Does training on behavioral finance influence fund managers' perception and behavior?

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Abstract

This paper provides survey evidence on the influence of *training on behavioral finance* on professional fund managers' perception and investment behavior. In particular, it examines whether "trained" fund managers differ from the "untrained" ones in their perception of markets and themselves as well as in their choice of information sources and investment strategies. Additionally, the influence of integration of behavioral finance approaches into investment processes is also considered. The results reveal that training on behavioral finance basically intensifies the perception of biases in the behavior of others, i.e. the reflection effect and the home bias. Training also reduces the affinity to conformity, leading to less reliance on colleagues and other market participants as information sources. However, pure training is insufficient to significantly affect fund managers' investment behavior, but behavioral finance approaches need to be integrated into investment processes.

JEL codes: G 10 (general financial markets), D 83 (learning, knowledge, belief)
Keywords: behavioral finance, fund managers, biases, training, integration

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1. Introduction

Psychologists argue that behavioral biases are difficult to overcome even with the knowledge of their existence (Pronin et al., 2002). From several studies we know that financial experts such as brokers, investment bankers, or fund managers are subject to behavioral finance biases which negatively affect their performance (see e.g. Biais et al., 2005). As financial experts typically act fiduciarily, are monitored and paid for good performance, they, in fact, have stronger incentives to learn rational behavior. However, experts' sophistication and trading experience may diminish but still fail to eliminate biases such as e.g. the disposition effect (Shapira and Venezia, 2001, Feng and Seasholes, 2005, Visaltanachoti et al., 2007)[1]. Studies directly comparing the behavior of professionals and students unveil that professionals often behave even more overconfidently (Glaser et al., 2005) or exhibit a greater extent of myopic loss aversion than students (Haigh and List, 2005).

This paper ties up to the discussion on the persistence of behavioral anomalies in the behavior of financial professionals.[2] It analyzes the influence of *training on behavioral finance* on professional fund managers' perception and investment behavior.[3] A questionnaire survey conducted among German fund managers provides data for this examination. First, the survey sample is split into two groups: (i) The "trained" fund managers, who get seminars and training on behavioral finance on the part of their employers, and the "un-

[1] Shapira and Venezia (2001) detect that both professional and individual investors are subject to the disposition effect, whereas this effect is stronger for the latter. Feng and Seasholes (2005) show that sophistication and trading experience reduce the propensity to realize gains too soon, but fail to eliminate it. Visaltanachoti et al. (2007) provide strong evidence for the disposition effect in Chinese A-share markets, which are dominated by individual investors; however, regarding B-shares markets, which are dominated by sophisticated institutional investors, the evidence for the disposition effect is relatively weak.

[2] Menkhoff and Nikiforow (2009) analyze the impact of fund managers' endorsement of behavioral finance on their perception of markets and themselves. This study reveals that endorsers of behavioral finance significantly better recognize behavioral biases in the behavior of other fund managers. However, the view of one's own biases is hardly influenced by the endorsement of behavioral finance. Thus, even though endorsers of behavioral finance are well-informed about the existing behavioral biases and have strong incentives to learn efficient behavior, they still fail to recognize their own biases more appropriately. Such a biased self-perception might hinder the effort to overcome one´s own biases.

[3] Henceforth, "training" stands for "training on behavioral finance".

trained" ones, who do not get any training in that field. These two groups are tested for differences with respect to their perception of markets, their self-assessment as well as their choice of information sources and investment strategies. Second, apart from this general analysis, the underlying survey data allow for exploring two further interesting questions: (ii) How might "experts", i.e. those fund managers who assess themselves as possessing good knowledge in behavioral finance, differ from each other depending on whether they are trained in behavioral finance or not? (iii) How might "trained" fund managers differ from each other, depending on whether their company has integrated behavioral finance approaches into its investment processes or not?[4] These two additional considerations aim to examine the influence of training more specifically.

The analysis reveals that the degree of confrontation with behavioral finance in their daily business affects fund managers' perception and behavior in a different manner. *Training* on behavioral finance, which can be regarded as the weakest kind of implementation of behavioral finance issues, intensifies fund managers' perception of biases in the behavior of others, specifically the reflection effect and the home bias. Training also reduces the affinity to conformity – leading to less reliance on colleagues and other market participants as information sources; however, training does not result in a significant different reliance on other information sources regarded here, i.e. fundamental facts and technical indicators. *Integration* of behavioral finance into investment processes, regarded as strongest kind of implementation of behavioral finance, particularly influences fund managers' investment behavior. Regarding the information sources used, integration reduces the importance of fundamental facts (besides the importance of colleagues and other market participants). Furthermore, it significantly affects the use of investment strategies: The buy-and-hold strategy loses its relevance mostly in favor of other strategies (an answering

[4] Henceforth, "integration" or "integration of behavioral finance approaches" stands for "integration of behavioral finance approaches into investment processes of a company".

category not specified in the survey, but different to the strategies momentum, contrarian, and buy-and-hold) as well as in favor of the behavioral-finance-motivated momentum strategy. Hence, training alone rather influences fund managers' perception and only partly their investment behavior (at least with regard to the information sources used), whereas the latter is mainly affected by integration of behavioral finance approaches into investment processes.[5]

The remainder of this paper is structured as follows. Section 2 describes the data of the questionnaire survey. The comparison groups for the three analyses are defined in Section 3. Section 4 presents the results regarding the groups' perception, specifically that of markets and themselves. Section 5 focuses on the effects on groups' investment behavior. Section 6 concludes the paper.

2. Data

Between August 15 and December 12, 2002 we conducted a questionnaire survey in Germany which yielded a representative sample of 117 questionnaires from 35 relevant German fund management companies. Concerning participating fund management companies - out of the 59 fund management companies we addressed - this survey resulted in a response rate of 59%. To avoid any misinterpretation in the formulation of questions and thus to ensure the reliability of responses, many intensive interviews with fund managers as well as pre-tests were held before starting the survey. Feedback indicates that the response is useful for our research purpose.[6]

[5] We regard the non-influence of training on fund managers' investment behaviour as a result of an investment process being determined not by fund managers themselves but by others, e.g. by a company's senior management and/or the head of an asset management team. Thus, fund managers usually have to follow some given investment guidelines, without having a direct influence on them. In this case the given investment guidelines represent a kind of an institutional "barrier", which hinders fund managers from adjusting their investment approach to their knowledge of behavioral finance. This is a plausible explanation for the observed non-influence of training on fund managers' investment behaviour. In contrast, the impact of training becomes observable when fund managers are not restricted by anything, i.e. in case of their perception.

[6] The analyses in Menkhoff and Schmidt (2005) and Menkhoff et al. (2006) rely on the same survey.

To analyze, first, the influence of training on behavioral finance as well as, second, the influence of the integration of behavioral finance findings into the investment process on fund managers' perception and investment behavior, three pairs of comparison groups are considered. These groups are formed by reverting to three statements in the questionnaire. These statements are given in Table 3 as BF (Behavioral Finance) 1, BF2, and BF3, all assessed by 6 answering categories, ranging from "completely agree" (coded as 1) to "completely disagree" (coded as 6). By the degree of approval to statement BF1 the respondent expresses to which extent he or she is trained on behavioral finance. For a more specific differentiation, the information from statement BF2 is also used, where fund managers assess their state of knowledge in behavioral finance. By assessing statement BF3, the respondent states to which extent his or her company implements behavioral finance findings in its investment process.

3. Formation of comparison groups

3.1 "Trained" versus "Untrained" fund managers (Analysis I)

The analysis starts by considering the general influence of *training* on behavioral finance on fund managers' perception and behavior. For this purpose the respondents are split into two comparison groups based on their assessment of statement BF1, asking about the offer of training and seminars on the part of the respondent's employer.

Regarding the answer distribution to statement BF1 in Figure 1, it becomes obvious that behavioral finance still plays an inferior role in German fund management companies. Only 6 of 110 (5.5%) respondents get relatively intensive training on behavioral finance issues (answering category "completely agree" coded as 1), whereas 40 of them (36.4%) get no offer for behavioral finance education or training at all (answering category "completely disagree" coded as 6).

Due to the striking left-skewed distribution of answers, it seems plausible to define those fund managers with answering categories 1-4 as "trained" ones and assign those with answering categories 5-6 to the "untrained" group. This way of clustering results in 39 trained (35.5%) vs. 71 untrained (64.5%) fund managers.

3.2 "Trained experts" versus "Untrained experts" (Analysis II)

According to the chi-square test as well as to the Spearman rank correlation, the statements BF1 and BF2 are not independent.[7] Their significant positive correlation (p-value 0.015) implies that the knowledge of behavioral finance key messages improves with an increasing offer of seminars to behavioral finance, which is not really surprising but rather expected. This confirmation of the expected relation between BF1 and BF2 provides a good basis for the second, more specific analysis, i.e. whether it matters to be a trained or an untrained "expert" in behavioral finance (Table 1). Focusing only on "experts", i.e. those fund managers who possess *"good knowledge" in behavioral finance*, might reveal a specific, marginal influence of training on this good knowledge: As "trained experts" regularly stay in touch with recent insights into behavioral finance research, one might expect that their knowledge is frequently updated and their behavior rather well trained in this field. In contrast, the "untrained experts" might have gained their good knowledge of behavioral finance in seminars or training some time ago or even through self-study. Therefore, compared to the trained experts, the untrained experts do not stay in touch with behavioral finance issues so regularly, so that they can be assumed to be relatively less sophisticated regarding behavioral finance issues. As this second analysis aims for a more specific differentiation of groups, it can also be regarded as a robustness test for the first analysis.

[7] The result of the chi-square test for statements BF1 and BF2 is 30.602 with the p-value 0.061. The coefficient of the Spearman rank correlation is 0.232 with the p-value 0.015.

To analyze whether it matters to be a trained or an untrained expert, the information from the assessment of availability of training on behavioral finance (BF1) is combined with the information on the state of knowledge in behavioral finance (BF2). First, "experts" in behavioral finance are defined as those fund managers who assess themselves as possessing "good knowledge" of the behavioral finance key messages, i.e. who answer statement BF2 with answering categories 1 and 2.[8] Second, the group of experts is differentiated according to their assessment of statement BF1. This consideration results in 27 "trained experts", who posses good knowledge of behavioral finance due to training (BF1-answering categories 1-4) and 42 "untrained experts", who posses good knowledge without training (BF1-answering categories 5-6). These two groups are framed in the contingency table in Table 1.

3.3 "Trained and BF integrated" versus "Trained and BF not integrated" (Analysis III)

The third analysis examines whether "trained" fund managers' differ among themselves depending on the *extent of integration* of behavioral finance approaches into investment processes of their company. Thus, it tests for additional influences on trained fund managers emerging particularly from the integration of behavioral finance. The contingency table in Table 2 illustrates the definition of the comparison groups for this analysis.

The focus is put only on "trained" fund managers as defined in section 3.1. Here, this group is further separated on the basis of answers to statement BF3, asking about the extent to which the respondent's company implements behavioral finance findings in its investment process. Regarding the distribution of answers for BF3 given in Table 2, the comparison groups are formed by comprising the BF3 answering categories 1-3 vs. 4-6. This defines the groups "Trained and BF integrated" with 21 fund managers, and "Trained and BF not integrated" with 18 fund managers.

[8] Due to the distribution of answers to statement BF2 (see the contingency table in Table 1) the group "experts" is defined by comprising answering categories 1 and 2, whereas category 3 seems to characterize an intermediate stance in comparison to the sample.

4. Trained fund mangers' perception of markets and their self-assessment

4.1 Perception of markets

To learn about fund managers' perception of markets, we ask them to assess the five statements given in Table 4.

The *house money effect*, which is grasped by the statement MP (Market Perception) 1, names the phenomenon that investors become less loss-averse and more likely to take risks when reinvesting recently made profits. Psychologically, this behavior is explained through the fact that the perceived discomfort in case of a loss of recently earned money is diminished only because it was a gain before (Thaler and Johnson, 1990).

The *confirmatory bias* (statement [MP2]) describes a behavioral propensity which occurs after a decision has been made. Then, people tend to collect information which confirms their decisions, thereby ignoring contrary evidence or interpreting even ambiguous information in favor of their earlier decision. The confirmatory bias serves to preserve the self-respect of a decider as well as to avoid regret or unpleasant feelings after decision-making (Festinger, 1957, Nickerson, 1998, Pronin, 2007).

Statement [MP3] addresses the *reflection effect*. This behavioral bias implies a change in the risk attitude of an investor depending on whether an outcome is a gain or a loss: People display risk aversion in the domain of gains, whereas they behave loss averse and even risk seeking in the domain of losses (Kahneman and Tversky, 1979). Statement [MP3] asks about the risk seeking behavior in case of loss positions, which partly explains the disposition effect[9], subsuming that investors tend to hold loser assets too long.

Statement [MP4] serves to detect the *home bias*, i.e. the preference to invest in the home market or in markets in closer proximity. The psychological explanation for this bias is the human preference for familiarity, associated with the belief that one possesses more or

[9] Investors' propensity to hold loser stocks too long and to sell winner stocks too early was called the "disposition effect" by Shefrin and Statman (1985).

even special information about the local market (Babilis and Fitzgerald, 2005, Lütje and Menkhoff, 2007, Konishi, 2007).[10]

Herding is the last behavioral finance bias considered here with statement [MP5]. Herding means that - under certain circumstances - fund managers imitate the behavior of others, thereby ignoring their own relevant information (see Bikhchandani and Sharma, 2001, Guo and Shih, 2008, Lütje, 2008).[11]

Results

Table 4 gives the mean answers of the respective group to the statements [MP1]-[MP5]. Regarding the formation of the bars it is striking that, except for the reflection effect (statement [MP3]), the perception intensities for the five biases examined here are rather equally ranked in all groups: Herding [MP5] is perceived most strongly, followed by the confirmatory bias [MP2], the house money effect [MP1] and finally the home bias [MP4]. A significant impact of training on the perception of biases in the market is observable in the case of the *reflection effect* [MP3] in analyses I and II. Trained fund managers perceive this bias significantly more strongly than the untrained ones (mean of 3.08 versus 3.64). Trained experts among the fund managers shape up as being mostly sensitized to this bias (mean of 2.88) which partly accounts for the well-known disposition effect. This result indicates a learning effect and thus an obvious impact of training on fund managers' market perception. In particular, an increased awareness of the reflection effect is a very

[10] In the UK pension fund portfolios, Babilis and Fitzgerald (2005) detect strong evidence for the home bias against overseas foreign assets, and among the latter, in particular, against emerging markets. In the German market, the study of Lütje and Menkhoff (2007) reveals the home bias in the behavior of professional equity managers. Konishi (2007) provides some evidence for the reduction of the home bias when the world stock markets are integrated, thus giving foreign investors the opportunity of investing in domestic stocks more easily (here shown for NASDAQ).

[11] For the Taiwan market Guo and Shih (2008) show that the degree of directional co-movement, as a modified measure of herd behaviour, is higher in the high-tech stocks market than in traditional industries. Furthermore, they find that herding is greater during extreme up markets for all industries. Lütje (2009) provides evidence for reputational herding among professional fund managers. In his study, herding managers regard themselves as generally more risk averse than their non-herding peers.

welcome result, considering that the literature warns against the consequences of the disposition effect, for which several studies provide evidence of its negative impact on risk-adjusted performance (Odean, 1998, Coval and Shumway, 2005, Locke and Mann, 2005).

Furthermore, the difference in the perception of the *home bias* in analysis I is close to significance (p-value of 0.104): Compared to untrained fund managers, the trained ones observe the home bias remarkably more strongly (mean of 3.03 vs. 3.55). In analysis II, this difference also persists among the experts on behavioral finance with a p-value of 0.155.

Analysis III does not reveal any significant results. Thus, integration of behavioral finance approaches into investment processes of a company does not seem to additionally affect trained fund managers' perception of markets.

4.2 Self-assessment

This section focuses on fund *managers' perception of their own behavior.* Table 5 documents the groups' answers to the following five items: Statement SA (Self-Assessment) 1, question [SA2], and task [SA3] refer to the three facets of overconfidence: *Illusion of control* (Langer, 1975), grasped here by the persistent *hindsight bias* (Biais and Weber, 2007), *better-than-average effect* (Taylor and Brown, 1988) as well as *miscalibration* (Lichtenstein et al., 1982). For further discussion on these three interpretations of overconfidence see e.g. Menkhoff et al. (2006) and Glaser and Weber (2007). Statement [SA4] addresses another driving force of the *disposition effect*: As a counterpart to the assessment of their peers' behavior in the domain of losses (statement [MP3] Section 4.1), the surveyed fund managers are now asked to comment their own *risk aversion* in the domain of gains. This phenomenon also motivates the preference to sell "winning" assets too soon (Kahneman and Tversky, 1979, Shefrin and Statman, 1985, Weber and Camerer,

1998). Statement [SA5] aims to assess fund managers' *affinity to conformity*, also regarded as a motivation for herding (Bikhchandani and Sharma, 2001).

All these biases are guided by emotions and other natural human mechanisms preserving self-esteem and avoiding cognitive dissonance of the decision-maker. These mechanisms interfere with rational learning, including the recognition of and learning from one's own mistakes (Hirshleifer, 2001). Several studies have shown that the biases analyzed in this section have a negative impact on risk-adjusted investment performance (see Odean, 1999, Barber and Odean, 2000, 2001, Biais and Weber, 2007, Coval and Shumway, 2005). What will be the influence of training and integration of behavioral finance on fund managers' self-assessment and thus their ability to regard their own behavioral biases more critically?

Results

The only significant result in Table 5 reveals that training on behavioral finance significantly diminishes the *affinity to conformity* (statement [SA5]). In analysis I, there is a significantly stronger denial by trained fund managers that the discussion of an investment decision with colleagues reduces the pressure to succeed (means of 4.28 vs. 3.58 with a p-value of 0.022). In the group of experts in analysis II, this result sustains with a lower level of significance (means of 4.37 vs. 3.74 with a p-value of 0.096). This attitude in the group of trained fund managers might result from the knowledge of social psychology that, in contrast to the idea of the perfect group decision, where the group's members offset each other's biases, groups in fact reduce the variance of their members' opinions in a decision-making process. Thus, discussions of an investment decision in groups rather provide a feeling of confidence, conformity and competence (especially when one's own view is consistent with the view of the group) than result in better solutions (Montier, 2005). In

that context, we might conclude that training does have a significant impact on the recognition that group-based consensus decisions do not necessarily lead to the best decision making as they reduce group members' variance of views, thereby lowering their creativity. The self-perception of all the other biases (mentioned in Table 5) turns out to be not significantly affected by training.

Table 6 additionally presents the results for the *home bias* task in the questionnaire. This task serves to analyze whether training on behavioral finance affects fund managers' skills to diversify their portfolios internationally in an appropriate manner or whether fund managers remain prone to overweighting German assets (their home market) in their portfolios. The latter result would confirm the findings of several studies indicating the persistence of the home bias (Lütje and Menkhoff, 2007, Solnik, 2007). To obtain fund managers' personally preferred portfolios, which might differ from their managed ones due to restrictions e.g. on the part of their clients, task [AA] asks them to allocate a hypothetical amount of 10 million € to the global financial markets, thereby ignoring the respective fund's restrictions. According to the IAPM (International Asset Pricing Model) the optimum portfolio share of a country corresponds to the ratio of its market capitalization to the world capitalization. German investors' portfolios should thus contain 4% of German stocks and 8% of German bonds.[12]

Even with the explicit hint to ignore their funds' restrictions in this task, all the groups equally strongly overweight their home country Germany in their portfolios (around 14%). However, compared to the mean allocation of the whole sample as well as to analysis I, analyses II and III detect a shift in the allocation from Europe towards the USA and Canada. Compared to the untrained experts, trained experts (analysis II) would invest significantly more in the USA and Canada (mean of 34.28% vs. 28.70%), thereby decreasing

[12] Regarding this home bias task, it should be noted that specific overweightings of countries could also reflect active fund managers' market opinions (i.e. tracking error vs. neutral market weighting), even if they are well aware of the neutral, well diversified portfolio (according to global benchmarks).

their European engagements (30.90% vs. 35.22%). This tendency is also shown in analysis III: The group "Trained and BF integrated" differs from its comparison group by a remarkably lower investment share in Europe (means of 30.91% vs. 36.94% with a p-value of 0.172) mainly investing in the USA and Canada (35.32% vs. 29.89% with a p-value of 0.254).

Regarding these analyses, training seems not to affect the exaggerated preference to invest in the German home market, which supports the persistence of the home bias as reported in the literature. However, if we widen the definition for the "home market" from Germany to Europe, the picture changes. The observed tendencies of shifting the main investment share from the European market to a more highly capitalized American market (see analyses II and III) might be interpreted as an effort to overcome the concentration on the European home market. This conclusion would hold for 25% of the sample. Thus, in the case of experts, training significantly contributes to diminishing their home bias on the European level, whereas the investment share for the German home market remains at the same (overweighted) level. Also, fund managers working in companies that implement behavioral finance approaches show rather more effort in struggling against the European home bias.

In summary, the main results of section 4 are the following: First, with respect to fund managers' perception of markets, training on behavioral finance contributes to a significant better recognition of the reflection effect. Second, also the perception of the home bias becomes remarkably improved. Third, when it comes to self-assessment, training results in a significantly lower affinity to discussing decisions in groups and thus in a lower affinity to conformity, implying a lower tendency to imitate the decisions of others. Fourth, the diversification task reveals that trained experts would allocate a significantly higher share of assets to the USA and Canada, thereby shifting the weighting from the closer European

markets. By the same token, the group "Trained and BF integrated" tends to allocate less investment to Europe.

Thus, the results of section 4 detect some influence of training on fund managers' perception of markets and themselves. These influences might be understood as a learning process towards a more rational behavior, which training in behavioral finance aims to activate. However, it is not observable that trained fund managers' perception is additionally (significantly) affected by the integration of behavioral finance approaches into investment processes.

5. Consequences on the investment behavior

After focusing on fund managers' perception, next, their *investment behavior* is examined. Again, the analysis differentiates whether fund managers are trained on behavioral finance issues or not as well as whether they work in companies with integrated behavioral finance approaches or not.

Within the survey, investment behavior is grasped through the choice of information sources and investment strategies. The four sources of information given in Table 7, as well as the four investment strategies presented in Table 8, have been named as important for the investment management by fund managers in ex-ante interviews.[13]

According to analysis I in Table 7, training does not significantly affect the ranking in the use of information sources: Fundamental facts turn out to be the main information source, followed by technical indicators, colleagues[14] and finally by other market participants. Compared to the untrained fund managers, the trained ones tend to assess colleagues

[13] Menkhoff and Schmidt (2005) find that the strategies buy-&-hold, momentum and contrarian are typically applied mutually. Their use reflects the viewpoints and the level of risk-aversion of the respective fund manager.

[14] In the questionnaire this source of information is given as "Colleagues in the own company". In our pretest interviews fund managers indicated that they regard this answering category as a generic one, including their colleagues' statements/analyses/opinions.

and other market participants as relatively less important (analysis I). This difference becomes significant in analysis II: Compared to the untrained experts, trained experts rely significantly less on their colleagues (means of 3.41 vs. 2.81) and other market participants (4.02 vs. 3.52).[15] This assessment is absolutely consistent with trained experts' lower affinity to conformity, detected by the results from statement [SA5] in Table 5. Thus, less affinity to conformity seems to result in a lower consideration of colleagues and other market participants as information sources.[16] One plausible implication of this finding might be that trained experts more strongly trust in their own information. This might lead to a higher independence in their information processing, resulting in decisions being relatively less susceptible to market noise.

Analysis III in Table 7 reveals some first significant influences of the integration of behavioral finance approaches into investment processes. Compared to the untrained fund managers, trained fund managers in firms which implemented behavioral finance approaches attach significantly less importance to fundamental facts (mean of 2.26 vs. 1.56), colleagues (3.76 vs. 2.89) and other market participants (4.36 vs. 3.44) as information sources.

The results of analysis III in Table 8 reveal one further central finding: A significant difference in the ranking of investment strategies between the comparison groups. Trained fund managers in companies where behavioral finance is not integrated into investment process rely significantly more on the fundamental buy-and-hold strategy (mean of 37.05%), whereas their comparison group "Trained and BF integrated" shows a clearly lower use of the buy-and-hold (20.87%) but a remarkably higher use of the momentum

[15] To assess the relevance of the information sources given in the questionnaire there are 6 answering categories, ranging from "highest relevance" (coded as 1) to "no relevance" (coded as 6).

[16] Arnswald (2001) explains the importance assigned to these sources of information by interpreting them as a kind of external confirmation of one's own decisions. But he also mentions them to be channels for contagions of fear and exuberance.

strategy (28.71%) and other[17] strategies (20.57%). Regarding analyses I and II, it seems that training alone does not noticeably affect the use of investment strategies.[5]

In sum, based on the results presented in Table 7 and 8, we might conclude that it is rather the integration of behavioral finance than training in behavioral finance that significantly affects fund managers' investment behavior. In analysis III in Tables 7 and 8, we find that the group "Trained and BF integrated" significantly differs from its comparison group in its choice of information sources and investment strategies: The group "Trained and BF integrated" relies significantly less strongly on fundamental information and the fundamentally orientated buy-and-hold strategy, but instead more strongly on the behavioral-finance-motivated momentum strategy and other strategies (which are highly probably also based on behavioral finance approaches). This orientation seems to point to the expected direction of the analysis: Fund managers in the "Trained and BF integrated" cluster comparatively more strongly aim at benefiting from other market participants' behavioral biases.

6. Conclusion

This paper examines the influence of training in behavioral finance on professional fund managers' perception and behavior. It is based on a questionnaire survey including answers from more than 100 German fund managers. By separating this sample into "trained" and "untrained" fund managers, i.e. depending on whether they are trained in behavioral finance issues or not, we test these groups' perception of markets, their self-assessment as well as their choice of information sources and investment strategies for differences. Additionally, the influence of training only on the group of "experts" in behav-

[17] The answering category "other strategies" is not specified in the questionnaire. In this survey it includes all other strategies being different to the strategies momentum, contrarian, and buy-and-hold.

ioral finance is regarded. Furthermore, the effect of integrating behavioral finance approaches into investment processes is also analyzed.

Results of this study show that training rather influences fund managers' perception than their investment behavior. Training significantly sharpens the awareness towards the reflection effect, which is an important and desirable result, as this bias partly explains the well known disposition effect. Training also remarkably improves the perception of the home bias in the behavior of other fund managers. Furthermore, training reduces the affinity to conformity, which is reflected in a weaker consideration of colleagues and other market participants as information sources. To significantly affect fund managers' investment behavior, the integration of behavioral finance approaches in the investment process is needed: Trained fund managers in companies which implement behavioral finance in their investment processes assign less importance to fundamental facts, colleagues and other market participants as information sources. Furthermore, they use the fundamental buy-and-hold strategy remarkably less intensively, thereby applying more momentum and other (probably also behavioral finance motivated) strategies. This investment behavior indicates a relatively stronger intention to profit from behavioral finance biases in the market.

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FIGURE 1. "Trained" versus "Untrained" fund managers (Analysis I)

Distribution of answers to statement BF1 (frequencies and %)

[BF1] Statement: "My employer provides in-house training on behavioral finance or sends his/her employees to appropriate seminars".

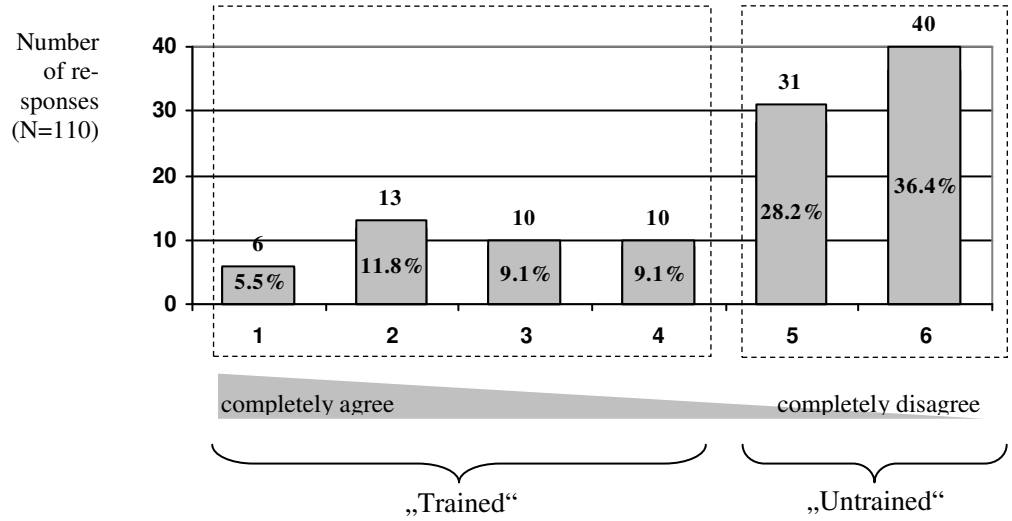


TABLE 1. "Trained experts" versus "Untrained experts" (Analysis II)

[BF1] Statement: "My employer provides in-house training on behavioral finance or sends his/her employees to appropriate seminars".

[BF2] Statement: "I've already concerned myself with behavioral finance, the key messages are well known to me".

		Distribution of responses (frequencies)							
		BF1: Employer provides training and seminars on behavioral finance completely agree ... completely disagree							
		1	**2**	**3**	**4**	**5**	**6**	∑	
BF2: Key messages of behavioral finance are well known to the respondent	**1**	6	4	5	3	8	8	*34*	„Experts"
	2	0	6	0	3	10	16	*35*	
	3	0	3	2	2	7	8	*22*	„No experts"
	4	0	0	3	2	5	4	*14*	
	5	0	0	0	0	1	4	*5*	
	6	-	-	-	-	-	-		
	∑	*6*	*13*	*10*	*10*	*31*	*40*	*110*	
		„Trained"				„Untrained"			

TABLE 2. "Trained and BF integrated" versus "Trained and BF not integrated" (Analysis III)

[BF1] Statement: "My employer provides in-house training on behavioral finance or sends his/her employees to appropriate seminars".

[BF3] Statement: "Behavioral finance approaches are already integrated in the investment process of our company".

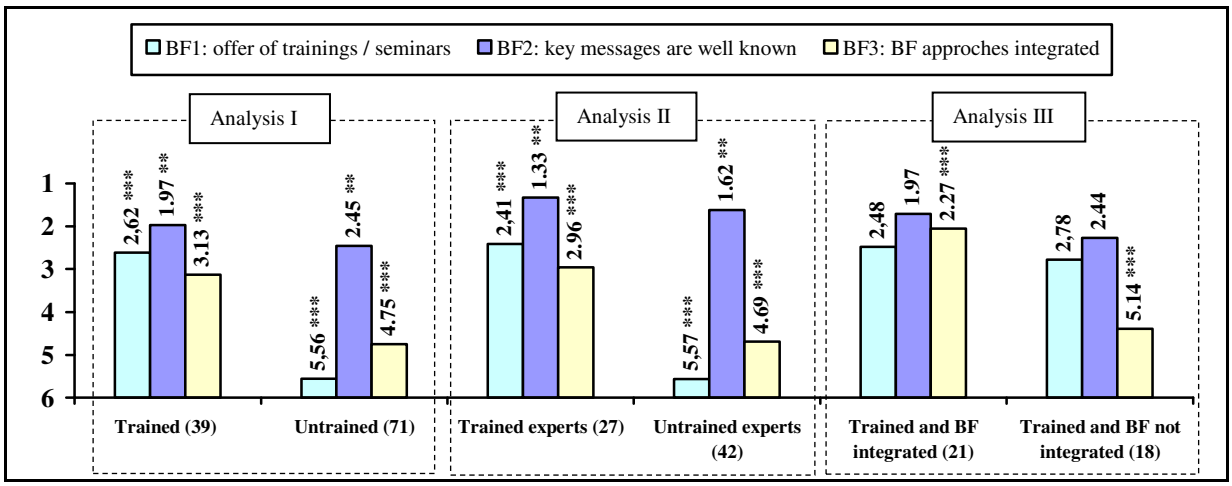
Distribution of responses (frequencies)									
		BF1: Employer provides training and seminars on behavioral finance completely agree → completely disagree							
		1	**2**	**3**	**4**	**5**	**6**	∑	
BF3: Behavioral finance approaches are integrated into investment process	**1**	4	2	0	1	1	1	*9*	„BF integrated"
	2	1	1	2	2	2	1	*9*	
	3	1	3	0	4	7	4	*19*	
	4	0	5	6	2	4	3	*20*	„BF not integrated"
	5	0	2	0	1	11	9	*23*	
	6	0	0	2	0	6	22	*30*	
	∑	*6*	*13*	*10*	*10*	*31*	*40*	*110*	
		„Trained"				„Untrained"			

TABLE 3. Familiarity with behavioral finance [BF]: Training, knowledge, integration[(a)]

[BF1] Statement: "My employer provides in-house training on behavioral finance or sends his/her employees to appropriate seminars".

[BF2] Statement: "I've already concerned myself with behavioral finance, the key messages are well known to me".

[BF3] Statement: "Behavioral finance approaches are already integrated in the investment process of our company".



Statements	*All fund managers (mean and number of responses)*	H_0: No difference [(b)] Analysis I	Analysis II	Analysis III
BF1: offer of training and seminars	*4.52* *110*	**-8.988***** **(0.000)**	**-7.207***** **(0.000)**	-0.893 (0.372)
BF2: key messages are well known	*2.42* *116*	**-2.111**** **(0.035)**	**-2.300**** **(0.021)**	-1.590 (0.112)
BF3: BF approaches are integrated	*4.17* *110*	**-5.144***** **(0.000)**	**-4.091***** **(0.000)**	**-5.477***** **(0.000)**

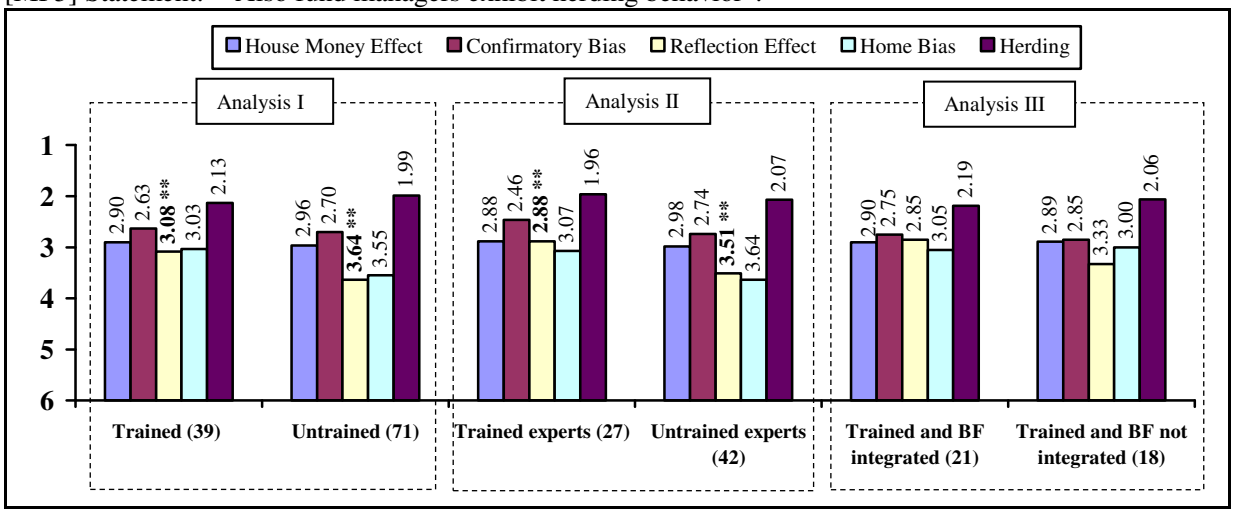
[(a)] The diagram gives the mean answers of the respective group (with the number of responses in parentheses) to the respective statements. Each statement can be assessed by six answering categories, shown on the y-axis, ranging from "completely agree" (coded as 1) to "completely disagree" (coded as 6). Thus, a mean of 3.5 or less indicates rather approval to the statement.

[(b)] H_0 states that there is no difference between the respective comparison groups. The figures given are the z-value of the Mann-Whitney U-test and the p-value in parentheses.

Stars refer to level of significance: * 10%, ** 5%, *** 1%.

TABLE 4. Market perception[(a)] [MP]

[MP1] Statement: "After several profitable investments fund managers tend to take on additional positions".
[MP2] Statement: "My colleagues pay particular attention to confirmatory news/information after having made an investment decision".
[MP3] Statement: "In case of loss positions other fund managers tend to increase their willingness to take risks".
[MP4] Statement: "Fund managers prefer to invest in near located markets".
[MP5] Statement: "Also fund managers exhibit herding behavior".



Statements	*All fund managers (mean and number of responses)*	H_0: No difference [(b)] Analysis I	Analysis II	Analysis III
[1] House money effect	*2.92*	-0.124	-0.359	-0.236
	115	(0.901)	(0.720)	(0.814)
[2] Confirmatory bias	*2.66*	-0.137	-0.832	-0.718
	115	(0.891)	(0.406)	(0.473)
[3] Reflection effect	*3.44*	**-2.123****	**-1.939***	-1.551
	114	**(0.034)**	**(0.052)**	(0.121)
[4] Home bias	*3.34*	-1.626	-1.423	-0.377
	116	(0.104)	(0.155)	(0.706)
[5] Herding	*2.02*	-1.436	-0.127	-0.445
	116	(0.151)	(0.899)	(0.656)

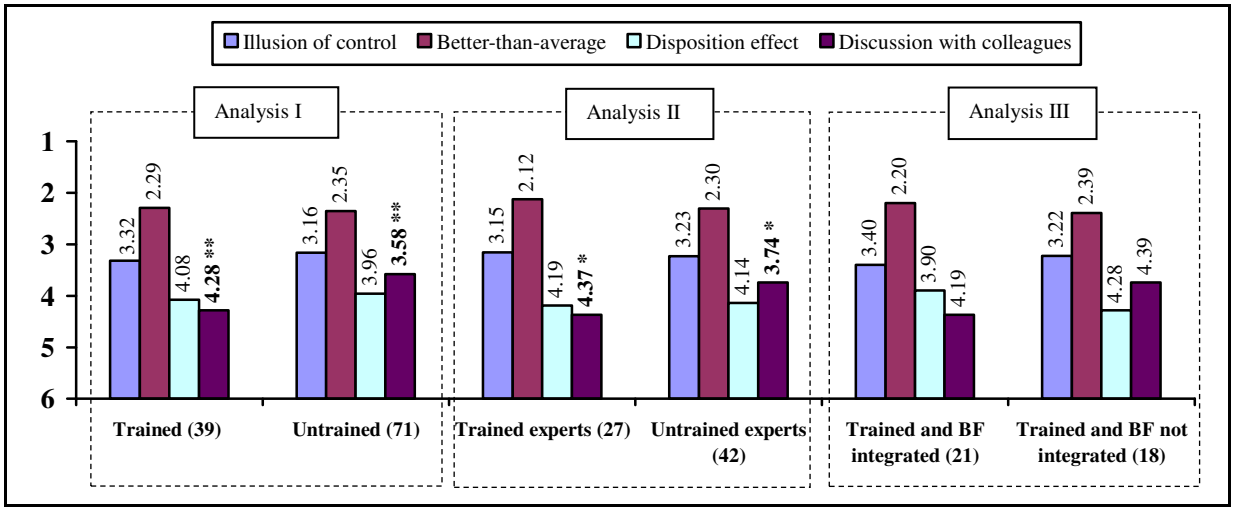
[(a)] The diagram gives the mean answers of the respective group (with the number of responses in parentheses) to the respective statements. Each statement can be assessed by six answering categories, shown on the y-axis, ranging from "completely agree" (coded as 1) to "completely disagree" (coded as 6). Thus, a mean of 3.5 or less indicates rather approval to the statement.

[(b)] H_0 states that there is no difference between the respective comparison groups. The figures given are the z-value of the Mann-Whitney U-test and the p-value in parentheses.

Stars refer to level of significance: * 10%, ** 5%, *** 1%.

TABLE 5. Self-assessment[(a)] [SA]

[SA1] Statement: "The majority of economic news is not surprising for me".
[SA2] Question: "How do you evaluate your own performance compared to other asset managers?"
[SA3] Task[(c)]: "Give an estimation of the DAX in one month. Determine a lower und an upper bound such that the quote of the DAX in one month from now will be inside the resulting interval with a probability of 90%".
[SA4] Statement: "I prefer to take profits when I am confronted with unexpected liquidity demands".
[SA5] Statement: "Discussion of an investment decision with colleagues reduces the pressure to succeed".



Statements	*All fund managers (mean and number of responses)*	H_0: No difference [(b)] Analysis I	Analysis II	Analysis III
[SA1] Illusion of control (Hindsight bias)	*3.20* *115*	-0.780 (0.436)	-0.183 (0.855)	-0.623 (0.533)
[SA2] Better-than-average	*2.34* *111*	-0.695 (0.487)	-0.280 (0.201)	-0.515 (0.614)
[SA3] Miscalibration [(c)]	*887* *111*	-0.649 (0.516)	-0.870 (0.384)	-1.536 (0.124)
[SA4] Disposition effect	*3.99* *116*	-0.529 (0.597)	-0.151 (0.880)	-0.546 (0.585)
[SA5] Affinity to conformity	*3.73* *116*	**-2.295**** **(0.022)**	**-1.665*** **(0.096)**	-0.519 (0.604)

(a) The diagram gives the mean answers of the respective group (with the number of responses in parentheses) to the respective statements. Each statement, except statement [SA2], can be assessed by six answering categories, shown on the y-axis, ranging from "completely agree" (coded as 1) to "completely disagree" (coded as 6). Thus, a mean of 3.5 or less indicates rather approval to the statement.
For statement [SA2] there are five answering categories: much better (coded as 1), slightly better (coded as 2), equally good (coded as 3), slightly worse (coded as 4), much worse (coded as 5).

(b) H_0 states that there is no difference between the respective comparison groups. The figures given are the z-value of the Mann-Whitney U-test and the p-value in parentheses.

(c) The results for task [SA3] are not given in the diagram. The means for the stated interval are 945 vs. 878 for analysis I, 1074 vs. 896 for analysis II, and 800 vs. 600 for analysis III.

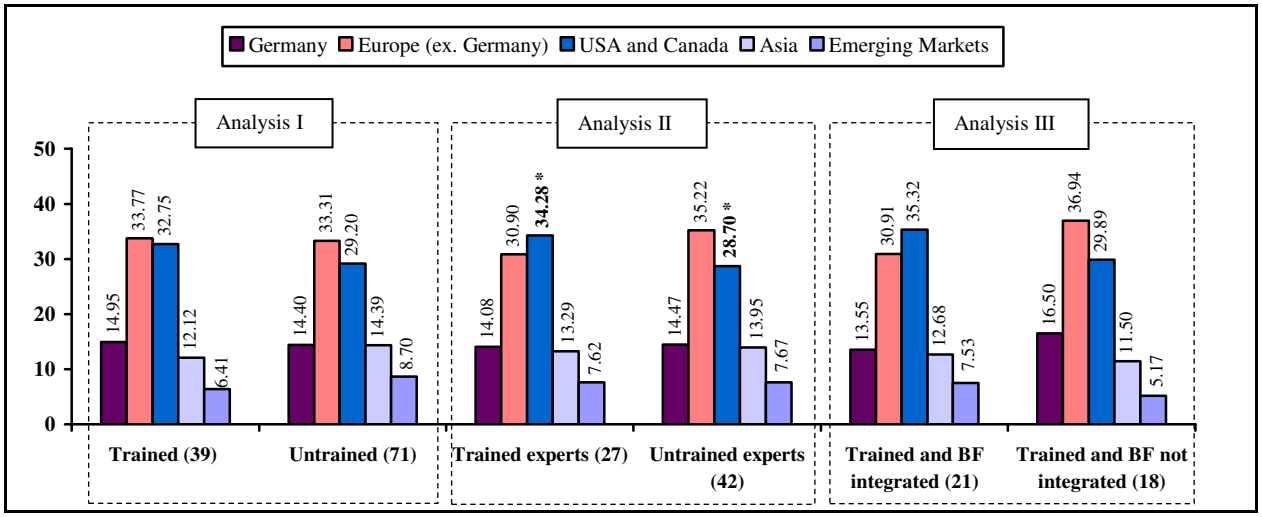
Stars refer to level of significance: * 10%, ** 5%, *** 1%.

TABLE 6. International asset allocation[(a)] [AA]

[AA] Task: "Please, allocate an amount of 10 million € to the following markets so that the shares sum up to 100% (thereby ignoring your funds' restrictions)."

___% Germany ___% Europe (without Germany) ___% USA and Canada"

___%Asia ___% Emerging Markets.



Statements	*All fund managers (mean and number of responses)*	H_0: No difference [(b)] Analysis I	Analysis II	Analysis III
Germany	*14.21*	-0.144	-0.102	-0.744
	111	(0.886)	(0.913)	(0.457)
Europe (without Germany)	*33.68*	-0.429	-0.834	-1.366
	111	(0.668)	(0.404)	(0.172)
USA and Canada	*30.61*	-1.301	**-1.720***	-1.140
	111	(0.193)	**(0.086)**	(0.254)
Asia	*13.62*	-0.459	-0.433	-0.317
	111	(0.646)	(0.665)	(0.752)
Emerging Markets	*7.89*	-1.329	-0.063	-1.374
	111	(0.184)	(0.950)	(0.169)

(a) The diagram gives the mean answers of the respective group (with the number of responses in parentheses) in %.

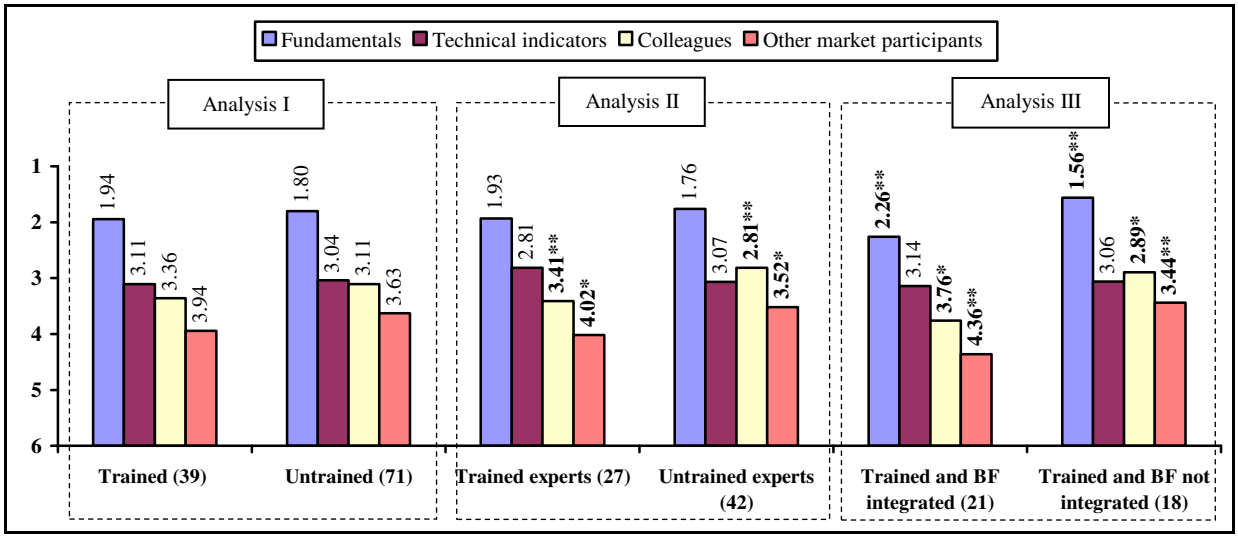
(b) H_0 states that there is no difference between the respective comparison groups. The figures given are the z-value of the Mann-Whitney U-test and the p-value in parentheses.

Stars refer to level of significance: * 10%, ** 5%, *** 1%.

TABLE 7. Assessment of information sources[(a)] [INFO]

[INFO] Task: "Please assess the importance of the following sources of information for you".

Information sources: "Fundamental facts about the company / market", "Technical indicators", "Colleagues from the own company", "Other market participants, not from the own company".



Statements	*All fund managers (mean and number of responses)*	H_0: No difference [(b)] Analysis I	Analysis II	Analysis III
Fundamental facts	*1.82* *115*	-0.686 (0.493)	-0.663 (0.507)	**-2.146**** **(0.032)**
Technical indicators	*3.02* *114*	-0.193 (0.847)	-0.909 (0.363)	-0.365 (0.715)
Colleagues	*3.17* *115*	-1.058 (0.290)	**-1.957**** **(0.050)**	**-1.853*** **(0.064)**
Other market participants	*3.73* *115*	-1.229 (0.219)	**-1.683*** **(0.092)**	**-2.485**** **(0.013)**

(a) The diagram gives the mean answers of the respective group (with the number of responses in parentheses). The importance of each source of information can be assessed by six answering categories, shown on the y-axis, ranging from "highest relevance" (coded as 1) to "no relevance" (coded as 6).

(b) H_0 states that there is no difference between the respective comparison groups. The figures given are the z-value of the Mann-Whitney U-test and the p-value in parentheses.

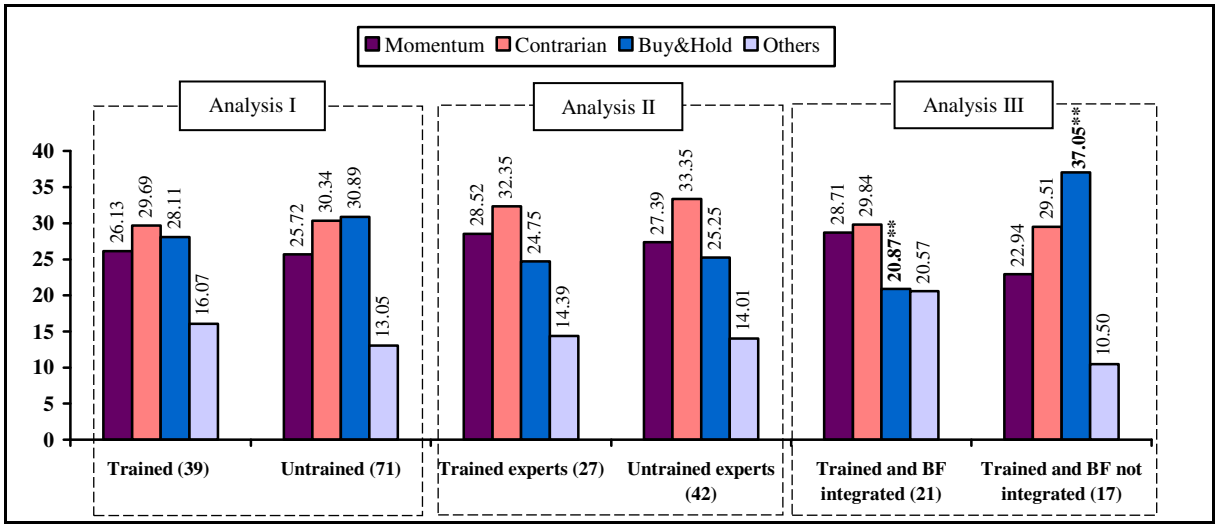
Stars refer to level of significance: * 10%, ** 5%, *** 1%.

TABLE 8. Assessment of investment strategies[(a)] [STRAT]

[STRAT] Question: "How intensively do you use the various strategies? Please allocate 100%."

___% Momentum strategy" ___% Contrarian strategy (Value strategy)"

___% Buy-and-Hold strategy" ___% Others"



Statements	*All fund managers (mean and number of responses)*	H_0: No difference [(b)] Analysis I	Analysis II	Analysis III
Momentum	*26.27* *108*	-0.293 (0.769)	-0.370 (0.712)	-1.365 (0.172)
Contrarian	*29.31* *108*	-0.069 (0.945)	-0.007 (0.995)	-0.148 (0.882)
Buy-and-Hold	*30.73* *108*	-0.565 (0.572)	-0.488 (0.626)	**-2.095**** **(0.036)**
Others	*13.69* *108*	-0.490 (0.624)	-1.101 (0.920)	-0.934 (0.350)

(a) The diagram gives the mean answers of the respective groups (with the number of responses in parentheses) in %.

(b) H_0 states that there is no difference between the respective comparison groups. The figures given are the z-value of the Mann-Whitney U-test and the p-value in parentheses.

Stars refer to level of significance: * 10%, ** 5%, *** 1%.