

Investment beliefs and portfolio risk-taking – a comparison between industry professionals and non-professionals

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Abstract: Investment beliefs, serving as a bridge between high-level objectives and practical decision making, are increasingly implemented in the investment industry. The present web-based study compares the beliefs of Swedish professional (N=64) and non-professional (N=278) investors, testing the links between investment beliefs and portfolio risk-taking in both samples. The results expose significant differences between the beliefs of professionals and others, also showing that the portfolio risk-taking of non-professionals is susceptible to self-confidence and emotional effects while the professionals respond to investment beliefs and risk attitude. The results confirm that disclosure of investment beliefs may reduce tensions between stakeholders and investment managers for the industry's benefit.

Keywords: Investment beliefs; Portfolio risk-taking; Pensions industry; Dual processing theory; Emotions

The paper is forthcoming in a collection of behavioral finance papers following the Third Israel Behavioral Finance conference (book name to be announced). Editor, Itzhak Venezia. Publisher, World Scientific. Corresponding author: Magnus Jansson. E-mail: magnus.jansson@gri.gu.se. Phone: + 46 (0)31 786 1421. Magnus Jansson, Carl-Christian Trönnberg and Sven Hemlin are from the Gothenburg Research Institute (GRI). The School of Business, Economics & Law. The University of Gothenburg. P.O. Box 603. SE-40530 Göteborg. Sweden. Doron Sonsino is at the College of Law and Business (CLB). Ramat-Gan. Israel and adjunct at the Economics department of Ben-Gurion University.

1. Introduction

Investment beliefs are attracting increased interest in the asset management industry (The investment officer; August 8, 2019). Ambachtsheer (2007) concisely defines investment beliefs as beliefs regarding valuations and how financial markets function. Raymond (2008) similarly speaks of a broad set of beliefs regarding return generating processes. Several authors (Gray, 2009; Koedijk and Slager, 2011; Chambers et al., 2012; Rozanov, 2015) adopt the term *investment philosophy* to address the collection of investment beliefs adopted by the asset management firm. Woods and Urwin (2010), more practically, refer to working assumptions regarding the investment world that underlie and inform the decision making of the firm.

A July 2005 survey finds investment beliefs statements in public documents of eighteen leading asset management firms with more than 5,500 billion dollars under management (Slager and Koedijk, 2007; exhibit 2). More recent industry surveys (Pensions and investments; July 23, 2012) reveal that statements of investment beliefs are becoming widespread, with pension funds across the globe displaying a list of investment beliefs in their web sites and official documents.

The specific attributes composing the investment beliefs of investment management organizations vary between providers, but few themes constantly recur (Koedijk et al, 2010). The time horizon of investment is one of the recurrent themes. Asset managers may be long-term inclined, believing that long-term investment enhances value development, or relatively short-term focused claiming that rapid adjustment is essential for achieving competitive return. The Minnesota *State Board of Investment* (SBI) investment beliefs, for example, emphasize that SBI is a long term investor, but the ability to pay benefits on a year-to-year basis is a key consideration in cases where short-term liquidity can be sacrificed for long-term return (<http://mn.gov/sbi/documents/SBI%20Investment%20Beliefs.pdf>). Other common dimensions of investments beliefs deal with market rationality, the risk-return tradeoff, the ability to control risk, and the advantage of diversification (see the Ontario Teachers' Pension Plan beliefs at <https://www.otpp.com/investments/performance/investment-strategy/our-beliefs>). Slager and Koedijk (2007) additionally emphasize the role of organizational norms and societal concerns. Indeed, many pension funds refer to these broader perspectives in recently advertised investment beliefs (see the discussion of investment beliefs at the *Principles for Responsible Investment* site <https://www.unpri.org/>). Rook (2012) illustrates that senior US and UK investment managers share common beliefs regarding sustainable investment, climate change, and resource scarcity.

Investments beliefs are often separated from investment policy, arguing that the mission and beliefs of the asset management firm should underlie its more concrete policy (Clark and Urwin, 2008; Fraser and Jennings, 2010; Woods and Urwin, 2010). Lydenberg (2011) claims that investment belief statements should serve as a bridge between high-level goals and practical decision making, helping trustees and

fiduciaries clarify their views on the nature of the financial markets through which they must operate. Few papers argue that the mere existence of published investment beliefs links with superior performance. Ambachtsheer (2007) connects the strong pre-crisis performance of the Harvard endowment Management Company (HMC) and the Ontario Teachers' Pension Plan (OTPP) to home-grown coherent investment beliefs. Koedijk and Slager (2009) analyse the published reports of forty pension funds and assets management firms managing more than 10.3 billion dollars. They find links between having published investment beliefs and improved risk-return ratios. A 2018 survey among eighteen global asset management companies relatedly suggests that the funds with high added value maintain their investment beliefs longer (FCLTglobal; August 30, 2018).

The extent to which investment beliefs are shared by professional investors and their beneficiaries, however, has not yet received due consideration. Shared investment beliefs and a common understanding of how value is created may improve the ability of pension managers to meet their fiduciary obligations and decrease the risk of conflicts between the pension fund beneficiaries and their agents in the service provider chain (Johnson and de Graaf, 2009). The first purpose of the present study is to investigate to what extent industry professionals and non-professional investors share the same investment beliefs. A web-survey is administered to professionals employed by Swedish pension funds and asset management firms (N=64) and to a convenience sample of non-professionals composed of students and private investors (N=278). In addition to characterizing the beliefs of respondents in both groups, the survey administered two stylized asset allocation problems to test to what extent the portfolio risk-taking of professionals and others is affected by their investment beliefs. To control for psychological factors that often link with the willingness to take financial risk, the survey also elicits measures of individual propensity to take risk (Grable, 2000; Weber et al., 2002; Dohmen et al., 2011), self-confidence (Doran et al., 2010) and affective state (Lucey and Dowling, 2005). The non-professionals additionally rate their knowledge in finance, while the professionals evaluate the risk-taking norms in their organizations.

The results of the survey point at significant differences between the financial beliefs of industry professionals and non-professional investors, also showing that the determinants of portfolio risk-taking vary between the two groups although their portfolios do not differ significantly. The professionals exhibit stronger belief in long-termed investment, the risk-return tradeoff, and the premium for expertise, and their portfolio risk-taking is affected by their beliefs and their personal risk attitudes. The portfolio risk-taking of private investors, however, strongly responds to self-confidence and their transitory mood. The results connect with research proposing that the decision making of professionals is generally more quantitative and deliberative, while non-professionals are more susceptible to psychological bias and emotional affects (Loewenstein et al., 2001; Slovic et al., 2005). By way of interpretation, the comparisons indeed confirm that publication of investment beliefs may bridge

probable gaps between more calculated trustees and emotional savers, for the industry's benefit (Slager and Koedijk, 2007; Johnson and De Graaf, 2009).

The remainder of the chapter is organized as follows. The next section reviews the research on how expertise and emotions may influence the willingness to take stock market risk. We then briefly introduce the investment beliefs examined in the current survey, leading to the main research questions. The method, results and discussion sections follow in order.

2. Expertise, emotions, and portfolio risk-taking

The willingness to take financial risk has shown to be affected by both objective and subjective measures of domain knowledge. Wang (2009) finds that objective knowledge, subjective knowledge, and financial risk-taking positively correlate in a sample of N=524 Internet participants, with subjective knowledge mediating the objective knowledge and risk-taking link. Tang and Baker (2016) similarly find that objective knowledge and self-esteem positively affect the willingness to take financial risk amongst few thousand participants in a longitudinal U.S. survey. The effect of self-esteem is both direct and indirect, through subjective financial knowledge. Hadar et al. (2013) argue that investors that perceive themselves as knowledgeable are more confident and their stronger confidence drives them to accept more risks. Manipulations that increase consumers' knowledge while decreasing their subjective knowledge decreased the willingness to invest in financial assets.

While professionals' knowledge in topics related to their expertise naturally exceeds the knowledge of non-professionals (McKenzie et al., 2008; Bačová et al., 2017), direct comparisons between the financial risk-taking of professionals and others are scarce and the results are inconclusive. Holzmeister et al. (2020) recent survey of N=2213 finance professionals and N=4559 non-professionals from nine countries does not find a difference in the willingness of professionals and non-professionals to invest in diverse return distributions. The results of smaller sample studies sometimes discover larger or smaller willingness to invest amongst the professionals. Lambert et al. (2012) compares the survey investment decisions of loan officers (N=20) and students (N=64), confirming that investments increase with perceived knowledge in both samples, although the loan officers' investments are about half smaller. In contrast, Thoma et al. (2015) find stronger willingness to take financial risk amongst N=53 banking industry workers compared to N=57 non-banking respondents.

Risk perception studies generally argue that experts tend to have a more specific and quantitative understanding of risk, while the risk perception of lay persons is more likely to be influenced by emotional factors (Loewenstein et al., 2001; Slovic et al., 2005). The differences in risk perception and risk-taking of experts and non-experts are frequently discussed in light of the theory of dual processing

systems (Sloman, 1996; Stanovich and West, 2000; Kahneman, 2003). According to the theory, human thinking can be broadly categorized as either fast, affective and intuitive or as slow, deliberative and analytical. Experts' perception of risk tends to be influenced more by the deliberative analytic system (*risk as analysis*), while lay people's risk perception is affected more by the intuitive and emotionally triggered system (*risk as feeling*; Solvik and Peters, 2006). Indeed, Diacon (2004) finds that investment advisors (N=41) exhibit weaker aversions to loss and complexity, while displaying more trust in providers and regulators compared to lay consumers (N=123). However, other studies, including the recent comprehensive Holzmeister et al. (2020) nine countries comparison, could not point at systematic differences between the risk perceptions of finance professionals and others (see also Olsen, 1997; Sachse et al., 2012).

The impact of emotions on the behaviours of investors and traders has been illustrated in diverse studies with professional and non-professional participants (Lucey and Dowling, 2005). In experimental studies, induced positive affect led participants to overestimate the probability of a financial reward (Nygren et al., 1996) and exhibit stronger risk appetite when trading experimental assets (Butler and Cheung, 2019). Negative affect brought parallel opposite consequences (Kuhnen and Knutson, 2011; Aldrovandi et al., 2017). The results regarding the susceptibility of finance professionals to emotions, however, are mixed again. Some studies prove that longer industry experience reduces the impact of emotions on trading behaviour (Fenton-O'Creevy et al., 2011; 2012), while others illustrate that professionals strongly respond to affect in intraday trading although their emotional response leads to suboptimal performance (Lo et al., 2005; Locke and Mann, 2009). In Coates and Herbert (2008), day traders morning testosterone levels predict daily profitability, while cortisol levels rise with the volatility of individual returns and implied market-volatility estimates.

The evidence regarding financial risk-taking amongst professional and non-professional investors is, in summary, inconclusive. While the literature appears to agree that objective and subjective knowledge bring stronger willingness to take financial risk, the results of comparisons between the willingness of professionals and others to take financial risk are mixed. Similarly, while dual processing research predicts that professionals would exhibit stronger rationality in financial decision, empirical studies show that the susceptibility of finance professionals to emotional bias varies, depending on contexts and tasks. The current study contributes to these lines of research by comparing the stock market risk-taking of Swedish professional and non-professional investors in stylized survey investment scenarios, and exploring the roles of investment beliefs as well as proclaimed knowledge and psychological attributes on financial risk-taking in the two samples.

3. Investment beliefs

Koedijk and Slager (2009) identified twelve types of investment beliefs categorized into four groups: beliefs concerning the financial market (e.g., importance of risk diversification); beliefs about the investment process (e.g., long-termed investment versus frequent portfolio adjustment); organizational beliefs, that is, how does the management promote investment effectiveness (e.g., importance of team decisions); and beliefs about sustainability and corporate governance (e.g., good corporate governance results in higher earnings). For the present study, we devise six investment beliefs' indices referring to major characteristics of the capital markets and possible ways to achieve high returns and control risk. Each index is constructed from three items, where the respondents rank their agreement with each item in a 1-5 Likert scale. The next paragraphs discuss the six indices, outlining the motivation for including these indices in a comparative study of the beliefs and financial risk-taking of industry professionals and others (see also Jansson et al., 2018). Appendix 1 presents the items used to derive each index.

Rationality: The first index deals with belief in the rationality or efficiency of the financial markets. The efficient market hypothesis (Fama, 1970) asserts that the stock market instantly reflects all relevant news and the stock return process is a random walk (Malkiel, 2003). Investors that believe in market efficiency may be less affected by short-termed sentiments and show inclination for long-term investment rather than constant pursuing of mispricing opportunities. It is unclear, however, whether professionals should rank higher in their belief in market rationality, as by the common view the professionals are those that instantly react to mispricing, keeping the markets efficient (Ericsson et al., 2005).

Diversification: Another principle of modern finance is that diversification of risks is essential for achieving the best risk-return ratios (Markowitz 1952; Sharpe 1964; Lintner, 1965). Our second index measures investors' belief in the merits of diversification. Again, as professionals may emphasize particular asset selection and response to mispricing opportunities (cf., Morrin et al., 2002), we are uncertain if their belief in diversification will be stronger. It is interesting yet to test if such belief links with the willingness to take stock market risk within the two samples.

Time horizon: In a survey of 180 investment managers and top executives, Guyatt (2005) found that long-term investment is considered the best way to improve performance. Over 30% of Guyatt's respondents stated that the most effective method to improve portfolio performance is to lengthen the investment horizon. The third item in our investment beliefs accordingly deals with the optimal time horizon of investment. Again, the more conservative view endorsing long term investment can be challenged by investors that believe in asset picking and riding mispricing opportunities.

Expertise: The efficient market hypothesis also relates to beliefs about the virtues of financial expertise. Believers in the efficiency of the financial market might de-emphasize the importance of expertise, arguing that professional investors are in no better position to predict future asset prices than lay people (Malkiel, 2003; 2005). Opponents of the efficient market hypothesis oppositely argue that the markets frequently appear inefficient as investors are irrational and cognitively biased (Barberis and Thaler, 2005; Barberis, 2018). The inefficiencies may generate mispricing opportunities that the expert asset manager may skilfully exploit.

Risk-return: Another basic principle of finance theory is that taking more risk is essential for achieving higher average return. Again, however, the theoretical principle is not uniformly accepted. While empirical research identifies risk factors that consistently generate excess return (Fama and French, 1992; 1993), behavioural studies show that lay investors intuitively categorize risky companies as bad investments, expecting that the stocks of high-risk firms would bring disappointing return (Ganzach, 2000; Shefrin, 2001). We accordingly anticipate that the professionals' belief in the risk-return link will be stronger.

Risk-control: Published investment beliefs typically include explicit statements regarding the financial risk management of the organization. Investment belief 5 of the Australian ACT government, for instance, asserts that risks should be viewed both qualitatively and quantitatively with particular focus given to the nature and likelihood of extreme events (<https://www.act.gov.au>). The Dutch PMT, to take a different example, asserts that risk management is designed to achieve the objective of generating the required excess returns within the framework of tight risk control (<https://www.bpmt.nl/>). While professional experience can increase the confidence of investors in the manageability of risks, it is oppositely possible that long acquaintance with the volatile markets would diminish such belief. The risk-control index is included in our list to compare the beliefs of professionals and others with this respect and test if belief in the controllability of financial risks correlates with portfolio risk-taking.

4. Research questions

The literature review motivates the following four main research questions: (1) Do professional and non-professional investors share similar investment beliefs? (2) Given the mixed findings regarding the portfolio risk-taking of professional and non-professional investors, can we find significant differences between the risk-taking of two such samples in an original survey assignment? (3) Do the investment beliefs of the responders reflect in their portfolio risk-taking? (4) Can we support the hypothesis that the portfolio risk-taking of professionals is more rational while the portfolio risk-taking of non-professionals responds to psychological attributes?

5. Method

5.1 Sample and procedure

Data were collected by means of a web-based survey constructed in Qualtrics. A link to the survey was distributed by email to Swedish professional and non-professional investors and the participants could respond within a week. Participation was voluntary and provided no compensation. The professionals were fund managers and financial analysts employed at investment firms that are members of the Swedish Investment Fund Association (Fondbolagens Förening). An initial contact was made with the CEOs or heads of investment in each firm. The aim of the research was presented in a formal letter with a request to provide contact information for fund managers and financial analysts that may participate in the survey. Of the 28 investment firms approached, 17 accepted the invitation. After receiving the contact information of potential respondents, we sent a welcome letter describing the study by email. A week later, the potential respondents received another email with a link to the survey. The survey closed on September 9th 2016, one week after sending the emails with the link. In total, 137 questionnaires were distributed and 64 were returned completed, representing a response rate of 46.7%. The professional sample is predominantly male, with 60 males and only 4 females, and the mean age is about 41 years. Twenty-three respondents were employed by major Swedish public pensions funds (AP-fonderna) and 41 were employed by private investment banks or mutual fund companies. Four of the 64 respondents had a top management position such as CEO, 9 were senior investment officers, 40 were fund managers, and 11 were financial analysts. Respondents' average work experience in the financial industry was 15 years.

The non-professional convenience sample consisted of 278 individuals (156 males, 122 females, mean age 48.3 years) with varying experience in the stock market. The participants were recruited by advertising the survey among Gothenburg university students and among members of the Swedish association for small private shareholders (Aktiespararna). The response rate was 19.1%. For this chapter, we treat the non-professional sample as single unit, ignoring some differences between the students and the private investors (details will be provided on request). The self-rated financial knowledge of the 278 non-professional participants in a five-point scale (ranging from 1 = "No knowledge at all" to 5 = "Very good knowledge") averaged at $M = 2.05$, with standard deviation $SD = 1.05$.

5.2 Questionnaire and measures

To test for psychological effects on risk-taking, the survey elicited indices of financial risk preference, financial self-confidence, and affective state (see Appendix 1 for the items composing each index). Respondents' attitude to financial risk was measured using four items in the spirit of Barclays psychometric scale of investor attitudes (Weber et al., 2013). An index of self-confidence in financial domains was similarly obtained using four items measured on a five-point Likert scale. Affective state

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was measured using the 10-items short version of the Positive and Negative Affect Scale (PANAS; Thompson, 2007), but since negative affect did not link with the main variables, we only discuss the positive index henceforth. The professional participants were also presented with four items dealing with the risk-taking norms in their organization (see the organizational risk norm items in Appendix 1). Our main dependent variable, portfolio risk-taking, was measured by the percentage that respondents allocate to stocks in the two allocation scenarios presented in Appendix 2. In the first scenario, the participants divided an investment budget between six international stock indices and two bond portfolios assuming investment periods of 3-months and 2-years. The second scenario presents six alternative splits between large cap Swedish stocks and 2-years bonds, asking the participants to select their preferred allocation for 3-months and 2-years periods. Portfolio risk-taking was measured by the average proportion allocated to stocks in the four assignments. Short-run and long-run portfolio risk-taking were defined based on the 3-months and 2-years allocations. The allocation tasks presented to the professionals adopted a fund management cover, asking the respondents to assume they have free mandate to allocate their fund's capital between few alternatives. The non-professionals were presented with identical scenarios, but the cover was personal asking the respondents to decide on the allocation of their savings. Since the two allocation problems only referred to large stock indices or large cap stocks, the portfolio risk-taking measure does not necessarily represent the readiness to invest in particular stocks, but measures the willingness to invest in large indices or stocks when the alternative consists of almost risk-free governmental bonds.

Table I: Investment beliefs and their correlations (complete sample; N=342)

	M (SD)	α	1	2	3	4	5
1. Rationality	2.8** (0.6)	.71					
2. Diversification	3.3** (0.6)	.61	.09				
3. Time horizon	3.4** (0.7)	.62	-.02	.08			
4. Expertise	3.2** (0.7)	.65	.17**	.12*	-.10		
5. Risk-return	3.3** (0.7)	.73	.15**	.15**	-.12*	.18**	
6. Risk-control	2.8** (0.6)	.64	.24**	.17**	-.05	.21**	.18**

Note. The left columns present the mean (M), standard deviation (SD) and Cronbach's alpha (α) for each investment belief. The asterisks at the left most column report the results of testing the hypothesis that the investment belief equals 3. The right panel shows the correlations between the investment beliefs. Significant correlations are shaded. * = $p < .05$, ** = $p < .01$ throughout the chapter.

6. Results

6.1 Investment beliefs, in general

The mean ratings of all respondents (N=342) for each investment belief are presented in Table I. The responders appear to perceive the stock market as irrational rather than rational (N=85 with rationality index > 3 vs. N=169 with rationality < 3; $p < 0.01$) and appear to have low confidence in the controllability of financial risks (N=100 with risk-control index > 3 vs. N=190 with index < 3; $p < 0.01$). The other investment beliefs are clearly supported, with the mean ratings significantly exceeding the midpoint of

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the Likert scale. The belief in long-term investment horizon is the strongest (N=217 with horizon>3 vs. N=71 with horizon<3), but financial expertise is more controversial (N=172 showing expertise index>3 vs. N=108 with expertise<3). Ten significant correlations between investment beliefs were identified. Belief in the rationality of the market positively correlates with belief in expertise, dismissing the point of view that markets are efficient to the extent that the industry has no productive role. Diversification, risk-return and risk-control mutually correlate revealing that investors may concurrently believe in index investing and risky return chasing.

Table II: Investment beliefs of professionals and non-professionals

	Group		T-stat
	Professionals (N=64)	Non-professionals (N=278)	
Rationality	2.7 (0.6)	2.8 (0.6)	-0.8
Diversification	3.3 (0.7)	3.3 (0.6)	-0.2
Time horizon	3.7 (0.6)	3.3 (0.7)	3.5**
Expertise	3.7 (0.7)	3.0 (0.6)	6.9**
Risk-return	3.6 (0.7)	3.3 (0.7)	4.2**
Risk-control	2.8 (0.6)	2.8 (0.6)	0.4

Note. The table presents the mean investment belief for each group and the results of a T-test for comparing the two samples. The shaded rows mark the dimensions where the two groups significantly differ.

6.2 Do professionals and non-professionals share the same investment beliefs?

Table II tests the extent to which professionals (N= 64) and non-professionals (N=278) endorse similar investment beliefs. The table shows that both groups have little confidence that the stock market is rational. They also roughly share similar beliefs in the virtues of diversification and the controllability of financial risks. The two groups however strongly differ in time horizon, expertise and risk-return. The professionals score higher in each of these three dimensions, displaying stronger belief in the role of the industry and the possibility to chase return by long term investment and calculated risk-taking.

Table III: Portfolio risk-taking of professionals and non-professionals

	Sample (N=342)	Group		T-stat
		Professionals (N=64)	Non-professionals (N=278)	
Portfolio risk-taking	43 (3.9)	43 (3.8)	43 (3.9)	1.6
3-months	46 (4.9)	44 (4.9)	46 (4.9)	2.3*
2-years	41 (3.8)	41 (3.5)	41 (3.8)	0.3
T-stat	21.5**	7.8**	20.2**	

Note. The method of the table is similar to the one of Table II

6.3 The portfolio risk-taking of professionals and non-professionals

The portfolio risk-taking statistics are presented in Table III. The mean allocation to stocks is 43% and the spread is very low with standard deviations around 3.8% in both samples. The hypothesis that the professionals or the non-professionals allocate 50% of their funds to stocks is easily rejected as only few respondents allocate more than 50% to the stock alternatives. Both groups allocate more to stocks in the 3-months allocation tasks compared to the longer 2-years assignments. The professionals take more risk when constructing the 3-months portfolios, but the differences disappear in the 2-years allocation.

Table IV: Investment beliefs effects on the portfolio risk-taking

	Regressions on all six investment beliefs			Results after iterated removal of insignificant effects		
	Prof (N=64)	Others (N=278)	F-test	Prof (N=64)	Others (N=278)	F-test
Rationality	-0.05 (.80)	-0.20 (.38)	0.87			
Diversification	-0.16 (.83)	0.40 (.38)	0.55			
Time horizon	-1.46 (.80)	0.81* (.36)	0.01	-1.42 (.78)	0.86** (.35)	0.01
Expertise	1.54* (.70)	-1.17** (.39)	0.01	1.40* (.63)	-1.23** (.38)	0.00
Risk-return	0.71 (.82)	0.00 (.36)	0.45			
Risk-control	-2.50** (.97)	-0.40 (.40)	0.05	-2.09** (.83)		
Intercept	47.3** (5.0)	44.6** (2.5)	0.63	48.5** (4.4)	44.3** (1.8)	0.40
R ²	17.3%	7.9%		16.2%	7.0%	

Note. The method of the table is explained in section 6.4. Shaded rows denote the beliefs by which the two samples significantly differ.

6.4 Do investment beliefs affect portfolio risk-taking?

The left panel of Table IV shows the results of regressing the portfolio risk-taking of professionals and non-professionals on the six investment beliefs. The regressions are separately run for each group and a standard F test is used to test the equality of the estimated coefficients. The six beliefs interestingly explain more than 17% of the variance in the risk-taking of professionals while it explains less than 8% of the variance in the risk-taking of non-professionals, but drawing conclusions from this comparison is dangerous since the samples are very different in size and the convenience sample of non-professionals is quite diverse. A more puzzling result is a reversed effect of expertise and time horizon on the portfolio risk-taking of the respondents in the two groups. While the risk-taking of the professionals increases with belief in expertise and decreases with belief in time horizon, the effects of these two beliefs on the risk-taking of the non-professionals are just opposite. The reversed effects are

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robust and results similar to those in Table IV emerge when the dependent variable is the 3-months or the 2-years portfolio risk-taking. Iterated removal of insignificant effects reconfirms the puzzle, as illustrated at the right panel of Table IV. The reversed effect of expertise can be tentatively explained by smaller inclination of non-professionals that believe in financial expertise to take stock market risk independently. Alternatively, it is possible that non-professional investors that believe in expertise may dislike the large stock indices and large cap stocks that are being offered in our allocation scenarios. The reversed effect of time horizon may be *ad hoc* attributed to different views regarding the investment periods of 3-months and 2-years implemented in the survey.

Table V: Personal attributes and their correlations with portfolio risk-taking

Panel a: professionals (N=64)	M (SD)	1	2	3	4
1. Financial risk preference	4.3 (1.3)				
2. Financial self-confidence	2.8 (0.8)	0.12			
3. Positive affect	3.6 (0.7)	0.25*	0.27*		
4. Organizational risk norms	2.4 (0.7)	-0.02	0.22*	0.09	
Portfolio risk-taking	43 (3.8)	0.28*	0.06	0.09	0.07
3-months risk-taking	44 (4.9)	0.26*	0.08	0.10	0.11
2-years risk-taking	41 (3.5)	0.24	0.00	0.05	0.04

Panel b: others (N=278)	M (SD)	1	2	3	4
1. Financial risk preference	2.9 (1.5)				
2. Financial self-confidence	2.2 (0.8)	0.51**			
3. Positive affect	3.2 (0.8)	0.39**	0.46**		
4. Self-rated Knowledge	2.0 (1.1)	0.51**	0.65**	0.47**	
Portfolio risk-taking	43 (3.9)	0.27**	0.34**	0.35**	0.36**
3-months risk-taking	46 (4.9)	0.16**	0.22**	0.27**	0.28**
2-years risk-taking	41 (3.8)	0.35**	0.41**	0.37**	0.38**

Note. The method of the table is explained in section 6.5

6.5 Psychological determinants of Portfolio risk-taking

The two horizontal panels of Table V examine the psychological attributes of the professional and non-professional (other) respondents, showing the simple correlation of each attribute with portfolio risk-taking in the two samples. The professionals of the current convenience sample score significantly higher in financial risk preference and self-confidence and also exhibit more positive affect than the non-professionals ($p < 0.01$ in all three comparisons). As anticipated, self-rated knowledge positively correlates with the portfolio risk-taking of the non-professionals, but the effect is quantitatively mild (mean risk-taking 44.5 for those that rank their knowledge at 4-5 compared to 41.2 for those that rank their knowledge at 1-3; $p < 0.01$).¹ More interestingly, the correlations between each of the personal

¹ N=92 of the non-professionals rated their knowledge at 1-2, N=94 at 3, and N=92 at 4-5. The portfolio risk-taking of the respondents with self-rated knowledge 4 or 5 exceeds the risk-taking of those with knowledge 1,2 or 3. The low knowledge sample is predominantly female while the high knowledge sample is predominantly

attributes (risk preference, self-confidence, positive affect) and portfolio risk-taking are always positive and highly significant for the non-professionals, while only risk-receptiveness correlates with the portfolio risk-taking of the professionals (compare the two correlation panels in Table V).

Table VI: Summarizing regressions

Dependent variable	OLS regressions		Logistic regressions	
	Portfolio risk-taking		$I_{\text{risk-taking} \geq 45}$	
	Professionals (N=64)	Others (N=278)	Professionals (N=64)	Others (N=278)
Investment beliefs	1.11* (0.47)	0.82** (0.22)	0.77* (0.34)	0.59** (0.15)
Financial risk attitude	0.82* (0.36)	-	0.59* (0.27)	-
Self-confidence	-0.20 (0.61)	0.91** (0.36)	-0.45 (0.42)	0.60** (0.24)
Positive affect	0.21 (0.65)	0.82** (0.29)	-0.45 (0.47)	0.40* (0.19)
Self-rated knowledge		0.56* (0.27)		0.32 (0.18)
R ²	16%	22%	-	-

Note. The method of the table is explained in section 6.6. Financial risk-attitude does not affect the risk-taking of the non-professionals when the other covariates are controlled. The logistic regressions account for self-rated knowledge although the effect is not-significant. The results are robust to removal of the knowledge variable.

6.6 Summarizing regressions

Table VI reports the results of OLS and logistic regressions that test the response of portfolio risk-taking to investment beliefs and personal characteristics concurrently. Investment beliefs are concisely measured using standardized factors that were extracted in principal component analysis.² For the logistic regressions, respondents are classified as high risk-takers when their portfolio risk-taking is at least 45%. The results of the OLS and the logistic regressions similarly reconfirm that investment beliefs affect the portfolio risk-taking of professionals and non-professionals, but the risk-taking of the professionals is only affected by their individual risk preference while the non-professionals strongly responds to self-confidence and positive affect. The results are robust and similar bottom-line conclusions emerge when investment beliefs are measured more closely using the indices of Table I,

male. Regressions of portfolio risk-taking on gender, knowledge and an interaction term suggest that gender or the interaction do not affect risk-taking when stated knowledge is controlled. The results reported in the main text are robust to splitting the non-professionals to low knowledge and high knowledge groups.

² The factors were separately extracted for the two samples. The formulas are $0.20 \cdot \text{rationality} - 0.09 \cdot \text{diversification} - 0.40 \cdot \text{horizon} + 0.63 \cdot \text{expertise} - 0.57 \cdot \text{risk-return} + 0.14 \cdot \text{risk-control}$, for the professionals (eigen value 1.05), and $-0.37 \cdot \text{rationality} - 0.17 \cdot \text{diversification} + 0.22 \cdot \text{horizon} - 0.39 \cdot \text{expertise} - 0.33 \cdot \text{risk-return} - 0.38 \cdot \text{risk-control}$, for the non-professionals (eigen value 1.21). The factors correlations with portfolio risk-takings are 0.27 ($p < 0.01$) for the professionals and 0.20 ($p < 0.01$) for the non-professionals.

when the sample of non-professionals is split depending on self-rated knowledge, when gender is taken into account and in other robustness analyses.

7. Discussion

While the literature on the determinants of investors' inclination to take stock market risk is large and diverse (cf., Calvet and Sodini, 2014), the influence of investment beliefs on financial risk-taking has not been previously explored. The current study attempts to fill this gap. Building on previous investment beliefs research by Ambachtsheer (2007), Slager and Koedijk (2007) and Koedijk and Slager, (2009), we investigate the endorsement of six major beliefs concerning the capital markets by samples of professional and non-professional investors. The comparisons reveal that professionals and non-professionals share a common perception of the stock-market as irrational rather than rational, and show similar doubt regarding the possibility to control market risks. The professionals, however, exhibit stronger belief in long-termed investment, the risk-return principle, and the premium for expertise.

The professionals' stronger belief in the virtues of long investment horizon and their stronger endorsement of the risk-return tradeoff are not surprising. Professionals can be expected to endorse the principles of modern portfolio more strongly than non-professionals, while behavioural studies prove that non-professionals exhibit diverse types of bias in the perception of risk and its correlation with return (Ganzach, 2000; Duxbury and Summers, 2004; Ricciardi, 2008; Wang et al., 2011). The gap between the more rational views of professionals and possibly biased views of non-professionals currently reflect in weaker endorsements of the horizon and risk-return beliefs by the non-professionals.

We are neither surprised by the strong general belief in the role of expertise in the financial market and the professionals' stronger confidence in financial expertise. Previous research has shown that professionals and non-professionals alike expect more skilful decision from experts compared to lay investors (Törngren and Montgomery, 2004; Peterson et al., 2015). It is argued that for this reason non-professionals search for the advice of investment experts (Huber et al., 2010) and put their trust and money in the hands of fund managers (Carlander et al., 2013). The stronger belief of experts in the merits of financial expertise may then unsurprisingly follow from motivational or professional identity concerns (Cohn et al., 2017), while the more sceptical view of the non-professionals can be attributed to emotional factors such as the cognitive dissonance that arises in delegation of investment funds (Chang et al., 2016).

Pension funds research proposes that the display of coherent investment beliefs correlates with stronger performance of leading asset management companies (Ambachtsheer, 2007; Koedijk and Slager, 2009; FCLTglobal; August 30, 2018). It has also been argued that clear statements of investment beliefs may

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alleviate tensions between the agents at the savings industry chain and the principal investors (Johnson and de Graaf, 2009). In addition to pointing at significant differences in major investment beliefs of professionals and non-professionals, the results of our survey confirm the hypothesis that the non-professionals' risk-taking decisions are susceptible to psychological effects, while the professionals are relatively immune to these same effects (Loewenstein et al., 2001; Slovic and Peters, 2006). The results thus suggest that effective use of investment beliefs may decrease the hazard of conflict in periods of booms or busts where investors worry about too conservative or too risky allocation of their savings (cf., Sievänen, 2012). The publication and delivery of clearly stated beliefs, to take another perspective, may decrease tensions on concrete matters such as the choice between passive index-tracking or more active asset selection by the pension fund's investment officers (Walden, 2015).

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Acknowledgements

This work was supported by a grant from the Torsten Söderberg foundation under grant E31/13.

Appendix 1: The main items of the survey

Investment beliefs: Rationality

The stock market tends to react emotionally *
The stock market is irrational *
The stock market has a short-term perspective *

Investment beliefs: Diversification

Spreading your risks usually gives you a higher return to a lower risk
Spreading your risks is usually the most efficient way of achieving a high return in relation to a given risk
Spreading your risk reduces your chance of a very high return *

Investment beliefs: Time horizon

Long-term investments contribute to better value development of the invested capital than short-term investments
There is a positive link between a long-term perspective and high return relatively to the risk taken
By having a short-term perspective and quickly adjusting to the market, you as investor will have better conditions for achieving a high return on your assets *

Investment beliefs: Expertise

Professional investors are better at judging financial risk than lay people
It is impossible for anyone, including professional investors, to forecast the value development of financial assets such as stocks *
Professional investors have no better chance of achieving high stock market returns than random chance *

Investment beliefs: Risk and return

There is a strong positive connection between risk-taking and return. Investments with higher risk are more likely to give a high return
In the long term, risk-taking leads to lower return on investments *
You have to take financial risks to achieve high returns

Investment beliefs: Risk-control

Stock market risk can to a large extent be controlled
Stock market risk can to a large extent be predicted
Risks affecting the stock market cannot be reliably estimated *

Financial risk preference

It is likely I would invest a significant sum in a high-risk investment
I am a financial risk-taker
Even if I experienced a significant loss on an investment, I would still consider making risky investments
I like to take financial risks

Financial self-confidence

I am significantly better than most investors in selecting assets that deliver a high return
I think it is almost impossible to predict future returns on stocks *
I am skilled in predicting how the financial market will develop in a time horizon of 6 months
I am skilled in predicting how the financial market will develop in a time horizon of 2 years

Positive affective state (PANAS, Thompson, 2007)

To what extent do you, at this moment, feel:

Active/Alert/Attentive/Determined/Inspired

Organizational risk norms

Taking financial risks is encouraged in our organization
In our organization, risk control is subordinate to achieving a high return
In our organization, it is acceptable to lose money in a quest for high returns
In our organization, risk-taking should always be minimized *

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Appendix 2: The portfolio risk-taking scenarios

The table shows the portfolio risk-taking scenarios as presented to the professional investors. The non-professionals' scenarios were identical, except for referring to the personal savings of the respondents instead of referring to the fund's capital.

Scenario 1

Imagine that you have an open mandate to allocate your fund's capital between the assets below. How would you allocate the capital assuming investment horizons of 3 months and 2 years? You can allocate between 0 and 100 percent of the capital to each asset, but the total sum in each column should be 100 per cent.		
Assets	Investment for 3-months	Investment for 2-years
Swedish treasury bonds with duration of 2 years	%	%
Swedish treasury bonds with duration of 10 years	%	%
Dow Jones, the American stock exchange in New York	%	%
OMX, the Swedish stock exchange in Stockholm	%	%
Nikkei, the Japanese stock exchange in Tokyo	%	%
BSE, the Indian stock exchange in Bombay	%	%
Hang Seng, the Chinese stock exchange in Hong Kong	%	%
Total	100%	100%

Scenario 2

Imagine that you have an open mandate to allocate your fund's capital. What would be your preferred mix of bonds and stocks for an investment horizon of 3 months and 2 years? Choose one option in each column.		
Balance between bonds and stocks	Investment for 3-months	Investment for 2-years
100% Swedish bonds with a duration of 2 years		
80% Swedish bonds with a duration of 2 years and 20% Swedish stocks (Large cap)		
60% Swedish bonds with a duration of 2 years and 40% Swedish stocks (Large cap)		
40% Swedish bonds with a duration of 2 years and 60% Swedish stocks (Large cap)		
20% Swedish bonds with a duration of 2 years and 80% Swedish stocks (Large cap)		
100% Swedish stocks (Large cap)		