

Rost, Katja; Osterloh, Margit

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You Pay a Fee for Strong Beliefs: Homogeneity as a Driver of Corporate Governance Failure

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Governance Failure**

Katja Rost

Margit Osterloh

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Katja Rost

Dr. rer oec., Dipl. Soz., University of Zurich, IOU Institute for Organization and Administrative Science, Universitätsstrasse 84, CH-8006 Zürich, mail: katja.rost@iou.uzh.ch, phone: 41 44 634 29 17, fax: 41 44 634 49 42, internet: www.iou.unizh.ch/orga

Margit Osterloh

Prof. Dipl. Ing. Dr. Dr. h.c., University of Zurich, IOU Institute for Organization and Administrative Science and CREMA – Center for Research in Economics, Management and then Arts, Universitätsstrasse 84, CH-8006 Zürich, mail: osterloh@iou.uzh.ch, phone: 41 44 634 29 40, fax: 41 44 634 49 42, internet: www.iou.unizh.ch/orga

You Pay a Fee for Strong Beliefs: Homogeneity as a Driver of Corporate Governance Failure

Abstract:

The financial crisis made apparent the fact that managers and the boards of banks had failed to see the implications of irrational behavior and had ignored the risk associated with group think. Taking data from Switzerland our study shows that there is an increasing homogeneity of management and board teams. Most committees mainly consist of males with a managerial background. We derive from the existing literature the hypotheses that in radically changing environments women and individuals without a managerial background are less affected by systematic forecasting errors. Using a dataset collected shortly before the peak of the financial crisis we demonstrate that the groups which are highly underrepresented in most boards and management teams were significantly more capable of giving correct forecasts than the groups generally best represented in boards and management teams. To mitigate corporate governance failures we argue that firms should use simple social mechanisms in order to increase the diversity of their management and board teams while at the same time avoiding the danger of time consuming team conflicts. They should therefore include criss-cross individuals, i.e. individuals with no clear-cut group affiliation such as males with a non-managerial background as well as women with a management-related background.

Keywords: Board diversity, psychological economics, forecasting predictions, gender, expert knowledge, uncertainty

JEL Classification:

Introduction

The recent financial crisis raises the question why most directors in the bank and insurance industry did not have the foresight to predict the problems of taking on too much risk (Mundy, 11.10.2008). We argue that a main reason for these failures is the increasing homogeneity of boards, e.g. the under-representation of varied educational backgrounds and differentiated viewpoints thereby leading to herding behavior and group think effects. We take Switzerland as an example because the Swiss economy is in large parts driven by the financial sector and some of the biggest Swiss Bank companies were affected by the financial crisis.

In the *first section* we show that in Switzerland homogeneity of boards and management teams is high within all business sectors; however we demonstrate that within the financial sector it is extraordinarily high. In the *second section* we argue in line with the literature in the field of psychological and behavioral economics that homogeneity increases group think; in particular homogeneous committees and groups often engage in herding behavior (Banerjee, 1992; Bikhchandani *et al.*, 1992; Chamley & Gale, 1994) and thus cause systematic risks. The illusion of invulnerability makes them incapable of forecasting the problems caused by their irrational behavior. In the banking industry, even when problems became apparent, few managers or directors of banks spoke up (Steverman & Bogoslaw, 11.10.2008). They still believed in the rationality of their behavior and ignored the systematic risks caused by their herding behavior. In the *third section* we use a dataset which was collected shortly before the financial system was in danger of collapsing. We demonstrate that the group of individuals of both sexes with an education in management-related studies such as finance or economics as well as men regardless of their background, were significantly less capable of foreseeing the financial crisis than individuals with no management related background, and women

regardless of their background. Unfortunately the latter two groups are highly underrepresented in most boards and management teams. In the *last* section we argue that more diverse management teams and boards would have been in a better position to estimate future unknowns than homogeneous groups, and therefore losses on mortgage-backed securities might have been lessened. This conclusion is in line with proposals which argue that board diversity is a valuable resource and increases creativity, innovation and encourages effective problem-solving (Adams & Flynn, 2005; Barnes *et al.*, 2007; Carter *et al.*, 2003; Erhardt *et al.*, 2003). It has been demonstrated that board diversity indeed increases firm profit (Carter *et al.*, 2003; van der Walt *et al.*, 2006). We also discuss the disadvantages of diversity. Too much diversity increases conflicts of interests and slows down the decision making process. Nonetheless, in order to secure the wealth of a firm, diversity within the board and management team of most companies needs to be higher than its present level. To cope with the problem of group conflicts in diverse groups we introduce criss-cross theory as a way to mitigate these problems.

The Increasing Homogeneity of CEOs, Board Chairs and Boards

We start our research with a descriptive analysis of the education and gender of corporate leaders and monitors with the example of Switzerland. Our sample includes all companies listed in the Swiss Market Index (SMI) and a random sample of companies listed in the Swiss Performance Index (SPI), i.e. overall 151 companies quoted on the Swiss Exchange (SWX). In order to study the variety in educational and gender composition of corporate leaders and monitors we split the sample into two industry groups: Corporations within the financial sector, including banks and insurance companies, and corporations within the non-financial sectors including manufacturing and the service industry. Further, we coded the gender and the educational backgrounds of CEOs, board chairs and directors. Educational backgrounds

were classified according to three categories: (1) management-related background including final degrees in business, economics or law, (2) background in natural sciences including final degrees in engineering or physics, (3) backgrounds in other social sciences and humanities including degrees in psychology, political science, philosophy, sociology or arts. Only a few individuals had a multiple background and were assigned to each of these backgrounds. Data was collected for all CEOs and board chairs of the 151 companies for the period 2002-2006 and for all board members of the 151 companies in the years 2002 and 2004. Since most Swiss companies have a one-tier board structure, i.e. both executives as well as non-executives form one single board, we do not differentiate between board members and management team members.

Figure 1 shows the percentages of Swiss CEOs and board chairs with management-related backgrounds from 2002 to 2006. In 2002, 67% of all CEOs within the financial sector and 65% of all CEOs within the non-financial sector had a background in management education. In 2006 nearly all CEOs (92%) within the financial sector were educated in management while the percentage within the non-financial sector only slightly increased to 68%. Figure 2 illustrates the percentage of female CEOs and Board chairs. Within the financial sector no female CEO or board chair existed while within the non-financial sector the share of women varies from 2% in 2002 up to 3% in 2006.

Figure 1 and 2 about here

Figure 3 illustrates the composition of Swiss boards according to the field of study. It shows that the professional diversity of Swiss boards is low. Within the non-financial sector the percentage of directors with backgrounds in natural sciences or other social science and humanities amounts to 23%, while this percentage within the financial sector only amounts to 12%. Finally, figure 4 illustrates the board composition according to gender. In total the

percentage of women within both sectors is very low. However, within the financial sector women are represented more highly (8%) than within the non-financial sector (4%).

In summary, our descriptive analysis demonstrates that women and individuals with non-management educations, i.e. backgrounds in natural sciences and humanities, are highly underrepresented in Swiss top-leader and board positions, in particular within the financial sector.

Figure 3 and 4 about here

Forecast Errors caused by Homogeneity and Group Think

Mainstream economic theory assumes that actors behave rationally: Actors are considered to be self-interested maximizer endowed to be unlimited information-processing and analytical faculties (Debreu & Scarf, 1963). Although it has long been recognized that in reality many markets (Uzzi, 1997) – even stock markets (Baker, 1990) – depart radically from this theoretical model (Frey, 1999; Granovetter, 1985), the assumption of rationality is the foundation of standard economic theory. Current applications of standard economic theory are the efficient market hypothesis (Fama, 1970, 1991) and modern portfolio theory (Markowitz, 1952).

This viewpoint stands in sharp contrast to the view of cognitive psychology: Individuals often act in a less than fully rational and self-serving manner (Kahneman & Tversky, 1973; Tversky & Kahneman, 1973, 1974, 1992). Psychological economics (for an overview see Frey & Benz, 2004) picks up this criticism by starting from the assumptions of bounded rationality (Simon, 1991), of bounded willpower¹ (Elster, 1999; Jolls *et al.*, 1998), and of bounded self-

¹ i.e. persons often take actions that they know to be in conflict with their own long-term interest.

interest ²(Fehr *et al.*, 2003a; Fehr *et al.*, 2003b).

We restrict our discussion to bounded rationality. In contrast to standard economics it is assumed that subjective risk factors influence decision making processes by shaping perceptions and reactions (McDonald & Stehle, 1975). First, behavior is affected by representativeness: In order to render complex problems manageable humans have an inclination to predict uncertain events in the future by taking a small portion of data and drawing a holistic conclusion (Kahneman & Lovallo, 1990; Tversky & Kahneman, 1974). Second, behavior is affected by mimicry, e.g. many people discover ‘trends’ in past prices and expect their continuation (De Long *et al.*, 1990). Third, behavior is affected by anchoring and adjustment: Persons often use a past event or a trend as a reference point for upcoming decisions (Ricciardi & Simon, 2001; Tversky & Kahneman, 1974).

These insights correspond with research on group think. Some groups under certain conditions produce homogenous beliefs and behavior due to conformity processes. At the same time individuals are often excluded from these groups whose characteristics do not conform to the characteristics of the majority. We discuss the group think phenomenon and its underlying conditions to develop our hypotheses.

Forecast Errors and Group Think

The theory of group think was proposed by Janis (1972; 1982). He “hypothesizes that decision making groups are most likely to experience groupthink when they are highly cohesive, insulated from experts, perform limited search and appraisal of information, operate under directed leadership, and experience conditions of high stress with low self-esteem and little hope of finding a better solution to a pressing problem than that favored by the leader or

² i.e. people care about being treated fairly and want to treat others fairly if those others are themselves behaving fairly.

influential members" (Turner & Pratkanis, 1998: 105). These conditions are assumed to lead to two symptoms of groupthink (Katz & Kahn, 1966). The first symptom includes the illusion of invulnerability, stereotyping of out-groups, self-censorship and the belief in the inherent morality of the group (Leahy, 1992). The second symptom involves the incomplete survey of alternatives and objectives, poor information searching, failure to appraise the risks of the preferred solution and selective information processing (Turner & Pratkanis, 1998). These combined forces are found to result in extremely poor decision making by the group.

Psychological literature offers different explanations for the underlying mechanisms which foster group think. For most explanations the behavior theory of Heider (1958) constitutes the theoretical basis. It indicates that actors strive for orientation and adequate reaction to their environment in order to anticipate the consequences of their actions. Information from the environment, e.g. characteristics, opinions, capabilities and behavior patterns of other people, is collected and compared with their own characteristics, opinions, capabilities and behavior. This comparison is simplified if actors are members of the same group. The theory postulates that people perceive situations as being less comfortable when they are confronted with a diverse group of individuals. For this reason people try to reach conformity within groups, first by excluding individuals with different and immutable characteristics and second, by changing their opinions and behavior accordingly. The first argument is able to explain why underrepresented persons within groups, i.e. women or persons with non-management backgrounds, decrease over the course of time. The second argument explains why groups tend to produce homogenous beliefs and behavior. Conformity processes within groups build further on a third mechanism that is able to explain which opinion determines the consensus within groups. Since group members who are recognized as experts or specialists are not eager to compare themselves with other members, groups tend to adapt their opinions. The

following arguments are critical: Group members, whose performance is clearly above group average, are not eager to compare themselves with other members and to decrease their performances. If social comparisons take place concerning capabilities, they result in a stratification process: Individuals with higher capabilities are assigned to a higher status. Thus, adaptation processes proceed in the direction of the actors with higher capabilities (Rost, 2008; Skinner, 1953). The third argument thus explains why experts or specialists promote group think.

Psychological literature explains under which circumstances group think results in forecast errors and poor decision making. It is postulated that uncertainty is a crucial point (Tversky & Kahneman, 1974). Uncertainty often occurs in situations in which the environment radically changes. Such changes often destroy the usefulness of established knowledge (Henderson & Clark, 1990; Tushman & Anderson, 1986). Groups which are infected by group think, i.e. which rely on homogenous opinions dominated by expert knowledge, under such circumstances often come to wrong decisions. They systematically underestimate alternative explanations by failing to re-evaluate the new situation (Katz & Allen, 1982).

In summary, psychological literature explains why homogenous groups are characterized by group think and poor decisions: These groups produce homogenous beliefs and behavior through conformity processes which include the exclusion of individuals with underrepresented characteristics, the adapting of opinions and the over reliance on experts. Under uncertainty, i.e. in a situation where the environment is radically changing, group think promotes poor decisions.

Education as a driver of forecast errors

Psychological literature supports the view that especially experts often fall victim to an oversight trap (Arkes *et al.*, 1986; Fox & Clemen, 2005; Griffin & Tversky, 1992; Paese &

Feuer, 1991; Spense, 1996). It has been shown that experts often overestimate the precision of their information and draw wrong conclusions with regard to estimating the probabilities of random outcomes, e.g., clinical psychologists (Oskamp, 1965), physicians and nurses (Baumann *et al.*, 1991; Christensen-Szalanski & Bushyhead, 1981), engineers (Kidd, 1970), entrepreneurs (Cooper *et al.*, 1988; Hayward *et al.*, 2006), investment bankers (von Holstein, 1972), stock market forecasters (Deaves *et al.*, 2005), or security analysts (Bar-Yosef & Venezia, 2006).

Cognitive biases also affect business decisions to a large extent (Bruner, 2005; Lovallo & Kahneman, 2003; Lovallo & Sibony, 2006; Powell *et al.*, 2006; Zajac & Bazerman, 1991). It has been shown that biased executives exhibit high investment-cash flow sensitivity (Malmendier & Tate, 2005), engage intensively in unsuccessful mergers and acquisitions (Lovallo *et al.*, 2007; Malmendier & Tate, forthcoming; Roll, 1986), are convinced about finding hidden synergies and about selecting the best targets for their company (Doukas & Petzemas, 2007), show a willingness to overpay for acquisitions (Hayward & Hambrick, 1997), avoid tapping the capital markets (Malmendier, Tate, and Yan 2006), execute stock options only shortly before they expire (Malmendier & Tate, 2003), think that the total profit earned by all other business entrants will be negative, but their own profit will be positive (Camerer & Lovallo, 1999), or that CEOs who feel “above average” are more likely to manage earnings to meet these forecasts (Hribar & Yang, 2006).

Empirical evidence further indicates that there is a pronounced “CFO effect” in corporate decisions (Bertrand & Schoar, 2003). CFOs are experts concerning capital structure, payout, and capital allocation decisions (Graham & Harvey, 2001). The research of Ben-David *et al.* (2007) demonstrates that overconfidence and optimism are persistent characteristics of CFOs: they are more confident following periods of high market return and less confident following

low market returns periods. This finding is consistent with the significant amount of literature in the field of behavioral finance (Barberis & Thaler, 2002; Ricciardi, 2004; Ricciardi & Simon, 2000) which shows that especially financial experts put too much emphasis on the latest, most striking news and too little on base-rate information (Daniel *et al.*, 2001). Ben-David *et al.* (2007) demonstrate that the cognitive biases of CFOs have far-reaching and negative consequences for shareholders: Firms with overconfident CFOs invest more and engage in more acquisition, are less likely to pay dividends, instead using the funds to make investments, have higher debt ratios, and rely more heavily on long-term debt.

This literature explains the cognitive biases of experts by referring to special information and past experiences which distinguish experts from novices and less experienced people (Litterer, 1965). Experts have an intense experience through education and practice in a particular field. Their familiarity in a particular field of study enables them to rapidly retrieve complex configurations of information from long-term memory (Dreyfus & Dreyfus, 2005). For example, investors utilize familiarity heuristics when they have to assess difficult financial circumstances and investment choices within a narrow timeframe (Ricciardi & Simon, 2001). However, familiarity can be inappropriate when situations are characterized by modified and non-typical circumstances. Experts in a non-typical situation often reason that prior knowledge can be correctly applied to the new situation (Kahneman & Tversky, 1973). The literature presents four reasons for the tendency of experts to over- or underestimate the probability of non-typical events, and to therefore come to wrong forecasts and decisions.

First, experts focus too much on the circumstances underlying “typical” events and too little on the circumstances underlying a specific event. This human tendency is referred to as availability, status quo or representativeness bias (Fox, 2006; Kahneman & Tversky, 1974). It suggests that the likelihood of events is estimated based on how many examples of such

events come to mind (Fox & Tversky, 1995). Individuals who are subject to this bias prefer the current state, ignore relevant facts that should be included in the decision-making process and thus predict uncertain future events by taking a small portion of data and drawing a holistic conclusion (Fox & Hadar, 2006; Samuelson & Zeckhauser, 1988).

Second, experts may be overconfident in existing scientific knowledge and thus ignore how certain factors perform together as a whole (Slovic *et al.*, 1985). Overconfidence means that humans have an inclination to overestimate their own skills, abilities, and predictions for success (Ricciardi & Simon, 2001).

Third, experts may be more prone to anchoring. Anchoring explains the strong inclination to latch on to a belief, that may or may not be truthful, and to use it as a reference point for upcoming decisions (Hammond *et al.*, 1998). One of the most frequent anchors is a past event or trend. Compared with less experienced people experts have more knowledge about past events or trends and thus may also have a higher probability by selecting trends as an initial reference point.

Fourth, experts may have a higher illusion of control (Langer, 1975). It makes a person believe that he or she can control the outcome of a random decision or situation based on their skills (Baker & Nofsinger, 2002). Experts may assume that they have a greater ability to foresee and navigate potential hazards and therefore may systematically underestimate risks (Powell *et al.*, 2006).

There is much evidence suggesting that the familiarity bias under uncertainty operates in capital market decisions as well.³ Relying on the literature we hypothesize the following:

³ For example people remain for long periods of time to the default option offered by their firm and make no changes to the composition of their retirement portfolios (Madrian & Shea, 2001). U.S. investment managers invest disproportionately in locally headquartered firms (Coval & Moskowitz, 1999). Investors tend to hold the shares of firms that have nearby head-quarters and communicate in investors' native tongue (Grinblatt & Keloharju, 2001). Investors concentrate holdings in stocks to which the investor is geographically or

Stock market forecasts of financial experts were less valid compared with the forecast of non-financial experts when the situation was different from the time before. This was the case when rapidly increasing housing prices heralded a bubble. Under financial experts we understand individuals with financial education, financial experience or with beliefs which go along with financial backgrounds.

Hypothesis 1. Stock market forecasts of financial experts were systematically less valid compared with the stock market forecasts of non-financial experts in the situation when harbingers of the financial crisis were obvious.

Gender as a driver of forecast errors

There is a great deal of literature which shows that women and men react differently emotionally and that these reactions influence the judgment process and decision making. This literature points out that females reveal a greater level of worry than men (for an extensive overview see: Ricciardi, 2008). For example it has been shown that women have a more negative problem orientation than men (Robichaud *et al.*, 2003) and have more unfocused worries which are not necessarily connected to recent stressful events. They tend “to worry about a wide range of subject matter such as their personal and professional relationships, finances, money, economic conditions, work experiences, retirement issues, family problems, educational topics, sexual relations, safety concerns, and health issues” (Ricciardi, 2008: 20). The causes of these gender differences in worrying are unclear. They might be the results of different socialization processes but could be as well inborn.

professionally close or that he has held for a long period (Massa & Simonov, 2006). Portfolio managers have more pessimistic expectations about foreign stocks than about domestic stocks (Strong & Xu, 2003). In international financial markets, investors tend to hold domestic assets instead of diversifying across countries (French & Poterba, 1991). Firms tend to cross list their stocks in countries where investors are more familiar with the firms to be listed (Pagano *et al.*, 2002). Lower levels of trust toward citizens of a country lead to less trade with that country, less portfolio allocation to assets in that country, and less direct investment in that country (Guiso *et al.*, 2007).

From a psychological perspective “worrying is often seen as a constructive occupation that helps to solve potential problems” (Davey, 1994: 35). Many researchers have noted that uncertainty represents an important variable in our understanding of worry (e.g. Dugas *et al.*, 1997; Dugas *et al.*, 2001). At a general level, individuals who worry show a higher intolerance of uncertainty (MacLeod *et al.*, 1991). Intolerance of uncertainty may be defined as the excessive tendency of an individual to consider it unacceptable that a negative event may occur, however small the probability of its occurrence.

Since there is strong evidence for a relation between worry and intolerance of uncertainty most financial literature discusses the negative effects of worrying on risk taking and performance. For example it has been demonstrated that people who are incapable of feeling emotions as a result of brain lesions accept more risk with high rewards (Shiv *et al.*, 2005) or that students who worry about money perform less well than their peers in degree examinations (Ross *et al.*, 2006). The findings, (a) that women have a higher tendency to worry and (b) that worrying reduces financial risk taking and performance might partially explain why women are highly underrepresented within management teams and boards. This explanation overlaps with other explanations, e.g. different network strategies, glass ceiling, different socialization processes, or different educational backgrounds (Littmann-Wernli & Osterloh, 2000; Osterloh & Scheidergger, 2004).

However, as indicated by the relationship between worrying and uncertainty, in some situations worrying might be helpful, for example by forecasting unlikely negative outcomes. For example, it has been shown that managers in the presence of affective reactions tend to reject investment alternatives that elicited a negative effect (Moreno *et al.*, 2002). For this reason we hypothesize that at times where harbingers of the financial crisis such as the rapidly increasing housing bubble were obvious, i.e. when the situation was different from the time

before, the stock market forecasts of women were more valid compared with the forecast of men. The more negative problem orientation might help women by reflecting on multiple past circumstances and thus by forecasting unlikely negative events.

Hypothesis 2. Stock market forecasts of women were systematically more valid compared with the stock market forecasts of men in the situation when harbingers of the financial crisis were obvious.

Method

Sample

We conducted a survey within the time where harbingers of the financial crisis were already obvious, but the extent of the financial crisis was unknown. The survey was conducted from 3.04.2008 to 8.04.2008. Our sample consists of 479 students at the University of Zurich and the ETH (Eidgenössische Technische Hochschule⁴) from various different fields of study, i.e. students in management, economy, finance, social science, engineering etc. The survey had the character of a natural experiment because the participants were required to forecast a future event in the stock market. More precisely we analyzed the accuracy of stock market forecasts with the example of the Swiss bank UBS by comparing the forecasts with the true UBS stock price two month later.

We choose UBS for two reasons: First, as a consequence of significantly wrong speculations in context with the mortgage crises in the second half of the year 2007 and the first quarter of the year 2008, the UBS stock price started to drop dramatically, i.e. from 80 SFR down to 27 SFR. The UBS case was also the most prominent in the Swiss public media, e.g. in newspapers, TV, radio, talk-shows etc. Thus, even people with no financial interests or no

⁴ Swiss Federal Institute of Technology

expertise had a great deal of information about the UBS case. Second, after the announcement of considerable losses in the quarterly report, the UBS stock price recovered and started to increase again, i.e. in the month before we conducted our study the share prices increased from 27 SFR up to 33 SFR. The situation for market forecasts was non-typical, i.e. it was characterized through highly volatile stock prices and a high amount of uncertainty.

Figure 5 illustrates the study design and the development of the UBS share price from 1.11.2007 to 1.10.2008. From November 2007 to mid-May 2008 the UBS share price dramatically collapsed as a consequence of significant incorrect speculations in context with the mortgage crises. In the month before the survey was conducted, i.e. from mid-March 2008 to the start of April 2008, the UBS share price increased temporarily. The background was the belief that all sub-prime write-downs were included in the quarterly report. However, within the forecast horizon, i.e. from mid-April 2008 to mid-July 2008, the UBS share price dramatically declined again, because the bank announced even more sub-prime write-offs. In September/October 2008 the bank has so far been forced to write off about \$43 billion and has had to be supported by the Swiss government. In November 2008 the shares of the UBS had a value around 10 SFR. Shares were worth four times less than they were five years earlier.

In the time period when the survey was conducted a recurrence of fall in prices was contra-intuitive for most people. As we will demonstrate later only 21% of the participants expected such a development. 54% of the participants put emphasis on the latest, most striking news, e.g. the recovery of the UBS share price in context with the belief that the financial situation would recover soon and all sub-prime write-offs were included in the UBS quarterly report.

Figure 5 about here

In order to reach a high number of students with diverse educational backgrounds we used a

combination of two sampling methods, snowball sampling and stratified sampling. 42 students from different fields of study, e.g. psychologists, students in finance, management, and economics were asked to interview 10-20 students from the University of Zurich as well as from the neighboring ETH. In order to ensure a sufficient number of students with financial experience it was required that at least 20% of the interviewed students had practical experience in the stock market. Our final sample is in a number of areas (e.g. the number of passed semesters, age, grad point average) a true representative sample for the whole University of Zurich and the ETH. In other areas, e.g. the overrepresentation of persons with stock market experience (35%), the overrepresentation of men (66%), of students with management-related background (70%) and in particular of finance students (20%), the sample intentionally does not reflect a normal student sample.

Variables

Accuracy of forecasting prediction. The accuracy of forecasting predictions was measured by asking the respondents within the time period 3.04.-8.04.2008 about the development of the UBS stock price within the next two months (5-point-Scale: 1= UBS stock price will rise massively to 5= UBS stock price will fall massively). In order to minimize random predictions of irresolute respondents every person also had the possibility to answer “no idea”. The distribution of the answers is shown in figure 6. Higher values indicate more accurate forecasts because in reality the UBS stock price declined within the forecasting period.

Figure 6 about here

The next measurements try to capture the independent variable, i.e. financial expertise. We applied different measurements which can be categorized as educational, knowledge, experience, information gathering, beliefs and socialization variables.

Education (Field of study). The participants were asked about their main field of study. 30% of all participants have a non-management-related background, i.e. they have a background in natural sciences (15%) or in humanities/social sciences (15%). The remaining 70% have a management-related background. In the following we contrast these students against students with non-management-related backgrounds. Students with management-related background were classified into four different fields of management education: (1) finance (0= no, 1= yes), (2) economics (0= no, 1= yes), (3) management (0= no, 1= yes), and (4) management and economics, i.e. an all-rounder education in economics and management (0= no, 1= yes).

Knowledge. Knowledge about financial issues and stock markets was measured by three items. On a general level the respondents were asked on a 5-point scale how they evaluate their knowledge of stock markets (1= uninformed, 5= expert). Furthermore, we asked if the students have ever attended lectures about stock markets or financial issues (0= no, 1= yes) and if the students dabble in stocks and shares (0= no, 1= yes). As a consequence of our sampling method the students who are active on stock markets with their own money, is overrepresented with 35%.

Experience. Experiences within the real financial sector were measured by two items. Most Swiss students are employed part time outside of their university studies. We asked if the students are employed within the financial sector (0= no, 1= yes). In fact, 20% have a job within the financial sector. Furthermore, incentive pay, i.e. bonus pay or variable pay through shares and stock options, is most common within the financial sector. We asked if the students are paid via incentive pay within their jobs (0= no, 1= yes). 19% of the respondents answered yes.

Information. The amount of knowledge is influenced by the kind of information gathering. We asked the participants which newspaper sections they read regularly. We differentiated

between regular information about “economy” and/or “finance” (0= no, 1= yes), about “national politics” and/or “international politics” (0= no, 1= yes), and about “society” including sports, culture, and/or gossip (0= no, 1= yes).

Beliefs. Beliefs are influenced by the kind of education and the kind of knowledge. Economic or financial experts often believe in standard economic theory, e.g. in the invisible hand of markets. In order to capture these beliefs we asked the respondents to agree on five items by using a 5-point scale (1= totally disagree to 5= totally agree). These items were: (1) “I have a high trust in banks”. (2) “Competent managers were aware of the mortgage crisis”. (3) “Top CEOs are more talented than other economic participants”. (4) “Principal-agent-theory’s predications are always true”. (5) “The increase in CEO salaries is market-conform”. We ran a principal-component analysis and a Cronbach's Alpha test in order to test the consistency of the scale (see table 1). All items formed one component; although admittedly the factor loading of item 2 is low. The Cronbach's Alpha test indicates that all items measure one construct since every item improves the Cronbach's Alpha of the overall scale. The Cronbach's Alpha of the overall scale amounts to .55. We include the “Trust in optimal contract” construct because we are not aware of comparable measurements which have been validated within literature. For each person we averaged the values of the items 1-5. Higher values indicate a higher trust in self-regulating markets.

Table 1 about here

Beliefs might be reflected in professional career wishes aswell. We asked the respondents where they see themselves within the next 10 years, i.e. as a normal employee, as a manager, as a top-manager, as an entrepreneur, or as a full-time mother/father. From these answers we selected two: career as a top-manager (0= no, 1= yes) and career as an entrepreneur (0= no, 1= yes). The assumption is that persons who wish to become a top-manager or entrepreneur

have a higher expert status within social systems going along with typical expert beliefs.

Socialization. Socialization might have consequences on forecasting predictions because it influences learning processes, beliefs or self-selecting in a field of study. We captured socialization by the following items: (1) One parent is working in the finance sector (0= no, 1= yes). (2) Parents are wealthy (0= no, 1= yes). (3) One parent has a university degree (0= no, 1= yes). (4) Parents are active on the stock exchange (0= no, 1= yes). (5) Parents bought stocks as a present (0= no, 1= yes). (6) Stock market education through parents (0= no, 1= yes).

Risk orientation. Financial literature often discusses an individual's risk perception or risk orientation as an important driver of judgment process and decision making (Ricciardi, 2004). Therefore, we additionally included an individual's risk orientation. We measured risk orientation using two alternative measurements.

First, we asked how much money a person would reinvest in stocks if he/she has bought stocks for CHF 1000 and sold these stocks for CHF 2000. Individuals who would reinvest more than CHF 1000 were coded as "1" indicating a higher risk orientation. Persons who reinvest less or equal than CHF 1000 were coded as "0" indicating a lower risk orientation. We call this variable "Willingness to take financial risks".

Second, we measured the general risk orientation of persons by using a multiple item scale (1= totally disagree to 5= totally agree). The 14 items are listed in table 2 and include statements like drug consumption, gambling, etc. We ran a principal-component analysis and a Cronbach's Alpha test in order to test the consistency of the scale (see table 2). The items formed three selective components which we labeled as (1) risk as thrill, (2) risk as breaking the law, and (3) risk as readiness to change. The Cronbach's Alpha test indicates that the items of component 1 and 2 indeed measure one construct. The Cronbach's Alpha amounts to .61

respectively .60. Component 3, i.e. risk as readiness to change, is badly reflected through the measurements. The items show low factor loadings and the Cronbach's Alpha of the scale only amounts to .39. For the sake of completeness we will include “risk as readiness to change”. However, the results should be interpreted with caution. For each person we averaged the values of the items measuring (1) risk as thrill, (2) risk as breaking law, and (3) risk as readiness to change. High valued indicate a higher risk orientation.

Table 2 about here

Demographics. Finally, we took into account certain demographic characteristics. In order to test hypothesis 2, we asked the gender of each person (0= female, 1=male). Furthermore, we measured the age of each person (1=19-20, 2=21-22, 3=23-24, 4=25-26, 5=27-28, 6=29-30, 7≥31), the income per month (0< SFR 1500, 1≥ SFR 1500), workload beside study (1= 0%, 2<20%, 3= 21-40%, 4=41-60%, 5>60%), happiness at the university (1=very unhappy to 5= very happy), number of passed semesters (from 1 up to 12), grade point average (from 4 up to 5.7; in Switzerland the grade “4.0” is the minimum required grade to pass an exam and the grade “6.0” the best possible grade).

Table 3 documents the descriptive statistics and the correlations of the variables studied.

Table 3 about here

Analyses

We examine the effects of the independent variables on the accuracy of forecast predictions by running simple OLS regression analyses, i.e. we assume that our dependent variable has a quasi-metric scale. We ran sensitivity tests by comparing these results with the results of logit regression analyses using “wrong” and “right” forecasts as our dependent variable and with the results of ordinal regression analyses. The results do not significantly differ. Furthermore,

we ran sensitivity tests by comparing the OLS results with the results of clustered regression analyses. We clustered according to the 42 students who interviewed the 479 students. The snowball sampling method does not significantly bias our results. For simplicity we will mainly document the results of OLS regression analyses. In the final model we will show the results of sensitivity tests.

Our regression models build on a sample of 355 students. 64 students of the 479 students had to be excluded because we have no usable information on the dependent variable “UBS stock price forecasts”. Other persons had to be excluded because we have incomplete information on some independent variables. Furthermore, since expert knowledge is measured using different kinds of indicators, some of these indicators are highly correlated with each other. In order to avoid problems caused by multicollinearity, we will run separate models for different indicator types. In all partial models we check for demographic characteristics. Finally, we will run a model which includes all variables. As these results could be distorted by multicollinearity we will also test if the identified significant variables are still significant in a model which only includes these drivers. These final results are then tested for sensitivity by running a clustered regression and an ordinal regression as well.

Results

Table 4 documents the results of the regression analyses. We first discuss the effect of gender on forecasting predictions; we next turn to the effects of financial expert knowledge on forecasting predictions, and finally discuss the results of the overall model and the sensitivity tests.

Table 4 about here

Gender. In all models, i.e. the partial models as well as the overall model, gender has significant effects on forecasting predictions. The negative effects support hypothesis 2 which predicted that in uncertain situations women make more accurate forecasts than men. A descriptive analysis shows that 16% of all men made accurate forecast predictions. However this percentage is for women nearly twice as great and totals 33%.

Expert knowledge. Model I tests whether the field of study has effects on the accuracy of forecast predictions in uncertain situations. It turns out that finance and economic students were more frequently wrong to a significant extent in their forecast predictions compared with students who have no finance or economic background, supporting Hypothesis 1. A descriptive analysis shows that 15% of all finance students and 16% of all students of economics made accurate forecast predictions. The percentage for non-finance students totals 23% and that for non-economic students 22%.

Model II tests whether knowledge about the stock exchange and finance knowledge influences forecasts. We obtained two significant effects supporting hypothesis 1: students who visited courses about stock markets and finance and students who are active on the stock exchange made less accurate forecasts compared with students who didn't have this knowledge. Descriptive analyses demonstrate that the accurate forecasts of students without knowledge were nearly twice as high.

Model III tests whether experience, i.e. employment in the finance sector or incentive pay, influences forecast predictions. Both variables show negative but nonetheless insignificant effects.

Model IV tests the effects of information gathering on forecast predictions. It turns out that regular information about economy & finance and about politics has no effects while regular information about society increases the likelihood that individuals made more accurate

forecasts. Thus, the data indirectly supports hypothesis 1 by showing that “non-expert” information, i.e. information which is not connected to financial issues, increased the accuracy of forecasts.

Model V tests whether beliefs influence forecasts. In line with hypothesis 1 it turns out that people who highly trust in self-regulating, efficient markets made significant less accurate forecasts. Career wishes as a top-manager or as an entrepreneur show negative but again insignificant effects on the accuracy of forecasts.

Model VI and model VII test whether socialization or risk orientation influence forecasting predictions. No variable shows significant effects. The non-findings of model VII are especially surprising because finance and standard economic literature pay much attention to risk orientation and one could expect high effects on forecasting predictions. In our sample however that is not the case.

Overall model and sensitivity tests. Model VIII in table 2 illustrates the results of an overall model. It mainly supports the results of the partial models. Males, students who visited courses about stock markets and finance, and who highly trust in self-regulating, efficient markets made significantly less accurate forecasts supporting hypothesis 1 and 2.

Finally, the models in table 5 test if the results are stable by including only the significant variables of the overall model, i.e. gender, finance courses and trust in optimal contracts. The results support the former findings indicating that multicollinearity has not biased the results. Furthermore, the OLS regression model, the clustered regression model, and the ordinal regression model show related findings indicating that the results are not sensitive to the kind of method applied. Gender, finance courses and trust in optimal contracts explain the accuracy of forecast predictions between 23% and 28%, which is an acceptable proportion of explained variance for a social explanation.

Table 5 about here

Figure 7 summarizes the study findings by showing the percentage of accurate forecasts dependent on gender, finance courses, and trust in optimal contracts.

First, in uncertain situations expert knowledge, measured via the visitation of finance courses, negatively affects forecasting accuracy if individuals additionally hold strong beliefs in mainstream expert knowledge, measured via the trust in self-regulating, efficient markets. These persons made only 10% accurate forecasts whereas the forecast accuracy of persons who share only one or none of these characteristics varies between 26% and 35%.

Second, in uncertain situations the forecast accuracy of women seems to be less affected by beliefs and expert knowledge. Women who have strong beliefs in mainstream expert knowledge or have access to expert knowledge made just as good predictions as men who have weak beliefs in mainstream expert knowledge or have no access to expert knowledge. Respectively 23% and 27% of these women and men made accurate forecasts.

Third, the last results can be extended: Women who have weak beliefs in mainstream expert knowledge or have no access to expert knowledge made by far the best predictions. Respectively 39% and 42% of these women made accurate forecasts. In contrast, men who have strong beliefs in mainstream expert knowledge or have access to expert knowledge made by far the worst predictions. Respectively only 12% and 13 % of these men made accurate forecasts.

In summary, the results support our hypotheses by showing that knowledge and gender affects the accuracy of forecasting predictions. Within the situation where harbingers of the financial crisis were already obvious our data show that the stock market forecasts of women and of non-experts were systematically more accurate. These results are strongly supported by the

findings that women who are non-experts made by far the best forecasts whereas men who are experts made by far the worst forecasts. Our results also show some interesting details about the interaction between expertise and gender: *First*, under uncertainty the market predictions of women are not to the same extent affected by expert knowledge and beliefs as the forecasts of men. Women with financial expertise or beliefs are mistaken as frequently as are men without this expertise or beliefs. *Second*, in times of uncertainty expert knowledge is a major driver of wrong forecasts if individuals simultaneously strongly believe in the status quo of mainstream models in the discipline.

Figure 7 about here

Discussion and Implications

Our paper started with the question why managers of banks and their boards had failed to see the problems of irrational behavior within the last years and ignored the systematic risks of group think. Most managers and boards constantly increased the financial leverage of their banks, which not only increased the vulnerability of their bank to the mortgage-backed securities losses but also of the whole financial system. We answered the question by the increasing homogeneity of these committees, especially within the financial sector: In the last few years people with non-management backgrounds and women were highly underrepresented in most positions. In our theoretical section we demonstrated how homogeneity fosters group think and systematic risks. We hypothesized that in radically changing environments underrepresented groups, i.e. non-experts and women, make far better market forecasts. These expectations were strongly supported by our data. As a consequence, it might be the case that the financial crisis could have been lessened if the leaders and boards in banks had been more diverse.

Management team and board diversity has been a controversial topic for many years. On the one hand some authors argue that diversity promotes a better understanding of the market place, increases creativity, innovation, and effective problem-solving (Adams & Flynn, 2005; Barnes *et al.*, 2007; Carter *et al.*, 2003; Erhardt *et al.*, 2003). In line with such arguments it has been demonstrated by some authors that board diversity does indeed increase firm profit (Carter *et al.*, 2003; van der Walt *et al.*, 2006). On the other hand some authors argue that diverse boards and management teams are less capable of engaging in debates and are therefore less effective (Sheridan & Milgate, 2005; van der Walt & Ingley, 2003; Yermack, 1996). In line with these arguments it has been shown by other authors that there is mixed evidence regarding the effect of team composition on corporate performance (de Andres *et al.*, 2005; Dulewicz & Herbert, 2004). Both findings are in line with the literature on diversity which shows that diversity has an inverse u-relationship on performance, i.e. the diversity in teams should be neither too low nor too high (Perry-Smith & Shalley, 2003; Stock, 2005). However, the suggestion that board diversity should lie somewhere in-between is difficult to implement. As shown in the theory sections, teams with overrepresented groups tend to become homogenous in progress with time because the majority continuously excludes minorities.

Criss-cross theory might help companies to achieve an optimal degree of board and management team diversity. The term criss-crossing characterizes situations in which exist contradictory indicators of group identity (Eiser, 1986), i.e. the same person can be related to one group based on one aspect, i.e. to be a male, and to another one based on a different aspect, i.e. to be a non-expert (Flap, 1988). Criss-cross theory thus requires at least two characteristics which allow a classification of group members in majority and minority. Our paper discusses the effects of two characteristics, i.e. of gender and expert knowledge, which

permit this kind of group member classification. In such groups four status constellations are possible by subdividing actors into each two subgroups: (1) Males who are experts, (2) females who are non-experts, (3) males who are non-experts, (4) females who are experts. If the majority and the minority are demarcated by visible group borders, e.g. if the majority consists of males who are experts and the minority consists of women who are non-experts, the potential for conflicts is high. In contrast, the potential for conflict is low, if some persons do not have a clear group affiliation and therefore belong partially to both groups, e.g. males who are non-experts or females who are experts. Such criss-cross individuals serve as a bridge between the otherwise separate groups. i.e. the minority and the majority. They not only confound group borders between conflicting parties but also prevent the self-reinforcing homogeneity in groups which are characterized by majorities (Flap, 1988).

In summary, companies can rely on simple social mechanisms in order to reach an optimal degree of team diversity. Firms should increase the diversity of their boards and management teams by simultaneously including more persons with non-management backgrounds and more women. They should take into consideration that some individuals should serve as a bridge between the otherwise unconnected groups, i.e. they should not only include females with non-management background but also males with non-management background or females with a management background. Criss-crossing permits majorities within groups, e.g. of persons with management backgrounds, without fostering conflicts or the exclusion of minorities.

Limitations and Further Research

Three limitations of our research need to be addressed. First, our empirical analysis is based on a student sample and therefore external validity is doubtful (Harrison & List, 2004). For

this reasons one should translate our findings carefully to the real world. Further research is needed, namely research on real managers and real board members, in order to validate our findings. Second, our study has the drawback of not being in the position to observe real behavior but only to forecast predictions. Further research in the field, preferably field experiments, is needed to analyze the effects of gender and expert knowledge on performance under uncertainty in applied fields such as in stock corporations. Third, our design does not explain why the forecasting predictions of women differ from men. We introduced the psychological concept of worrying to explain this effect. However, worrying might have different causes. It might be an inherent feature of women, but it might be as well a result of different socialization processes, different network strategies, different experiences, or different education. Further research could start to examine gender differences more deeply.

Conclusion

The main contribution of this study consists in its findings that under uncertainty forecasts of women and people of both sexes with non-managerial backgrounds are by far better than the forecasts of men and persons with management-related backgrounds. The increasing homogeneity of boards and management teams in stock corporations, especially within the financial sector, might therefore be detrimental for the governance of firms. We argue that firms can use simple social mechanisms in order to increase the diversity of their managers and directors while not increasing the danger of time consuming conflicts. To mitigate corporate governance failures firms should include in their boards and management teams criss-cross individuals, i.e. persons who have no clear-cut group affiliation such as males with a non-management background and women with a management background.

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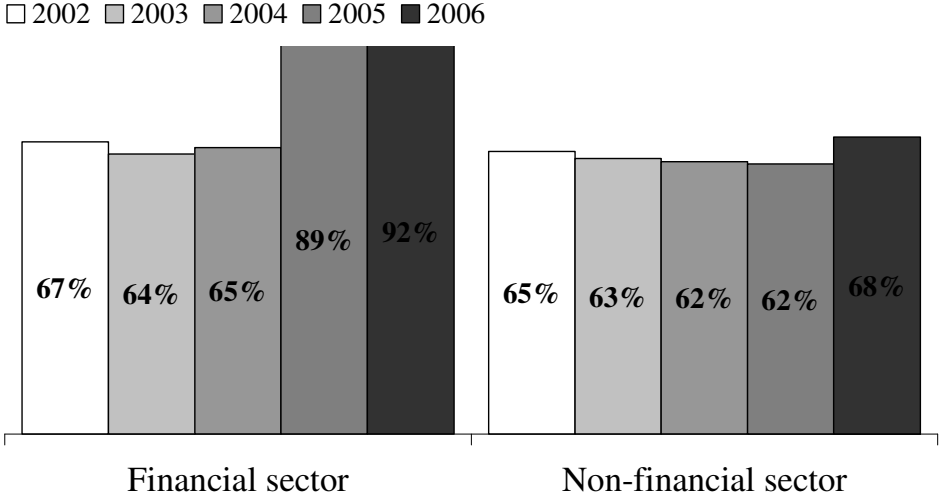
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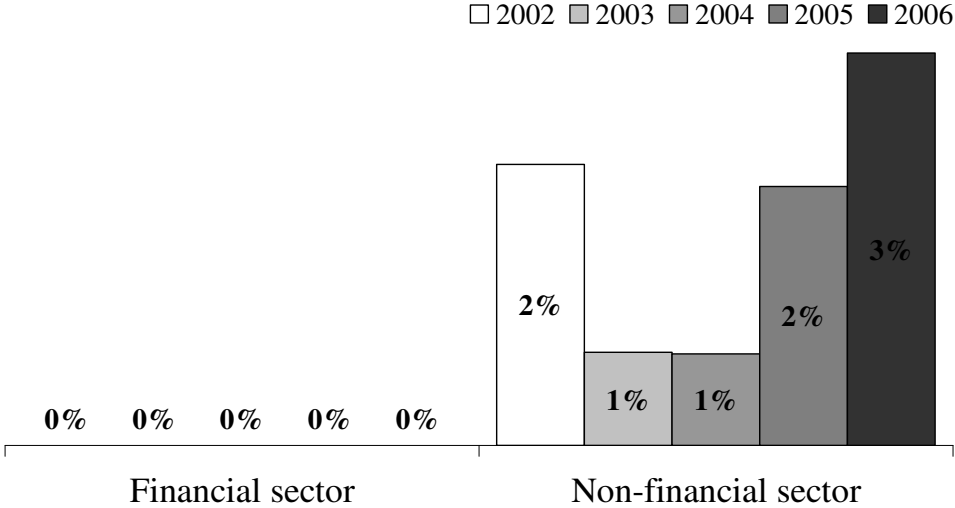
Figures & Tables

Figure 1. Percentage of Swiss CEOs and Board chairs with management backgrounds



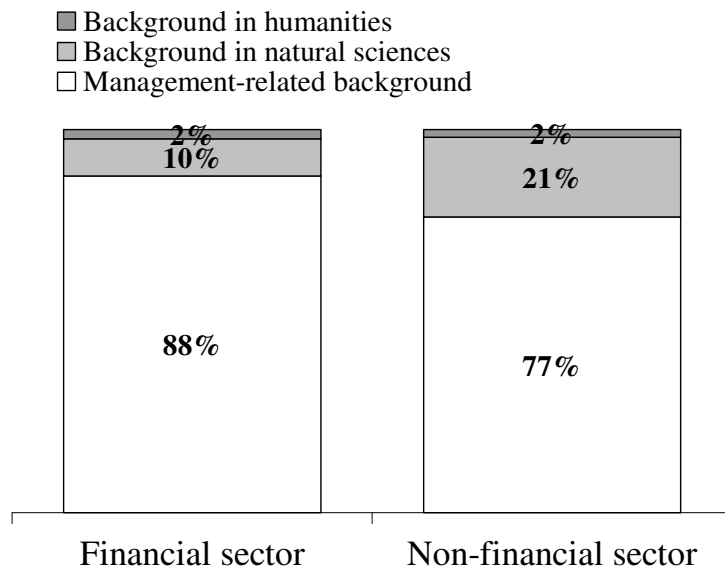
Legend: 151 Swiss SMI, SPI firms

Figure 2. Percentage of Female Swiss CEOs



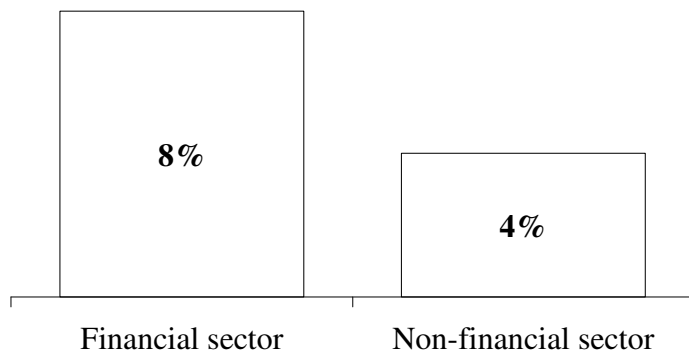
Legend: 151 Swiss SMI, SPI firms

Figure 3. Composition of Swiss Boards according to field of study



Legend: 151 Swiss SMI, SPI firms, Years: 2002 & 2004

Figure 4. Percentage of Female Swiss Board members



Legend: 151 Swiss SMI, SPI firms, Years: 2002 & 2004

Figure 5. Study Design and Development of the UBS stock price and the Swiss Market Index

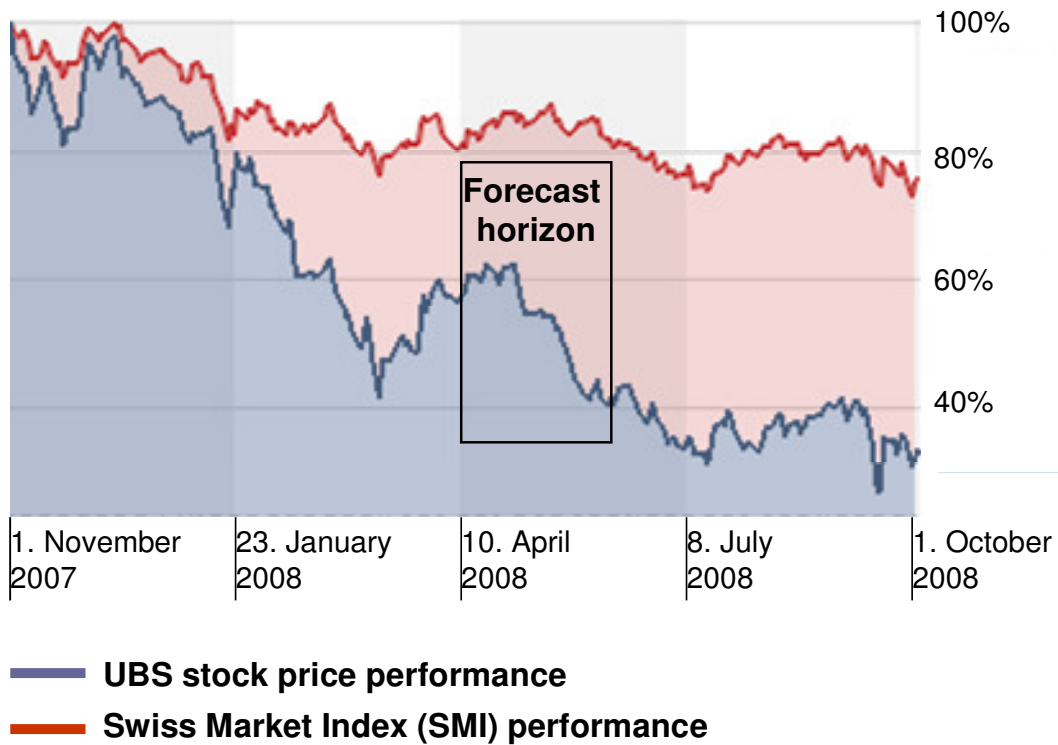
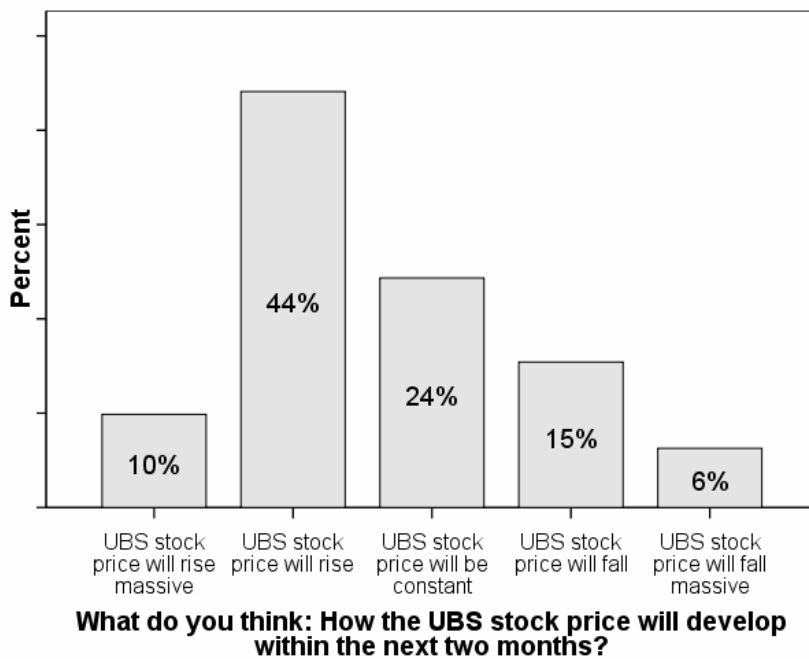


Figure 6. UBS stock price forecasts



Legend: 64 students (13.4% of the overall sample) answered “no idea” and were excluded.

Figure 7. Percentage of accurate forecasts dependent on gender, finance courses, and trust in optimal contracts

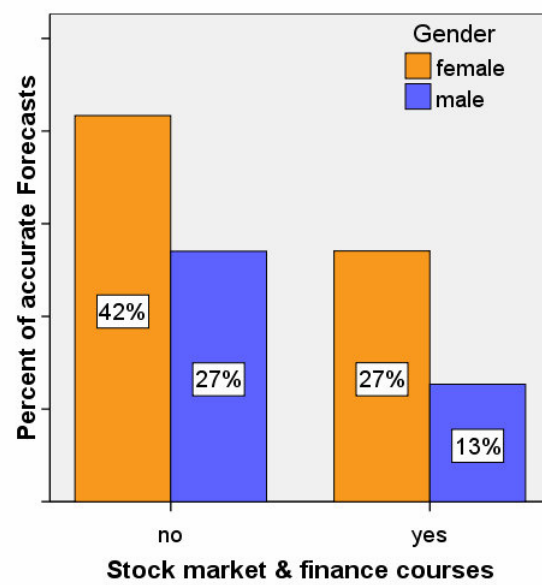
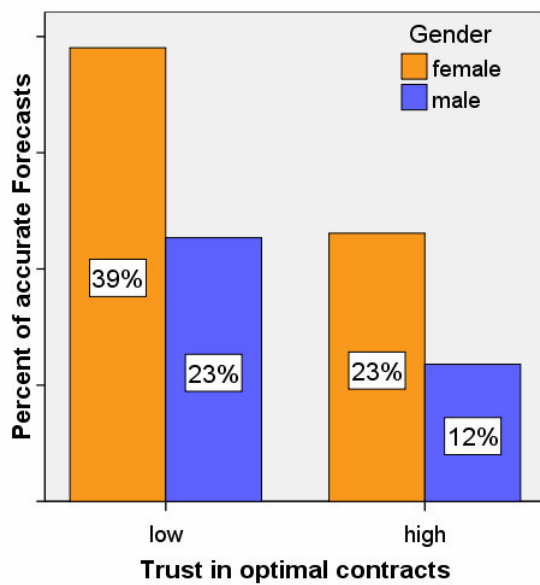
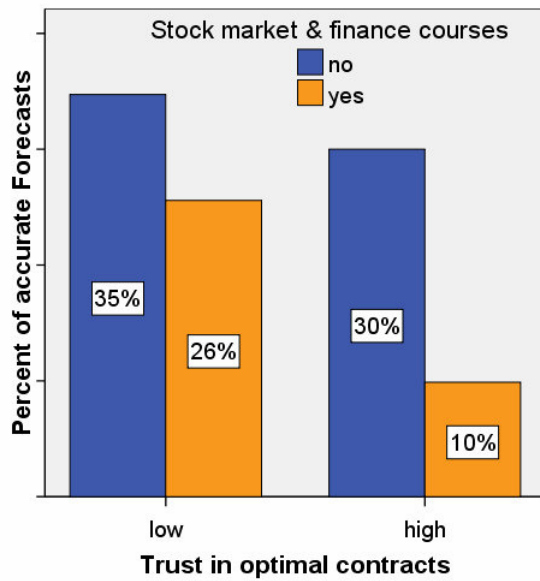


Table 1. Measurement of trust in optimal contracts

Variable	Min	Max	Mean	SD	Principal Component Matrix	Cronbach's Alpha if item deleted
Trust in Banks	1.00	5.00	3.29	1.01	.52	.52
Competent Managers were aware of the mortgage crisis	1.00	5.00	3.19	1.09	.37	.54
Top CEOs are more talented than other economic participants	1.00	5.00	2.76	1.10	.74	.42
Principal-Agent-theory's predications are always true	1.00	5.00	2.65	1.15	.74	.41
Increase in CEO salaries is market-conform	1.00	5.00	2.56	.94	.56	.51
% of Variance					.37	
Cronbach's Alpha						.55

Legend: N=444

Table 2. Measurement of personal risk orientation

Variable	Min	Max	Mean	SD	Principal Component Matrix			Cronbach's Alpha		
					Risk as thrill	Risk as breaking law	Risk as readiness to change	Risk as thrill	Risk as breaking law	Risk as readiness to change
Preference for unpredictable friends	1.00	5.00	2.01	1.04	.67			.58		
Drug consumption	1.00	5.00	1.77	1.25	.66			.53		
Extreme sport	1.00	5.00	1.88	1.19	.55			.58		
Unrestrained parties	1.00	5.00	2.97	1.37	.54			.50		
Make journeys without fixed plans	1.00	5.00	2.89	1.14	.44			.59		
Speeding	1.00	5.00	3.04	1.33		.76			.49	
Avoidance of customs declaration	1.00	5.00	2.89	1.44		.60			.52	
Gambling	1.00	5.00	2.29	1.41		.54			.54	
Fare dodging	1.00	5.00	2.05	1.26		.51			.52	
Worse preparation for exams	1.00	5.00	2.73	1.29		.45			.62	
Interest in getting married with someone of foreign country	1.00	5.00	3.19	1.25			.64			.26
Making new food experiences in restaurants	1.00	5.00	2.24	1.08			.58			.32
Make the most of life	1.00	5.00	3.91	1.06			.57			.37
Exciting to speak in front of groups	1.00	5.00	2.79	1.15			.42			.33
% of Variance					22.21	9.59	8.75			
Cronbach's Alpha								.61	.60	.39

Legend: N=458

Table 3. Descriptive statistics and bivariate correlations

Nr.	Variable	N	Min	Max	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Accuracy of forecasting prediction	415	1.00	5.00	2.64	1.06														
2	Finance student	479	.00	1.00	.20	.40	-.12													
3	Management & Economic student	479	.00	1.00	.07	.25	.04	-.13												
4	Economic student	479	.00	1.00	.08	.27	-.07	-.14	-.08											
5	Management student	479	.00	1.00	.39	.49	.01	-.40	-.21	-.23										
6	Knowledge about stock market & finance	478	.00	1.00	.20	.40	-.14	.32	-.01	.04	.09									
7	Stock market & finance courses	476	1.00	5.00	2.89	.91	-.18	.30	.09	.05	.13	.49								
8	Active on stock exchange	478	.00	1.00	.65	.48	-.16	.21	-.02	.04	-.03	.42	.27							
9	Employment in the finance sector	479	.00	1.00	.35	.48	-.06	.21	-.09	-.09	.10	.30	.14	.22						
10	Incentive pay within job	479	.00	1.00	.19	.39	-.03	.05	.06	-.02	-.07	.14	.12	.14	.17					
11	Regular Newspaper: Economy & Finance	469	.00	1.00	.77	.42	-.12	.23	.05	-.01	.21	.50	.43	.25	.19	.10				
12	Regular Newspaper: Politics	461	.00	1.00	.78	.42	.03	-.15	.00	.06	.00	-.10	-.10	-.10	-.08	-.10	-.05			
13	Regular Newspaper: Society	451	.00	1.00	.37	.48	.14	-.07	.09	.04	-.09	-.08	-.10	-.20	-.10	.06	-.06	-.01		
14	Trust in optimal contracts	479	1.00	4.40	2.89	.63	-.20	.15	.04	.02	-.02	.21	.18	.12	.02	.02	.21	.06	-.09	
15	Career as Top-Manager	478	.00	1.00	.17	.38	-.06	.09	-.06	.03	.02	.11	.05	.02	.04	.05	.07	.01	.02	.12
16	Career as Entrepreneur	478	.00	1.00	.21	.41	.03	-.12	.02	-.02	.05	-.06	-.06	-.01	-.03	.06	-.02	-.02	.08	-.06
17	One parent is working in the finance sector	479	.00	1.00	.15	.36	-.05	.10	-.02	-.08	.01	.08	.08	.10	.20	.03	.06	-.03	-.06	.01
18	Parents are wealthy	460	.00	1.00	.35	.48	.06	.04	.04	.01	.08	.07	.10	.06	.01	.03	.09	.03	-.03	.06
19	Parents have an university degree	476	.00	1.00	.50	.50	.07	-.02	-.06	.07	.04	-.06	.01	-.06	.05	.09	.05	.05	-.01	.01
20	Parents are active on stock exchange	479	.00	1.00	.48	.50	-.03	.04	.03	-.01	.05	.20	.13	.23	.10	.04	.12	-.03	-.06	.10
21	Stocks as a present from parents	478	.00	1.00	.17	.37	.00	.07	.04	.00	-.03	.06	.08	.20	.07	.12	.02	.01	-.07	-.08
22	Stock market education through parents	479	.00	1.00	.18	.39	-.03	.17	-.02	-.03	-.02	.22	.19	.30	.13	.17	.14	-.08	-.02	.08
23	Willingness to take financial risks	471	.00	1.00	.51	.50	.05	-.05	-.01	.02	-.01	-.22	-.13	-.20	-.02	-.04	-.13	-.01	.01	-.16
24	Risk as thrill	478	1.00	4.80	2.31	.75	-.04	.05	.11	.08	-.07	.15	.11	.07	.04	.03	.10	-.01	.06	.09
25	Risk as breaking law	478	1.00	5.00	2.60	.83	-.04	.11	.02	.00	.01	.22	.20	.12	.07	.16	.17	-.09	.00	.09
26	Risk as readiness to change	478	1.00	5.00	3.28	.68	.00	.03	.11	.11	-.16	.03	.04	-.02	-.08	.00	.04	.11	.11	.01
27	Male	477	1.00	2.00	1.66	.47	-.18	.13	-.03	-.03	.05	.24	.12	.25	.10	.04	.20	-.01	-.17	.19
28	Age	478	1.00	7.00	3.32	1.24	.03	-.06	-.03	-.10	.14	.04	.05	.08	.11	.08	.13	-.04	-.09	-.05
29	Income per month	416	.00	1.00	.53	.50	.02	.01	-.01	-.02	.06	.13	.08	.14	.17	.13	.13	-.01	-.02	.02
30	Workload beside study	474	1.00	5.00	2.62	1.09	.00	-.01	-.03	.01	.06	.11	.08	.08	.26	.30	.12	.00	.01	-.07
31	Happiness at the university	475	1.00	5.00	3.73	.88	-.08	.05	-.07	-.02	.02	.12	.09	.01	.02	.08	.07	.04	.02	.02
32	Number of passed semesters	475	1.00	12.00	6.67	2.74	.04	-.13	-.06	-.10	.18	.09	.12	.10	.08	.00	.04	.02	-.02	-.09
33	Grad point average	405	4.00	5.70	4.79	.33	-.04	-.02	-.07	.14	-.17	-.01	-.09	.00	-.04	-.01	-.03	.16	.01	.03

Nr. Variable	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
16 Career as Entrepreneur	-.24																	
17 One parent is working in the finance sector	-.06	.03																
18 Parents are wealthy	.11	.06	.18															
19 Parents have an university degree	.10	-.01	.07	.25														
20 Parents are active on stock exchange	-.02	.00	.31	.28	.03													
21 Stocks as a present from parents	.02	.00	.18	.22	.04	.21												
22 Stock market education through parents	-.04	.07	.28	.26	.08	.44	.24											
23 Willingness to take financial risks	-.04	-.02	-.04	-.06	-.07	-.15	-.03	-.13										
24 Risk as thrill	.03	.15	-.06	.16	.08	.06	.01	.07	-.13									
25 Risk as breaking law	.01	.16	.01	.11	.00	.13	.01	.17	-.11	.43								
26 Risk as readiness to change	.05	.10	-.07	.04	.07	.01	.06	.01	-.14	.31	.21							
27 Male	-.04	.06	.07	.05	-.08	.15	-.03	.05	-.17	.15	.22	.01						
28 Age	.08	.10	-.05	-.08	.00	-.12	-.06	-.07	.03	.00	.04	-.02	.12					
29 Income per month	.07	.13	.09	.06	.11	.07	.02	.01	-.08	.09	.14	.03	.12	.25				
30 Workload beside study	.00	.10	-.02	-.01	.02	.02	.03	-.02	.02	.06	.16	.09	.12	.24	.41			
31 Happiness at the university	.02	-.07	.09	-.04	.09	.09	.13	.05	.05	-.04	-.05	.12	-.02	-.08	.07	.00		
32 Number of passed semesters	.00	.00	-.02	-.03	-.01	.00	-.01	-.02	-.04	.07	.08	.01	.07	.56	.23	.20	-.01	
33 Grad point average	.12	-.11	-.02	.01	.08	-.05	.03	-.08	-.12	.04	-.09	.16	-.04	-.06	.00	.02	.10	.06

Variables	B	SD	Sig. B	B	SD	Sig. B	B	SD	Sig. B	B	SD	Sig. B	B	SD	Sig. B	B	SD	Sig. B	B	SD	Sig. B			
	Model I			Model II			Model III			Model IV			Model V			Model VI			Model VII			Model VIII		
Demographics																								
Male	-.39	.12	**	-.35	.12	**	-.43	.12	**	-.37	.12	**	-.37	.12	**	-.42	.12	**	-.41	.12	**	-.31	.13	**
Age	.01	.06		.00	.05		.01	.06		.02	.06		.02	.06		.02	.06		.01	.06		.02	.06	
Income per month	.10	.12		.12	.12		.10	.12		.13	.12		.12	.12		.07	.13		.10	.13		.15	.13	
Workload beside study	.00	.06		.00	.06		.01	.06		-.01	.06		-.02	.06		-.00	.06		-.01	.06		-.01	.06	
Happiness at the university	-.09	.06		-.08	.06		-.10	.06		-.09	.06		-.10	.06		-.10	.07		-.11	.06		-.09	.07	
Number of passed semesters	.01	.03		.02	.02		.01	.02		.01	.03		.01	.02		.01	.03		.02	.02		.01	.03	
Grad point average	-.15	.17		-.19	.17		-.15	.17		-.17	.17		-.10	.17		-.17	.17		-.15	.17		-.16	.18	
R		.26			.29			.22			.26			.27			.24			.22			.35	
R-Square		.07			.08			.05			.07			.07			.06			.05			.13	
Adj. R-Square		.04			.06			.03			.04			.05			.02			.02			.04	
F-Value		2.22	**		3.11	**		2.02	**		2.46	**		2.79	**		1.59	*		1.60	*		1.69	**
N		355			355			355			355			355			355			355			355	

Legend: Dependent variable accuracy of forecasting prediction of the change in the UBS stock price in the next 2 months. *p < 0.10, **p < 0.01.

Table 5. Main determinants of the accuracy of forecasting predictions under uncertainty

	OLS Regression			Clustered OLS Regression			Ordinal Regression (Logit)		
	B	SD	Sig.	B	SD	Sig.	B	SD	Sig.
(Constant)	4.07	.28	**	4.07	.28	**			
Threshold [1; stock price will rise massive]							-4.65	.55	**
Threshold [2; stock price will rise]							-2.21	.51	**
Threshold [3; stock price will be constant]							-1.04	.50	**
Threshold [4; stock price will fall]							.47	.52	
Knowledge									
Stock market & finance courses	-.34	.11	**	-.22	.11	**	-.60	.20	**
Beliefs									
Trust in optimal contracts	-.24	.08	**	-.21	.09	**	-.35	.15	**
Demographics									
Male	-.31	.11	**	-.31	.14	**	-.45	.20	**
R/ Pseudo-R		.28			.23			.26	
R-Square/ Cox and Snell		.08			.05			.07	
Adj. R-Square/ McFadden		.07			.04			.03	
F-Value/ Chi-Sqaure		11.38	**		7.24	**		27.64	**
N		411			411			411	

Legend: Dependent variable accuracy of forecasting prediction of the change in the UBS stock price in the next 2 months. *p < 0.10, **p < 0.01.