and riskier (Chuang & Susmel, 2011, p. 1643).

The over- or underreactions of securities prices triggered by this trading behaviour contradict Fama's market efficiency hypothesis, according to which all information is priced into securities prices (cf. Wärneryd, 2001, p. 156 and the explanations in Chapter 3.1).

The market anomaly of overreaction is shown by positive price developments caused by the reaction to news over a period of three to five years. Securities, for example, about which the investor hears consistently positive news, are initially valued too high based on the fundamental data and then show lower returns in the further course (cf. Barberis, Shleifer, & Vishny, 1998, p. 307f.).

An underreaction, on the other hand, occurs when unusual corporate events occur after a short phase of extreme performance. The investor reacts only with a delay of one to twelve months to new information regarding the underlying and accordingly the price values are also adjusted only gradually, but in any case too slowly (cf. Brav & Heaton, 2002, p. 585).

In this context, Daniel, Hirshleifer and Subrahmanyam developed a model to explain overreactions.

This model is based on overconfidence as well as on the distorted self-attribution of private investors (cf. Daniel, Hirshleifer, & Subrahmanyam, 1998, p. 1844). Overconfidence affects the correct assessment of one's own evaluation competencies with regard to a correct share valuation and thus the variance of forecast errors (cf. ibid.). These misinterpretations and weightings of informational signals can in turn be confirmed by content made public, which leads to success being attributed to one's own investment skills. Thus, in principle, selective perception, the illusion of control as well as the self-serving bias ensure the formation of further tendencies to overestimate one's own ability to assess the market (cf. Grunewald, 2007, p. 5f.). On the other hand, private investors only react with a vaguely reduced overconfidence if information contradicts their own views (cf. Daniel et al., 1998, p. 1845).

The core statement of the model can be subsumed under the aspect that an overreaction to private information signals occurs due to self-overestimation. The consequence is the confirmation bias. The underreaction in turn arises due to the marginal weighting of public information that is incongruent with the investor's views.

Local and home bias (familiarity)

Two approaches to familiarity are studied in detail by scholars. On the one hand, the focus is on the more regional local bias, on the other hand on the more international home bias.

Both behavioral biases will always occur in behavioral economics when share portfolios are diversified portfolios of company holdings that are either geographically not far from the investor's location, or contain primarily well-known companies to which personal ties or inclinations exist under certain circumstances.

Investors who have a preference for domestic companies or companies located in the region behave according to the local bias. Thus, with this type of investment, the diversification and securities weighting of foreign companies or companies with which there is a geographical distance and information barriers are too high are automatically reduced (cf. Foad, 2010, p. 277; Baker & Nofsinger, 2010, p. 234; Huchzermeier, 2009, p. 25f.). One of the most frequently used explanations for this is based on the supposed information advantage that investors see in an investment in local shares.

This applies to both institutional and private investors. (cf. Coval & Moskowitz, 1999, p. 2045f.; Ivkovic, 2003, p. 267; Zhu, 2005, p. 167). Not without reason, the results of the study by Weisenbenner are taken into account, which show an excess return of 3.5 per cent when investors trade in domestic rather than international stocks (Weisenbenner, 2005, p. 273).

However, Seasholes and Zhu object to this, pointing to the incorrect application of statistical calculation methods and being unable to identify any relevant information about regional companies among the respective investors (cf. Seasholes & Zhu, 2010, p. 1987f.; Seasholes & Zhi, 2013, p. 23).

In a study comprising 39,000 accounts and 940,000 transactions, they prove that private investors deploy 14 per cent more of their capital, but that below-average performance is achieved via negative alphas (cf. also Massa & Simonov, 2006, p. 635). Diametrically opposed results in this context are

provided by the studies of Massa and Simonov, who examine Swedish investors who buy shares in companies to which there was a geographical or professional proximity (ibid.).

The authors are of the opinion that it is precisely the regional information advantage about regional companies that enables above-average returns (Massa & Simonov, 2006, p. 684). However, the multitude of studies justifies the multitude of results at this point. Døskeland and Hvide, who analyse Norwegian investors with a local bias and find only negative returns due to this bias (cf. Døskeland & Hyide, 2011, p. 1013ff.), provide contrary findings.

It is therefore difficult to make a valid statement on the extent to which local bias is responsible for the underperformance of private investors. The only thing that is clear is that uncertainty in markets can be one of the triggers for this behaviour (cf. Kumar, 2009, p. 1359; Bodnaruk, 2009, p. 631). The home bias, on the other hand, paints a somewhat clearer picture. One of the central concepts for avoiding risks is the diversification of one's own portfolio. "Diversification is both observed and sensible; a rule of behaviour which does not imply the superiority of diversification must be rejected both as a hypothesis and as a maxim" (Markowitz, 1959, p. 77). The Capital Asset Pricing Model (CAPM) states that investors link the weighting of risky and risk-free securities to their respective preferences (cf. Lintner, 1965, p. 590). In this way, the unsystematic risk could be avoided. By diversifying into a world market portfolio (cf. Solnik, 1974, p. 504), the systemic risks of cyclical fluctuations can also be minimised, since the correlations decrease with greater distance between the national economies. Most private investors are classically underdiversified. They invest in a maximum of ten stocks and at the same time in stocks that come from their home country (cf. Sharpe, 1963, pp. 171-349; Ivanova & Dospatliev, 2017, p. 294; Miller, 1960, p. 391; Sharpe, 1995, pp. 84-88). The home bias thus results in a widespread behavioral tendency that can be closely related to the degree of portfolio dispersion as well as to the information made accessible in the sense of the availability heuristic (cf. French & Poterba, 1991, p. 223; Lewis, 1999, p. 571ff.). The reason for this can be seen in the investor's efforts to protect himself against imponderable risks outside his cognitive information processing capacities, i.e. exogenous factors. "Moreover, we relate home bias to investors' desire to hedge against inflation, sophistication and overconfidence" (Karlsson & Nordén, 2007, p. 317). Thus, diversification potentials remain unused, although an internationally diversified portfolio has only one tenth of the risk of a purely national portfolio (cf. Solnik op. cit., p. 521). Figure 4 shows a simple CAPM under the aspect of the home bias of a typical US retail investor. The average standard deviations of the portfolio returns are entered on the abscissa, i.e. the comparison between variously diversified portfolios and the average market performance on the ordinate.

Point A, for example, represents a portfolio that consists of 100 per cent domestic securities and point B one that consists of 100 per cent foreign securities. For investors who prefer low risk, a weighting in point C would be ideal. Looking at the ordinate, US stock portfolios with a pronounced home bias perform the weakest. Ideally, the portfolios that perform best are those that move to the right towards the abscissa (low risk) and upwards on the ordinate (higher return).

Thus, the internationally diversified portfolio provides the best performance, but also implies the highest risk. A portfolio that suits an individual investor is therefore based on the assessment of a constant benefit (expected return) of an indifference curve with different weighting factors of national and international securities. In the case under consideration, this would be the case at point D, i.e. a weighting of 40 per cent US securities and 60 per cent international corporate holdings. While this ratio can now be individually adjusted, Foad sees a clear risk/return disadvantage in the home bias (cf. Foad, 2010, p. 280).

De Bondt and Davis come to the same conclusions. While De Bondt shows that private investors invest to an above-average extent in government securities, whereby the shares of one's own employer are preferred (cf. also Foad, 2010, p. 286) and therefore play a special role, Davis shows in a study of US pension funds that these have a low ratio of foreign securities in an international comparison (cf. De Bondt, 1998, p. 835; Davis, 2005, pp. 9-13). Even a survey of institutional investors reveals that they tend to invest in geographically close markets (cf. Lütje & Menkhoff, 2004, p. 22).

In addition, there is a cross-border local bias (CBLB) for individual investors, which induces individuals who live geographically close to a neighboring state to invest more in companies in that state and thus have a significantly lower CBLB than investors who live geographically elsewhere (cf. Baltzer, Stolper, & Walter, 2013, p. 2825f.). Taking into account the selection of the overconfidence anomaly, studies by Graham, Harvey and Huang prove that investors are more likely to bet on international portfolios if they consider themselves competent enough to understand the advantages and risks of international investment opportunities (cf. Graham, Harvey, & Huang, 2009, p. 1078). However, this is not sufficient for a secure return on one's own portfolio.

Intuition and rationality

In both of the behavioral deviations presented, the concept of irrational behaviour or at least limited rational behaviour (cf. Simon, 1959, p. 256f.; Hübscher, 2020, p. 154; Dittrich, 2019, p. 845) was shown to play a major role.

In order to take the following empirical investigation into account, the concepts of rationality should therefore be contoured and comprehensively elaborated. To this end, it is first necessary to draw a distinction between intuition and consciousness (cf. Hoftort, 2011, p. 6), which is considered the seat of reason (cf. Dijksterhuis, 2010, p. 20). In a dichotomous view, consciousness is thus considered wise and prudent, while intuition deals with the simpler and more meaningless matters (cf. Dijksterhuis, ibid.). On the other hand, there are assumptions that the results of unconscious processes are served to the consciousness in a quasi bite-sized way, without the consciousness knowing about them (cf. Bargh & Chartrand, 1999, p. 462ff.). In an effort to separate intuition and reason, a scientific explanatory model of intuition will now be described. The term itself implies "a form of judgement or cognition that is not consciously induced and cannot be fully explained in retrospect" (Zeuch, 2006, p. 1).

Kahneman defines the term as simple recognition (cf. Kahneman, 2009, p. 515), an explanation that is

similar to Simon's: "Because of this knowledge and recognition capability, experts can respond to new situations very rapidly-and usually with considerable accuracy. Of course, on further thought, the initial reaction may not be the correct one, but it is correct in a substantial number of cases and is rarely irrelevant" (Simon o.J., o.S.). For Gerd Gigerenzer, intuition is "...neither a whim nor a sixth sense, neither clairvoyance nor God's voice. It is a form of unconscious intelligence" (Gigerenzer, 2013, p. 56).

Due to the ambivalent interpretability of the term, a delimitation of the term can succeed primarily through some scientific approaches that have emerged in recent years. The first approach confirms intuition as experiential or implicit knowledge (cf. Erpenbeck & Sauter, 2013, p. 27), which has been gained over the years through experience. This knowledge can be processed and retrieved unconsciously, resulting in fast and efficient action times (cf. Holtfort, 2011, p. 7).

The second approach combines intuition with subliminal perception in the sense that people are also confronted with impressions and experiences outside the present horizon of consciousness. This would mean that only a small part of our experiences can really be experienced consciously, while a large part of information exists that also forms the mind (cf. James, 1981, p. 23).

Somatic markers [third approach], in turn, direct bodily feelings towards certain alternatives that can evoke decisions. They are function-specific affects and are perceived intuitively, which leads to the support of conscious as well as unconscious decision-making (cf. Holtfort ibid.).

In the fourth approach, the insight of the so-called fractal logic of affect matures into the causality of intuition (cf. Ciompi, 1997, p. 45). Affects are responsible for focus, the connection to stored information in memory or also for the linking of thought content. Regardless of the preferred approach, intuition has one positive thing in common: In an environment of uncertainty and information asymmetries, the intuitive decision can be advantageous or even the only option (cf. Zeuch loc. cit., Holtfort, 2011, p. 10).

4. Conclusion

The following summary is intended to provide an overview of the theory-centred findings. In addition to the distortions of individual information perception, processing and evaluation, the empirical studies on overconfidence and home bias should offer a validated basis that makes it possible to identify the core of the problem as actually real. The quintessence of both bias-based study results is that overconfidence and home bias lead to underperformance on the stock market and that private investors make several irrational mistakes in their transactions.

In this context four measures to overcome both biases can be derived from the nomological metastudy:

1. *To achieve sharper investment awareness, it is necessary to clarify ex ante how living standards and monetarism correlate.*

This point must be made redundantly clear to investors with overconfidence, so that the willingness to invest in overly risky assets is reduced if there is a high degree of convergence in this respect. This can

be achieved if existing information can be communicated in a way that is not overloaded and easy to understand.

It is not very promising to actually go in search of successive individual titles with all the information circulating, so the advice to switch to other capacities should be given urgently at this point. It has been recognisable for years that the significance of artificial intelligence (AI) will gain in importance in the topic of private wealth accumulation.

2. *Don't invest in shares, but first in artificial intelligence.*

The financial markets have exponentially growing amounts of data at their disposal, which make the possibility of independent quantitative evaluation of these data by AI programmes obligatory. In this way, home- and overconfidence biases could be almost completely eliminated, as AI can create emotionless and fact-centred decisions.

In this way, the corresponding programmes independently generate knowledge from accumulated experience and recognise informative regularities with the help of self-learning algorithms, which constitute a past-related data pool that makes it more likely to anticipate future price developments. Additive to such a programme, the risk assessment of planned investment decisions may also be calculated in at this point.

The recommendation for AI-based "outsourcing" is supported by important findings from neuroscience. Ivantchev proves that there is always no real learning effect for private investors, for example, when an attempt is made to generate an understanding of the contents and mechanisms of the market with "play money" on the demo trading account and subsequently implement it (cf. Ivantchev, 2020, pp. 234-235). The necessary seriousness and possibility of failure is missing.

Ultimately, demoaccounts always aim at the investor's ability to deal with the challenges of the stock market and to explain whether one is able to adequately interpret these complex interrelationships. This dissertation can already prove that most private investors do not have these skills. Therefore reconsidering Ivantchevs Insights, a catalogue of convincing and effective measures to guide them how to learn seems necessary.

As a further central aspect of the provision of information via a nudging-based approach, it must be taken into account in this context that chart analyses are primarily past-related. The question that therefore arises is how to convince private investors to accept the possibility of high volatility ranges on the one hand and not to rely solely on the emphasis on the trend-like course of history charts. In principle, investors should be precluded from concentrating on products that have established large returns and positive price jumps in the recent past, which, as is well known, can be due to several effects (e.g. Herding) and, for example, in the case of overconfidence in one's own investment abilities, can lead to a price forecast being derived from a trend without informing oneself more extensively. However, such an implicit assumption is prohibited. Therefore, as a third aspect of an advisory guide, the fluctuation margin should be considered.

3. *Do not look at past trends, but at the historical volatility of the share.*

This tip can reduce the overconfidence bias, because it aims to react patiently in the case of strong price fluctuations and not to bet that the stock will develop in the desired direction at the time of purchase, of all things, even if volatility offers an option to reap high price gains in a short time. Rather, the assumption applies that stocks that have shown themselves to be volatile in the past will also do so in the future and therefore seem to be exempt from the more stable developments. A concrete and informative educational work that is improved by the presentation effect can act as a corrective at this point.

The preparation of chart analyses and the classification of the general price development on the stock exchange can be indicators for a more prudent investment strategy, especially if the position is to be closed. The desire for risk clarification can also be met by taking the degree of volatility into account, because the perceived range of fluctuation influences the risk perception of the investment. Since a reference value is often lacking and it is difficult anyway to document volatility over time and to evaluate it by means of a standard yardstick, a graphical presentation would make sense, which corresponds to the sixth measure, at least in terms of context. In order to play out a concrete nudge, for example, a highly volatile share can be put in relation to low-volatility shares. Risk affinities that develop due to the overconfidence bias could be reduced again if it is made clear to the investor to what extent a planned investment can endanger the overall portfolio. Numerical information is more effective than verbal statements. The tendency of private investors to invest in home country stocks has been shown to lead to inferior portfolio compositions (cf. chapter 1.3). The explicit acceptance of providing classifying information on investment geography qua country analysis in both samples accentuates the desire for macroeconomic context and the chance of reducing the effects of home bias. A pre-selection of international stocks made by the AI can have a complexity-reducing effect, but the perceived difference in knowledge can only be made behaviourally effective by a clear and, above all, identical data template based on the different country-specific stock markets. Therefore, a data template that prepares the information from the country analyses in the same way is recommended in order to prevent the tendency towards familiarity.

4. *Use identical and standardised data sets to classify relevant information from different countries and their stock markets.*

Thus, when domestic and foreign stocks are presented equally, the feeling of knowing less about international stocks is alleviated. Levelling the information construct of all investments under consideration does not completely cure the home bias, but it automatically broadens the investment horizon. What is important here is that reading and absorbing the information via a standardised procedure is above all easy to understand and requires relatively little time.

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