THE CHANGING RISK PREFERENCES OF HIGH-NET-WORTH INDIVIDUAL INVESTORS DURING THE GLOBAL FINANCIAL CRISIS

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ABSTRACT: *This paper studies how high-net-worth individual (HNWI) investors changed their risk preferences during the Global Financial Crisis (from 2007 to 2009) and how their asset allocation evolved in the same period. We had access to a confidential database from a Swiss international private bank with two samples of risk preferences questionnaires (suitability tests) filled by the same HNWI investors in 2007 and 2009. We compared the suitability tests' suggested investment profiles to those investors' real asset allocations at the same moments in time. We estimated correlation coefficients and ran hypothesis tests to examine if the changes in risk preferences during the period were statistically significant. Findings: HNWI investors' risk preferences changed during the period, but the gap between their self-assessed risk preference and their real asset allocation narrowed, suggesting that they have a convex value function curve. We found evidence consistent with the psychological risk-as-feelings model, as lower risk-exposed HNWI investors also tended to decrease their risk preference level during a crisis. The evidence also suggests a stronger preference for cash during the crisis period, confirming the results of studies that have focused on the importance of liquidity during external shocks.*

KEYWORDS: *behavioral finance, risk preferences, high-net-worth individual (HNWI)*

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INTRODUCTION

The stability of risk preferences is one of the cornerstones of conventional finance theory. However, behavioral economics studies have challenged the stability hypothesis during recent decades, suggesting that risk preferences depend on heuristics that can be identified through experiments (Rabin–Thaler 2001). Nevertheless, the literature from psychology is based on assessing self-assessed risk preferences through questionnaires, which have been shown to be valid and reliable (Hertwig et al. 2018). Psychological studies have shown that risk preferences are stable, although they tend to decrease throughout the individuals' lifespan, and under exogenous shocks (Schildberg-Hörisch 2018).

Studies about individual retail investors have found contradictory results (Schooley–Worden 2016), and studies about institutional investors have identified preferences for liquidity in distressed markets (Dimmock et al. 2021). We found a gap in the literature regarding the study of high-net-worth individual (HNWI) investors' risk preferences.

In this paper, we analyze a sample of 100 clients of a Swiss international private bank, HNWI investors, regarding their risk preferences and asset allocation. We examine the evolution of their self-assessed risk preferences at two different moments of the Global Financial Crisis (2007 and 2009) and compare those risk preferences to their real asset allocations in the respective years. We show that in 2007 HNWI investors were, on average, invested in riskier portfolios than their self-assessed risk preferences and that in 2009 their risk preferences changed. We hypothesize that HNWI investors changed their risk preferences due to market events, prioritizing liquidity. We also hypothesize that HNWI investors have a decreasing relative risk aversion that may be expressed using a convex value function curve. HNWI investors exposed to lower levels of risk reduced their self-assessed risk preferences, which is consistent with the predictions of the risk-as-feeling psychological model.

We contribute to the literature on risk preferences by showing that private bankers can implement better asset allocations if they consider that HNWI investors do not have stable risk preferences and that HNWI investors have a liquidity preference when faced with external shocks. Acknowledging that aggregate investor behaviour is more predictable than individual behavior, we conclude that the role of sociology in the study of financial markets is increasingly important.

The remainder of the paper is organized as follows: the next section reviews the relevant literature on risk preferences, the third section describes the data and methodology, and the fourth section discusses the results of the empirical study. The final section concludes.

LITERATURE REVIEW

The finance research literature about risk preferences is based on the seminal work of Arrow (1965) and Pratt's (1964) theorem of risk aversion, which used individual wealth as the value function argument. According to the Arrow-Pratt measure of relative risk aversion, investors have an increasing relative risk aversion (as wealth increases, they want to hold a smaller share of wealth in risky assets), a decreasing relative risk aversion (as wealth increases, they want to hold a larger share of wealth in risky assets) or a constant relative risk aversion. Although Arrow (1965) argued in favor of assuming an increasing relative risk aversion (concave value function), empirical studies found evidence of decreasing relative risk aversion among individual investors (Cohn et al. 1975), suggesting the existence of convex value functions.

Kahneman and Tversky's (1979) prospect theory criticized the conventional expected utility value function, showing that it is concave for gains, convex for losses, and steeper for losses than for gains. Rabin and Thaler (2001) further demonstrated that conventional expected utility is not a plausible explanation for risk aversion, and that concave utility functions do not render rational results. They further concluded that people do not display a consistent coefficient of relative risk aversion, and that risk aversion is better explained by loss aversion and mental accounting than by expected utility. These findings opened the debate about the stability of risk preferences over time.

Conventional financial theory posits that risk preferences are stable (Stigler–Becker 1977), but since the beginning of the twenty-first century, several studies have found evidence of changing risk preferences related to emotions from negative shocks (Loewenstein et al. 2001), income (Chuang–Schechter 2015), and age and macroeconomic conditions (Sahm 2012). Schildberg-Hörisch (2018) reviews the literature, concluding that individual risk preferences change due to external shocks such as those associated with financial crises. The latter author proposes a framework inspired by personality psychology that considers preference parameters as distributions instead of imposing mean-level stability. This framework accommodates the empirical evidence on risk preference stability by considering time-varying mean risk preference, which decreases throughout the individual lifespan. Hertwig et al. (2018) clarified the difference between the concept of risk preference in psychology, estimated mainly through self-reporting (questionnaires), and in the economy, estimated through behavioral measures (experiments). They further conclude that, unlike experiments, self-reporting shows considerable temporal stability across periods of years, and thus is better suited to estimating risk preferences.

A range of studies about financial markets found changing risk preferences

among retail investors (Schooley–Worden 2016; Rabbani et al. 2020; Chen–Schmidt 2021). Regarding the Global Financial Crisis (GFC), Hoffman et al. (2013) found that investor risk tolerance decreased during the worst months of the crash but recovered towards the end of the recession. However, individual investors did not de-risk their investment portfolios during the crisis. Guiso et al. (2018) analyzed a sample of Italian bank clients to test if individual risk aversion increased following the GFC. They found that risk aversion measures exhibited large increases following the crisis and that, contrary to the findings of Hoffman et al. (2013), individual investors divested, suggesting an increase in the curvature of the utility function. Cohn et al. (2015) further showed that financial professionals exposed to a financial crash were more fearful and risk-averse than those exposed to a booming market, suggesting that self-reinforcing processes amplify market dynamics. Confirming this result, Sokolowska and Makowiec (2017) conducted an internet study to examine perceived risk and actual risk preferences in bear and bull markets. The main finding is that investors tend to choose riskier portfolios during bull markets more often than in bear markets. From a distinct perspective, Weber et al. (2013) surveyed UK online brokerage customers between 2008 and 2009 at three-month intervals for their risk preferences and their asset allocations. Their main conclusion is that the levels of risk changed substantially over time, but unlike what was found in previous studies, risk preferences were weakly correlated with those changes. Lobão (2020) addresses these questions, showing that individuals that are about to start their activity in financial markets are incoherent in their values and beliefs, questioning the persistence over time of those individuals' attitudes towards investing.

Other branches of the finance literature have studied the connections between target asset allocation defined by modern portfolio theory and the real asset allocation decisions of institutional investors, finding that the market liquidity level strongly impacts portfolio choice (Gârleanu 2009; Jansen–Werker 2022). For example, Dimmock et al. (2021) showed that, unlike the classic modern portfolio theory prediction that the allocation ratio between any two assets is constant over time, institutional investors rebalance their asset allocation towards liquidity during crises. Recent research about risk preferences has focused on automated investment managers and robo-advisors (Alsabah et al. 2021; Dong et al. 2021; Capponi et al. 2022). These new models aim to estimate optimally adjusted risk and return investment portfolios that account for investors' changing risk preferences.

To the best of the authors' knowledge, no research addresses the evolution of the risk preferences of HNWI investors. This type of investor is not an institutional market player or a retail investor. They are the most qualified

among individual investors (usually classified as professional investors) and are not included in the 'dumb money' category traditionally associated with individual retail investors (Frazzini–Lamont 2008). We aim to fill this gap by investigating how HNWI investors translate their risk preferences into different asset allocations, testing if their asset allocation is in line with their declared risk preferences, and analyzing how their risk preferences evolved during the GFC.

DATA AND METHODOLOGY

Sample

The population of HNWI investors, those with one million euros or equivalent in other currencies of invested financial assets, was estimated to be around forty million worldwide at the time of the GFC (Private Banker International 2007). In most European countries, under the Market in Financial Instruments Directive (MiFID), these investors qualify as professional clients, the most proficient individual investors in financial markets. This is a relatively homogeneous population regarding socioeconomic characteristics, as they represent the wealthier individuals in their home countries (Capgemini 2021). According to Capgemini (2021), more than 50% of their investments in financial markets are conducted through private banks or wealth management firms.

We had access to a private and confidential sample of questionnaires from a Swiss international private bank, where a survey about HNWI clients' preferences is carried out every two years. These surveys are mandatory under the MiFID of the European Union, and the process is also known as the Suitability Test. Clients are asked about their investment horizon and risk preferences regarding the assets they are mandating the private bank to manage. The bank let us use the questionnaires from 2007 and 2009 anonymously because this is 15-year-old data and because in 2021 the bank was acquired by a competitor, so this information had become obsolete. As most members of the target population are not willing to participate in the survey for reasons of secrecy, it was not possible to draw a purely random sample from the target population. Nevertheless, as the target population is expected to be relatively homogeneous (clients of private banking), a nonprobability sample was assumed to be acceptable, even for statistical testing. The sample comprises hundred HNWI investors with a residence in one of the following countries: Switzerland, France, Italy, Spain, Portugal, Greece, Turkey, Romania, Poland, Brazil, Angola, and Mozambique. These origins represent

twelve different countries, three continents, eight different languages, and eight different national currencies. We were not allowed to specify the proportions of HNWI investors of each origin, but we considered that the investors' diverse origins contributed to the sample's stratification and randomization.

Questionnaire

Most studies about risk preferences are carried out with questionnaires developed using classical test theory (Grable 2017), which is based on the notion that the scores are composed of two parts: a true score and a measurement error. Risk preference questionnaires are associated with validity and reliability problems (Frey et al. 2017). Saad et al. (1999) suggest the measurement of criterion-related validity and test-retest reliability. According to these authors, there is a very beneficial concurrent validity if the correlation coefficient between the risk preference results and the respective asset allocation is above 0.35, and there is test-retest adequate reliability if repeated test scores over time correlate at above 0.70.

The bank's official questionnaire was developed by Morningstar, a company that specializes in conducting surveys of financial market players. It is a fifteen-item scale that includes questions regarding risk preferences. This questionnaire has been tested and used by several different banks throughout the years. The questionnaire is presented in Appendix 1. As can be seen from Questions 1.3 and Section 3, it addresses the wealth that the HNWI investors are investing in the specific bank, not their global wealth.

After processing the questionnaire through the algorithm presented in Appendix 2, where each answer corresponds to a pre-determined number of points, each participant's risk preference is classified into one of five categories of investment profile: Preservation, Income, Income & Growth, Growth, and Aggressive Growth. According to Morningstar, a portfolio classified as a Preservation profile should have over 50% of the assets in cash; a portfolio classified as Income profile should have over 50% of the assets in bonds; a portfolio classified as Income & Growth profile should have between 30% and 50% of the assets in bonds and equity (in each of the asset classes); a portfolio classified as Growth profile should have between 50% and 70% of the assets in stocks, and a portfolio classified as Aggressive Growth profile should have over 70% of the assets in stocks. These profiles will be compared to the HNWI investors' real asset allocations.

At the end of the risk-preference profiling, the participants are asked about their current allocation of assets currently in the private bank's account as a

proportion (percentage) (we did not have access to the amounts held in the accounts for privacy reasons), split into four categories: Cash, Bonds, Stocks, Other. These categories are widely known in the finance industry as the main asset classes in which to invest, cash being the least risky, and stocks the riskiest. The bank uses the Other category for residual investments like commodities (oil or gold) or real estate. Each participant's asset allocation was translated into an investment profile according to the rules described in the previous paragraph.

The hundred questionnaire answers from 2007 and 2009 were processed according to the cross-tabulation tables presented in the appendices. This process had already been run by the bank's staff in accordance with the MiFID regulation, and we were handed the results together with the algorithm developed by Morningstar to help understand the process of translating the responses into five standard generic investment profiles and the corresponding five levels of risk preference, as explained in Appendix 3. Afterwards, in Appendix 4, a table translates each investor's asset allocation into the same five standard generic investment profiles. In Appendix 5, each investor is classified on an ordinal scale, and the numerical differences between each investor's risk preferences and their asset allocation were quantified. Appendix 6 includes all the participants' investment profiles and respective differences. This procedure was repeated for two years (2007 and 2009), with the same participants.

We acknowledge that the algorithm that translated the answers in the questionnaire into an investment profile equivalent to the asset allocation might have errors and biases. Thus, we verify the validity and reliability of the questionnaire in the next section.

RESULTS

Descriptive statistics

Table 1 shows the proportion of respondents classified into each investment profile regarding their risk preferences. We observe that in 2007 we had HNWI investors in all five profiles, with 50% located in the two lower-risk profiles and the remaining 50% in the three higher-risk profiles.

Table 1 also includes a transition matrix to identify the transitions between investment profiles from 2007 to 2009. The lighter shading identifies transitions of less than 10% of the sample. Intermediate shading identifies transitions representing between 10% and 19% of the sample. Dark shading identifies transitions representing more than 20% of the sample.

Table 1. *Risk preference transition matrix (%)*

	Risk preferences	To: Preservation	Income	Income & Growth	Growth	Aggressive Growth
	2007:	*17*	*33*	*29*	*15*	*6*
	Preservation	17	0	0	0	0
	Income	29	4	0	0	0
From:	Income & Growth	16	13	0	0	0
	Growth	1	14	0	0	0
	Aggressive Growth	0	6	0	0	0
	2009:	*63*	*37*	*0*	*0*	*0*

Source: Authors' calculations.

We observe that the larger transition in terms of risk preferences occurred from the Income investment profile to the Preservation investment profile, with 29% of the sample respondents changing their risk preferences from the Income investment profile in 2007 to the Preservation investment profile in 2009. The Preservation investment profile comprises at least 50% cash, suggesting that respondents had a stronger preference for liquidity. Next, 16% of the sample transitioned from the Income & Growth profile to Preservation and 13% to Income. In 2007, 50% of the sample had risk preference profiles equivalent to the three higher-risk investment profiles. In 2009 there were no participants in the sample classified into those three investment risk profiles. Overall, the evidence suggests that a significant share of the sample's investors changed their risk preferences within a relatively short period.

Table 2 presents the same information but now regarding the asset allocation of the questionnaire respondents. More importantly, in 2007 there was not one client in the Preservation investment profile (liquidity), and only 1% in the Income investment profile. In 2009, these two profiles included 76% of the sample respondents.

Table 2. *Asset allocation transition matrix (%)*

	Asset allocation	To: Preservation	Income	Income & Growth	Growth	Aggressive Growth
	2007:	*0*	*1*	*35*	*47*	*17*
	Preservation	0	0	0	0	0
	Income	1	0	0	0	0
From:	Income & Growth	13	20	2	0	0
	Growth	9	24	14	0	0
	Aggressive Growth	1	8	8	0	0
	2009:	*24*	*52*	*24*	*0*	*0*

Source: Authors' calculations.

The largest transition from 2007 to 2009 occurred in the Growth profile, with 24% of the sample shifting to the Income profile. Next, 20% of the sample transitioned from the Income & Growth profile to the Income profile. In 2007 64% of the sample had asset allocations classified as Growth or Aggressive Growth (investment profiles with more than 50% of the portfolio invested in the stock market). In 2009 these two investment profiles had no HNWI investors.

Table 3 describes the changes in the median and mean risk preferences and asset allocations measured on an ordinal scale of 1 (Preservation) to 5 (Aggressive Growth).

The sample respondents changed their mean risk preferences from 2007 to 2009 by reducing their preferred investment profile from Income & Growth (2.6) to Preservation (1.37). Furthermore, they changed their asset allocation from a Growth investment profile (3.8) to an Income investment profile (2.0), a change in the same direction as the shift that occurred with the risk preferences.

Table 3. *Sample medians, means, and standard deviations*

Year	Profile	Median	Mean	Standard Deviation
2007	Risk preference	2.50	2.60	1.12
	Asset allocation	4.00	3.80	0.72
	Differences	−1.00	−1.20	0.89
2009	Risk preference	1.00	1.37	0.49
	Asset allocation	2.00	2.00	0.70
	Differences	−1.00	−0.63	0.66
	Average differences	*−1.00*	*−0.92*	*0.62*

Source: Authors' calculations.
Note: Differences is a new series computed by subtracting the asset allocation profile number from the risk preference profile number of each respondent. Average differences is also a new series composed of the average Differences (2007 and 2009) of each respondent. The median, mean, and standard deviation of these new series are presented in columns.

In 2007, the sample respondents held portfolios with a mean risk of 1.2, higher than the investment profile estimated according to their self-assessed risk preferences. In 2009, this difference had decreased by half, to 0.63. This means that the changes in asset allocation did not completely mirror the changes in risk preferences, as in 2009 there were still 24% of respondents with an investment profile above the two first levels (Preservation and Income). According to the explanation provided to the authors by the private bank's CEO, the clients did not have more cash (or fewer stocks) in their portfolios because they did not want to sell the securities at a loss, holding onto risky investments in the

hope that someday the invested amount would be recovered. This behavior is consistent with the sunk cost fallacy (Arkes–Ayton 1999; Friedman et al. 2007), according to which investors show maladaptive economic behavior that is manifested in a stronger tendency to continue an endeavor once an investment in money, effort or time has been made. Weber and Camerer (1998) suggest that this fallacy induces the disposition effect, whereby investors sell 'winners' and keep 'losers,' which is inconsistent with modern portfolio theory.

The standard deviation of the risk preferences within the sample individuals fell sharply from 2007 (1.12) to 2009 (0.49), while the standard deviation of the asset allocation within the same sample was almost the same (0.72 in 2007, 0.70 in 2009) in the two years under analysis. The standard deviation of the differences between self-declared risk preferences and real asset allocations also fell from 0.89 to 0.66.

The statistical significance of these changes in risk preferences is assessed in the following section.

Empirical results

Table 4 shows the correlation coefficients that can be used to assess the validity and reliability of the questionnaires.

Table 4. *Correlation matrix*

Correlations	Risk preference 2007	Asset allocation 2007	Risk preference 2009	Asset allocation 2009
Risk preference 2007	1			
Asset allocation 2007	0.61 (0.00)	1		
Risk preference 2009	0.68 (0.00)	n.a.	1	
Asset allocation 2009	n.a.	0.40 (0.00)	0.42 (0.00)	1

Note: P-value in parenthesis.

In 2007, the correlation coefficient between risk preferences and the HNWI investors' asset allocation was 0.61, falling to 0.42 in 2009. According to Saad et al. (1999), these correlations are evidence of the validity of the suitability test that was used to identify the respondent's risk preferences (the criteria is > 0.35).

The correlation coefficient for the risk preferences between 2007 and 2009 is 0.68. This reliability coefficient value is slightly below the adequate level of 0.70

(Saad et al. 1999). Considering the test-retest reliability concept, if the retest is taken during periods of anxiety (as was the case in 2009), the adequate level for the reliability coefficients may be lower than 0.7 (Saad et al. 1999).

To test if there is an equality of means in the risk preferences and asset allocation of 2007 and 2009, we began by running the Shapiro–Wilk and the Kolmogorov–Smirnov tests on those two dates. Both tests strongly rejected sample normality (p-values < 0.001) at the two moments. This means that we are required to proceed with nonparametric tests. Thus, we applied the Wilcoxon test for the difference of medians between the two related samples. The test rejects the null hypothesis of the two samples having the same median (p-value < 0.001) for both the risk preferences and the asset allocation. The HNWI investors significantly changed their risk preferences in a relatively short period, as well as their asset allocation. This finding goes against the conclusions of Hoffman et al. (2013), who found that individual investors did not de-risk their investment portfolios during the crisis. The different results might be explained by the fact that Hoffman et al. (2013) studied the behavior of brokerage clients who do not receive investment advice, while our sample of investors (private banking clients) do receive investment advice.

In addition, we tested if the difference between the risk preference and the asset allocation in 2007 was the same as in 2009. The Wilcoxon test suggested rejection of the null hypothesis of this difference having the same median in 2007 and 2009, which means that HNWI investors reduced the gap between the two indicators from 2007 to 2009. This is an important finding because if the questionnaire algorithm process delivers a biased investment profile (if, for example, an Aggressive Growth investment profile estimated by the questionnaire is a Growth profile in terms of asset allocation), the change in risk preference should have produced a parallel shift in asset allocation. There was no parallel shift in the two indicators, which can be interpreted as a sign that the change in median risk preferences was more pronounced than the corresponding change in median asset allocation. This finding contradicts the results of Weber et al. (2013), who concluded that the respondents in their sample maintained relatively stable risk preferences throughout the measurement period. However, it should be noted that the study of Weber et al. (2013) focuses on changes observed during a narrower timeframe (nine months between 2008 and 2009). In the case of the current study, the change occurred over two years, suggesting that the loss of wealth caused by the stock market crash of 2008 provoked a more than proportional decrease in the risk preferences of respondents. This result confirms the findings of Cohn et al. (1975) about investors having decreasing relative risk aversion, which is consistent with the presence of a convex value function. Therefore, our results do not support the predictions of the Arrow–

Pratt theorem and seem to confirm the empirical findings of Kahneman and Tversky (1979) in favor of a convex value function in the domain of gains.

Further, the analysis of the transition matrices indicates that HNWI investors with lower-risk asset allocations, thus less exposed to the GFC, also changed their risk preferences to lower-risk investment profiles. This confirms the findings of Guiso et al. (2018), suggesting that not all changes in risk preference occur due to changes in wealth. Loewenstein et al. (2001) suggest that, when faced with an external shock, individuals suffer a divergence between their emotions and their cognitive assessments of risks, with emotional reactions driving behavior. These authors propose the risk-as-feelings hypothesis as an alternative to models based on expected utility and value functions. Another alternative hypothesis is the effect of investors' changing liquidity preferences (Dimmock et al. 2021) when faced with a volatility increase. As mentioned earlier, the Preservation investment profile is composed of at least 50% in cash, and was the preferred self-assessed risk preference in 2009.

CONCLUSIONS

In this study, we examined the changes exhibited by HNWI investors during the GFC (from 2007 to 2009) and how their asset allocation changed in the same period. Unlike the assumptions of conventional finance theories, HNWI investors are shown not to have stable risk preferences. The impact of the GFC was negative and significant in their self-assessed risk preferences, but their changes in asset allocation did not mirror the decrease in risk preference. The decline in wealth these investors experienced from 2007 to 2009 suggests that they have a convex value function with decreasing relative risk aversion. HNWI investors that already had low-risk portfolios in 2007 also report a decrease in risk preference, which is consistent with the predictions of the psychological risk-as-feelings model (Loewenstein et al. 2001). We also found an increase in the preference for cash during the crisis period, confirming the results of studies focused on the importance of liquidity during these events (Dimmock et al. 2021).

Private banks could benefit from these findings by understanding that HNWI investors change their risk preferences according to market conditions. The preference for liquidity in distressed times is also of note and could be included pre-emptively into portfolio construction. The study of the aggregate behavior of HNWI investors through questionnaires has advantages in relation to the study of individual behaviour through heuristics, as collective behavior is more predictable than individual behavior. The role of sociology in analyzing financial

markets is becoming increasingly important. Further studies of financial markets should focus on cross-disciplinary research, applying methodologies from sociology to study investors' behavior.

One suggestion for future research is that it would be interesting to replicate this study in other samples from other banking systems. Access to the data is limited due to bank secrecy, but outdated anonymous questionnaires and respective asset allocations could be provided by banks interested in knowing their customers better.

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APPENDICES

Appendix 1. Questionnaire

Client No. _____.

Please mark the correct answer to each of the following questions.

Section 1 – To match the portfolio with the client's financial situation
1.1 In relative terms, revenue from the:
1.1.1. Client's profession is:
   a) very important;
   b) not important.
1.1.2. Client's financial portfolio is:
   a) very important;
   b) not important.
1.2. The evolution of the professional revenue of the client during the next five years can be described in the following way:
   He/She expects his/her global revenue to:
   a) increase clearly above inflation (promotion, growth of own business, etc.);
   b) increase at a pace similar to inflation;
   c) decrease (due to retirement or other reason).
1.3. Approximately how much of the client's total assets does he have invested in this bank?
   a) Less than 25%
   b) Between 25% and 50%
   c) Between 51% and 75%
   d) More than 75%
1.4. Does the client use credit regularly?
   a) Yes
   b) No
1.5. If he/she does, for what reason?
   a) Tax purposes
   b) Financial leverage
   c) Other reasons

Section 2 – To assess the client's attitude and experience in financial assets
2.1. What is the client's reference currency?
   a) Euro
   b) US dollar

2.2. Does the client have financial assets denominated in other currencies?
   a) Yes
   b) No

2.3. Which of the following best describes the client's level of investment experience?
   a) Novice / Beginner / Little experienced – his first investment in the financial markets was in the past 12 to 18 months.
   b) Somewhat experienced – the client understands the basics of investing but he/she is less confident about how the markets work and interact.
   c) Experienced – the client has been actively investing for several years or more and he is reasonably confident in his knowledge of the financial markets.
   d) Very experienced – the client is quite knowledgeable about the financial markets and feels very comfortable making investment decisions.

2.4. Which statement best describes the client's attitude toward investing?
   a) He/She is extremely safety conscious and does not want the value of his investment portfolio to decline at all;
   b) He/She realizes that there are risks in investing, but tries to reduce them as much as possible;
   c) He/She is willing to assume some investment risk to enhance the potential return of the portfolio;
   d) He/She is willing to assume a significant risk for a portion of the portfolio to increase the potential for higher overall returns;
   e) He/She is comfortable assuming a significant risk for the overall portfolio to maximize the possibility of higher returns.

2.5. To increase the expected return of his/her investment the client would be willing to:
   a) add quite a lot of risk to his total investment;
   b) add quite a lot of risk in part of his investment;
   c) add a little more risk to his total investment;
   d) add a little more risk in part of his investment;
   e) not increase the risk of his investment.

Section 3 – To determine the client's time horizon

3.1. With the amount invested the client seeks a return on the investment:
   a) on the short term;
   b) on the medium term;
   c) on the long term.

3.2. The client expects to need the present amount in the time frame of:
   a) one year;
   b) between 2 to 3 years;
   c) between 4 to 5 years;
   d) more than 5 years.

3.3. Does the client expect to need more than half of the amount before that time frame?
  a) No
  If yes, when does the client expects to withdraw that amount?
  b) Up to 1 year
  c) Up to 2 years or more
3.4. Is the client aware that the value of his assets under management can change over time and eventually be worth less than their present value?
  a) Yes
  b) The client did not know that, but he has acquired this notion.

Section 4 – Current asset allocation.
Please input the current percentage of each of the following asset classes in the client's portfolio (under management in this bank):
  Cash: _____%
  Bonds: _____%
  Stocks: _____%
  Other: _____%
  Total: 100.00%

  Date: __/__/_____

Appendix 2. Answer quantification

This table converts the questionnaire answers into a risk preference level that will be used in Appendix 3. For each of the following answers attribute the indicated points and sum up the total of points at the end of the table.

Client No. ___1_____

Questions	Value points	Points in 2007	Points in 2009
1.1.1. a)	8	8	8
1.1.1. b)	5		
1.1.2. a)	4		4
1.1.2. b)	8	8	
1.2. a)	5	5	
1.2. b)	2		2
1.2. c)	1		
1.3. a)	10		
1.3. b)	9		
1.3. c)	5	5	5
1.3. d)	3		
1.4. a)	7		
1.4. b)	4	4	4
1.5. a)	3		
1.5. b)	9		
1.5. c)	1		
2.1. a)	3	3	3
2.1. b)	4		
2.2. a)	10		
2.2. b)	6	6	6
2.3. a)	2		
2.3. b)	5	5	5
2.3. c)	24		
2.3. d)	26		
2.4. a)	2		2
2.4. b)	21	21	
2.4. c)	47		
2.4. d)	68		
2.4. e)	95		
2.5. a)	25		
2.5. b)	20		
2.5. c)	10		
2.5. d)	5	5	
2.5. e)	2		2
3.1. a)	0		0
3.1. b)	25		
3.1. c)	30	30	
3.2. a)	0		
3.2. b)	5		
3.2. c)	25		
3.2. d)	30	30	30
3.3. a)	30	30	30
3.3. b)	5		
3.3. c)	30		
3.4. a)	10	10	10
3.4. b)	0		
Total		*170*	*111*

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Appendix 2. Answer quantification (continued)

Asset Allocation 2007			
Cash	Bonds	Stocks	Other
5%	35%	55%	5%
Asset Allocation 2009			
Cash	Bonds	Stocks	Other
30%	60%	5%	5%

Source: Author's calculations. The Asset Allocations of 2007 and 2009 are the real percentages of the HNWI investor's wealth in each of the identified asset classes.

Appendix 3. Investor's risk preferences

Please tick the box in the table below that corresponds to the investor's total points.

Client No. ___1____

Total points	< 134	[134–174[	[174–224[	[224–275]	> 275
Risk preferences 2007	Preservation	Income X	Income & Growth	Growth	Aggressive Growth
Risk preferences 2009	Preservation X	Income	Income & Growth	Growth	Aggressive Growth

Source: Author's calculations.

Appendix 4. Investment profile

Tick the box in the second line of the table below that corresponds to the investor's asset allocation.

Client No. ___1____

Real asset allocation	Cash > 50%	Bonds > 50%	Bonds and stocks between 30% and 50% each	Stocks > 50% but no more than 70%	Stocks > 70%
Investment profile 2007	Preservation	Income	Income & Growth	Growth X	Aggressive Growth
Investment profile 2009	Preservation	Income X	Income & Growth	Growth	Aggressive Growth

Source: Author's calculations.

Appendix 5. Differences between risk preferences and investment profile

Tick the boxes below to compound the matches or differences (numerical) between the risk preferences and the investment profile of each investor.

Participant No. ___1____

Risk profile	Preservation (1)	Income (2)	Income & Growth (3)	Growth (4)	Aggressive Growth (5)
Risk preference 2007 (A)		X			
Investment profile 2007 (B)				X	
Difference 2007 (A – B)	–2				
Risk preference 2009 (A)	X				
Investment profile 2009 (B)		X			
Difference 2009 (A – B)	–1				

Source: Author's calculations.

Appendix 6. Investors' risk preferences, investment profiles, and respective differences

Participant No.	Risk preferences 2007	Investment profile 2007	Difference 2007	Risk preferences 2009	Investment profile 2009	Difference 2009	Average difference
1	2	4	−2	1	2	−1	−1.5
2	2	4	−2	1	2	−1	−1.5
3	3	4	−1	2	3	−1	−1.0
4	2	4	−2	1	3	−2	−2.0
5	2	4	−2	1	2	−1	−1.5
6	3	4	−1	1	2	−1	−1.0
7	1	3	−2	1	2	−1	−1.5
8	2	4	−2	1	3	−2	−2.0
9	3	4	−1	1	2	−1	−1.0
10	3	4	−1	2	2	0	−0.5
11	3	4	−1	2	3	−1	−1.0
12	3	4	−1	1	2	−1	−1.0
13	3	4	−1	1	2	−1	−1.0
14	1	3	−2	1	1	0	−1.0
15	4	5	−1	2	2	0	−0.5
16	5	5	0	2	2	0	0.0
17	3	5	−2	1	2	−1	−1.5
18	1	4	−3	1	2	−1	−2.0
19	3	5	−2	2	3	−1	−1.5
20	4	4	0	2	3	−1	−0.5
21	1	3	−2	1	1	0	−1.0
22	1	2	−1	1	1	0	−0.5
23	2	3	−1	1	1	0	−0.5
24	1	4	−3	1	2	−1	−2.0
25	2	4	−2	1	1	0	−1.0
26	3	5	−2	1	3	−2	−2.0
27	2	4	−2	1	2	−1	−1.5
28	2	5	−3	1	2	−1	−2.0
29	1	3	−2	1	1	0	−1.0
30	2	4	−2	1	2	−1	−1.5
31	3	5	−2	1	2	−1	−1.5
32	2	4	−2	1	1	0	−1.0
33	2	3	−1	1	1	0	−0.5
34	5	4	1	2	2	0	0.5
35	4	4	0	2	3	−1	−0.5
36	1	3	−2	1	1	0	−1.0

Participant No.	Risk preferences 2007	Investment profile 2007	Difference 2007	Risk preferences 2009	Investment profile 2009	Difference 2009	Average difference
37	2	4	−2	1	2	−1	−1.5
38	2	4	−2	1	2	−1	−1.5
39	3	4	−1	1	3	−2	−1.5
40	4	5	−1	1	2	−1	−1.0
41	4	5	−1	2	3	−1	−1.0
42	3	4	−1	2	3	−1	−1.0
43	2	4	−2	1	1	0	−1.0
44	3	5	−2	1	2	−1	−1.5
45	4	4	0	2	1	1	0.5
46	2	4	−2	1	1	0	−1.0
47	2	5	−3	1	2	−1	−2.0
48	3	4	−1	2	3	−1	−1.0
49	4	4	0	2	3	−1	−0.5
50	1	3	−2	1	2	−1	−1.5
51	2	3	−1	1	1	0	−0.5
52	3	4	−1	2	2	0	−0.5
53	3	4	−1	2	2	0	−0.5
54	5	5	0	2	3	−1	−0.5
55	2	4	−2	1	1	0	−1.0
56	5	5	0	2	3	−1	−0.5
57	3	5	−2	2	3	−1	−1.5
58	2	4	−2	1	1	0	−1.0
59	3	4	−1	1	1	0	−0.5
60	3	4	−1	1	1	0	−0.5
61	2	3	−1	1	1	0	−0.5
62	5	5	0	2	1	1	0.5
63	4	4	0	2	2	0	0.0
64	1	3	−2	1	2	−1	−1.5
65	4	4	0	2	2	0	0.0
66	4	4	0	2	2	0	0.0
67	3	5	−2	2	3	−1	−1.5
68	4	4	0	2	2	0	0.0
69	3	4	−1	1	3	−2	−1.5
70	4	4	0	2	2	0	0.0
71	3	3	0	2	2	0	0.0
72	4	4	0	2	2	0	0.0
73	3	3	0	1	2	−1	−0.5
74	2	4	−2	1	3	−2	−2.0
75	1	3	−2	1	2	−1	−1.5
76	1	3	−2	1	2	−1	−1.5

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Appendix 6. Investors' risk preferences, investment profiles, and respective differences (continued)

Participant No.	Risk preferences 2007	Investment profile 2007	Difference 2007	Risk preferences 2009	Investment profile 2009	Difference 2009	Average difference
77	5	5	0	2	3	−1	−0.5
78	1	3	−2	1	1	0	−1.0
79	1	3	−2	1	1	0	−1.0
80	2	4	−2	1	3	−2	−2.0
81	2	3	−1	1	1	0	−0.5
82	3	3	0	2	2	0	0.0
83	2	3	−1	1	2	−1	−1.0
84	2	3	−1	2	2	0	−0.5
85	3	3	0	1	3	−2	−1.0
86	4	4	0	2	2	0	0.0
87	2	3	−1	2	2	0	−0.5
88	2	3	−1	2	2	0	−0.5
89	1	3	−2	1	2	−1	−1.5
90	1	3	−2	1	1	0	−1.0
91	2	3	−1	2	2	0	−0.5
92	3	3	0	2	3	−1	−0.5
93	4	4	0	2	3	−1	−0.5
94	1	3	−2	1	2	−1	−1.5
95	2	3	−1	1	2	−1	−1.0
96	2	3	−1	1	2	−1	−1.0
97	3	3	0	1	2	−1	−0.5
98	2	3	−1	1	2	−1	−1.0
99	2	3	−1	1	1	0	−0.5
100	3	3	0	1	2	−1	−0.5
Mean	*2.60*	*3.80*	*−1.20*	*1.37*	*2.00*	*−0.63*	*−0.92*
Std. Dev.	*1.12*	*0.72*	*0.89*	*0.49*	*0.70*	*0.66*	*0.62*

Source: Author's calculations.