

Evaluation of MiFID questionnaires in France

Study for the
Autorité des Marchés Financiers

André de Palma (Ecole Normale Supérieure de Cachan and Ecole Polytechnique)
Nathalie Picard (THEMA, Université de Cergy-Pontoise and Ecole Polytechnique)

No quotes without the authors' explicit authorisation
27/11/2010

Acknowledgements

This project was made possible by Fabrice Pansard and Elisabeth Fonteny at the Autorité des Marchés Financiers, who gave us their trust. They provided us with invaluable support at every step of the way. Bruno Gizard supported our research and we are grateful to him.

We would also like to thank our contacts in the organisations taking part in the project at the invitation of the AMF: Viviane Neiter (APAI), Marianne Attal and Patrick Martin (BNP Paribas), Jean-Pierre Bornet (BPCE), Pierre-Laurent Fleury (CGPLand), Pascal Gruner (Crédit Mutuel - Centre Est Europe), Pierre Antraygues, Christian Candelier, Laurent Facque, Philippe Gaud, Serge Lamberet, Joanna Melodista and Erik Verite (HSBC France), Olivier Gayno (HSBC Global Asset Management), Amandine Charbonnier and Keith Vosgien (HSBC Private Bank France), Jean-Pierre Banzet and Olivier Raynaud (Lazard), Frédérique Bonnell and Carine de La Cotardière (Rothschild), Philippe Cheyssial, Philippe Gravey and François-Henri Paroissin (Société Générale).

TNS Sofres collected most of the data. Our contacts, Cyrille Massin and Magali Tran, helped us with this long and complex task.

Finally, we would like to extend our heartfelt thanks to Céline Brunet (Ecole Normale Supérieure de Cachan), who worked with us for the eight months it took to develop the project and draft this report, Adélaïde Olivier (Ecole Nationale de la Statistique et de l'Administration Economique), who produced the main estimates and econometric analyses, and Sri Srikandan (Ecole Polytechnique), who developed the website used for this study.

Executive Summary

1. Background and purpose of the study

The Markets in Financial Instruments Directive (MiFID) sets conduct of business rules for investment services providers dealing with retail clients. The rules require providers to categorise clients and supply them with appropriate information so that they can understand the advice given to them. MiFID aims to provide protection for investors that is adapted to their level of investment knowledge. It calls for clients to be divided into three categories:

- ➔ eligible counterparties (banks and financial institutions)
- ➔ professional clients (corporate clients)
- ➔ retail clients (individuals).

The purpose of this report is to review the implementation of MiFID with regard to the third category, retail clients (i.e. clients of retail banks, private banks and independent wealth advisers).

It has been nearly three years since MiFID came into force, and no systematic review has so far been conducted. This project: “Evaluation of MiFID questionnaires in France” was developed at the initiative of the AMF. It is aimed at producing a diagnosis and an objective and quantitative measurement of the reliability of the main tools that financial institutions have designed to evaluate risk profiles. This “audit” is also aimed at assessing the extent to which MiFID questionnaires comply with both the letter and the spirit of the underlying law. In practical terms, this means determining whether appropriate tools have been developed, whether financial institutions have been using them properly and if there is reason to think that these tools can improve the investment advice given by financial services providers.

To conduct an objective study, data were collected from investors (the “affluent” SoFia panel of TNS Sofres) and from financial institutions’ clients. The data collected and the results obtained remain completely confidential and anonymous. The study was conducted on 14 questionnaires produced by 10 financial intermediaries:

- ➔ 3 banking groups doing business in both retail banking and private banking
- ➔ 3 mutual banks, including two that also produce a private banking questionnaire;
- ➔ 2 private banks
- ➔ 1 online bank
- ➔ a body representing independent wealth advisers.

Two main series of results were produced:

- ➔ the results from an *ex ante* analysis of the questionnaires, which was a qualitative analysis based on the questions contained in each questionnaire;
- ➔ the results from an *ex post* analysis of the questionnaires, which was a quantitative analysis based on a sample of respondents.

2. Compliance with MiFID requirements

The preliminary analysis, which is based solely on the questions asked, evaluates how well each questionnaire complies with MiFID requirements.

Development of a compliance grid

Enforcement of these requirements, which are set out in the directive and its implementing legislation, leaves considerable room for interpretation, especially with regard to the tools used to determine a client's risk profile. We relied on the following sources to ascertain the spirit of the directive in order facilitate clearer understanding of the principles set out:

- ➔ the interpretation of MiFID produced by the AMF
- ➔ *A Consumer's Guide to MiFID*, by CESR
- ➔ The Delmas-Marsalet Report on the marketing of financial products
- ➔ Academic literature on behavioural finance primarily.

A scorecard was defined to evaluate the contents of questionnaires being analysed with respect to each of these sources. The scorecard tracks four categories of information:

- ➔ personal characteristics: gender, age, profession, education and marital status;
- ➔ knowledge and experience: knowledge of financial products, investment experience, confidence to make one's own decisions on financial markets;
- ➔ financial situation: net worth, source and extent of regular income, debt, financial needs;
- ➔ investment objectives: minimum holding period, investment goal and amount, preferences regarding risk taking.

Questionnaires are more or less compliant and vary in the emphasis they place on risk tolerance

As a rule, the MiFID questionnaires comply to varying degrees with the various MiFID requirements regarding investment advice. Some questionnaires score reasonably well according to criteria that are not explicitly contained in MiFID, which suggests that some of the financial institutions concerned sought to comply not only with the letter of MiFID, but with the spirit as well. This is encouraging news, even though, paradoxically, it highlights the directive's deficiencies and lack of precision.

Furthermore, most of the questionnaires devote some space to measuring risk-taking preferences, even though MiFID is fairly vague on this issue. Consequently, the questionnaires make efforts to evaluate risk profiles that can help ensure that clients are sold suitable products. However, for want of clear guidance, these efforts are not really successful with regard to more specific sources, such as the Delmas-Marsalet Report, the AMF interpretation of the directive or the findings of behavioural finance research.

Therefore, the compliance of the questionnaires with these various sources can and should be improved so that the quality of the investment advice provided on the basis of the questionnaires can be deemed satisfactory.

An examination of the contents of the 14 questionnaires in light of the four categories of criteria defined above gives rise to the following remarks:

- ➔ Only one third of the questionnaires refer to the information about personal characteristics, even though this information is relevant for measuring risk tolerance. It should be noted, however, that MiFID does not require such information to be obtained.
- ➔ All the questionnaires included questions about the client's knowledge and experience. However, the questions deal more with experience than with knowledge, and they rarely address the two complementary facets of experience, namely objective and subjective experience.
- ➔ Only 9 out of the 14 questionnaires contain a more or less thorough analysis of the client's financial situation, even though this is one of the MiFID requirements.
- ➔ Only 11 of the 14 questionnaires ask about the investment holding period and investment goals and only 3 questionnaires ask about the investment amount. Ten of the 14 questionnaires deal with risk-taking preferences, but often in a superficial manner. Only 8 questionnaires attempt to quantify preferences regarding risk taking and the questions asked are often too vague to be of any real help for ensuring that clients are sold suitable products.

3. Do the questionnaires measure risk tolerance correctly?

This second analysis uses the answers to the questionnaires provided by a sample of persons taking part in this study.

Nature of the sample and methodology

Each individual filled in three questionnaires, including a “benchmark” questionnaire. The authors designed the benchmark to be fully MiFID-compliant. However, it also goes beyond the directive's requirements by providing a quantitative and multidimensional measurement of the respondent's attitude towards risk. This measurement is a key step in providing suitable investment recommendations for each client. In some ways, the benchmark represents the “ideal” questionnaire with respect to the constraints set out in the letter and spirit of MiFID, and it constitutes a point of reference for ex post quantitative analysis. The method used in this study makes it possible to evaluate the consistency of the different questionnaires under review with the benchmark questionnaire. The analysis places special emphasis on the capacity of the questionnaires to correctly measure investors' preferences regarding risk taking. The benchmark questionnaire uses the econometrics of qualitative variables to measure the three dimensions of risk-taking preferences that are the most important when providing investment advice. These three dimensions are a few of the dimensions revealed by risk economics, experimental economics and behavioural finance. They are risk tolerance, loss tolerance and the tendency to distort probabilities. None of the

questionnaires under review have provided for measurement of the latter two dimensions, which are not explicitly mentioned in MiFID, despite their importance for the quality of investment advice. Therefore, the analysis of the questionnaires focuses on the first dimension: risk tolerance.

Only a minority of the questionnaires in our sample rely on scoring techniques that attribute points for each answer. Furthermore, the questionnaires under review that do rely on scoring techniques generally fail to use sufficiently sophisticated econometric methods when setting their scoring rules.

The sample of respondents is largely made up of people in the TNS Sofres SoFia panel. A small section of the sample comes from a financial intermediary that agreed to take an active part in the research project by providing TNS Sofres with contact information for some of its clients so that they could be asked to take part in the study. The whole panel was made up of members with an average age of 49, most of whom are employed in the private sector or retired. The panel members are more affluent on average than the total French population, since at least 82% own at least one real estate asset. Their average financial assets stand at €250,000 and their average monthly net income stands at €5,500. The median amount of their planned investment is nearly €50,000 for an average period of 10 years. Their main investment objectives are providing for retirement, increasing net worth and purchasing or renovating real estate.

Generalised scoring method

A “generalised score” method was used more specifically to measure the capacity of each questionnaire to accurately evaluate the respondents’ risk tolerance. A Risk Index was compiled for each individual on the basis of the benchmark questionnaire and then subjected to a regression analysis with the answers that each respondent gives for each questionnaire. This produced an “artificial” score, which is different from the score calculated by financial intermediaries when a scoring technique makes such calculations possible. The “artificial” score can be defined as the best score that an intermediary could produce using its own questionnaire (compared to the benchmark Risk Index). The findings are as follows:

- ➡ One third of the questionnaires have an overall explanatory power that exceeds 25% (with a maximum of 37.6%), while another third fall short of 10%.
- ➡ By optimising the model, which means eliminating the least relevant questions in each questionnaire, the explanatory power of the remaining questions reaches 40% for two questionnaires. On average, the optimised relevance of all questionnaires stood at 23%.

An explanatory power of 40% is a reasonable minimum for deeming that the questionnaire asks the right questions to measure risk tolerance. This threshold means that 40% of the variations in the Risk Index for the population of investors can be explained by the questions asked in the questionnaire under review.

Consistency of risk tolerance measured by different questionnaires with the Risk Index

The focus was then narrowed to those questionnaires with a scoring technique. The aim was to measure the consistency of scores from one questionnaire to another (pair-wise) and then compare the scores with the Risk Index calculated using the benchmark questionnaire:

- ➔ The correlation of scores calculated by the different financial institutions provided a preliminary indicator of their consistency. The scores are only weakly correlated, suggesting that different financial institutions evaluate the same respondent's risk tolerance differently and, consequently, provide very different investment advice. The maximum correlation was approximately 40%, but half of the correlations were around 20% and one was only about 10%. These are low levels of correlation for scores that are supposed to measure the same characteristic, in this case risk tolerance.
- ➔ The correlation of the different financial institutions' scores with the Risk Index varied greatly. Two of the questionnaires produced a score correlated with the Risk Index by more than 40%.

Comparing the different analyses

Finally, the comparison of the ex ante and ex post analyses shows that compliance with the criteria required by MiFID and the related laws and regulations does not necessarily mean that retail investors' risk tolerance is properly evaluated, and vice versa.

4. Conclusions of the study of the questionnaires

In sum, the analyses of the questionnaire contents and their capacity to evaluate risk tolerance show that financial intermediaries are willing to establish an aid for investment advice using such questionnaires, while fulfilling the regulatory requirements stemming from MiFID. This was a difficult task however, and financial intermediaries' responses to it vary and leave room for improvement. Some of the problems include:

- ➔ the wide latitude for interpretation left by the directive, which contributes to the diversity of the questionnaires;
- ➔ the lack of benchmarks or models for financial intermediaries in this new exercise;
- ➔ the obvious operational constraints that come with this type of exercise, particularly the difficulty of polling a large number of clients on a topic that many of them consider sensitive.

Based on the findings and an analysis of academic research, a number of criticisms and some advice for designing questionnaires can be put forward, without overlooking the constraints that may be associated with operational implementation.

- ➔ **Market participants do not systematically computerise their questionnaires or construct databases**, even though this is essential for the effectiveness and quality of investment advice. That said, the leading service providers have developed tools in the form of **questionnaires** that are sometimes integrated into a Customer Relationship Management (CRM) system.
- ➔ Questionnaires **comply to varying degrees with the recommendations of the various laws and regulations** relating to MiFID regarding investment advice: MiFID itself [10, 35], the AMF's briefing paper [3], the Delmas-Marsalet Report [23], CESR guides [8, 9], and the academic literature. **Most of the MiFID questionnaires attempt to evaluate risk-taking preferences**, but they are not always successful because of the ambiguity of the directive [35] and its implementing decree [10], despite the clarification provided by the AMF's briefing paper [3]. Only one third of the questionnaires try in some way to **quantify** risk aversion. And yet quantitative measurement of risk-taking preferences is the only reliable way to ensure that suitable products are sold to clients.
- ➔ **Fewer than half of the financial institutions polled have developed scoring rules** for categorising investors by risk profile. Furthermore, the vast majority of the scoring rules that do exist consider only one dimension, whereas preferences regarding risk taking have many dimensions, not counting the other dimensions that MiFID explicitly requires the questionnaires to measure.
- ➔ The risk profile questionnaires in use do not seem to rely on true **econometric methods** to determine their scoring rules, meaning the points attributed for different answers. Consequently, the classification of investors is still based on **subjective judgments**, rather than on data and quantified findings, for virtually all of the questionnaires giving a score. This entails great disparities in the advice that different institutions give to the same investor with the same investment plan.
- ➔ **The risk profile questionnaires do not give proper consideration to current economic conditions**, which (wrongly) have an excessive influence on clients' answers, thus distorting their risk profiles. These distortions need to be corrected before providing investment advice. This can be achieved by **tracking clients over time** and periodically recalibrating the scoring rules. Recalibration can eliminate the disruptive effects that current economic conditions have on the clients' answers, enabling institutions to provide them investment advice that is suitable to their true risk-taking preferences, regardless of the economic conditions prevailing at the time they fill in their questionnaires.

5. Recommendations for designing questionnaires that comply with the letter and spirit of MiFID

- ➔ Investors' experience cannot be measured solely by their own subjective evaluation, which is usually heavily influenced by current economic conditions. **An objective evaluation of their experience is also needed**, looking at investment choices actually

made and the number of years that they have been investing. These two sources of information are imperfect, but they can be more reliable together, combining stated preferences and revealed preferences.

- ➔ The questions need to be asked in a specific context, and not in an abstract manner with no conceptualisation. **Only questions that are explicitly asked in an investment context** constitute a helpful basis for offering investment advice. Preferences regarding risk taking measured in other contexts may be very different from financial risk tolerance. Consequently they are not very relevant for providing investment advice.
- ➔ To ensure the quality of investment advice, the evaluation of risk-taking preferences needs to be based on **quantitative** measurements. The measurements must not just concern risk tolerance, it must also incorporate **loss tolerance** and the **tendency to distort probabilities**. A quantitative approach is the only way to implement econometric models to underpin client-product suitability.
- ➔ The risk profile questionnaires must give due consideration to current economic conditions, which (wrongly) have an excessive influence on clients' answers and distort their risk profiles. These distortions need to be **corrected** before providing investment advice. Tracking clients over time and periodic and proactive reviews of scoring rules make such corrections possible.

Project participants

A. Autorité des Marchés Financiers

➡ Fabrice Pansard

Head of Research Department, Regulation Policy and International Affairs Division

➡ Elisabeth Fonteny

Economist, Research Department, Regulation Policy and International Affairs Division

➡ Bruno Gizard

Deputy Secretary General in charge of the Investment Services and Asset Management Division

B. Research team

➡ André de Palma

Project Manager, Ecole Normale Supérieure Cachan and Ecole Polytechnique

andre.depalma@ens-cachan.fr

➡ Nathalie Picard

Co-Project Manager, THEMA-Université de Cergy-Pontoise and Ecole Polytechnique

nathalie.picard@polytechnique.edu

➡ Céline Brunet

Special Assistant, Ecole Normale Supérieure Cachan

➡ Adélaïde Olivier

Student, ENSAE Paris Tech

➡ Sri Srikandan

Computer Scientist, Ecole Polytechnique

C. Other collaborators

➡ Romain Boulland

Student, ENSAE Paris Tech

➡ Rafik Khier

Student, ENSAE Paris Tech

➡ Emilie Tidjani

Student, THEMA-Université de Cergy-Pontoise

D. Financial institutions

The list of persons in the various financial institutions and other structures that participated in this study can be found in Annex A.

E. TNS Sofres

➡ Cyril Massin

Client Manager, Finance Department, TNS Sofres

➡ Magali Tran

Senior Researcher, Finance Department, TNS Sofres

Contents

Acknowledgements	2
Executive Summary	3
1. Background and purpose of the study	3
2. Compliance with MiFID requirements	4
3. Do the questionnaires measure risk tolerance correctly?	5
4. Conclusions of the study of the questionnaires	7
5. Recommendations for designing questionnaires that comply with the letter and spirit of MiFID	8
Project participants	10
A. Autorité des Marchés Financiers	10
B. Research team	10
C. Other collaborators	10
D. Financial institutions	11
E. TNS Sofres	11
Contents	12
I. Background and objectives	14
A. General remarks and background	14
B. Financial institutions and investors	14
C. Legislation	15
D. Outline	16
E. Additional introductory remarks	17
II. Regulatory framework and theoretical contributions	18
A. Regulatory requirements for questionnaires	18
B. Economic theory and the spirit of MiFID	24
III. Ex ante qualitative analysis of the questionnaires	31
A. The questionnaires and their use by financial institutions	31
B. Analysis of questionnaire contents	35
C. Interpreting the questionnaires	38
D. Questionnaire compliance analysis	40
E. Summary of the ex ante analysis	48
IV. Ex post quantitative analysis of questionnaires	49
A. Creating the databases	49
B. Descriptive statistics	53
C. Construction of a Risk Index and Artificial Scores	62
D. Analysis of questionnaires with a score	72
E. Ex post analysis of the questionnaires	78
V. The ex ante and ex post analyses in perspective	81
A. Compliance scores versus artificial scoring	81
B. Implications for questionnaires with a score	83

VI. Conclusions and recommendations	87
References	89
Glossary	92
VII. Annexes	94
A. Institutions taking part in the study	94
B. Persons interviewed	95
C. Key concepts addressed in the reference sources	97
D. Construction of compliance scores	99
E. Principal Component Analysis of MiFID questionnaires	100
F. Descriptive statistics: main findings	104
G. Distribution of scores and profiles	112
H. Self-assessments	116
I. Consistency between financial institutions' own scores	119
J. Consistency of financial institutions' scores with the Risk Index	122
K. Comparison of institutions' scores with the Artificial Score	123
List of tables	124
List of figures	125

I. Background and objectives

A. General remarks and background

The recent financial crisis has highlighted the growing interdependence of markets, financial participants and the various investment products on offer. Retail investors have access to an increasingly wide range of products that may suit their investment plans through financial intermediaries (banks in most cases) and/or their investment advisers. The financial crisis has undermined the relationship between individual investors and financial intermediaries by increasing the resulting mis-selling risks:

- ➔ the liquidity crisis affecting banks during the financial crisis may have influenced their investment advice to some degree in their effort to maintain savings deposits on their balance sheets;
- ➔ the financial crisis also resulted in a poor understanding of the recently redesigned product range.

In other words, the recent turmoil in finance has exacerbated structural problems stemming from informational asymmetry between product distributors and retail investors, and the fact that the two sides are not always working towards the same ends.

B. Financial institutions and investors

A legislative framework was established to regulate relationships between financial institutions and their clients with the objective of investor protection in order to overcome the negative consequences of asymmetrical information and conflicts of interest that could mar relationships between investors and financial institutions. Investor protection is a critical issue in relationships between clients and financial institutions. If investors were able to find out about financial products on their own and measure their needs and risk-taking preferences accurately, there would be no need for investment advice. But it is hard for every participant to find information, which, in addition, is difficult to explain and communicate. For this purpose, an investment adviser needs to size up investment clients in all their dimensions, including personality, financial situation and investment plans, in order to help them make decisions.

We have listed seven types of relevant questions in this context and have attempted to provide answers to them throughout this report.

1. How much to invest?
2. What are the investment objectives?
3. What are the returns and risks expected by the investors?
4. Which products should be purchased?
5. How should investments be managed?

6. What is the timeframe?
7. When should the investor enter or leave the market?

These are difficult questions and it is normal to at least attempt to frame them in the spirit of MiFID [10, 35].

C. Legislation

Various laws have been passed in France and throughout Europe to regulate the adviser-client relationship more effectively. The purpose of these laws is to protect the clients of financial institutions, including both retail and institutional investors. The laws also seem to protect financial institutions, since they set out conduct of business rules for advisers. These rules provide for checklists that protect compliant institutions by ensuring protection for clients.

But any rule needs two types of interpretation. The first, which is also the most obvious, concerns the suitability of the rule: is it consistent with legal, economic and psychological principles and does it deal with familiar practices? The second interpretation looks at the way these rules are enforced. Quite often, lawmakers will lay down the rules, but they do not explain clearly enough how to enforce them. This is particularly true in the case of European directives. A directive would be useless in practice if nobody knows how to enforce it.

France started enforcing the Markets in Financial Instruments Directive [10] on 1 November 2007, nearly three years ago. It seemed important to the Autorité des Marchés Financiers (AMF), which commissioned this study, to look at how well financial institutions have complied with European legislation.

One of the key points of our study will be to find out if financial institutions have acquired the means to collect the information needed to measure investors' economic capabilities and their psychological traits in order to offer them financial products that they understand and that meet their needs.

To accomplish this, we have proceeded as follows:

- ➔ Contacts with financial institutions;
- ➔ Handover of the financial institutions' questionnaires and their scoring rules, if any;
- ➔ Gathering of supplementary information;
- ➔ Analysis of the questionnaires and calculation of scores for compliance with regulations and benchmarks in terms of questions asked;
- ➔ Adaptation of the benchmark questionnaire (academic);
- ➔ Data collection via the dedicated website or via TNS Sofres;
- ➔ Analysis of the data collected;
- ➔ Calculation of artificial scores for all of the questionnaires;
- ➔ Analysis of scores for questionnaires that use scores;

- ➔ Econometric evaluations of the various questions found in the financial institutions' questionnaires, based on respondents' answers.
- ➔ Recommendations.

D. Outline

In Section I, we discuss the background and objectives of the study that the AMF commissioned from Ecole Normale Supérieure de Cachan.

Section II presents the regulatory framework and theoretical contributions. In Section II.A, we analyse the recommendations contained in four regulatory and advisory texts, called the “references”: MiFID [10, 35], the AMF commentary on MiFID [3], the Delmas-Marsalet Report [23] and CESR's *A Consumer's Guide to MiFID* [8]. In Section II.B, we review the recommendations made in the academic literature, especially in behavioural finance research, which emphasises the multiple dimensions of attitudes towards risk.

In Section III is an ex ante qualitative analysis of the questionnaires. In Section III.A, we discuss financial institutions' use of the questionnaires in practice, based on interviews with the managers in charge of the questionnaires. Their answers are cited anonymously so as not to stigmatise one institution or another, since the results vary greatly. In Section III.B, we analyse the questionnaire contents, using the criteria highlighted in the four reference texts cited above, as well as the criteria suggested in academic research. In Section III.C, we develop questionnaire compliance grids and we give “compliance ratings” with respect to the four reference texts and the academic criteria. In Section III.D, we analyse the data, using Principal Component Analysis first, and then using a Hierarchical Ascendant Classification.

Section IV presents a quantitative ex post analysis of the questionnaires. It describes the compilation of databases (Section IV.A), the statistics on the individual data collected from investors (Section IV.B), a “benchmark score”, called the *Risk Index*, based on a benchmark questionnaire (Section IV.C), and an *Artificial Score* for each questionnaire analysed based on the Risk Index. Then we analyse the questionnaires that use scoring (Section IV.D). In Section IV we compare the scores of the various questionnaires with each other and then we compare their scores with the *Risk Index* that we have constructed. This analysis also enables us to evaluate the econometric relevance of the various questions asked with respect to the answers given.

In Section V, we compare the ex ante analyses, meaning the compliance ratings discussed in Section III with the ex post analyses based on the scores discussed in Section IV. On the one hand, we compare the ex ante compliance ratings with the ex post Artificial Scores for all questionnaires (Section V.A). And, on the other hand, we compare the scores given by institutions that use scoring methods in their questionnaires with the Artificial Scores that we have calculated (Section V.B).

In Section VI, we present our conclusions and recommendations. Obviously, we do not make any judgments about the quality of the questionnaires, but we do make some recommendations nevertheless.

Interested readers will also find a glossary and a list of references. The annexes to this report contain a series of findings.

E. Additional introductory remarks

A great deal of work went into this report. It should be stressed that no such evaluation of MiFID questionnaires with ex ante and ex post comparisons has yet been conducted. This means that many of the matters discussed here are completely original, not only in France, but, as far as we know, on the international stage as well.

To the best of our knowledge, no country has had an opportunity to analyse the internal or external relevance of the tools used by financial institutions. No studies have been done to collect data where the same respondents fill in several MiFID questionnaires in order to compare the investment profiles and recommendations provided by different institutions to the same investor.

Consequently, the recommendations in the last section of this report are based on original data and statistical and econometric analyses, which makes them unique. It is our hope that this type of validation of tools developed by financial institutions becomes more widespread and, more especially, that it continues in the future.

II. Regulatory framework and theoretical contributions

Article 19 of Directive 2004/39/EC of 30 April 2004 on Markets in Financial Instruments [35], or MiFID, as supplemented by the Implementing Directive 2006/73/CE of 10 August 2006¹ [10], specifies the information that financial institutions are required to gather from their clients. This information should then be used to determine each client's risk profile, in order to define a suitable investment strategy that meets their objectives and their constraints.

A. Regulatory requirements for questionnaires

The information that financial institutions are required to obtain is stipulated as follows in the fourth and fifth paragraphs of Article 19 of MiFID [35]:

“the investment firm shall obtain the necessary information regarding the client's or potential client's knowledge and experience in the investment field relevant to the specific type of product or service, his financial situation and his investment objectives so as to enable the firm to recommend to the client or potential client the investment services and financial instruments that are suitable for him”.

Despite the explanations provided in the Implementing Directive [10], there is considerable leeway for interpreting how these requirements are to be implemented, particularly when it comes to the tools used to determine the client's risk profile. The directive is very specific about the client's level of knowledge and experience, but it does not provide a specific framework for measuring the other aspects of the investor's risk profile, such as risk aversion. And yet this is a key aspect for determining investors' risk profiles. It is critical for developing a suitable investment strategy that fits each client's constraints and objectives.

To interpret the explicit requirements of MiFID and its implementing measures, we have relied on other sources that do not have the regulatory force of the directive, but still make it possible to explain the “spirit” of MiFID. These sources are:

- ➔ the interpretation of MiFID produced by the AMF [3]
- ➔ *A Consumer's Guide to MiFID* produced by the Committee of European Securities Regulators (CESR) [8, 9]
- ➔ the Delmas-Marsalet Report [23] on the marketing of financial products.

¹ This is the Implementing Directive for Directive 2004/39/EC of the European Parliament and the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive.

We also refer to many findings of behavioural finance research and, more generally, theoretical and empirical economic and psychological research that analyses individual behaviour with regard to investment decision-making and behaviour under risk.

1. Knowledge and experience

Article 36 of the Implementing Directive [10] stipulates that investment firms are required to ascertain their clients' level of knowledge and experience. Article 37-1 of the directive lists the information that the firm must obtain for this purpose:

"Member States shall ensure that the information regarding a client's or potential client's knowledge and experience in the investment field includes the following, to the extent appropriate to the nature of the client, the nature and extent of the service to be provided and the type of product or transaction envisaged, including their complexity and the risks involved:

- a) the types of service, transaction and financial instrument with which the client is familiar;
- b) the nature, volume, and frequency of the client's transactions in financial instruments and the period over which they have been carried out;
- c) the level of education, and profession or relevant former profession of the client or potential client."

The client's knowledge and investment experience are key to helping him make financial decisions and having confidence in his investment choices. The quality of the information that a financial adviser provides to its client also plays a critical role and should be adapted to the client's level of understanding and skills. The adviser also needs to make sure that the client's knowledge of financial products and investment experience actually translate into satisfactory understanding of the concepts and mechanisms behind financial instruments and markets. The fact that a client *claims* to know what a hedge fund is does not guarantee that he really does and, accordingly, he can make an ill-informed choice to invest in one.

The client's understanding must encompass two aspects: the characteristics of financial products, including the various risk dimensions in these products, and the consequences of his investment decisions. Section 2.4.3.1 of the Delmas-Marsalet Report ([23], page 45), *Training consumers of financial products*, sets the problem out very clearly:

"Consumers of financial products cannot take full responsibility unless they are able to understand the critical information about these products".

Consequently, the AMF's interpretation of the directive [3] states that firms must ensure that:

"the client has the necessary experience and knowledge to understand the risks involved in the recommended transaction or in the portfolio management service provided".

This finding is what gave rise to the creation of the Public Financial Education Institute (<http://www.lafinancepourtous.com>). This non-profit organisation was established in 2006 following a discussion on financial literacy by a working group set up by the AMF. The group concluded that a body should be set up to develop French citizens' financial and investment knowledge.

A similar body, Ecole de la Bourse (www.ecolebourse.com), was founded in 1997. It works in partnership with NYSE Euronext and the French Federation of Investment Clubs to introduce individuals to basic financial vocabulary and mechanisms, the organisation of financial markets and potential investment strategies for coping with times of crisis.

2. Financial situation

Article 35-1 of the Implementing Directive [10] stipulates that the adviser must ensure that:

“the client is financially able to bear any risks related to the recommended transaction or to the portfolio management service provided and consistent with his investment objectives”.

To provide appropriate advice, the adviser must make the investor understand that it is in his own interest to disclose his financial situation.

The directive [10] stipulates that the adviser must obtain:

“relevant information on the source and extent of his regular income, his assets, including liquid assets, investment and real property, and his regular financial commitments”.

To provide suitable recommendations, the adviser must determine the investor's capacity to tie up his money (Delmas-Marsalet Report [23]), which will depend on his available funds, constraints and liquidity needs. For this purpose, the adviser needs to ask the client about the nature and make-up of his assets (liquid and illiquid financial assets and real estate), as well as his debt. Even though the directive only mentions this aspect indirectly in the phrase “regular financial commitments”, it must be addressed through pointed questions, dealing separately with the frequency of payments and the number of payments remaining (and/or on the period before full repayment of a loan is due, and/or the amount of principal still owed).

The adviser must also obtain more qualitative information with regard to the stability of the investor's income (job security, and not just income level) and needs (rent, marital status), and factors that are likely to affect his income (professional problems, risk of divorce).

The income and its stability should be assessed for both the individual and the individual's household. If the household splits up, each member must be able to meet their personal commitments out of their personal income. The economic literature contains many examples, illustrated in Ben-Akiva *et al.* [5], where a household's choices are determined not only by total income, but also by the distribution of income within the household.

The notes on the adviser's meetings with clients should also include a historical account of the client's net worth and, more generally, the client's financial situation, to ensure proper transmission of this information. This recommendation corresponds more to an ideal than to reality because of the technological and psychological constraints associated with gathering this type of data owing to investors' reluctance to answer questions and fatigue resulting from long meetings.

3. Investment objectives

According to Article 35-4 of the Implementing Directive [10], investment objectives encompass a wide variety of aspects. These include:

“The information regarding the investment objectives of the client or potential client shall include, where relevant, information on the length of time for which the client wishes to hold the investment, his risk-taking preferences, his risk profile, and the purposes of the investment.”

The Implementing Directive includes three very distinct notions in “investment objectives”. Each of these notions is discussed in turn below:

- ➔ **investment period**
- ➔ **purposes of the investment**
- ➔ **preferences regarding risk taking.**

a) Investment period and purpose

The investment period in this context is a complex and multifaceted notion, and the different reference texts focus on different aspects of this period:

- ➔ the directive mentions “the length of time for which the client wishes to hold the investment”;
- ➔ the AMF's interpretation of the directive [3] mentions the “desired investment period”
- ➔ the Delmas-Marsalet Report [23] mentions the “investment horizon”.

Therefore, the directive and the AMF's interpretation of it focus on the investor's *wishes* with regard to the investment period, whereas the Delmas-Marsalet Report [23] also looks at potential discrepancies between this wish and the *actual* investment period. The report also stresses that advisers need to alert clients to the consequences of such discrepancies, as part of their effort to provide investment advice that is suited to the client's needs.

The *actual* investment period has major implications for the risk levels of financial products and, consequently, for the products best suited to investors in view of their attitudes towards risk. The investment period should be discussed with investors in conjunction with any liquidity constraints and the risk that they may have to cash in their investments earlier than originally planned. The Delmas-Marsalet Report addresses this point by stating that advisers need to ensure that their clients will not encounter liquidity needs during the investment period. The report also mentions, “interest on cash savings held as a precaution”

([23], page 34) in the list of clients' potential investment objectives². The report places the liquidity of a product on the same level as its risk characteristics when advice is being provided, and it stresses the importance of finding out the minimum investment period, which is a key element when recommending an investment, especially with regard to the return/risk ratio. Therefore, advisers need to provide clients with:

“all of the statistics for all of the risk products that demonstrate that the risk/return ratio of investments, notably for equities, is much more favourable when the investment period is longer” ([23], page 2).

This means that advisers must evaluate the risk that clients will need to cash in the funds invested earlier than originally planned in order to provide suitable recommendations.

b) Preferences regarding risk taking

The ambiguous language referring to “preferences regarding risk taking, risk profile” raises both theoretical and practical problems with regard to evaluation methods and criteria for investors' attitudes towards risk. Even though the Delmas-Marsalet Report stresses the need to develop advisory support resources and use standardised questionnaires to identify “investors' degree of risk appetite/aversion” ([23], page 25), it does not provide any explanation of practical steps to measure risk aversion.

The ambiguous language is cleared up in the AMF's briefing paper on MiFID (, page 43), which explicitly includes the key concept of “risk aversion” in the information about investment objectives. This concept has been defined precisely by economists specialising in risk, such as Gollier, Eeckhoudt and Schlesinger ([28]). Yet, the commentaries do not provide any method for evaluating risk aversion. However, these two notions are familiar to theorists and econometricians, who have developed precise and workable methodologies for measuring risk aversion. A *quantitative* measurement of risk aversion constitutes a critical step in the reasoning behind MiFID, since such a measurement is essential for defining an optimum investment portfolio.

Given the ambiguous language and the implementation problems, few financial institutions have acquired the means to make this type of *quantitative* measurement. In this report, we have striven to clarify the concept and to give a *quantitative* measurement of it within the context of providing advice to retail investors.

c) Investment amount

In keeping with the spirit of MiFID, we feel that the planned **investment amount** needs to be included. Even though MiFID does not mention this information explicitly, we think it is a key

² The Delmas-Marsalet Report [23] uses the term “objective” to describe what MiFID calls the “purpose” of the investment.

element for determining clients' investment objectives. The Delmas-Marsalet Report also deems that "the seller should start by asking about the **investment amount**" ([23], page 35).

4. Implications for investment advice

MiFID [35, 10] introduced important changes to the business of providing investment advice to retail clients. It requires financial intermediaries to set up information systems on:

- ➔ financial products to ensure the relevance of the information about investment products given to clients;
- ➔ investors' degree of expertise to implement the necessary resources to obtain information about clients' knowledge and experience;
- ➔ investors' financial situation to find out about investors' financial situation despite their potential reluctance to disclose such information;
- ➔ audit trails to keep a record of all services provided;
- ➔ investors' investment objectives to give due consideration to them when making recommendations.

The suitability of the services and products offered is assessed according to the clients' abilities and objectives. Accordingly, a client's objectives must be compatible with his financial situation. However, we feel there are still some problems to be solved for effective implementation of the MiFID provisions with regard to the suitability of investment advice:

- ➔ MiFID does not demand a *quantitative* evaluation of investors' risk tolerance. MiFID questionnaires often use qualitative questions that cannot be used on their own to estimate the risk tolerance value and make quantitative investment recommendations;
- ➔ Clients' investment objectives need to be considered at two levels: at the level of the investor and at the level of each of the investor's investment plans. More specifically, risk-taking preferences are partly specific to each investor, meaning that they apply to all his investment plans, and partly specific to each one of his plans. Yet, MiFID deals only with investment plans, which explains why none of the MiFID questionnaires is designed to take both levels into account. In practice, when investors present several investment plans to the same financial institution, they are either required to fill in a single questionnaire that will be used for all of their projects, or else they are required to fill in a separate questionnaire for each of their projects.

These problems could be addressed by relying on decision theory and behavioural finance theory.

B. Economic theory and the spirit of MiFID

To explain the steps needed to comply with MiFID requirements, it is helpful to review some of the advances in behavioural finance and experimental economics to explain individual behaviour with regard to financial investments. The findings of academic research, including theoretical analysis, econometric analysis and experimental economics, may help clarify the relevance of the concepts in MiFID and the related laws and regulations. More specifically, the cognitive biases found in decision-making processes under uncertainty are bound to play a major role in understanding and, more importantly, implementing MiFID.

This leads us to examine some MiFID concepts from a different angle and to consider additional elements that are not explicitly mentioned in the directive, or even in the related laws and regulations in some cases. For this purpose, we pay special attention to the different character traits and behaviour biases revealed by behavioural finance, experimental economics or decision theory.

1. Investment objectives

Here, we review, explain and expand the list of objectives to be considered in an investment plan, starting with the investor's diverse preferences regarding risk taking. These preferences and the related biases shed more light on the different characteristics to be measured using MiFID questionnaires.

a) Preferences regarding risk taking

There is a great deal of academic literature (Mangot, [34], Schiller, [38], Gollier, Eeckhoudt and Schlesinger, [28] and de Palma *et al.*, [17]) on defining and measuring risk aversion. We shall see how relevant these notions are in the context of investment advice and how effectively they can be applied.

Preferences regarding risk taking were conventionally seen as a notion with one dimension, according to expected utility theory. The Markowitz model, which is still widely used in the finance industry, is based on the idea that investors' risk-taking preferences can be described using a single parameter that measures their risk aversion. Unfortunately, this model cannot explain a number of behaviour patterns seen on the financial markets, such as the home bias (excessive preference for domestic products) or the equity premium bias, which states that the small proportion of equity typically held in portfolios corresponds to risk tolerance levels that are too low to be plausible. Recent developments in behavioural finance, which studies the other dimensions of attitudes towards risk analysed below, have started to provide some solutions to these paradoxes. The multidimensional aspect implies that each dimension of attitudes towards risk should be measured precisely in order to offer suitable investment advice for every circumstance. Failing that, the advice given at a specific instant could, in the best case, be suitable for the situation at that instant, but it would become unsuitable for a different investment, involving different amounts, or following significant changes in market conditions.

The pioneers of behavioural finance, Allais [1], Kahneman and Tversky [29, 42], described many “cognitive biases” that distort investors’ rationality. These biases affect investors’ perception of the risks and returns of financial assets. Consequently, they alter investors’ expectations and influence their decisions. Omitting these behavioural biases when measuring risk aversion may significantly skew the results of questionnaires for evaluating investors’ profiles and, ultimately, lead to less than optimum risk exposure.

Consequently, the questionnaires must incorporate these biases and other character traits in order to adapt the questions and adjust for their impact on measuring attitudes towards risk. Some of the relevant notions are:

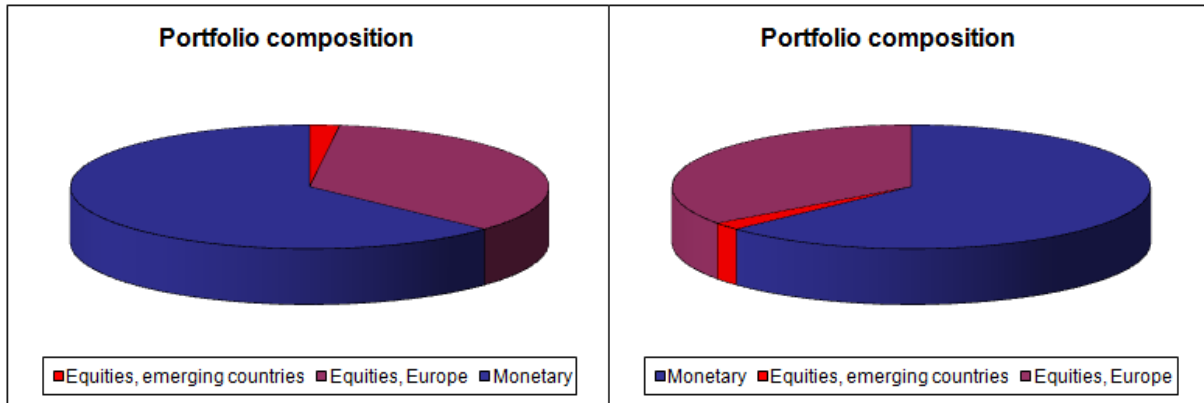
- ➔ **Risk aversion.** Investors are said to be **risk-averse** if they prefer a certain gain to a risky gain with the same expected value. This conventional notion implies that investors demand a risk premium to hold volatile assets and they tend to sell winning securities rapidly to lock in their gains. **Risk tolerance** is the opposite of risk aversion and is more familiar to investors and their advisers.
- ➔ **Assymmetric valuation of gains and losses, loss aversion.** The negative impact on welfare of the loss of a given sum is greater than the positive impact of a gain of the same amount. Investors are generally reluctant to acquire assets involving risks – even small risks – of major losses (equities, hedge funds, etc.). Yet the same investors also like assets that offer large potential gains, even if such gains are unlikely (IPOs, hedge funds or games of chance and lotteries). In addition to average returns and volatility, the attractiveness of financial products also depends on the asymmetry between gains and losses. Investors are also generally risk averse with regard to gains, but risk takers with regard to losses. They are more reluctant to accept a certain loss than an uncertain loss with the same expected value. The most important thing is the fact of losing, but they are less and less sensitive to the amount of the loss. Both types of asymmetrical behaviour explain investors’ tendency to hang onto loss-making securities longer than money-making securities (Mangot, [34]). Increasing an investor’s gains increases his satisfaction, but with diminishing returns. Consequently, the increase in welfare associated with a potential further increase in gains would be smaller than the decrease in satisfaction in the event of a loss on the same securities (Schiller, [38]). We refer readers to the empirical paper by Dimmock and Kouwenberg [24] studying the implications of loss aversion in the portfolio choices of investors living in the Netherlands.
- ➔ **Ambiguity aversion.** In decision economics, the term “ambiguity” has a very specific meaning that is a legacy of Ellsberg [26]. It is used to qualify choices where the probabilities of potential events are imprecise, doubtful or uncertain, or else where the list of potential events itself is imprecise. The “Ellsberg Paradox” reveals that a decision-maker’s choices under uncertainty are determined by both the consequences and the probabilities associated with those consequences, as assumed under the expected utility theory, but also by the decision-maker’s confidence in his own judgment concerning the probabilities. On financial markets, ambiguity aversion leads to excessive reluctance with

regard to products with poorly understood return prospects, which is particularly true of foreign products and, more especially, of *exotic products*. Ambiguity aversion explains some of home bias (i.e. an excessive preference for domestic products, even when they offer smaller returns).

- ➔ **Regret aversion.** Regret is such a powerfully negative emotion that the prospect of experiencing it causes investors to make decisions that fail to maximise performances. Investors refuse to sell an underperforming security despite its mediocre prospects in order to avoid posting a loss and to avoid any regret if the price were subsequently to rise. Therefore, investors tend to choose median strategies because they minimise expected regrets or because they maintain the status quo. On this point, see the article by Raeva, Mittone and Schwarzbach [36].
- ➔ **Representativeness and availability** These notions refer to investors' inclination to think and act as if events that have been observed, experienced or memorised are more frequent than objectively observation shows. This inclination can be seen in the markets when investors use recent performances to judge future performances (momentum bias) or make associations between "similar" securities. This often means that a decision is determined by salient but virtually anecdotal information that is given more weight than its relevance suggests, as discussed by de Palma [13] in a series of other areas besides finance. This inclination also leads to giving too much weight to the recent past, as shown by Baucells and Villasis [4], or by Ebert and Prelec [25].
- ➔ **Probability distortion** is the tendency of investors to overestimate the probability of rare and extreme events in their decision-making. This bias helps us to understand why some people are attracted to games of chance (because they overestimate the probability of winning a big payout) but still buy insurance to cover against extreme risks (Ebert and Prelec, [25]) The optimism or pessimism biases deduced in this way also explain some of the herding effects that lead to procyclical portfolio allocations. During a stock market crisis, investors are excessively wary of risky securities, even though it is a good time to buy because prices are low. Conversely, when markets are euphoric, investors tend to pressure their advisers to buy overpriced and risky products – those that are too risky for the investor's true risk aversion in normal times. The resulting portfolio allocation is sub-optimal in both cases in view of the investors true risk tolerance and the real prospects for the market.
- ➔ **Framing effects** also influence perceptions. The way a product is presented, and even the type of chart used to represent its components or its returns, influences the way investors perceive risks and influences their risk taking. Kokinov and Raeva [32] revealed the framing effects associated with how presentation of questions influences respondents' behaviour. They demonstrated within the context of experimental economics that the same respondent taking part in the same experiment involving playing cards took more risks when the photo of a smiling baby on the back of each card was replaced by a photo of James Bond. This experiment further emphasises the fact that the impact of circumstances that are deemed to be secondary (pictures on playing

cards) can actually turn out to be primordial. In the case of descriptions of financial products, similar framing effects are at work, if 3-D pie charts are used, for example. In Figure 1, the share of emerging country equities may seem larger on the left, even though the composition of the portfolio is exactly the same on the left and on the right.

Figure 1 - Framing effects for a hypothetical portfolio



b) Investment period

The notion of an investment period is complex and takes many forms. The Delmas-Marsalet Report [23] stresses the distinction between the originally intended period and the actual period of the investment in question, suggesting that investment advisers need to consider both of these very distinct concepts. The difference between the two stems partly from the **temporal framing**, which corresponds to the frequency with which an investor reviews his past strategy and validates his future strategy. As time goes by, the residual investment period automatically diminishes, which generally, rightly or wrongly, leads the investor to reallocate the portfolio, gradually boosting the share of less risky products. As the Delmas-Marsalet Report [23] points out, equity investments become increasingly risky as the residual investment period diminishes. For a given level of risk aversion, the investor is naturally inclined to reduce the risky components of his portfolio to compensate for the increase in risk as the residual period diminishes.

The more frequently investors review their strategy, the more they tend to choose low risk-low return assets (Gneezy and Potters, [27]).

As we can see, research has revealed a series of cognitive and behavioural biases that are likely to influence investors' choices. This calls for an evaluation of how far these biases affect financial investments. We shall see in Section IV.C.1 that these biases are indeed present and quantifiable in the case of the risk profile questionnaires.

c) Purpose of the investment

The purpose of the investment has a substantial influence on investment decisions resulting from the investors' **mental accounting**, as revealed by Thaler ([40]): investors earmark their financial assets. Each earmark corresponds on the source of funds to be invested and a very specific purpose (security, income, growth, wealth, etc.) and concerns the assets best suited to that purpose. However, investment advice often neglects the complexity of investors'

attitudes towards risk, and the correlation between *earmarks*, which means the advice is ill-suited to clients' needs.

The more holistically the portfolio is considered, the more optimal the diversification becomes, but the investors' actual perception is usually far removed from this optimum diversification. *Earmarking* is actually contrary to effective management of an individual's assets. However, it is common enough in investors' minds to be addressed explicitly when giving them advice. Viviana Zelizer, a sociologist from the University of Princeton, quoted by La Finance Pour Tous, asserts that "money does indeed smell and its users appropriate it for themselves and colour it with social, cultural or emotional meanings". The contributions of various philosophers (see, for example, Simmel [39]) and sociologists in this area are also worthy of discussion, even though this report is not the place for such a discussion.

2. Knowledge and experience of financial markets

a) Financial education

Clients' knowledge is closely linked to their level of *financial education* and to their investment experience (nature of past transactions, relevant current or past profession, etc.) Financial education should enable investors to understand and master such notions as cumulative returns, the intrinsic risk of each financial product, or correlations of returns on different products and portfolio diversification. In France, the main organisations striving to disseminate financial education are La Finance Pour Tous and Ecole de la Bourse (presented at the end of Section II.A.1).

When managing risk in their portfolios, investors too often consider only the intrinsic risk of various assets and overlook correlations of returns on different products. Too often, they have a **poor understanding of the correlation principle**. This means that their portfolios are not adequately diversified and that they overlook assets that may be very volatile, but could reduce the overall risk in their portfolios since they are negatively correlated to the other assets in their portfolios.

b) Investment experience

Investment experience improves knowledge of financial products and mechanisms through learning by doing.

However, past successes and failures often and wrongly influence investors' beliefs and expectations.

Past successes create **overconfident** investors through self-attribution bias. Overconfidence (de Bondt and Thaler, [11]) causes an individual to overestimate his own abilities or good luck. It leads to excessively frequent trading on financial markets, decreased risk aversion and inhibited loss aversion.

Several mechanisms create or exacerbate investors' overconfidence: **confirmation bias** causes people to remember only events that are positive for them, **self-attribution bias** causes people to believe that their successes can be attributed to their own ability and that

their failures are caused by external forces. **Optimism bias** makes investors believe that everything will go their way. Conversely, **pessimism bias**, which is exacerbated by past failures, makes investors overestimate the risk of incurring similar losses again. These biases, combined with the representativeness and availability bias, and the tendency to give too much weight to the recent past, explain the excessive influence of investors' life experiences in their subsequent investment decisions.

The problems relating to investors' knowledge and experience are easier to solve in discussions between investors and their advisers, when they fill in the MiFID questionnaire together and select financial products, than in the questionnaire itself.

3. Personal characteristics

The regulations are not very explicit about the social and economic characteristics of the investor to be included in MiFID questionnaires. The only exception for MiFID [10] relates to investors' education and profession, which are part of the information about the clients' knowledge and experience. And yet education and profession are not the only factors determining an investors' attitude towards risk.

Much research (e.g. Mangot, [34], El-Mekkaoui-De Freitas *et al.*, [33], or de Palma and Picard *et al.* [14], de Palma *et al.* [17]) has actually shown that all social and economic factors, such as gender, age, household income, marital status, residential status, household size and number of years of higher education, are significant determining factors for risk aversion. These findings have been confirmed by de Palma *et al.* [15] using data collected online from investors.

More specifically, there are significant differences in men's and women's perception of risks (Mangot, [34]; de Palma *et al.*, [19]). Women are more risk averse and more loss averse than men and rely more on their acquaintances or financial advisers to get information. Men are more likely to make their decisions on their own. They also take more risks and trade more frequently. In general, men are more optimistic than women are about the economic situation and about the prospects for financial markets. Excessively risk averse or risk taking behaviour patterns **are** moderated by experience.

4. Financial situation

MiFID stipulates explicitly which information needs to be considered to ascertain the client's financial situation. This information covers the client's assets, source and extent of regular income, debt and recurring financial needs.

Net worth and income are important factors for evaluating the risk of a portfolio. When the investor's preferences can be characterised as Constant Relative Risk Aversion (CRRA), the only thing that counts is the relative risk of his portfolio. This means that the investor feels that he is incurring the same risk when he invests €50,000 out of total assets of €500,000 as when he invests €5,000 out of total assets of €50,000.

Conversely, for an investor whose preferences are characterised as Constant Absolute Risk Aversion (CARA), the only thing that counts is the absolute risk of his portfolio. This means that, when he invests €50,000, he feels that he is incurring the same risk (and, consequently, makes the same portfolio allocation) whether this investment represents all of his assets or only one-tenth of his assets. More generally speaking, investors' preferences need to be tested in order to provide investment advice under all circumstances. In practice, this means finding the utility functions that best describe their risk-taking preferences. The basic methodology for doing so is described in de Palma, Picard and Prigent [18].

The stability of investors' income and needs may also have a considerable influence on their attitude towards risk, as pointed out by Guiso and Paiella [29] in their research on background risk. They show that the optimum risk level for a portfolio decreases in line with the risk level for other resources, even though portfolio returns are independent from income or net worth.

5. Implications for designing MiFID questionnaires

In light of the academic literature on behavioural finance, experimental economics and decision theory, there are two main findings to be addressed:

- ➡ The way that questions are worded in MiFID questionnaires, as well as in the more general context of financial institutions' information-gathering, is critical. This impact still needs to be studied and we do not have the information or the resources to conduct such a study. This analysis also involves a degree of subjectivity that could lead to difficult discussions. Yet, on the one hand, we made an effort throughout Section II.B to evaluate the presence of questions that could measure this or that element stipulated in the MiFID reference texts (without commenting on the wording of the specific questions) and, on the other hand, we analysed how well the various questions captured investors' risk-taking preferences in Section IV. This analysis is based on a specific statistical and econometric methodology, and on the data that we collected for the purposes of the study.
- ➡ The academic research cited suggests that of all the various elements with potential relevance for behavioural finance, in addition to risk aversion, two dimensions play a critical role. The first relates to loss aversion and the second to probability distortion. These two dimensions are discussed in Section IV, as part of the quantitative analysis of MiFID questionnaires. It should also be noted at this point, that omitting these secondary dimensions of the attitude towards risk could bias the measurement of the first dimension (risk tolerance). This makes it critical to measure them.

III. Ex ante qualitative analysis of the questionnaires

Before making a quantitative analysis of the questionnaires using the data collected for this project (see Section IV), we made an ex ante analysis of the questionnaire contents. The objective was to understand how well each questionnaire complies with the requirements of MiFID [10], and with the spirit of MiFID. Since the directive is vague with regard to certain notions, we feel that it does not provide a sufficiently rigorous framework for producing investor profiles. Therefore, we have included all of the additional notions provided by the AMF [3], CESR [8], the Delmas-Marsalet Report [23] and academic research, taking care to distinguish between them in each case.

After describing how institutions use the questionnaires and the notions measured by the questionnaires, we developed a scorecard for the questionnaires, along with a rating system. We used this system to attribute compliance ratings to the questionnaires and to classify the questionnaires according to the weight they give to specific criteria in the directive [10].

A. The questionnaires and their use by financial institutions

As part of this study, we evaluated 14 MiFID questionnaires from 10 institutions that took part in the study. Information about these questionnaires is summed up in Table 1 and discussed below.

The information reflects the situation at the time we met with the institutions concerned. It is subject to rapid changes, since some institutions are revising their questionnaires and others are working on integrating them into their information systems.

1. Participating institutions

The institutions that agreed to collaborate on this project are listed in Annex VII.A.

We were able to evaluate questionnaires produced by:

- ➔ three banking groups doing business in both retail banking and private banking
- ➔ three mutual banks, including two that also produce a private banking questionnaire
- ➔ two private banks
- ➔ one online bank
- ➔ a body representing independent wealth advisers.

2. Questionnaire targets

The vast majority of institutions combining retail and private banking business have developed two separate questionnaires for these two clienteles, which have very different needs and profiles.

The questionnaires were classified into three categories according to the way they are used by the financial institutions concerned. Throughout this report:

- ➔ pink type is used for private banking questionnaires (C, D, E, K, L, M);
- ➔ blue type is used for retail banking questionnaires (F, G, N, O);
- ➔ violet type is used for general-purpose questionnaires used for both retail and private banking clients (B, H, I, J).

3. Scoring rules

Scoring is common practice for producing investor risk profiles. It makes it possible to ensure systematic and equal treatment of clients and avoids potentially overly subjective reactions by financial advisers. Scoring is often criticised as an unfriendly approach that creates a distance between advisers and their clients. We think that, on the contrary, scoring is an effective tool for strengthening and improving the adviser-client relationship, as long as it is based on sound science and produces relevant and effective investor profiles. Sophisticated scoring methods are in use for lending. But similar methods do not seem to be used so systematically for financial investments.

Of the 14 questionnaires, 6 questionnaires produced by 4 financial institutions are used with scoring rules, but we were only able to obtain 5 sets of scoring rules out of the 6. Only one questionnaire uses multidimensional scoring rules. We have not analysed the latter questionnaire in this report in order to preserve confidentiality.

4. Administering the questionnaires

All the participating financial institutions stressed how hard it is to get clients to fill in the questionnaires. This explains why clients sat down together with the adviser to fill in 10 of the 14 questionnaires analysed and why only 4 questionnaires were self-administered. Clients' reluctance to answer questions that are seen as overly complex also makes it very difficult to update the answers to the questionnaires on a regular basis. However, such updates are needed at least once every two years. All that is needed is to select some especially important questions, where the answers vary greatly over time, primarily as a result of changes in economic conditions, or in clients' financial situations or marital status. The list of questions could be optimised to ensure succinctness, which is critical for making the client agree to the review, as well as the relevance of the updated information for effectively adjusting investment advice. In this case, the scoring rules obviously need to be updated as well, which is not currently the case.

5. Integration of questionnaires into financial institutions' information systems

Integration of the questionnaires into the Customer Relationship Management system (CRM) means that some fields can be filled out by the system, thus easing the burden on clients. For example, the system can fill in the answers about personal characteristics, as long as the information in the system is up to date. Such integration optimises the processing

of answers and may also help optimise investment recommendations. Integration into the institution's information system has already been achieved for 6 questionnaires produced by 4 institutions.

In 2 institutions that produce 3 of the questionnaires, warning systems based on the MiFID questionnaires restrict clients' access to certain products. These systems prohibit certain investments depending on the client's profile. Similarly, the information system blocks the opening of securities accounts for clients who refuse to answer all the questions. These restrictions are desirable. However, they are primarily part of a preventive approach related to regulatory requirements. More systematic integration of questionnaires into information systems would be desirable because it would optimise investment recommendations, thereby improving the advice provided to clients. But, to be effective, integration calls for a degree of flexibility that current information systems are generally unable to offer.

For one of the participating institutions, a mutual bank, integrating the questionnaires is a complex project because the institution runs several information systems.

Table 1 – Use of questionnaires by financial institutions

Questionnaire	Frequency of use	Scoring rules	Computerisation	Self-administered	Integration into CRM system	Revision of questionnaire in progress
QB	When opening a securities account	Yes	Computerised process with signed hard copy for client	No	No	No
QC	Every three years at most	Yes	Computerised process with signed hard copy for client	No	Yes	Yes
QD	When opening a securities account	Yes	Computerised process with signed hard copy for client	No	No	Not provided
QE³	When opening an account	Yes	Yes (+ scan of signed hard copy)	No	Yes (+ alerts)	Yes
QF	High net worth: every year; others: every 2 years	Yes	Yes	No	Yes	Yes
QG	Not provided	Yes	Yes	Yes	Yes	No
QH	Not provided	Yes ⁴	Computerised process with signed hard copy for client	No	No	Project for integration into CRM system
QI	Variable	No	Paper form	No	No	No
QJ	Not provided	No	Yes	Yes	Not provided	Yes
QK	Not provided	No	Yes	Yes	No	Not provided
QL	Annually and following certain events	No	The client fills in a paper form	No	Yes, but at a later stage	Yes (2 nd half of 2010)
QM	Not provided	No	Paper form filled in during a meeting with the adviser	No	No	No
QN	Not provided	No	Yes	Yes	No	Not provided
QO	Mandatory for opening a securities account; update drive launched after 2 years	No	Yes (A scan of the paper copy signed by the client is kept on file)	No	Yes (+ alerts)	Yes

³ Specific to discretionary asset management.

⁴ These rules exist, but they were not given to us.

B. Analysis of questionnaire contents

The questionnaires produced by institutions must enable them to meet their obligations under MiFID [10], which include knowing clients better in order to ensure that products and services are suitable for their investor profile. For this purpose, the questionnaires need to define the profile of any potential client, but providing an adequately exact diagnosis of his financial situation, while accurately ascertaining his objectives, his understanding of the markets and his level of knowledge and experience regarding financial products.

But the most delicate task that these questionnaires need to perform is to measure investors' risk-taking preferences. This measurement needs to be the base for building up a suitable portfolio for each client. This point is the primary focus of the ex post analysis of the questionnaires in Section IV.

Questions in MiFID questionnaires need to be relevant so that the client's answers can reveal his investor profile. The 14 MiFID questionnaires analysed in our study deal with the key concepts in more or less detail but, regrettably, they are generally dealt with on an "overall" basis, and not with specific reference to the client's planned investments. In fact, the notion of investment plans is not addressed in the evaluations carried out by financial institutions.

In practice, a wide range of answers is provided for the client, with an average of four choices per question. This tends to improve the accuracy of the questionnaire results. On the other hand, this number of possible answers seems low for certain criteria and forces the client to make choices that may not reveal his true preferences. This is the case, for example, when a closed question asks the client to choose between three types of investment. Here, the client has to choose one of the three, even if it is not the investment he would prefer in absolute terms, since that option was not offered.

1. Knowledge and experience

All the questionnaires ask about the client's financial experience and knowledge, which shows how important financial institutions deem this criterion to be. On the other hand, the criterion is all too often restricted to the client's practical experience (past investments, investment amounts and frequency, knowledge of financial markets, etc.) for the purpose of classifying the client as either a "retail client" or a "professional client".

Regrettably, MiFID questionnaires generally do not attempt to assess clients' knowledge from the point of view of financial literacy. In most cases, the client is asked to judge his own investment abilities. And yet research has clearly shown (see, for example de Bondt and Thaler, [11] or Ritter, [37]) that investors generally tend to overestimate their financial ability, which severely limits the relevance of such questions if no serious verification is carried out.

Furthermore, several questionnaires use technical language and some of them ask clients to compare portfolios or consider hypothetical changes in returns shown on charts, without clearly defining the concepts and mechanisms involved, such as risk, the risk/return trade-off of financial products or the impact of the investment horizon on risk taking. Furthermore, these questionnaires do not attempt to verify that the client has understood the questions properly, despite the complexity of the questions asked. If the client is new to investing, he probably does not have the technical abilities needed to understand the questions being asked and to make an informed choice when answering them.

2. Financial situation

The analysis of the client's financial situation is more or less detailed and comprehensive in 9 of the 14 questionnaires, even though the directive [10] clearly and explicitly requires a full diagnosis of the client's finances in order to assess his investment needs and capacity.

Furthermore, even when questionnaires address this criterion, it is rarely associated with a qualitative analysis of the client's sources of income, financial commitments and outstanding debts, or even his financial stability. And yet a good understanding of the client's financial stability is critical for providing suitable investment advice. In the same vein, academic analyses (Guiso and Paiella [29]) stress the important role played by stable resources and background risk (i.e. risks incurred elsewhere) when determining the optimum level of risk for an investment.

Few questionnaires specify whether the answers should refer to net amounts or gross amounts, which causes confusion for the client and makes it more difficult to process the data collected.

3. Personal characteristics

One third of the questionnaires contain questions about the clients' personal characteristics. Where a questionnaire contains such questions, answering them is often considered to be optional. MiFID [10] may not make these questions mandatory, but academic research has shown that variables such as the client's age, marital status, profession and planned retirement age – which none of the questionnaires ask for, despite its relevance – show strong correlation to investment objectives and horizons, and that they are factors in the clients' risk aversion (Gollier, Eeckhoudt, Schlesinger, [28]).

None of the questionnaires we analysed asks about the client's educational attainment, and only half of them ask about his profession. And yet these two criteria are explicitly mentioned in MiFID [10]. The small proportion of compliant questionnaires stems in part from the fact that some institutions use other databases to fill in sections of MiFID questionnaires before or after the clients do (see Table 1). Moreover, CRM databases usually contain this type of information. This solution helps shorten the questionnaires and frees up resources in banks' IT systems. Four of the nine participating institutions use other

databases to help fill out questionnaires. However, the people we met with stressed the problems encountered in ensuring that these data are up to date, especially as regards clients' professions, marital status or dependent children.

4. Investment objectives

a) Investment period

Eleven of the 14 questionnaires ask about the desired minimum investment period or horizon. This is rarely linked to the risk/return trade-off of the investment under consideration or to the liquidity criteria, even though these notions are closely related. The Delmas-Marsalet Report [23] recommends that financial institutions ask about the risk of the investor being forced to cash in his investment sooner than expected, and that they adapt their investment recommendations accordingly.

b) Purpose of the investment

The purpose of the investment is addressed in 11 of the 14 questionnaires. It is a critical criterion since the products and investment strategies proposed to the client must be suited to his motives within the context of the investment in question.

Investment plans are not addressed as an overall notion, however; the questionnaires deal separately with the types of investments and the amounts being considered. The link between investment amounts and investment periods is not really established, or not clearly enough, even though the two criteria cannot be examined separately for a specific investment.

Most of the questionnaires analysed fail to distinguish properly between the purpose of the investment and the client's expectations for it. Expectations may often relate to the liquidity criterion, or the availability of the investment, or the client's preferences with regard to the risk/return trade-off of a financial product.

c) Investment amount

Clients are rarely asked about the amounts that they intend to invest. Only 3 of the 14 questionnaires analysed ask this question. This criterion is not explicitly mentioned in MiFID [10, 35], but it is still critically important to consider the investment amount to ensure that suitable products are offered to clients, since the optimum level of risk for an investor depends on the size of the investment being considered relative to his net worth and income.

5. Preferences regarding risk taking

The questionnaires do not systematically analyse risk-taking preferences. However, these preferences need to be measured in order to produce suitable investment

recommendations for each client. Only 10 of the 14 questionnaires analysed actually address this factor more or less explicitly.

And even when it is addressed, it is generally dealt with in a superficial and fairly imprecise way. Most of the questionnaires contain questions that offer only two possible answers. In some cases, a questionnaire will ask the client to assess his attitude towards risk directly. Such self-assessments are by definition subjective and are of little help for providing helpful and workable advice to clients. Furthermore, some questionnaires ask clients to place themselves on a graduated scale of risk taking, without explaining the characteristics of the scale. This can lead to excessive concentration of answers in the mid-range.

Only 8 of the 14 questionnaires analysed attempt to make a more or less quantitative evaluation of the client's attitude towards risk. And yet, when putting together a portfolio, investment decisions are ultimately **quantitative** decisions. Therefore, we feel that a quantitative measurement of a client's attitude towards risk constitutes a necessary step for recommending suitable products to each client.

C. Interpreting the questionnaires

Our analysis of the questionnaires was based on the concepts defined in the directive [10], i.e. knowledge of financial markets, investment experience, financial situation and investment objectives. We also included other notions from the AMF [3], CESR [8, 9], the Delmas-Marsalet Report [23] and academic research in our scorecard. Based on these additions, we explicitly included personal characteristics and the investment amount. Furthermore, in the investment objectives section, the attitude towards risk – a critical factor for investment advice – will be broken down into purely qualitative questions and quantitative questions.

The 14 MiFID questionnaires examined in our study were then analysed one by one and rated according to the key criteria below, which are summarised in Table 2. The table summarizes the items from Section II that were subsequently used to evaluate the questionnaire contents:

1. Personal characteristics: gender, age, profession, education and marital status;
2. Financial situation: net worth, source and extent of regular income, debt, financial needs;
3. Investment objectives: minimum investment period, investment purpose and amount, risk-taking preferences;
4. Knowledge and experience: knowledge of financial products, investment experience, independence and confidence to make one's own decisions on financial markets.

Table 2 – SUMMARY: Key concepts addressed in the reference sources (extracts)

Themes and criteria		MiFID [10] <i>Section 3 Articles 35 and 37</i>	AMF briefing paper on MiFID [3] <i>Chapter IV: ISPs’ relationships with their clients</i>	A Consumer's Guide to MiFID, CESR [4]	Delmas-Marsalet Report [23] <i>Chapter II: Recommendations</i>	Scientific explanations and contributions from behavioural finance
Personal characteristics	Gender	Not addressed	Not addressed	Not addressed	Not addressed	Significant socio-economic determinants: Mangot [34]; El-Mekkaoui-De Freitas <i>et al.</i> [33]; Arrondel and Masson [2]; de Palma and Picard [15]
	Age	Not addressed	Not addressed	"Age"	"Age"	
	Profession	"level of education and profession or [...] former profession."	Not addressed	"level of education and [...] profession or past profession"	"socio-professional status"	
	Education					
	Marital status	Not addressed	Not addressed	Not addressed	"marital situation"	
Financial situation	Net worth	"assets, including liquid assets, investments and real property"	"assets (...) including liquid assets, investments and real property"	"your assets, real property"	"financial assets [...] where applicable, in other institutions"	Scale effects: de Palma, Picard and Prigent [18] Background risk: Guiso and Paiella [29]
	Regular income + source	"source and extent of his regular income"	"source and extent of regular income"	"source and extent of your regular income"	"income"	
	Debt	Not addressed	Not addressed	"any debts"	"debts"	
	Regular needs	"regular financial commitments"	"regular financial commitments"	"other financial commitments"	"needs"	
Investment objectives	Period	"length of time during which the client wishes to hold the investment"	"length of time during which the client wishes to hold the investment"	"length of time"	"investment horizon"	Temporal framing: Gneezy and Potters, [27].
	Liquidity	Not addressed	Not addressed	Not addressed	"ability to tie up the funds invested"	Liquidity risk
	Purpose	"purposes of the investment"	"purposes of the investment"	Not addressed	"investment objectives"	Investors’ mental accounting: Thaler, [40]
	Amount	Not addressed	Not addressed	Not addressed	"investment amount"	Scale effects: de Palma, Picard and Prigent [18]
	Source of funds to be invested	Not addressed	Not addressed	Not addressed	Not addressed	Mental accounting: Thaler, [40] ; Simmel [39]
	Preferences regarding risk taking	"his preferences regarding risk taking, his risk profile"	"the client’s profile such as his degree of risk aversion"	"your risk appetite and your risk profile” “level of risk that you are willing to accept”	"degree of risk accepted"	Risk preferences and behavioural biases
Knowledge & experience of financial markets	Investment experience	"nature, volume and frequency of the client’s transactions", "the period over which they have been carried out."	"necessary experience and knowledge"	"nature, volume and frequency of your previous transactions"	"client’s experience with these products"	Poor understanding of the correlation principle.
	Knowledge of financial products	"types of service, transaction and financial instruments with which the client is familiar"		"services and products that you are familiar with"	"understand key product-related information"	Overconfidence: de Bondt and Thaler, [11], confirmation, optimism bias.
	Independence, confidence	Not addressed	Not addressed	Not addressed	Not addressed	Thaler [41]

D. Questionnaire compliance analysis

1. Compliance ratings for questionnaires

a) Rating criteria

We conducted a qualitative analysis of the contents of 14 MiFID questionnaires to give each one a “compliance” rating based on the criteria defined by MiFID and four other reference sources, summarised in Table 2. The columns in Table 3 correspond to the five reference sources considered:

- ➔ **MiFID**: the Markets in Financial Instruments Directive [10, 35];
- ➔ **AMF**: the AMF’s briefing paper on MiFID [3];
- ➔ **DM**: the Delmas-Marsalet Report [23];
- ➔ **CESR**: *A Consumer’s Guide to MiFID* by CESR [8, 9];
- ➔ **MIFS**: academic literature, from the field of behavioural finance primarily.

The ratings were attributed in three steps.

For each reference source r and each criterion i , we defined:

- ➔ the **absolute importance** of the criterion in the relevant reference source, denoted $P_i(r)$, which can be 0 or 1;
- ➔ the **relative importance** of the criterion in the relevant reference source:

$$p_i(r) = 100 \bullet \frac{P_i(r)}{\sum_j P_j(r)} \quad (1)$$

“0” values have been replaced by “-” in Table 3 to make it more understandable.

The “Total” line in Table 3 gives the number of criteria considered in reference source r . This means that the number of criteria is measured by: $\sum_j P_j(r)$.

The last column of Table 3 is the most complete, since it refers to all the legal and academic reference sources to draw up the list of relevant criteria for MiFID. Naturally, this reference source is complete, by construction.

Some of the MiFID criteria were not addressed in the AMF’s briefing paper, since they were already clear and precise enough.

Several of the criteria discussed in the Delmas-Marsalet Report [23] were not covered in MiFID [10, 35], and we think it would be a good idea to include them in a future revision of this part of the directive. We feel that these criteria should be included in MiFID

questionnaires systematically, since they help to refine investor profiles and, thus, improve the quality of advice provided. These criteria deal with three main themes: personal characteristics, financial situation and investment objectives.

The criteria considered by CESR have the same overall importance as the MiFID criteria, but the lists of the criteria in both sources are not exactly the same. CESR considers debts, which are critical for assessing a client's financial situation and preventing mis-selling of investments that are not compatible with the client's other commitments, but it does not deal with the purpose of the investment. And yet research on mental accounting and the idea that "money smells", which Thaler [40] discusses at length, has highlighted the importance of the purpose of the investment (see also Simmel [39]).

Table 3 – Importance of the various criteria according to the reference sources

Theme	Criteria		r=MiFID		R=AMF		r=DM		r=CESR		r=MIFS		
			$p_i(r)$	$P_i(r)$	$p_i(r)$	$P_i(r)$	$p_i(r)$	$P_i(r)$	$p_i(r)$	$P_i(r)$	$p_i(r)$	$P_i(r)$	
Personal characteristics	Gender		-	-	-	-	-	-	-	-	4.3	1	
	Age		-	-	-	-	6.7	1	-	-	4.3	1	
	Profession		9.1	1	-	-	6.7	1	9.1	1	4.3	1	
	Education		9.1	1	-	-	-	-	9.1	1	4.3	1	
	Marital status		-	-	-	-	6.7	1	-	-	4.3	1	
Financial situation	Net worth		9.1	1	12.5	1	6.7	1	9.1	1	4.3	1	
	Income (steadiness, source)		9.1	1	12.5	1	6.7	1	9.1	1	4.3	1	
	Debts		-	-	-	-	6.7	1	9.1	1	4.3	1	
	Needs (family structure, financial commitments)		9.1	1	12.5	1	6.7	1	9.1	1	4.3	1	
Investment objectives	Horizon		9.1	1	12.5	1	6.7	1	9.1	1	4.3	1	
	Liquidity		-	-	-	-	6.7	1	-	-	4.3	1	
	Purpose		9.1	1	-	-	6.7	1	-	-	4.3	1	
	Amount		-	-	-	-	6.7	1	-	-	4.3	1	
	Source of funds to be invested		-	-	-	-	-	-	-	-	4.3	1	
	Preferences regarding risk taking	Quantitative	Risk aversion	9.1	1	12.5	1	6.7	1	9.1	1	4.3	1
			Loss aversion	-	-	-	-	-	-	-	-	4.3	1
			Probability distortion	-	-	-	-	-	-	-	-	4.3	1
		Qualitative	Risk aversion	9.1	1	12.5	1	6.7	1	9.1	1	4.3	1
			Loss aversion	-	-	-	-	-	-	-	-	4.3	1
Probability distortion			-	-	-	-	-	-	-	-	4.3	1	
Knowledge & experience	Experience		9.1	1	12.5	1	6.7	1	9.1	1	4.3	1	
	Knowledge of financial products		9.1	1	12.5	1	6.7	1	9.1	1	4.3	1	
	Independence and confidence		-	-	-	-	-	-	-	-	4.3	1	
Total (number of criteria)			-	11	-	8	-	15	-	11	-	23	

b) Questionnaire ratings

For each questionnaire q and each criterion i , we evaluated:

- ➔ the **absolute quality** of the representation of the criterion, $N_i(q)$. This value is 1 when the criterion is present in the questionnaire in an incomplete or unsatisfactory manner (for example, if it is expressed in qualitative terms when the data to be collected is quantitative), 2 when the criterion is dealt with completely and satisfactorily, and 0 if it is not discussed at all;
- ➔ the **relative quality** of the representation of the criterion can be measured with the following index:

$$n_i(q) = 100 \cdot \frac{N_i(q)}{\sum_j N_j(q)}. \quad (2)$$

Three of the criteria (liquidity, source of the funds to be invested, independence and confidence) receive special treatment and are rated 1 or 0. The maximum value \overline{N}_i that can be attributed to $N_i(q)$ is 1 for these three criteria and 2 for the others. The reason for this special treatment is that the criteria in question are not explicitly mentioned in MiFID [10], but the other reference sources still consider them to be important. For example, the Delmas-Marsalet Report [23] considers liquidity to be part of the investment objectives, and behavioural finance research has highlighted the importance of these three criteria in investors' choices. Therefore, we considered these criteria in our evaluation of the questionnaire contents, but without giving them the same weight as the other criteria that MiFID does discuss.

On the other hand, we have given maximum weight (with ratings up to 2) to other criteria, such as the investor's age or gender, since we feel that they are implicitly included in the spirit of MiFID, even if the directive does not explicitly include them. In addition, several other reference sources consider them to be important.

Details about the absolute and relative evaluations of the different criteria for each questionnaire can be found in Annex VII.D. Combining the absolute quality measurements with the importance that the different reference sources give to each criterion, we were able to define and calculate five **compliance ratings** for each of the 14 MiFID questionnaires. These compliance ratings are obtained by applying the following formula:

$$C(q, r) = 100 \cdot \frac{\sum_i P_i(r) N_i(q)}{\sum_i P_i(r) \overline{N}_i} \quad (3)$$

The maximum compliance rating calculated is 100 for each reference source, which means that ratings can be compared. Table 4 shows the compliance ratings of each questionnaire. The lowest ratings are printed in red and the highest ratings are printed in green.

Table 4 shows considerable dispersion of the questionnaires' compliance ratings. Furthermore, the five compliance ratings obtained by one questionnaire are fairly closely correlated, with a correlation coefficient between 90% and 99%, despite some variations. Questionnaire C is at the bottom of the heap, since it has the lowest compliance rating for all reference sources. On the other hand, questionnaires E and L are at the top of the pile. Questionnaire E has the highest compliance ratings with three reference sources, and questionnaire L has the highest compliance ratings with two others (DM and MIFS).

Table 4 – Questionnaire compliance ratings by reference source

	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO
MiFID	59	14	59	82	32	18	64	32	55	32	68	50	50	45
AMF	69	19	63	88	38	25	63	38	50	38	81	50	63	44
DM	69	14	62	69	28	14	66	28	52	28	76	52	41	38
CESR	59	14	59	77	27	18	59	27	45	32	68	45	50	45
MIFS	47	12	44	49	21	16	49	26	42	19	63	40	30	26
Average	60	14	57	73	29	18	60	30	49	29	71	47	47	40

2. Multidimensional analysis of compliance ratings

To gain a better understanding of the evaluation findings, we carried out a Principle Component Analysis using the relative qualities of representation of the various criteria associated with the 14 questionnaires (denoted $n_i(q)$ and explained in detail in Table 20 in Annex VII.D). This technique summarises the relative importance that the various questionnaires attribute to different criteria. The purpose is to summarise the information contained in Table 20 in order to highlight the critical items. We have supplemented this analysis by defining groups of questionnaires that are similar in that they focus on the same criteria.

The findings of the analysis reveal two main axes of differentiation⁵ between the questionnaires:

- ➔ Axis 1 (horizontal) plots questionnaires with special emphasis on the client's financial situation and the purpose of his investment plan on the left. It plots the questionnaires

⁵ Readers who are familiar with data analysis will find details about the construction of the axes and the analysis of the higher order axes in Annex VII.D.

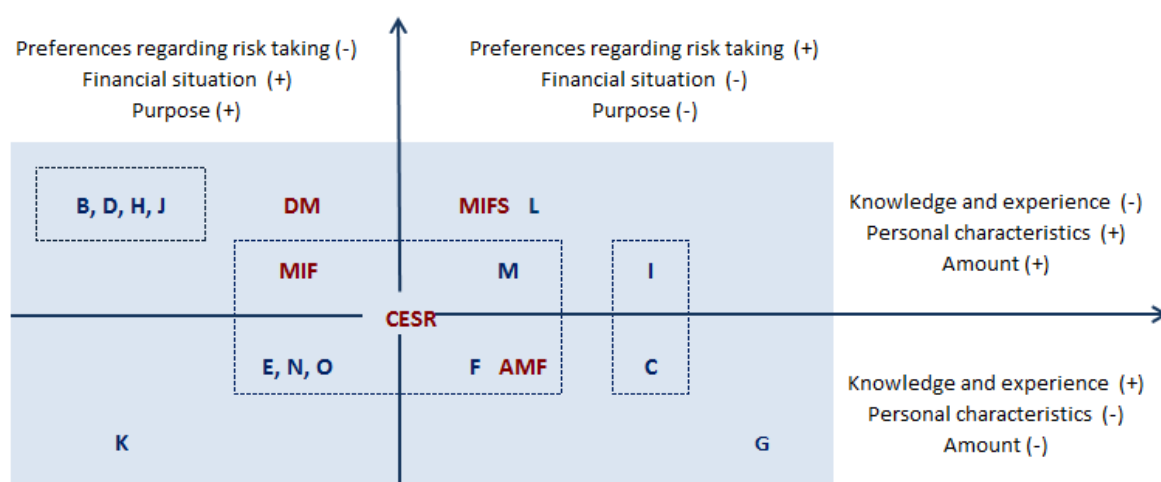
with special emphasis on preferences regarding risk taking on the right. We feel it is critical to measure **both** the client's financial situation and his preferences regarding risk taking accurately to ensure that suitable products are recommended. However, the analysis reveals that the questionnaires generally focus on only one of these two aspects to the detriment of the other.

- ➔ Axis 2 (vertical) plots the questionnaires according to the importance that they place on either personal characteristics and amount of the planned investment, or on the client's knowledge and experience of financial products and markets.

If the analysis is taken further (see Annex VII.D), the investment horizon constitutes a third axis of differentiation for the questionnaires.

Figure 2 shows three main groups of questionnaires, plotted according to the dimensions explained above.

Figure 2 - Principal Component Analysis: representation of the first two axes



The different reference sources for compliance are shown in red print in the same figure, where MIF stands for MiFID. Their respective positions show the points of differentiation of the reference sources and represent the shading of their interpretation of MiFID. For example, MiFID [10, 35] and the interpretations of it produced by the AMF [3] and CESR [8] form a fairly uniform group at the centre of Figure 2, while the Delmas-Marsalet Report [23] and the academic literature are differentiated by the particularly great importance that they place on personal characteristics and the investment amount compared to the other two reference sources. Moreover, MiFID itself and the Delmas-Marsalet Report give the most importance to the client's financial situation and the purpose of the investment, while the AMF and the academic literature emphasise the client's preferences regarding risk taking more.

In a way, CESR [8] constitutes a mean between the other reference sources with respect to the importance placed on the various criteria. This could infer that CESR adopted a mean

position between the legislation, the recommendations of the Delmas-Marsalet Report and the behavioural aspects highlighted in the academic literature.

The distances between the different questionnaires and reference sources are consistent with their compliance ratings (see Figure 13 and Figure 14 in Annex VII.E.2). Therefore, the more importance a questionnaire places on the same criteria as a given reference source, the higher its compliance rating and the closer it is to that reference source in Figure 2.

Four questionnaires with comparable compliance ratings are particularly close to each other in the upper left quadrant of Figure 2 and in the projections in Figure 13 in Annex VII.E.2). These questionnaires share the same emphasis on the client's personal characteristics and financial situation, to the detriment of the client's risk profile and knowledge and experience. They are close to both MiFID [10] and the Delmas-Marsalet Report [23] in the plane.

Five questionnaires make up a second group in the centre of Figure 2. This means that they are close to the "mean" questionnaire, which constitutes a kind of summary of the quality of representation of the criteria⁶ in all 14 of the questionnaires analysed. This mean questionnaire is very close to CESR's recommendations. We can also see that the five questionnaires in this group take a fairly balanced approach to all of the criteria needed to define the investor profile.

Two questionnaires stand out to the right by placing a great deal of importance on the client's risk profile, giving less consideration to his financial situation and the purpose of the investment; yet the two questionnaires differ from one another in terms of the importance afforded to the investment amount.

Finally, three isolated questionnaires are located on the periphery, in three corners of the plane.

We can see that the two questionnaires with the highest compliance ratings are positioned differently. This illustrates the heterogeneousness of the questionnaires, which, in turn, illustrates the possible interpretations of the regulations. The two highest-rated questionnaires emphasis different notions: one of them focuses on personal characteristics and the investment amount (amount and source of the funds), along with the risk profile, whereas the other takes a more balanced approach: it skirts the risk profile somewhat, but it addresses all of the other criteria: financial situation, personal characteristics, investment purpose and horizon (see projections along Axis 3 in Figure 14 in Annex VII.E.2), knowledge

⁶ For example, the rating of the mean questionnaire for the representation of the "purpose" criterion would be the mean of the ratings attributed to each questionnaire for this criterion (see Q* in Table 20 in Annex VII.D).

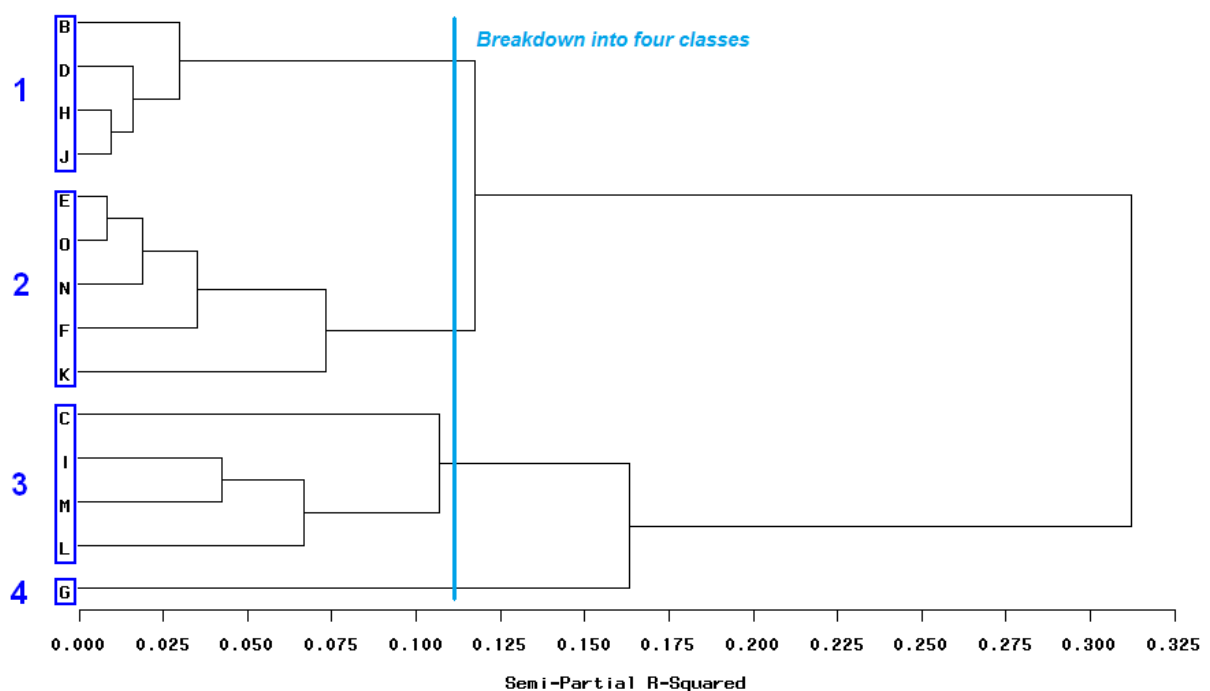
and experience. Both of them are also far away from the questionnaire with the lowest compliance ratings.

We also found that retail and private banking questionnaires produced by the same financial institutions are generally located in the same quadrant in Figure 2, and even in the same groups. This means that, when a financial institution produces two questionnaires to meet the specific needs of retail and private banking clients, it does so according to the same interpretation of MiFID.

3. Classification of the different questionnaires

We will now discuss the classification of the questionnaires in detail to put them into groups in consideration of their overall compliance with all of the criteria in MiFID [10] and with the additional criteria contributed by the other reference sources. Two questionnaires will be put into the same class if their contents are comparable because they emphasise the same criteria. Figure 3 illustrates the four classes revealed by this hierarchical ascendant classification.

Figure 3 - Hierarchical Ascendant Classification of the 14 questionnaires



The analysis shows that each class contains four or five questionnaires, except for the last class, which is made up of a single questionnaire that stands out singularly from the others.

The first class (1), with four questionnaires, contains the questionnaires that place a priority on personal characteristics, financial situation and investment purpose, but neglect the other dimensions.

The second class (2) contains five questionnaires that place particular emphasis on financial situation, investment purpose and the client's knowledge and experience.

The third class (3) contains four questionnaires that primarily address the notions of risk, along with the investment amount and horizon.

The last class (4) contains a single questionnaire, which is different from all of the others. It addresses the notions of risk and knowledge and experience of financial market in a particularly detailed manner.

The results of this classification are fairly consistent with the groups shown in Figure 2, except for the centre of the figure. The differences between the two analyses lie in the methods, since the multidimensional analysis summarised in Figure 2 is restricted to the first two axes of differentiation, meaning the criteria that most distinguish one questionnaire from another, omitting certain criteria, which are less distinctive and, consequently, plotted along Axis 3 and the following axes. This is particularly the case of the investment horizon (see Table 23).

Both methods for analysing the questionnaires highlight the specificity of questionnaire G, which distinguishes itself very clearly from the other questionnaires because of its special emphasis on the client's preferences regarding risk taking. Virtually the entire questionnaire is taken up with questions on this topic.

It is an isolated case, since the majority of the questionnaires focus on the clients' personal and financial situations, and not on their attitudes towards risk per se. In this way, questionnaire G is in line with the recommendations of this report. It suggests that it is possible, from an operational point of view, to measure clients' risk tolerance, despite the clients' reluctance to deal with questions that are sometimes seen as overly technical.

However, the quality of the information about preferences regarding risk taking gathered with this questionnaire seems to be obtained to the detriment of other information that is material with respect to MiFID [10, 35] or the related sources [3, 8, 23].

The compliance ratings and classification of the questionnaires show several points in common, and it could be thought that their findings are redundant, but there are still significant differences in each approach and they complement each other. For example, the mean ratings of the four classes shown in Figure 2 vary by a factor of 3, but the variability of the ratings within each class is still great. Two questionnaires with very different ratings may end up in the same class, as is the case for Class (3), which contains the lowest-rated questionnaire and one of the highest rated. These differences lie in the fact that the classification evaluates the *relative importance* given to different criteria, whereas the compliance ratings reflect their *absolute importance*. In general, longer questionnaires obtain higher compliance ratings because they deal with more criteria, or they deal with them more comprehensively and in greater detail.

E. Summary of the ex ante analysis

Even though the rating systems have their limitations, there is still a critical need for a stable method for evaluating financial institutions' information-gathering procedures and their compliance with the letter and the spirit of the directives in force. We have seen that the performances of the questionnaires are similar, but that they are different according to the reference sources. The work done in this section teaches us several lessons, which are summarised briefly below:

- ➔ There is little variation in the compliance ratings of the questionnaires from one reference source to another (correlations between the different compliance ratings for the same questionnaire range from 90% to 99%), but there is greater divergence from one questionnaire to another (correlations between the compliance ratings of the different questionnaires with the same reference source range from 35% to 99%). Furthermore, two questionnaires are more highly rated than all of the others with respect to all reference sources, which means that they rank higher than the other questionnaires.
- ➔ The fact that some questionnaires have reasonable ratings for compliance with criteria not mentioned in MiFID suggests that the financial institutions concerned did not settle for doing the minimum to comply with MiFID. This is encouraging news, but it highlights the directive's deficiencies and lack of precision. The directive should be supplemented the next time it is revised.
- ➔ Most of the questionnaires give a great deal of importance to measuring risk-taking preferences, even though MiFID is not very explicit on this point. Consequently, the questionnaires make efforts to evaluate risk profiles that can help ensure that clients are sold suitable products. However, for lack of clear guidance, these efforts are not always successful with regard to the most specific reference sources, such as the Delmas-Marsalet Report [23] or the findings of behavioural finance research.

Following an ex ante analysis of the questionnaire contents, meaning the questions asked, Section IV examines the answers given by clients when they fill in the questionnaires and analyses the ex post use of their answers by financial institutions. This leads us to examine the questionnaire scoring rules, where relevant, and we endeavour to create equivalent scoring rules where such rules do not exist or were not given to us.

IV. Ex post quantitative analysis of questionnaires

A. Creating the databases

1. Selecting respondents and gathering data

Data were collected from respondents through two channels: an invitation-only secure website that we set up, <https://www.evaluation-mif.fr>; and TNS Sofres, a polling firm. Before the data could be collected, it was necessary to program the questionnaires that were to be assessed. ENS Cachan and Ecole Polytechnique did the initial programming, which was used on the <https://www.evaluation-mif.fr> website. TNS Sofres then took this as the basis for its subsequent reprogramming of the questionnaires.

a) Data collection principle

To compare the individual results of different questionnaires (risk profiles, investment recommendations, and so on), we developed a multi-questionnaire survey. Specifically, each respondent was asked to carry out a survey that consisted in answering three questionnaires. In each individual survey, one of the three questionnaires was the benchmark that we developed and tested from 2004 to 2010. This questionnaire was designed to exhaustively cover MiFID obligations, in the broad sense, and, even more importantly, to be in keeping with the spirit of the directive. In particular, it contains a quantitative assessment of the respondent's risk aversion. It additionally explores different dimensions of risk attitude highlighted by behavioural finance research published over the last decades ([14], [15], [16], [18], [19]).

Since it obviously takes a relatively long time to fill out the benchmark questionnaire, and given that the total survey time would be even longer with two additional questionnaires to complete, we were aware of the high risk that respondents might give up because they were tired of having to answer the same questions several times. We therefore grouped certain questions that appeared in numerous questionnaires in an introductory section. However, we kept the wordings of the different questions, which in some cases had a wide range of possible answers.

The questions grouped in the introductory section concern respondents' personal details, including gender, age, marital status, professional status, level of education, property (value and level of outstanding debt, if any), financial assets and income.

b) Data collection procedure

The initial plan had been to gather data solely through the dedicated website. However, most financial institutions were unhappy with this method, and in the end we collected information from a small proportion of respondents through the site. Most of the data were

gathered by TNS Sofres, which, in the opinion of the financial institutions, offered greater assurance of security and anonymity.

(1) → <https://www.evaluation-mif.fr>

Data were collected from five populations through the website:

- ➔ Independent wealth advisers that are customers of CGPLand;
- ➔ some of these advisers agreed to email their customers to ask them to take part in the study;
- ➔ members of the Association des Petits Actionnaires Indépendants (APAI), an association of small, independent shareholders, which also agreed to support our study;
- ➔ Université Paris I and Ecole Nationale d'Assurance Masters students taking risk economics courses with André de Palma and Nathalie Picard;
- ➔ participating financial institutions, which were invited to use the site before it went online.

All respondents received an email invitation outlining the study and asking them to participate by clicking an embedded hyperlink, which took them to our secure site.⁷

We used the online responses provided in the introductory section on the value of assets to classify respondents as retail banking customers (assets under €250,000) or private banking customers (assets over €250,000). We then assigned each respondent the appropriate type of questionnaire. There were four general questionnaires, which were considered to function as retail or private banking questionnaires. Respondents classified in the retail category answered the benchmark questionnaire as well as two questionnaires chosen at random from the list of retail and general questionnaires. Respondents classified in the private banking category answered the benchmark questionnaire as well as two questionnaires selected randomly from the list of private banking and general questionnaires.

(2) → TNS Sofres

Two types of respondents took part in the study through this channel:

- ➔ members of the TNS Sofres SoFia panel;
- ➔ customers of one financial institution, which agreed to participate actively in the study by providing TNS Sofres with the contact details for some of its customers so that they could be asked to take part.

⁷ Financial institutions particularly disliked this use of a hyperlink, given their anti-phishing policies.

The members of the SoFia panel come from the "affluent" online sub-sample (assets over €50,000) and were initially considered by TNS Sofres as private banking customers. This resulted in an overly small number of respondents for the retail banking questionnaires, a problem that was only partially rectified.

Table 5 – Data collection: response rates

	Sent	Completed	Gave up	Response rate
FI retail banking customers	19,702	329	786	1.7%
FI private banking customers	1,973	35	141	1.8%
SoFia panel	≈ 2,500	1,001	2	≈ 40%
TNS Sofres sub-total	≈24,200	1,365	929	≈5.6%
Wealth advisers	808	66	42	8.2%
Wealth adviser customers	686	54	80	7.9%
APAI	108	12	8	11.1%
Students	38	31	5	81.6%
Other (participating FIs)	16	5	1	31.3%
Sub-total MiFID assessment	1,656	168	136	10.1%
Total	≈26,000	1,533	1,065	≈5.9%

The response rate for SoFia panellists is very high because they are used to taking part in this kind of survey and because they are paid for participating. The rate had to be approximated, because we were not told exactly how many people were contacted.

The response rate for students is close to 100% because these questionnaires offer an excellent illustration of their theoretical courses on measuring attitudes to risk. Scientific interest therefore acts as a good incentive for them to take the time to respond seriously to a long questionnaire. The high rate of response among participating financial institutions reflects the involvement of these institutions in the project. By completing their own questionnaire, which we had adjusted for the purposes of the study, these institutions got an opportunity to see how their questionnaires had been reworked.

APAI members, wealth advisers and their customers had a similar, if weaker, incentive. These respondents stood to receive a condensed report on the results of the study once they were validated by the sponsor. No such incentive could be offered to respondents contacted via the financial institution that agreed to take part in the study, which explains the very low response rate for that group.

Overall, the response rates are in line with expectations, and the initial target of 1,400 respondents (that completed a full survey, i.e. which filled out three questionnaires) was exceeded.

Table 6 – Data collection: Number of respondents per questionnaire

	Introduction	Benchmark questionnaire	Lotteries	Complete surveys	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	Total
FI retail	329	329	329	329	30	2	3	1	69	82	60	0	38	2	2	2	322	45	658
FI private	35	35	35	35	7	6	6	2	0	0	1	0	4	35	5	4	0	0	70
SoFia panel	1,001	1,001	1,001	1,001	212	215	232	214	3	2	224	0	228	234	218	213	7	0	2,002
Sub-total	1,365	1,365	1,365	1,365	249	223	241	217	72	84	285	0	270	271	225	219	329	45	2,730
Wealth advisers	94	77	70	66	14	3	2	3	16	1	9	78	1	3	2	2	11	14	159
Wealth advisers' customers	95	75	59	54	7	2	2	3	8	0	13	66	6	6	1	5	3	12	134
APAI	19	17	13	12	4	2	1	1	3	0	1	4	2	1	4	3	0	3	29
Students	37	34	32	31	10	1	0	0	11	4	16	15	2	1	2	1	14	11	88
Other	6	6	5	5	1	1	0	0	1	0	0	0	0	0	1	0	1	1	6
Sub-total	251	209	179	168	36	9	5	7	39	5	39	163	11	11	10	11	29	41	416
Total	1,616	1,574	1,544	1,533	285	232	246	224	111	89	324	163	281	282	235	230	358	86	3,146 ⁸

2. Number of respondents per questionnaire and source of data

Each respondent was given two questionnaires at random from his or her category, that is, private banking or general questionnaires for private banking customers, and retail banking or general questionnaires for retail banking customers. Each respondent also filled out the benchmark questionnaire.

There were around 100 respondents for each retail banking questionnaire, except for the questionnaire of the financial institution that agreed to participate actively in the study, which had over 300 respondents.

⁸ The actual number of completed questionnaires, in addition to the benchmark questionnaire, (3,146) is higher than the number of respondents who completed the full survey multiplied by two ($2 \times 1,533 = 3,066$). This is because of a change in the survey that took place shortly after we began collecting data. Our initial plan was for the survey to consist of three questionnaires in addition to the benchmark questionnaire. The significant risk that respondents might give up because of the length of the survey led us to change our methodology and shorten the survey to include two additional questionnaires.

B. Descriptive statistics

In this section, we analyse respondents' characteristics and investment plans, based on their answers to the preliminary questions of the survey, which are grouped in the introductory section, as well as to the benchmark questionnaire, which all respondents fill out.

The study population comprises 1,544 respondents, including 1,365 individuals whose responses were collected by TNS Sofres and 179 who responded through the www.evaluation-mif.fr website. A person is considered to be a respondent if he or she has completed the survey through to the lotteries and has completed all the proposed lotteries.

1. Personal characteristics⁹

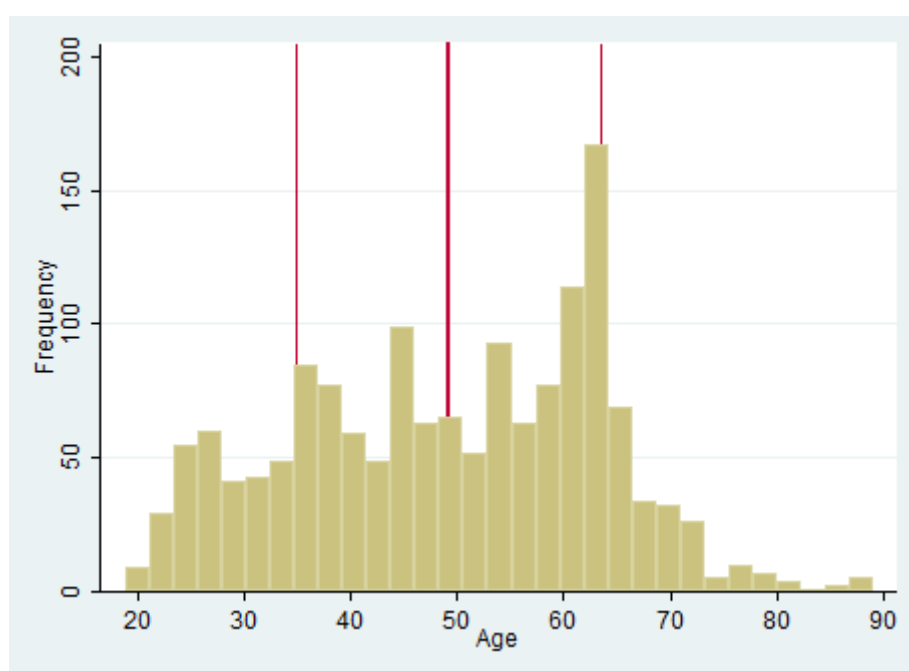
Respondents were asked about themselves, i.e. gender, age, profession, education and marital status.

The population is not uniformly split between men and women because most of the respondents (around 70%) are men (Figure 15 in Annex VII.F.1). This is consistent with the fact that in couples, it is more often the man than the woman who takes care of financial matters and therefore who answers financial questionnaires on behalf of the family.

Respondents' ages varied from 19 to 89. The mean age of the sample was 49 (the bold line in the middle of the sample shown in Figure 4); 90% of respondents were between 25 and 69, and approximately two-thirds were between 35 and 65 (the thin lines, representing the mean minus one standard deviation to the left and the mean plus one standard deviation to the right). The sample is thus not representative of the French population as a whole, but is more representative of the population of investors subject to MiFID.

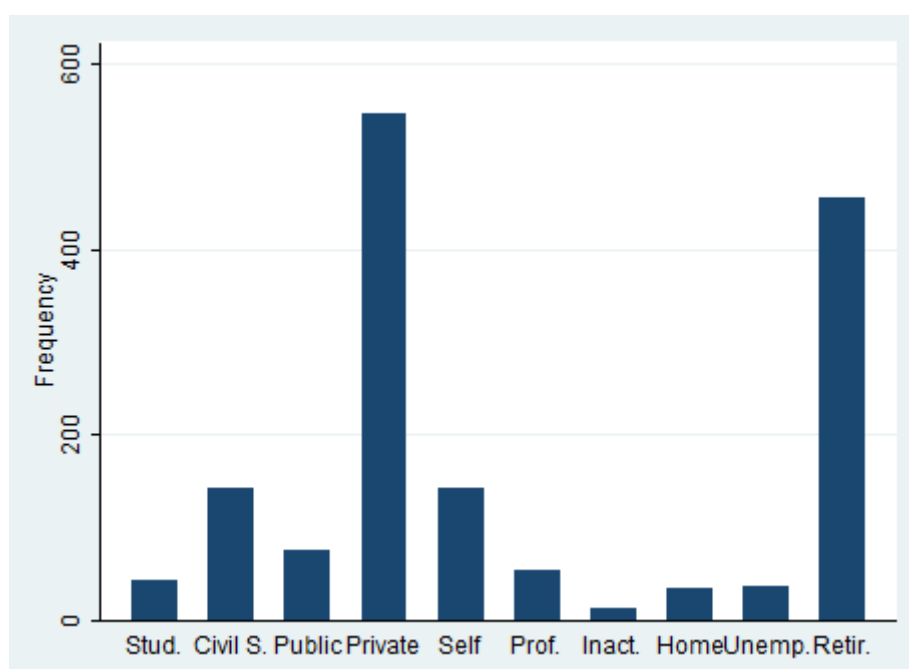
⁹ See Annex VII.F for detailed results.

Figure 4 - Distribution of respondents' ages



About 35% of respondents are private-sector workers and 30% are retired (547 and 455 respondents respectively, as shown in Figure 5). Students make up 3% of the population, although their share rises to 13% on the www.evaluation-mif.fr site, which is consistent with the data sources.

Figure 5 - Profession of respondents



A full 75% of respondents have post-secondary education (Figure 16 in Annex VII.F.1). About one-quarter of respondents hold a Master's degree and 22% have a PhD or a degree from a

business or engineering school. Once again, the sample is much more representative of the population of investors subject to MiFID than of the French population as a whole.

Just over 23% of respondents live alone (unmarried, widowed, divorced) while 77% live with someone (married, civil union, living together). Specifically, around 60% of respondents are married (with or without a marriage contract) and 16% are single (Figure 17 in Annex VII.F.1).

On average, respondents are planning to retire in 20 or so years, which is consistent with the average age of respondents, i.e. 49 (Figure 18 in Annexe VII.F.1).

2. Financial situation

Next, respondents are asked about their financial situation, with questions about property ownership, assets, debt and income. Since most people in the sample belong to the SoFia "affluent" panel, it is not surprising that they should be better off on average than the general French population.

Table 7 shows means and ranges for the financial situation of individuals according to marital status (living alone or with someone). See also Figure 20, Figure 21 and Figure 22 in Annex VII.F.2. In the case of people living with someone, we endeavoured to isolate the financial situation of the individual from that of the household. The household's assets were thus divided into the own assets of the respondent, the own assets of the respondent's partner, and the couple's joint assets.

We feel that this is an important point with regard to MiFID, because investors must be able to meet their commitments in the future, even if they separate from their partner. Also, the household's approach to managing financial matters may be used to determine which resources to factor in when providing advice (i.e. own resources versus those of the household).

Respondents often hesitate to disclose their assets and income because they view this as sensitive information. For this reason, we did not make it mandatory to answer those questions, which explains the high number of missing values in Table 7. However, it is reasonable to imagine that most of the missing values correspond to null values, particularly for items such as outstanding property debt, or, in the case of people living together, the own assets of each partner or the couple's joint assets.

In the case of the 1,444 people who agreed to answer these questions, the financial assets of the household averaged around €250,000. The average is a little higher (about €265,000) for people living with someone else (household assets) than for people living on their own (just under €190,000). This 40% difference is consistent with the equivalence scale ($\sqrt{2}$, or 41% more than a single person) usually used for couples.

About 82% of people in the sample have at least one piece of property (Figure 19 in Annex VII.F.2). On average, property assets were worth around €400,000 for the sub-sample (943 people, once the missing values are excluded).¹⁰

The average total amount still to be paid back on property is €70,000. This amount was calculated for just 646 individuals, with the missing values corresponding mostly (although not exclusively) to situations where property loans have been fully paid back.

Table 7 – Unadjusted statistics on the financial situation of respondents

		People living alone	People living with someone else		Overall
			Individual	Household	
Value of financial assets	Obs.	361	1,138	1,083	1,444
	Mean	187,832	101,381	264,249	245,145
	Min.	0	0	0	0
	Max.	3,000,000	6,000,000	12,000,000	12,000,000
Value of property	Obs.	362	658	581	943
	Mean	200,820	272,308	520,950	398,058
	Min.	0	0	0	0
	Max.	2,500,000	15,000,000	15,000,000	15,000,000
Outstanding property debt	Obs.	221	574	425	646
	Mean	55,486	39,422	74,049	67,699
	Min.	0	0	0	0
	Max.	575,000	1,000,000	2,000,000	2,000,000
Net monthly income	Obs.	363	1,162	1,162	1,525
	Mean	4,270	5,960	10,501	5,558
	Min.	0	0	0	0
	Max.	150,000	400,000	930,000	400,000

Personal net monthly income averaged around €5,500 for the 1,525 people who responded. Income is slightly higher at the individual level for people living with someone else, and the household income of people living with someone else is slightly more than double the income of people who live alone. This is consistent with the fact that people who live with

¹⁰ The mean is calculated by excluding missing values, which has the effect of excluding most (though not all) of the people or households that do not own property. Respondents often did not enter anything for this question, thus generating a missing value. But since it was not mandatory to answer the questions about assets, missing values do not always mean a null value for assets. In some cases, the respondent refused to answer, i.e. the respondent said that he owned property without putting a value on it.

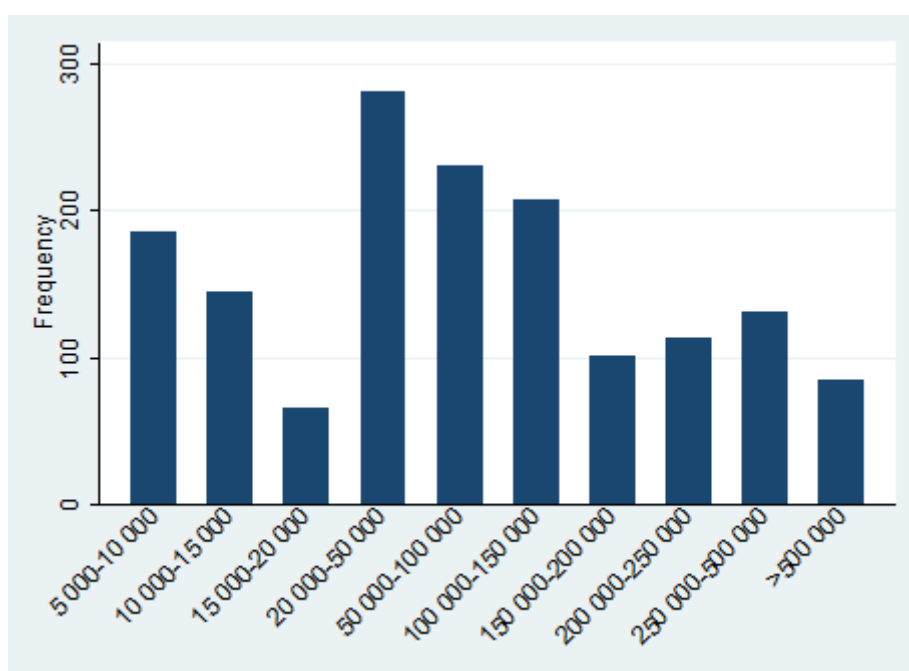
someone else are on average a little older (and therefore have more experience on the job market) than people who live alone. The households in our sample typically have two working members, with the second person earning on average a slightly lower wage than the first person (usually the head of the household and the survey respondent).

3. Investment objectives

Each respondent describes an investment plan, giving an amount, duration and reasons.

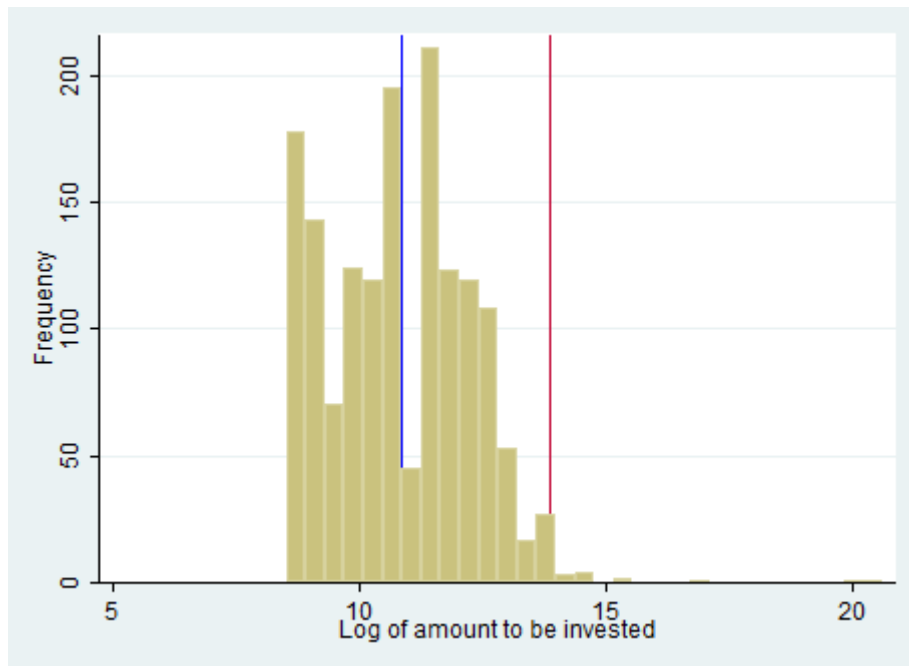
The amounts assigned to investment plans ranged from €5,000 to €900 million (the maximum amount is around €1 million if five particularly high values are taken out). Respondents wish to invest €1 million on average, but the mean is not the most useful indicator here, because the amounts are distributed so asymmetrically, with a handful of extremely high values (two around €5 million, one at €20 million, another at €500 million and one at €900 million). The relevant values are well below the mean (which is actually to the right of the highest category in Figure 6), because 90% of respondents want to invest between €5,000 (the minimum given in the questionnaire) and €500,000, with a median of €50,000, or 20 times less than the mean.

Figure 6 – Amount to be invested



Given this asymmetry, the log of the amount to be invested (shown in Figure 7) is far more informative than the amount itself, and less sensitive to the exceptionally high values. We show the mean of the log of the amount in blue (close to the centre of the distribution), and the log of the mean amount in red (on the far right of the distribution). All subsequent estimates are thus based on the log of the amount to be invested, rather than on the amount itself.

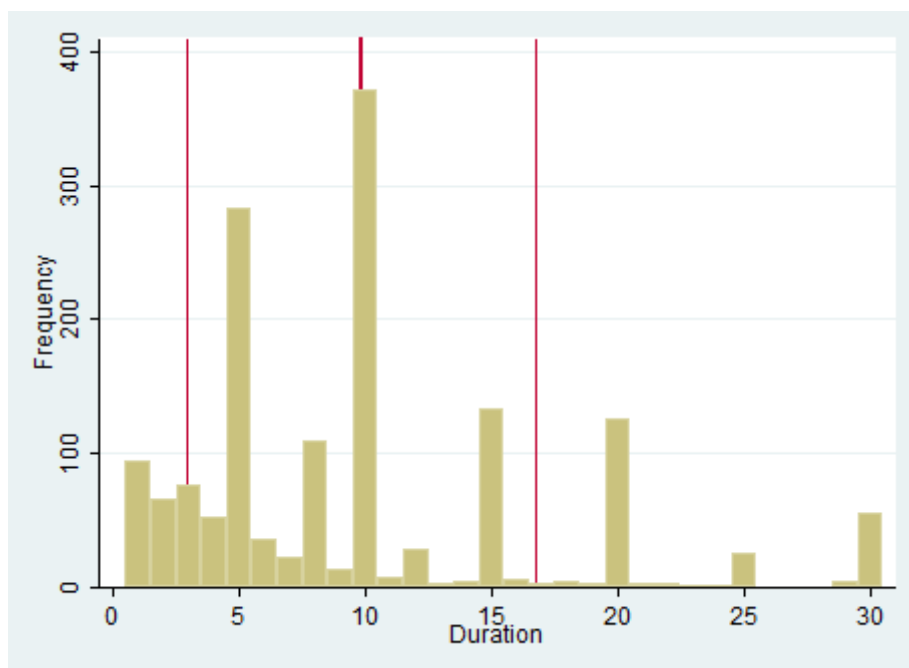
Figure 7 – Log of amount to be invested



If we separate individuals according to whether or not they own property, the average amount intended for the project is over €1 million (€1,200,000) for property owners, compared with €200,000 for respondents who do not own property.

The length of the investment varies between 1 and 30 years, with a mean of ten years (Figure 8, bold line in the middle of the sample). The mode of the distribution is also ten years, with a second peak at five years. Smaller peaks at 15, 20, 25 and 30 years reflect a preference among respondents for round numbers.

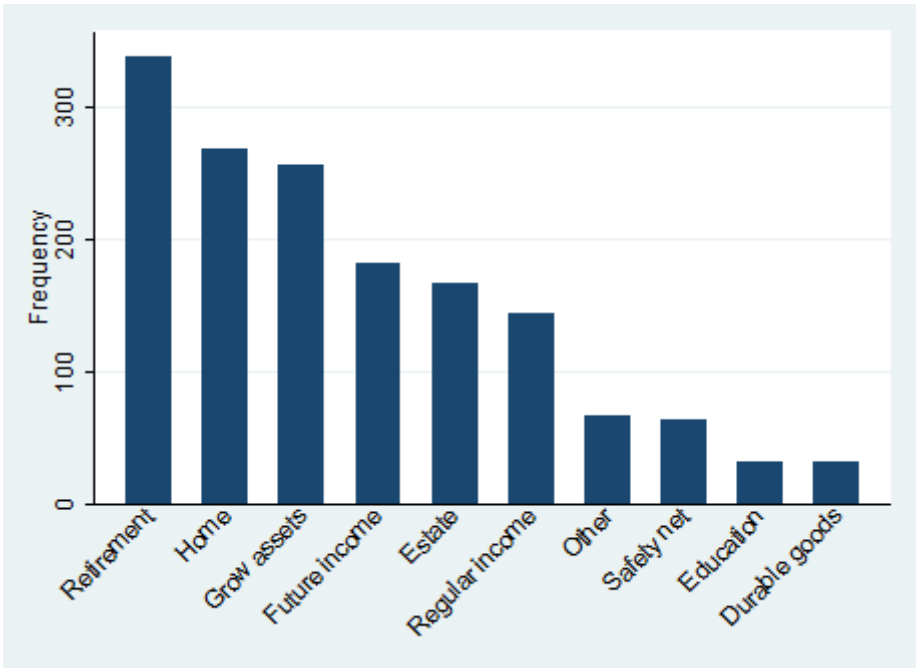
Figure 8 – Length of investment needed to complete project



Just over one-third (37%) of respondents want to invest for under five years. They are generally advised to hold a small proportion of risky assets. A similar proportion (36%) of people in the sample want to invest for between five and ten years, leaving 27% of investors who want to invest for over ten years.

The most common reasons (goals) for investment plans are to save for retirement, to buy or renovate a home, and to grow assets (Figure 9).

Figure 9 – Reasons for project



We will see later that the investment goal plays a significant role in explaining risk tolerance. It is therefore important that MiFID questionnaires should contain at least one question that makes it possible to identify the goal of the investment. This is not always the case for the questionnaires used in the study.

4. Knowledge and experience

Respondents were also asked how much they know about investment products and different investment management methods. Five products were offered: equities, bonds, passbooks, structured products, innovation/venture capital funds.

As might be expected, the best-known products are savings account (known to around 95% of respondents), ahead of equities and bonds (known by 87% and 73% respectively). Conversely, more sophisticated (and often riskier) products are far less familiar: just 20% of respondents are familiar with structured products (See Figure 23 and Figure 24 in Annex VII.F.3.).

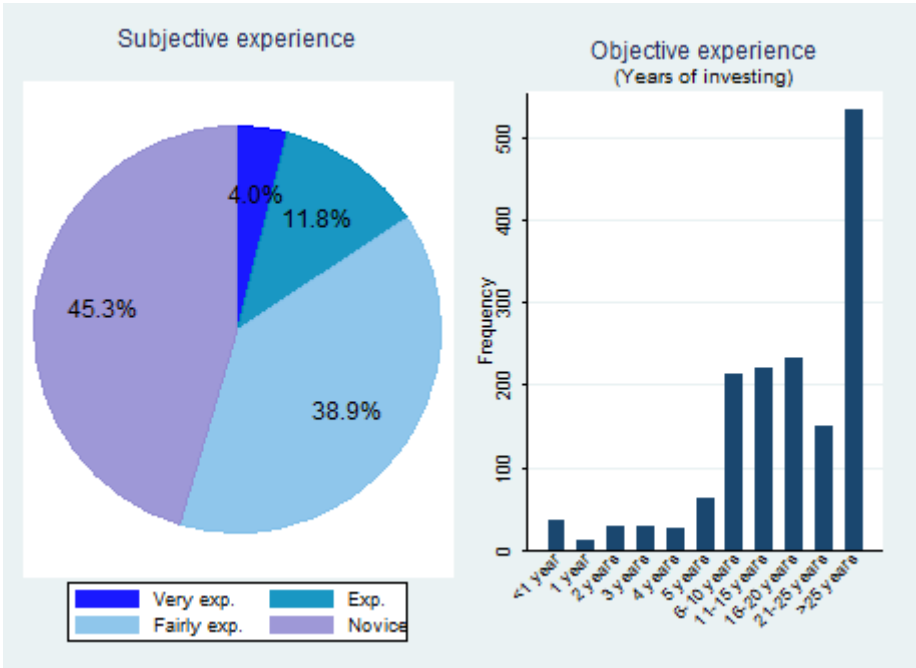
Different methods of investment management are not well known overall, aside from discretionary mandates (known to 44% of respondents) and collective investing (known to

65% of respondents). Fewer than 20% of respondents were familiar with management strategies such as alternative investing, as contrasted with conventional management. (See Figure 25 and Figure 26 in Annex VII.F.3.) This indicates that the different methods of management offered by a financial institution must be carefully explained before being offered to a customer.

The sources of information most commonly used by respondents are the banking adviser (46%) and the business press (41%). (See Figure 27 and Figure 28 in Annex VII.F.3.)

We used two different notions of customer experience: the first based on a subjective estimate, the second on a more objective estimate. In the first case, the respondent assesses his or her own level (from novice to experienced). In the second, the respondent says how many years he or she has been investing for.

Figure 10 – Subjective and objective measures of experience



The results confirm that these are indeed two different notions and that they are fairly weakly correlated (14%). Furthermore, the more financial products that respondents are familiar with, the more they tend to think of themselves as experienced. The subjective level of experience shows a 46% correlation with the number of products and a 57% correlation with the number of management methods known. The same is not true of the objective level of experience (25% and 10% respectively).

5. Quality of the sample

We used a procedure for collecting data that suited the requirements of financial institutions (confidentiality, anonymity, anti-phishing, etc.) as well as the financial constraints of the

project (more than half the budget went to gathering the data). Thanks to the cooperation of financial institutions, professionals and TNS Sofres, we managed to reach – and exceed – the initial target number of respondents (133 more than the initial group of 1,400) by combining different collection methods and populations. The data gathered are unique and of exceptionally high quality. Other large-scale surveys have certainly been conducted (France has a household wealth survey, for example, and the Netherlands conducts a similar exercise), but they deal marginally with questions relating to risk. These highly general questionnaires contain at most one or two lotteries that are insufficiently detailed to be able to precisely measure risk tolerance and other dimensions of risk preferences.

We were able to verify that the sample was sufficiently representative, not of the general French population, but of the population of investors covered by MiFID. Furthermore, we compared these data with those taken from a sample of over 6,000 respondents compiled progressively over six years in France, Europe (Switzerland, Belgium, Italy, Germany) and Tunisia. These comparisons across time, space and different cultures give us some distance on the data collected for this study.

Our data gathering campaign suggests that the questionnaires published by financial institutions and the benchmark questionnaire are understandable to respondents. It turned out to be entirely possible to ask respondents a series of questions – even quantitative ones – for thirty or so minutes (the average time taken to fill out the three questionnaires in the context of the study). However, the context and incentives of respondents play an important role. Each year, at Ecole Polytechnique, we have respondents answer a questionnaire that is tougher than the benchmark questionnaire, and we obtain a response rate of around two in three. The only incentives are randomly distributed prizes with an average value of €6. This small reward, coupled with curiosity and the desire to know oneself better, are enough incentive for students to fill out a questionnaire that is much longer and harder than the MiFID questionnaires provided by financial institutions or the benchmark questionnaire.

Ultimately, what matters in a MiFID questionnaire is first and foremost the intrinsic quality of the questions, which must allow the respondent to pick an investment based on the answers provided. The goal is to identify the essential information needed to advise the respondent: investment horizon and objectives, financial situation, knowledge and experience of financial markets, but also, most importantly of all, risk tolerance.

We are now going to examine the use, or potential use, made of the responses to the questionnaires. This is the key aspect of the questionnaire. We will see that the quality of the use made, whether actual or potential, varies considerably from one questionnaire to another. This is because the right questions are not being asked, or are not being asked properly insofar as it is impossible to extract enough information from them. To avoid analysing the questions too subjectively, we will use an econometric approach to assess the appropriateness and informative qualities of answers and the suitability of questions with respect to MiFID recommendations.

C. Construction of a Risk Index and Artificial Scores

1. Risk Index definition and measurement

The benchmark questionnaire offers respondents three series of lotteries with a wide range of hypothetical returns (including very negative returns or, on the contrary, very high returns). These are used to determine a quantitative measurement of the different dimensions of preferences regarding risk taking by constructing a **Risk Index**. The risk profile questionnaires are generally restricted to a single dimension: risk tolerance (or, equivalently, risk aversion). The other dimensions are more difficult to measure, but they cannot be omitted under any circumstances. Detailed study of these different dimensions, their determinants and their measurement falls outside the scope of this report. We simply show here that these different dimensions are indeed present in the population under consideration, that they vary significantly from one investor to another and that they can be measured with the help of a risk profile questionnaire.

The method for measuring preferences regarding risk taking consists of offering each individual client three sequences of choices or *series of "lotteries"*. Each question involves a choice between two financial assets: the first asset offers a return that is certain, while the other, risky, asset offers either a low return or a high return. Each question specifies the probability of "low" or "high" returns for the risky asset. The returns and probabilities vary from one lottery to the next within the same series, depending on the respondent's previous choice. This makes the questionnaire dynamic.

If the investors' behaviour patterns are consistent with the expected utility theory, it should only take a single series of lotteries to estimate each respondent's risk tolerance (one-dimensional measurement). But the presence of loss aversion or a tendency to distort probabilities means that several series of lotteries will be needed to capture preferences regarding risk taking and to measure them accurately in all of their diversity.

The choice of the best utility function to represent preferences regarding risk taking has been discussed by de Palma, Picard and Prigent [14]. The authors conducted rigorous testing of the different forms of utility functions related to loss tolerance and the tendency to distort probabilities. Based on these results, we assume here that the respondents' preferences can be represented by a Constant Relative Risk Aversion (CRRA) utility function, given by:

$$U_{\theta}(x) = \frac{x^{1-\theta} - 1}{1-\theta}, \theta \neq 1, x > 0; U_1(x) = \log(x), x > 0 \quad (4)$$

With such a utility function, only relative risk influences choices, which means that doubling all of the amounts under consideration should not have any impact on the respondents' decisions. A CRRA utility function is characterised by a constant relative risk aversion

coefficient θ and, more intuitively, by a constant risk tolerance index $\gamma = 1/\theta$. Each series of lotteries helps situate risk tolerance between two bounds. Sophisticated econometric tools are then used to obtain a measurement of risk tolerance depending on the responses to each series of lotteries, along with answers to other questions that play the role of explanatory variables. The qualitative variables regarding to the attitude towards risk are particularly helpful explanatory variables for the Risk Index.

The risk tolerance index or Risk Index IR_i , of individual i is then calculated as the harmonic mean of the risk tolerance indices estimated for each series of lotteries.

The three series of lotteries used in the benchmark questionnaire are used to measure risk tolerance, loss tolerance and the tendency to distort probabilities. We were able to verify that these three character traits are indeed present in the sample, that they vary significantly from one respondent to the next, and that it is not always the same individual characteristics that influence risk tolerance, loss tolerance or the tendency to distort probabilities. Each of these three character traits has a very specific influence on the selection of suitable investment products for each investor, or on the content of the investment advice that each investor needs. For example, a special educational effort will be needed for an investor with a strong tendency to distort probabilities to make him understand the true risks of the various financial products offered to him. The adviser needs to give him more help than other clients to help the client avoid being deceived by appearances and being influenced by current economic conditions. Similarly, an investor with a very low loss tolerance should invest in fully guaranteed loss-free products, even if the return on the product varies considerably, as long as it remains positive. On the other hand, an investor with low risk tolerance should invest in a product where the returns do not fluctuate, even when the returns are positive.

To provide high quality investment advice, each of these three dimensions of the attitude towards risk needs to be measured more specifically. However, we did not find any questions that can be used to quantify these three dimensions on the basis of the questionnaires analysed. Therefore, we have had to restrict our evaluation to the most important dimension of the attitude towards risk: risk tolerance. The Risk Index, IR_i , that we use in this study primarily measures risk tolerance, but it has undergone minor adjustments to account for loss aversion and the tendency to distort probabilities. This is the best way of accounting for these three dimensions of the attitude towards risk in a single variable, which can then be used to evaluate each of the questionnaires.

2. Thematic evaluation of the questionnaires

In the spirit of MiFID, the questions are grouped according to the four main themes identified in Section II. The themes cover (1) personal characteristics, (2) financial situation, (3) investment objectives and (4) the client's knowledge and experience. This section

endeavours to measure the relevance of each of the themes for the different questionnaires.

Two measurements of relevance can be attributed to each group of questions. They relate to the *marginal* contribution that the group of questions makes to predict the Risk Index. The marginal contribution can be calculated two ways, depending on whether we start “from nothing” or “from everything”, which define two *partial R² statistics*.

- ➔ The adjusted R^2 statistic of the regression¹¹ that explains the Risk Index solely on the basis of the group of questions concerned (Column (1) of Table 8) measures the marginal contribution of this group of questions when we start “from nothing”. It provides a measure of how well this group of questions on its own predicts the Risk Index.
- ➔ The difference between the R^2 statistic of the regression that includes all the questions in the questionnaire concerned and the R^2 statistic of the regression where only the questions in the group concerned have been omitted (Column (2) of Table 8) measures the marginal contribution of the group of questions when we start “from everything”. It measures how well this group of questions predicts the Risk Index, *all else being equal*, meaning without the influence of all of the other explanatory variables.

When questionnaires address personal characteristics, the latter generally provide very little information about the Risk Index, whether we start “from nothing” or “from everything”: the partial R^2 statistics in Columns (1) and (2) of Table 8 are often negative. There are exceptions for two questionnaires that produce partial R^2 statistics of about 5% for the personal characteristics. We can deduce from this that some personal characteristics do have an influence on risk tolerance, as suggested in the discussion in Section II.B.3, but that these material personal characteristics are rarely captured by the MiFID questionnaires. This omission is harmful since it neglects an opportunity to refine the measurement of preferences regarding risk taking and thereby an opportunity to ensure that clients are sold more suitable products.

The questions dealing with the client’s financial situation provide even less information about the Risk Index, except for one questionnaire where the partial R^2 statistic is greater than 20%. Once again, we could conclude from this that, in keeping with the findings of economic research (see II.B.4), the client’s financial situation has a considerable influence on his risk tolerance, but the MiFID questionnaires generally fail to ask the right questions to measure this influence.

¹¹ Coefficient of multiple determination that measures the (square of the) correlation between the Risk Index and the value of the Index estimated using the variables in the model. As is customary in econometrics, the coefficient of determination is adjusted for the size of the sample and the number of explanatory variables.

In most questionnaires, the investment objectives theme has the greatest explanatory power, which is not surprising given that, in accordance with MiFID, we have included the questions about the client's attitude towards risk in the theme of investment objectives. Depending on the questionnaires, all of the variables related to investment objectives can explain between 1% and 30% of the variations in the Risk Index (within the population of investors surveyed). There are large disparities between questionnaires on this level. The 4 questionnaires where the partial R^2 statistic is under 3% on this point can hardly be used as a basis for giving investment advice about suitable products in terms of risk for a specific client. This is particularly disturbing because Table 8 shows that the other themes do not compensate for the weak explanatory power of the "investment objective" theme in these 4 questionnaires.

The explanatory power of the "knowledge and experience" theme also varies greatly from one questionnaire to the next, ranging from next to nothing to around 20% (Column (1) under "Knowledge & exper."). The high value of the partial R^2 statistic for this theme in some of the questionnaires shows that clients' risk tolerance does depend on their knowledge and experience of financial markets, as has been suggested by research (see II.B.2). This means that it is important for MiFID questionnaires to collect accurate information about clients' knowledge and experience, not only because this information is important in itself for determining which products should not be offered to a client because he is not familiar with them and which additional information and explanations need to be provided to each client, but also because this information is helpful for improving the suitability of products sold to clients in terms of risk.

Table 8 – Quality of the questionnaires by theme¹²

	Pers. characteristics			Financial situation			Objectives			Knowledge & exper.		
	Nb. var. (Nb. quest.)	(1)	(2)	Nb. var. (Nb. quest.)	(1)	(2)	Nb. var. (Nb. quest.)	(1)	(2)	Nb. Var. (Nb. Quest.)	(1)	(2)
QB	7(3)	5.2%	6.9%	44(48)	0.8%	-1.8%	17(4)	29.7%	15.0%	5(2)	2.8%	0.8%
QC	-	-	-	-	-	-	18(5)	14.8%	13.1%	6(2)	0.0%	-1.6%
QD	12(4)	1.0%	-2.5%	32(11)	6.1%	2.3%	11(3)	10.9%	7.2%	5(1)	0.3%	-2.5%
QE	7(2)	-1.6%	-2.2%	25(13)	3.7%	-3.5%	19(12)	11.0%	-4.3%	24(15)	20.8%	10.6%
QF	3(1)	3.3%	2.2%	-	-	-	14(5)	13.0%	4.6%	9(5)	8.3%	-0.4%
QG	-	-	-	-	-	-	12(7)	23.8%	23.8%	4(4)	1.5%	1.5%
QH	12(4)	6.4%	1.9%	29(9)	-2.7%	-3.4%	18(7)	9.3%	5.0%	12(12)	-0.6%	0.4%
QI	-	-	-	-	-	-	23(7)	2.7%	7.4%	11(7)	-3.7%	1.0%
QJ	25(3)	1.6%	-2.0%	18(11)	0.0%	-2.2%	10(5)	1.9%	2.6%	9(9)	5.0%	4.2%
QK	-	-	-	20(5)	-2.7%	-2.4%	5(1)	1.9%	1.5%	22(22)	0.2%	0.3%
QL	11(3)	-1.5%	-0.1%	14(7)	21.7%	26.8%	42(14)	9.6%	8.6%	15(15)	8.2%	4.9%
QM	4(1)	-1.4%	0.4%	4(2)	1.2%	-0.9%	17(6)	16.1%	16.6%	85(57)	18.9%	24.8%
QN	-	-	-	24(5)	2.8%	0.2%	17(4)	21.4%	14.8%	15(14)	8.1%	1.3%
QO	4(1)	-1.1%	-12.8%	18(9)	-13.4%	-24.2%	7(5)	1.1%	-7.6%	8(7)	17.3%	-5.3%

(1) Adjusted R2 statistic of the regression explaining the Risk Index solely on the basis of the group of questions relating to the relevant theme in the questionnaire specified in the left hand column.

(2) Difference between the R2 statistic of the regression including all of the questions in the questionnaire concerned and the regression where questions in the relevant group of questions has been omitted.

Table 9 shows the most significant question for each theme in MiFID and for each questionnaire, along with the degree of significance. The significance of a variable measures its effect on the Risk Index, all else being equal, and the accuracy of this measurement. The more significant a variable is, the more it influences the Risk Index: this is represented here by the number of stars, corresponding to the significance threshold commonly used by statisticians or econometrists. Because the sample size was relatively small for each questionnaire (see Table 6 for the number of respondents per questionnaire), we used fairly high significance thresholds compared to usual practice. This meant that we considered variables that were sometimes not very significant. A more exacting study of each questionnaire, using a larger sample, is needed to refine the list of questions to be included in each questionnaire.

¹² See Table 10 for the size of the samples for each questionnaire.

Table 9 – The most significant questions for explaining the Risk Index

	Pers. charc.	Financial situation	Objectives	Knowledge & exp.
QB	Age *****	Non-financial assets: main residence *****	Fluctuations accepted ****	Knowledge of financial investments NS
QC	- -	- -	Risk tolerance ****	Desired investment profile (execution only, etc.) NS
QD	Gender ****	Net worth *****	Annual variations accepted *****	Knowledge of investments NS
QE	Profession NS	Steadiness of income *	Purpose of investment *****	Knowledge of derivatives *****
QF	Age ***	-	Risk associated with products: preferences ****	Exp.: previous investments *****
QG	- -	- -	Choice of 3 investments ****	Delegation of powers accepted ****
QH	Age ****	Source of income ***	Degree of risk accepted *****	Exp.: transactions in the previous year ***
QI	- -	- -	Desired risk for the investment **	Exp. options, hedge funds, etc. ****
QJ	Gender ****	Source of income NS	Ideal mix of risk and investment horizon *****	Knowledge of real estate investment funds Scpi/Opci *****
QK	-	Annual amount of regular income *****	Purpose of investment *****	Knowledge of EMTN/Collateralised structured instruments *****
QL	Profession NS	Annual amount of income from work *****	Investment amount ***	Knowledge of Services *****
QM	Profession NS	Proportion of investment in equities NS	Choice of 3 investments ***	Knowledge of structured funds, EMTN with or without a capital guarantee *****
QN	- -	Financial assets *****	Choice of 3 investments *****	Knowledge of foreign stock markets *****
QO	Profession NS	Bank deposits NS	Purpose of investment NS	Exp.: holding an equities savings plan (PEA) **

The following code is used throughout the report:

***** <5%: the variable has a major effect that is measured very accurately. This variable must be considered systematically to predict risk tolerance.

**** 5-10%: the variable has a major effect that is relatively accurately measured. This variable should probably be considered to predict risk tolerance.

*** 10-15%: the variable seems to have an effect, but it was not possible to measure it accurately. This variable should probably be considered to predict risk tolerance, but it would be a good idea to verify it using a larger sample.

** 15- 20%: the variable may have an effect, but it was not possible to measure it accurately. This variable could potentially be considered to predict risk tolerance, but it needs to be verified with a larger sample.

* 20-25%: the variable does not seem to have an effect, but the apparent lack of effect may stem from the inaccuracy of its measurement. A verification using a larger sample is needed to find out whether the variable should be considered.

NS >25%: the variable has no observed effect on the Risk Index. All else being equal, the effect of this variable on the Risk Index does not need to be considered.

In addition to the specific features of each questionnaire, which should be studied in greater depth on a case-by-case basis, there are some noteworthy general findings. In general, these findings bear out the research findings discussed in Section II.B.

Personal characteristics, such as gender, age and profession have a significant influence on preferences regarding risk taking. MiFID questionnaires generally ask clients for their gender and age, or this information is obtained through other means, but information about the client's profession is often poorly filled-in, out of date or missing altogether. We feel that collecting and updating this information systematically are critical for the quality of investment advice.

The client's financial situation, as determined by net worth and income has a very significant influence on risk tolerance. This makes it critical to measure net worth and income very accurately, even though clients are reluctant to answer such questions, which are seen as invasions of their privacy. Financial institutions, national and European authorities and non-profit financial education bodies, such as Finance pour Tous or Ecole de la Bourse, should work together to convince investors that it is in their own best interest to disclose these numbers to their financial advisers in order to improve the quality of advice provided.

When addressing investment objectives, the questions aimed at measuring preferences regarding risk taking directly in quantitative or qualitative terms are, as could be expected, the ones that are the most helpful in predicting the Risk Index. But the purpose of the investment also plays a major role and should not be overlooked by any financial institution. The characteristics of the investment, such as the investment amount or horizon, play a significant role, but a less important one, which explains why they hardly appear in Table 9.

The knowledge of products and management procedures, as well as investment experience, generally have a significant influence, but it is difficult to draw any general conclusions

because the questions dealing with this theme vary considerably from one questionnaire to the next.

3. Definition of Artificial Score

The Risk Index defined previously (in section IV.C.1) serves as the basis for evaluating the extent to which the financial institutions' questionnaires are effective in measuring risk preferences. For this purpose, we carried out a regression of the Risk Index on the various questionnaire answers so as to obtain, for each questionnaire, the best estimate of the Risk Index that can be calculated from the answers provided. This estimated Risk Index corresponds to the best score, the **Artificial Score**, which the financial institution could derive from its own questionnaire. Two different models were estimated for the purpose of evaluating each questionnaire.

The **full model** includes all the variables measured in the each questionnaire, without exception. The R^2 of this regression¹³ represents the explanatory power of the questionnaire as a whole and provides an overall merit rating for the questionnaire. R^2 also measures the proportion of the variation in the Risk Index (from one respondent to another) that can be explained by the questionnaire. The full model would be the relevant one if the one and only purpose of the MiFID questionnaires were to measure risk preferences. But these questionnaires also serve other purposes, such as assessing the customer's experience or financial situation. These are of interest in themselves, independently of risk preferences. In principle, therefore, it does not matter that the adjusted R^2 of the full model on certain questionnaires is quite low, since these questionnaires ask some questions that have little to do with risk preferences.

The **optimised model** uses only the significant variables, that is, the variables that actually help to predict the Risk Index, "all other things being equal". In other words, this method enables us to evaluate the relevance of the various questions on a given questionnaire for explaining risk tolerance. Built in this way, the model is optimised: only the most relevant questions are retained as variables. This step selects the questions that need to be included to define an optimal score.

The Artificial Score corresponds to the best the financial institution could do (using a linear model), given the current form of its questionnaire, in evaluating its customers' risk tolerance.

It is important to stress at this stage that this kind of optimisation of the use of a questionnaire is valid at a given point in time only. It needs to be revised on a regular basis

because questionnaire answers are highly sensitive to current economic conditions, owing to the representativeness bias and other behavioural biases described in section II.B.1. For this reason, the weight given to each answer in calculating the optimal score should be revised regularly (several times a year). Even the choice of which questions are used in calculating the optimal score needs to be revised on a regular basis.

4. Overall evaluation of the questionnaires

This entire section relies on Table 10, which shows the adjusted R^2 of each questionnaire for the full model as well as the optimised model.

Table 10 - Ability of the questionnaires to explain the Risk Index

	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO
Adjusted R^2 (full)	27.1%	13.1%	11.1%	17.6%	15.7%	25.3%	7.0%	3.7%	5.2%	-0.4%	35.5%	37.6%	25.5%	-15.0%
Adjusted R^2 (optimised)	32.3%	14.7%	16.6%	31.3%	19.2%	25.7%	16.5%	9.7%	12.0%	4.3%	42.6%	42.4%	29.9%	22.0%
Relevance	1.19	1.12	1.50	1.78	1.22	1.02	2.37	2.62	2.31	-	1.20	1.13	1.17	-

Num. var. (quest.), full	73 (57)	24 (7)	60 (19)	75 (42)	26 (11)	16 (11)	71 (32)	34 (14)	62 (28)	47 (28)	82 (39)	109 (66)	56 (23)	37 (22)
Num. var. (quest.), optimised	30 (24)	8 (2)	28 (9)	13 (6)	10 (4)	14 (9)	20 (9)	13 (6)	16 (7)	21 (9)	22 (12)	57 (23)	20 (6)	14 (10)
Parsimony ratio	0.42	0.29	0.47	0.14	0.36	0.82	0.28	0.43	0.25	0.32	0.31	0.35	0.26	0.45

Effective ¹⁴	249	223	230	216	81	88	320	105	270	251	234	214	307	67
-------------------------	-----	-----	-----	-----	----	----	-----	-----	-----	-----	-----	-----	-----	----

For roughly a third of the questionnaires, the overall rating (R^2 of full model) is greater than 25%, whereas for another third of the questionnaires the overall rating is less than 10%. In accordance with econometric theory¹⁵, the adjusted R^2 of the optimised model is greater than the adjusted R^2 of the corresponding full model. The adjusted R^2 of the optimised

¹⁴ The effective number of respondents differs from the number indicated in Table 6 because some respondents do not fill out the entire questionnaire. Since this results in missing values for certain important variables, those respondents were excluded from the sample used for measuring risk tolerance.

¹⁵ The adjusted R^2 of a regression model necessarily increases when a non-significant variable is removed.

model exceeds 40% for two questionnaires (in green in Table 1). These questionnaires are therefore potentially very good tools for measuring risk preferences.

The adjusted R^2 of full model is negative for two of the questionnaires (in red in Table 1). This happens where the model has practically no explanatory power, which in this case means none of the questionnaire variables really explain the Risk Index. After optimisation, the adjusted R^2 of the optimised model for one of these two questionnaires tops out at 4%, whereas on all the other questionnaires it is close to or better than 10%. This is an isolated case that is not representative, since the mean of the adjusted R^2 is 22.8%. Even so, this result suggests that this questionnaire cannot validly be used to measure investors' risk tolerance. For the other of the two questionnaires, the R^2 exceeds 20% on the optimised model. In this second case, the low adjusted R^2 of the full model is explained by the small sample size (67 respondents).

In developing their MiFID questionnaire, financial institutions have to make a trade-off between seeking relevant answers to a comprehensive range of topics and trying the client's patience with a questionnaire that is too long. Succinctness, or parsimony, is therefore a fundamental quality of a MiFID questionnaire, provided it can be achieved without compromising relevance.¹⁶

To analyse this trade-off, we calculated:

- ➔ a **risk-relevance ratio** (greater than 1), which measures the improvement in relevance in going from the full model to the optimised model. It is the ratio of adjusted R^2 on the optimised model to adjusted R^2 on full model. A value far above 1 indicates that it is better to select only some of the questionnaire variables to predict risk tolerance, because including all of the variables has a redundant effect on risk tolerance. A value close to 1, on the other hand, indicates that all the variables in the questionnaire can be used to predict risk tolerance. The relevance ratio is not calculated where the R^2 of the full model is negative.
- ➔ a **parsimony ratio** (less than 1), which corresponds to the percentage of questionnaire variables used in the optimised model. If the value is close to 1, the questionnaire can be used in its entirety to explain risk preferences. If the value is far from 1, on the other hand, a large number of the questionnaire variables are not useful for explaining risk preferences -- which does not make them any less useful in meeting other requirements of the MiFID.

¹⁶ We evaluate relevance here strictly with respect to measuring risk tolerance. The other aspects that MiFID questionnaires need to address (financial situation, investment period and purpose, knowledge and experience) are easier to evaluate directly. They are discussed in section III.B.

The parsimony ratio thus measures the ex ante gain (in terms of parsimony, when composing the questionnaire) that results from reducing the size of questionnaire, whereas the risk-relevance ratio measures the ex post gain (in terms of relevance, when using the questionnaire) that results from reducing the size.

For nearly half the questionnaires, the risk-relevance ratio is greater than 1.50, which means the institutions using those questionnaires have much to gain from using only selected parts of them to measure their clients' risk tolerance. Again, this does not mean the other parts are not useful, because they generally are relevant to other aspects of the MiFID. The risk-relevance ratio is close to 1 for seven questionnaires, which means all the questions on them are relevant for measuring risk tolerance.

For the great majority of the questionnaires, the parsimony ratio is less than 0.50, which means that in most of them, fewer than half of the questions provide usable information on risk tolerance. These questionnaires could be reduced in size by more than half without impairing their ability to measure risk tolerance. But, yet again, measuring risk tolerance is not the only obligation the MiFID questionnaires are intended to fulfil.

D. Analysis of questionnaires with a score

1. Study and calculation of existing scores

Among the questionnaires that were studied, those denoted by letters from B to G define a score calculation method. These come from four different financial institutions. Based on this score, potential investors are assigned a profile associated with a set of investment recommendations. In this section we analyse the quality of the scores as the institutions have defined them.

a) Score construction methods

Before we even look at the answers to these questionnaires, we study how the scores are constructed: the questions used and the weights given to the various responses.

Financial institutions generally construct their scores on the basis of a subset of the questions rather than the whole questionnaire submitted to the client. This is consistent with the fact that the scores generally serve to quantify risk tolerance, whereas the MiFID questionnaires have a broader purpose and must serve not only to measure risk preferences but also to analyse other subjects mentioned in the directive (financial situation, investment objective, knowledge and experience).

As Table 11 shows, the number of questions used to construct a score ranges from 3 to 11. For the majority of the questionnaires, only five or six questions factor into the score. The percentage of questions used to define the score varies widely between institutions, ranging from 9% to 100% of the total.

Among the individual characteristics, the financial institutions deem only age to be relevant to calculating a score. This is not consistent with the results from the literature mentioned in section II.B, nor is it consistent with the results of section IV.C. The results in both categories suggest that gender and professional occupation as well as age ought to be taken into account in constructing a risk score to serve as a basis for investment advice.

The client's financial situation figures in the construction of the score on only one questionnaire, even though this item is filled in on most of the questionnaires with a score. Section IV.C has shown, however, that financial situation has a highly significant effect on the Risk Index. This finding consequently argues for systematic consideration of the client's financial situation by financial institutions for purposes such as, but not limited to, assigning a score to guide its provision of investment advice.

The client's investment horizon and investment goal routinely figure in the calculated score, which is gratifying. By contrast, the amount of the investment project is ignored by virtually all of the questionnaires, which impairs the quality of investment advice. The investment amount ought to be taken into consideration jointly with the client's financial situation. The literature shows that relative magnitude –the size of the investment as a proportion of the investor's net worth – is important.

Another positive aspect that should be mentioned is that all the questionnaires make an evaluation of the client's risk preferences, at least qualitatively, and use that evaluation to calculate the score. It is regrettable, though, that only half of them include any quantitative questions on this point. Bear in mind that because investment advice is inherently quantitative, the suitability of the product to the client ought to depend systematically on a quantitative measure of risk tolerance.

Only one questionnaire -- the one that uses the greatest number of questions to construct the score -- uses the client's knowledge and experience as a factor in the score, whereas the literature (see II.B.2) and section IV.C have emphasised the importance of this factor.

Table 11 - Questions used to calculate the scores

		QB	QC	QD	QE	QF	QG
Personal charact.	Age	1	-	1	-	1	-
Financial situation	Net worth	-	-	1	-	-	-
Investment objectives	Horizon	1	2	1	1	1	-
	Purpose	1	-	1	1	1	-
	Amount	1	-	-	-	-	-
	Risk preferences	Quantitative	-	-	1	1	4
		Qualitative	1	1	1	3	2
Knowledge & experience	Experience	-	-	-	-	1	-
	Knowledge	-	-	-	-	4	-
No. questions to calculate the score		5	3	5	6	11	6
No. questions in the questionnaire		57	7	19	42	11	11
Ratio		9%	43%	26%	14%	100%	55%

For four of the six questionnaires for which a score is defined, it is easy to determine the sign of the variable's effect on the score as well as the proportion of the score that it accounts for. For these four questionnaires, the score is defined by a one-dimensional linear equation; that is, a client's score is calculated as the sum of points assigned to each question based on the client's answer. For the other two questionnaires, the score is calculated in a way that combines the answers to several questions. We cannot reveal the details of the combination here, for confidentiality reasons.

For the four questionnaires with linear scores, Table 12 indicates the sign (the direction in which the answer affects the score) and the relative weight of each question in calculating the score. This relative weight is obtained by comparing the amplitude of the question (difference between the minimum and maximum number of points assigned based on the answer) with the total amplitude of the score (difference between the minimum and maximum number of points that can be assigned in total, for the entire questionnaire).

The four linear scores increase with risk tolerance: the higher the client's score, the more the client is suited to investing in riskier (and on average, higher-return) products. The signs are consistent with expectations and consistent across the questionnaires: age and amount have a negative effect on the score, while investment horizon and risk appetite have a positive effect.

Thus, across the financial institutions, there is only very slight consensus on the list of items to be used in constructing a score, but perfect consensus on the direction in which each item considered should affect the score. Further divergences appear in the magnitude of the effects of the different items that make up the score.

Table 12 - Effect of the various dimensions in the score calculation

			QB		QC		QD		QE	
			Sign	%	Sign	%	Sign	%	Sign	%
Personal char.	Age		-	10.3%			-	10.0%		
Financial situation	Net worth						+	46.7%		
Investment objectives	Horizon&Liquidity		+	10.3%	+	66.7%	+	10.0%	+	17.4%
	Purpose		ND	48.3%			ND	6.7%	ND	13.0%
	Amount		-	10.3%						
	Risk preferences	Quanti.							+	17.4%
		Quali.	+	20.7%	+	33.3%	+	26.7%	+	52.2%

ND = Not defined

The scores of different financial institutions accord widely varying weights to the various questions: one score depends mainly on the investment goal, a second is influenced primarily by the investment horizon, a third depends most of all on net wealth, and the fourth puts the main emphasis on (qualitative) risk preferences. However, these divergences between scores are modest from the standpoint of the principal issue. All the scores accord high importance to risk preferences, whether those are measured quantitatively or not.

b) Distribution of the scores

The scores defined by financial institutions as integer values use quite different scales, as shown in Table 13. The theoretical amplitudes (difference between the minimum and maximum score that can be assigned for a given questionnaire) range from 4 to 150.

We have found, though, that for the questionnaires with the broadest scales, the amplitude of calculated scores in the sample is less than the theoretical amplitude. The ratio of these two amplitudes varies between 80% and 100%.

Thus, for questionnaire B, a respondent who chose the answer giving the fewest points on each question would get a score of -55 (Min. Theoret. line), whereas a respondent who chose the answer giving the most points (Max. Theoret. line) would get a score of 90. The theoretical amplitude is therefore $90 - (-55) = 145$. However, no respondent in the sample caused the observed amplitude to reach this extreme. The lowest observed score on questionnaire B was -25, while the highest possible score was indeed observed in the sample. The observed amplitude for questionnaire B is therefore $90 - (-25) = 115$, or 79% of the theoretical amplitude.

Table 13 - Amplitude of the scores defined by the institutions

		QB	QC	QD	QE	QF	QG
Min.	Theoret.	-55	3	-10	1	1	1
Max.		90	15	140	24	12	5
Ampl.		145	12	150	23	11	4
Min.	Observed	-25	3	5	3	1	1
Max.		90	15	125	24	12	5
Ampl.		115	12	120	21	11	4
Ampl. ratio		79%	100%	80%	91%	100%	100%
Average		31.66	10.07	74.93	13.88	6.56	2.56
Standard dev.		22.56	2.36	26.82	4.65	3.28	1.02
No. answers		281	232	220	86	111	89
No. distinct profiles		4	-	5	4	12	-

For further details, the distributions of the scores are presented in Annex VII.G.

Four questionnaires define profiles, with associated investment recommendations, on the basis of the calculated score. The distribution of these profiles is presented in Annex VII.H.

2. Consistency of the scores and the Risk Index

Given the amplitude differences between the various scores in the study, we normalised each score to have it take values between 0 and 100, so as to make all the scores comparable.

a) Consistency between the existing scores

In this section we look at the consistency of scores between questionnaires (pair-wise) wherever the sample size permits. Of the fifteen possible pairs of questionnaires (2 different questionnaires out of 6), the number of respondents to both questionnaires was deemed sufficient for six pairs.

It was not possible (and it would have been of little interest anyway) to measure the correlation between scores assigned by a retail bank and scores assigned by a private bank. Depending on the type and level of wealth of the client, a respondent would receive either two retail bank (or generalist) questionnaires or two private bank (or generalist) questionnaires.

The correlation between scores as defined by the different financial institutions provides an initial indication of how consistent they are. The scores show little correlation between each other (all of the correlation coefficients are presented in Table 14), which suggests that the financial institutions are evaluating a given respondent's risk tolerance differently and providing quite different investment recommendations. The highest observed correlation is about 40% (on two questionnaires that do not come from the same institution), but half the

correlations are around 20%, and one is close to 10%. Correlations at levels such as these are not high enough for scores that are supposed to measure the same characteristic, namely risk tolerance. They are not surprising, though, in the light of the wide divergences revealed in section IV.D.1.

The low levels of these correlations could be a sign of a more complex non-linear relation between scores. This assumption was tested, and the charts presented in annex VII.I depict the test results, by showing the score obtained by a respondent to one of the questionnaires as a function of the score obtained by the same respondent to another questionnaire. No monotonic non-linear relation could be found. The implication of these charts is that the simple correlation coefficients are reliably measuring the (weak) relation that exists between scores calculated from different questionnaires.

b) Consistency with the Risk Index

The correlation of the different financial institutions' scores with the Risk Index (constructed from the reference questionnaire, denoted QA) is highly variable, as Table 14 shows. For one of the questionnaires, the correlation is even negative (but not significant). Two questionnaires produce a score that is more than 40% correlated with the Risk Index. It was unfortunately not possible to verify whether the scores calculated from these two questionnaires were highly correlated with each other, because one was intended for retail bank clients and the other, for private banking clients.

Table 14 - Number of respondents, correlation between existing scores and the Risk Index

	QA	QB	QC	QD	QE	QF	QG
QA		277	232	218	85	108	88
QB	33.17% *****		35	23	6	2	0
QC	-1.91% NS	20.41% *		22	12	0	0
QD	18.87% *****	19.00% NS	19.95% NS		12	0	0
QE	43.62% *****	10.61% NS	41.32% **	30.82% NS		0	0
QF	9.39% NS	ND	ND	ND	ND		0
QG	44.91% *****	ND	ND	ND	ND	ND	

Upper part of the table: number of respondents to the two questionnaires

Lower part of the table: correlation between scores (and significance level; see explanations following VII.J.

The correlations are depicted graphically in annex VII.J by curves representing each of the financial institutions' scores as a function of the Risk Index.

E. Ex post analysis of the questionnaires

Analysis of the responses to the different questionnaires by a sample of more than 1500 investors (taken from the SoFia panel of TNS Sofres or from among clients of financial institutions that participated in the study) brings out the diversity of the results that can be obtained from the different questionnaires and the low degree of consistency in investment recommendations and advice stemming from them. The low degree of consistency results primarily from:

- ➔ the omission in some questionnaires of quantitative questions (or the impreciseness of the questions asked), which are indispensable for measuring risk tolerance;
- ➔ the inconsistency, among questionnaires that have scoring rules, in the way that points are assigned to the different variables;
- ➔ the static, rigid (not to say arbitrary) character of the points assigned to the different variables. To serve as the basis for reliable investment advice, the points assigned ought to change over time to offset the excessive influence that economic and financial conditions have on how respondents answer the questions.

Taken together, the results show that it is possible to construct questionnaires and associate scores with them that are operationally useful and measure risk tolerance in a way that is

relatively precise. Only a minority of the questionnaires that we analysed uses a scoring rule, and the scoring variables used for those few questionnaires are too limited to capture the results reported in the literature. No questionnaire takes the respondent's gender into account in calculating the score, whereas the literature is unanimous in recognising that women are less risk-tolerant than men. In the few cases where the respondent's age is taken into account in the score (for the half of the questionnaires with a score assigned), the effect of the age variable on the score is consistent with the literature (risk tolerance decreases as age increases).

The investor's net worth and the amount he or she wants to put into his or her investment are taken into account in only one score each, and never simultaneously. Rectifying this omission in future questionnaires and their scores is desirable: the literature has clearly shown that the greater the proposed investment as a proportion of the investor's net worth, the less risk the investor is willing to tolerate.

Investment experience and investment knowledge are taken into account in the score on only one questionnaire each. These variables act primarily on the tendency to distort the probabilities, and they should be taken into account systematically in an investment advisory framework that is sufficiently detailed and precise to capture all dimensions of the attitude towards risk.

The investment goal and investment horizon are taken into account in the score for the majority of the questionnaires, which is consistent with MiFID requirements.

Risk preferences are indeed taken into account in all of the scores, which is reassuring, but two limitations deserve emphasis. Firstly, a third of the questionnaires make only a qualitative measurement of risk tolerance. This is not sufficient to serve as a basis for investment recommendations that are as precise as they ought to be. Secondly, the proportion of the score attributable to variables that measure risk preferences is surprisingly low. (With the exception of one questionnaire, these variables count for less than one-third in the score calculation).

Because the scores are constructed on questions that differ appreciably across questionnaires, they are not well correlated with each other: the correlation coefficient between pairs of questionnaires is generally in the neighbourhood of 20%, which is quite low for scores that are supposed to be measuring the same quantity, risk tolerance. A physicist would not be at all satisfied with two measuring instruments with such a low correlation.

One question that can be asked is whether the low correlation between scores reflects a deficiency of questionnaires which do not pose the right questions, or rather a deficiency of the score itself, which fails to make the right use of the responses. To answer this question, an *artificial score* was constructed for each questionnaire. The artificial score corresponds to the best score that could be constructed from a given questionnaire.. Only two of the questionnaires achieved an explanatory power of 40%, which is a reasonable minimum for

the questionnaire to be considered a good measure of the investor's risk tolerance (provided the right score calculation rules are used).

For the purpose of providing valid investment advice in any circumstance, in particular under different cyclical economic conditions, a questionnaire with an assigned risk profile ought also to measure the investor's tolerance of losses and tendency to distort probabilities, but only the reference questionnaire attempts to measure these three dimensions of the attitude towards risk. In practice, the scores calculated by a majority of the financial institutions show little consistency among themselves or with the Risk Index.

V. The ex ante and ex post analyses in perspective

A. Compliance scores versus artificial scoring

The compliance scores awarded in section III.D correspond to the ex ante analysis of the questions asked on the various MiFID questionnaires. They measure MiFID compliance in terms of acquiring information on all of the items relevant to product-client suitability (knowledge and experience, financial situation, investment objectives, with risk tolerance being only one investment objective among others). The ratings of consistency with the Risk Index discussed in sections IV.C and IV.D relate to the ex post analysis of responses to the questionnaires. They are confined to *just one aspect* of the MiFID, the one that in our view is the most important and the trickiest to measure: risk preferences.

Table 15 shows that the rankings of questionnaires on compliance with the MiFID and on ability to predict the Risk Index are quite similar:

- ➡ the three questionnaires that best comply with the directive are among the four that best predict the Risk Index;
- ➡ the five questionnaires with the lowest compliance scores are also in the bottom half of questionnaires in terms of predicting the Risk Index;
- ➡ the correlation between the compliance scores (ex ante) and ability to predict the Risk Index (ex post) is 52%, and the rank correlation between the rankings is 50%.

However, some notable inversions can be observed, and they are shown in red in Table 15. Three of the questionnaires ranked in the top half ex ante in terms of compliance move to the bottom half ex post in terms of predicting the Risk Index. For three other questionnaires, the reverse happens. In particular, the questionnaire in second place ex post on predicting the Risk Index places only in the middle of the rankings ex ante on MiFID compliance.

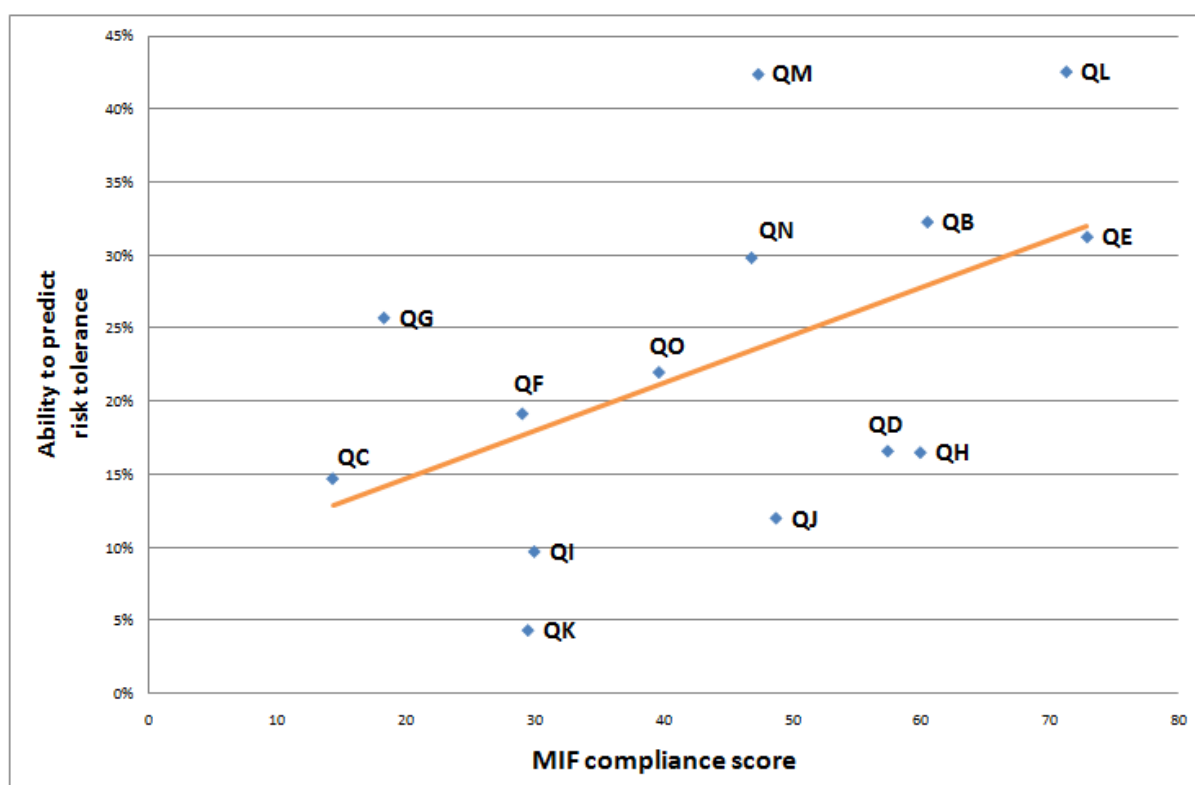
Table 15 - Comparison of rankings, ex ante and ex post

	MiFID compliance (ex ante)		Ability to predict Risk Index (ex post)	
	Score	Rank	Score	Rank
QE	72.9	1	31.3%	4
QL	71.3	2	42.6%	1
QB	60.5	3	32.3%	3
QH	59.9	4	16.5%	10
QD	57.4	5	16.6%	9
QJ	48.7	6	12.0%	12
QM	47.3	7	42.4%	2
QN	46.8	8	29.9%	5
QO	39.6	9	18.9%	7
QI	30.0	10	9.7%	13
QK	29.5	11	4.3%	14
QF	29.0	12	19.2%	8
QG	18.3	13	25.7%	6
QC	14.3	14	14.7%	11

MiFID compliance: average of compliance scores

Ability to predict risk tolerance: Adjusted R², optimised

Figure 11 - Correlation between score, *ex ante* and *ex post*



B. Implications for questionnaires with a score

1. Comparison of the Artificial Score with the financial institution's score

Table 16 provides information on the correlation between the Artificial Score and the score calculated by the institution. The higher this correlation, the closer the institution is to the best it could do with its questionnaire in predicting risk tolerance. In principle, where this correlation is low, the institution is not using the optimal method of defining its score.

One of the questionnaires in particular stands out: the correlation between the score defined by this questionnaire and the Artificial Score is not only very high (nearly 88%) but also far higher than the corresponding correlations of the other questionnaires. For two questionnaires, the correlation coefficients are not significant and very low (approximately 4% and 5%).

Table 16 - Correlation between the financial institutions' scores and the Artificial Score

	QB	QC	QD	QE	QF	QG
Corr.	32,1%	5,1%	35,6%	43,4%	4,2%	87,7%
<i>(significance)</i>	*****	NS	*****	*****	NS	*****

For a plot of each of the scores defined by the financial institutions as a function of the Artificial Score, see annex VII.K.

We noted above that not all the questions put to the potential investor are used by the financial institutions in defining their score (with the exception of Questionnaire F).

It is therefore possible to compare:

- ➔ the proportion of the Risk Index explained by the questions used in calculating the score ("Adjusted R², score" line in Table 17) ;
- ➔ with the optimal proportion of the Risk Index explainable by the questionnaire (calculated in Table 10, reproduced in the "Adjusted R², optimised" line in Table 17).

This comparison is made using a **score-relevance ratio** constructed in similar fashion to the risk-relevance ratio.

As shown in Table 17, for one of the questionnaires, the one with a score-relevance ratio close to 3, the financial institution would do well to redefine its scoring rules. Its questionnaire could yield a score that does much better at measuring investors' risk preferences. For two of the questionnaires, the difference between the model used to construct the existing score and the optimised model is slight, and the possible improvement in precision in measuring risk preferences is no more than 10% (score-relevance ratio below 1.1). Redefining the score on the current questionnaire would in these cases produce minimal improvement.

But the score-relevance ratios are merely a one-off indicator, valid at a given point in time, of the scope for improving the score. These results at a given point in time in a given context ignore an element that is essential in the longer term: taking into account the influence of cyclical economic conditions on the risk preferences measured by a risk-profile questionnaire. The only way to do this is to use a dynamic scoring rule that corrects for the influence of cyclical conditions on clients' questionnaire responses. The results of the study [16] currently being written up show just how important cyclical fluctuations are and how much they disrupt the measurement of risk preferences.

Table 17 - Scope for improvement in the financial institutions' scores

	QB	QC	QD	QE	QF	QG
Adjusted R ² , score	29.7%	12.6%	10.7%	10.9%	15.7%	24.7%
Adjusted R ² , optimised	32.3%	14.7%	16.6%	31.3%	19.2%	25.7%
Score-relevance ratio	1.09	1.17	1.55	2.86	1.22	1.04

Table 18 reports the number of questions used to define the existing score and the number used to define the Artificial Score. We also indicate the number of questions used in both the existing model and the optimised model.

The results imply that on one of the questionnaires, the financial institution would gain by increasing the number of questions used to define its score while keeping those it is already using. By contrast, on another of the questionnaires, the financial institution would gain by reducing the number of questions used to define its score. On the remaining questionnaires, the financial institutions should redefine the selection of questions that they use, at least in part.

Table 18 - Optimisation of the number of questions

	QB	QC	QD	QE	QF	QG
No. quest., score (N1)	5	3	5	6	11	6
No. quest., optimised model (N2)	24	2	9	6	4	9
Sign N1-N2	-	+	-	0	+	-
No. of common questions	3	1	3	2	4	6

2. Summary

The correlation between the score defined by the financial institution and the Artificial Score can be used to rank the six questionnaires concerned. This section compares this ranking with MiFID and the ability to predict risk tolerance.

One of the questionnaires is very close to the Artificial Score and scores well for measuring clients' risk tolerance. By contrast, because of its MiFID compliance ranking, the questionnaire is one of the last (13 on 14, Table 19). This is because it focuses solely on the client's risk preferences and his knowledge and experience, thus falling sort of MiFID requirements.

The questionnaires ranked second and third by the correlation are both MiFID-compliant (ranking 1 and 3 on 14) and very effective in predicting risk tolerance (4 and 3 on 14).

The last two questionnaires have weaker correlations and ranked among the last for MiFID compliance (12 and 14/14), but fared better after the ex post analysis (7 and 11/14).

Table 19 – Match between the evaluations

	Corr.		MiFID compliance (rank on 14)	Ability to predict risk tolerance (rank on 14)
	Score	Rank		
QG	87.7%	1	13	6
QE	43.4%	2	1	4
QD	35.6%	3	3	3
QB	32.1%	4	5	9
QC	5.1%	5	14	11
QF	4.2%	6	12	7

VI. Conclusions and recommendations

The analyses of questionnaires' content and ability to assess risk tolerance show that financial intermediaries want to use these questionnaires to introduce investment-advice support tools while satisfying regulatory requirements under MiFID. This is a challenging task, however, and financial intermediaries have met their obligations in a non-uniform manner that leaves room for improvement. Difficulties include the following:

- ➔ the wide latitude for interpretation left by MiFID, which has played a part in increasing the non-uniform nature of the questionnaires;
- ➔ the lack of a benchmark or model for what is a new exercise for financial intermediaries;
- ➔ the obvious operational constraints associated with this type of exercise, notably in terms of the difficulties entailed in surveying a large number of customers on an issue that many investors view as sensitive.

Based on the findings obtained and the academic research, we propose observations and recommendations for preparing questionnaires, while acknowledging the constraints that may be involved in actually putting them into effect.

Observations

- ➔ **Market participants do not systematically computerise their questionnaires or construct databases**, even though this is essential for the effectiveness and quality of investment advice. That said, the leading service providers have developed tools in the form of **questionnaires** that are sometimes integrated into a Customer Relationship Management (CRM) system.
- ➔ Questionnaires **comply to varying degrees with the recommendations of the various laws and regulations** relating to MiFID regarding investment advice: MiFID itself [10, 35], the AMF's briefing paper [3], the Delmas-Marsalet Report [23], CESR guides [8, 9], and the academic literature. **Most of the MiFID questionnaires attempt to evaluate risk-taking preferences**, but they are not always successful because of the ambiguity of the directive [35] and its implementing decree [10], despite the clarification provided by the AMF's briefing paper [3]. Only one third of the questionnaires try in some way to **quantify** risk aversion. And yet quantitative measurement of risk-taking preferences is the only reliable way to ensure that suitable products are sold to clients.
- ➔ **Fewer than half of the financial institutions polled have developed scoring rules** for categorising investors by risk profile. Furthermore, the vast majority of the scoring rules that do exist consider only one dimension, whereas preferences regarding risk taking have many dimensions, not counting the other dimensions that MiFID explicitly requires the questionnaires to measure.

- ➔ The risk profile questionnaires in use do not seem to rely on true **econometric methods** to determine their scoring rules, meaning the points attributed for different answers. Consequently, the classification of investors is still based on **subjective judgments**, rather than on data and quantified findings, for virtually all of the questionnaires giving a score. This entails great disparities in the advice that different institutions give to the same investor with the same investment plan.
- ➔ **The risk profile questionnaires do not give proper consideration to current economic conditions**, which (wrongly) have an excessive influence on clients' answers, thus distorting their risk profiles. These distortions need to be corrected before providing investment advice. This can be achieved by **tracking clients over time** and periodically recalibrating the scoring rules. Recalibration can eliminate the disruptive effects that current economic conditions have on the clients' answers, enabling institutions to provide them investment advice that is suitable to their true risk-taking preferences, regardless of the economic conditions prevailing at the time they fill in their questionnaires.

Recommendations

- ➔ Investors' experience cannot be measured solely by their own subjective evaluation, which is usually heavily influenced by current economic conditions. **An objective evaluation of their experience is also needed**, looking at investment choices actually made and the number of years that they have been investing. These two sources of information are imperfect, but they can be more reliable together, combining stated preferences and revealed preferences.
- ➔ The questions need to be asked in a specific context, and not in an abstract manner with no conceptualisation. **Only questions that are explicitly asked in an investment context** constitute a helpful basis for offering investment advice. Preferences regarding risk taking measured in other contexts may be very different from financial risk tolerance. Consequently they are not very relevant for providing investment advice.
- ➔ To ensure the quality of investment advice, the evaluation of risk-taking preferences needs to be based on **quantitative** measurements, not just risk tolerance. The measurements must also incorporate **loss tolerance** and the **tendency to distort probabilities**. A quantitative approach is the only way to implement econometric models to underpin client-product suitability.
- ➔ The risk profile questionnaires must give due consideration to current economic conditions, which (wrongly) have an excessive influence on clients' answers and distort their risk profiles. These distortions need to be **corrected** before providing investment advice. Tracking clients over time and periodic and proactive reviews of scoring rules make such corrections possible.

References

1. Allais, M. (1953), Le comportement de l'homme rationnel devant le risque: critique des postulats et axiomes de l'école américaine. *Econometrica*, 21, 503-546.
2. Arrondel, L. & A. Masson (2007), Inégalités patrimoniales et choix individuels: des goûts et des richesses..., *Economica*, 384 p.
3. Autorité des Marchés Financiers (2006), AMF briefing paper on MiFID: "La directive sur les Marchés d'Instruments Financiers: enjeux et conséquences pour la régulation française". http://www.amf-france.org/documents/general/6905_1.pdf
4. Baucells, M. & A. Villasis (2010), Stability of Risk Preferences and the Reflection Effect of Prospect Theory. *Theory and Decision*, 68 (1-2), 193-211.
5. Ben-Akiva, M., A. de Palma, D. McFadden, M. Abou-Zeid, P.-A. Chiappori, M. De Lapparent, S. Durlauf, M. Fosgerau, D. Fukuda, S. Hess, C. Manski, A. Pakes, N. Picard & J. Walker (2010), Process and Context in Choice Models, Proceedings of the Choice Symposium Conference, Key Largo, May 2010.
6. Booij, A. & G. van de Kuilen, (2009), A Parameter-Free Analysis of the Utility of Money for the General Population under Prospect Theory, *Journal of Economic Psychology*, 30, 651-666.
7. Byrne, A. & M. Brooks (2008), Behavioral Finance: Theories and Evidence. The Research Foundation of CFA Institute, Literature Review, 3(1), 1-26.
8. Committee of European Securities Regulators, CESR, (2008), A Consumer's Guide to MiFID. <http://www.cesr.eu/popup2.php?id=4984>
9. Committee of European Securities Regulators, CESR, and Commission bancaire, financière et Assurances, CBFA, (2008), Investir dans des produits financiers – La directive MIFID: Guide du Consommateur. http://www.cbfa.be/fr/cob/bro/pdf/cbfa_mifid.pdf
10. European Commission, Directive 2006/73/EC of 10 August 2006 implementing Directive 2004/39/EC of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:241:0026:0058:EN:PDF>
11. Chiappori, P.A. (1988), Rational Household Labor Supply, *Econometrica*, 56, 63-90.
12. de Bondt, W. & R. Thaler (1994), Financial Decision-Making in Markets and Firms: A Behavioral Perspective, *NBER Working Papers* 4777, National Bureau of Economic Research, Inc.

13. de Palma, A. (2009). Rational Behaviour, Risk Altruism: High Stakes for Society. (2009). In *Terrorism and International Transport: Towards Risk-Based Security Policy*, Round Table, 144, International Transport Forum, 144, 23-49.
14. de Palma A., M. Ben-Akiva, D. Brownstone, C. Holt, T. Magnac, D. McFadden, P. Moffatt, N. Picard, K. Train, P. Wakker & J. Walker (2008). Risk, Uncertainty and Discrete Choice Models, *Marketing Letters*, 19(3-4), 269-285.
15. de Palma, A. & N. Picard (2010), Mesure et déterminants de l'attitude face au risque dans le cadre des investissements financiers, Mimeo.
16. de Palma, A. & N. Picard (2010), Impact de la crise financière sur les attitudes et les croyances face au risque, Report for the Europe Savings Institute.
17. de Palma, A., N. Picard & J.-L. Prigent (2009), Prise en compte de l'attitude face au risque dans le cadre de la directive MIF, *Research paper, Ecole Polytechnique*, hal-00418892.
18. de Palma, A., N. Picard & J.-L. Prigent (2010), Eliciting Utility for (Non)Expected Utility Preferences Using Invariance Transformations. *Research paper, Ecole Polytechnique*, hal-00517726.
19. de Palma, A., N. Picard & A. Ziegelmeyer (2010), Individual and couple decision behavior under risk: evidence on the dynamics of power balance, *Theory and Decision*, in press, DOI 10.1007/s11238-009-9179-6.
20. de Palma, A. & J.-L. Prigent (2008), Utilitarianism and Fairness in Portfolio Positioning, *Journal of Banking and Finance*, 32(8), 1648-1660.
21. de Palma, A. & J.-L. Prigent (2009), La directive MIF et le positionnement optimal des OPCVM, *La Revue du financier*, 177.
22. de Palma, A. & J.-L. Prigent, (2009), Standardized Versus Customized Portfolio: a Compensating Variation Approach, Special Issue on Stochastic Dynamic Modeling of Investments and Risks, in *Financial Markets*; Guest Editors: M. Bertocchi, G. Pflug & H. Vladimirov, *Annals of Operations Research*, 165(1), 165-185.
23. Delmas-Marsalet, J. (2005), Report on the marketing of financial products, submitted to the French finance ministry.
http://www.amf-france.org/documents/general/6461_1.pdf
24. Dimmock, S.G. & R. Kouwenberg (2010), Loss-aversion and Household Portfolio Choice, *Journal of Empirical Finance*, 17, 441-459.
25. Ebert, J. & D. Prelec (2007), The fragility of time: Time-insensitivity and valuation of the near and far future, *Management Science*, 53(9), 1423-1438.
26. Ellsberg, D. (1961), Risk, ambiguity and the Savage axioms, *The Quarterly Journal of Economics*, 75(4), p. 643-669.

27. Gneezy U. & J. Potters (1997), An experiment on risk taking and evaluation periods, *Quarterly Journal of Economics*, 112 (2), 631-645.
28. Gollier C., L. Eeckhoudt & H. Schlesinger (2005), *Economic and Financial Decisions under Risk*, Princeton University Press.
29. Guiso, L. & M. Paiella, (2005), The role of risk aversion in predicting individual behaviour, *Banca d'Italia discussion paper no. 546*.
30. Kahneman, D. & A. Tversky (1974), Judgment Under Uncertainty: Heuristics and Biases, *Science, New series*, 1(85), 4157, 1124-1131.
31. Kahneman, D. & A. Tversky (1979), Prospect theory: An analysis of decisions under risk, *Econometrica*, 47(2), 263-91.
32. Kokinov, B. & D. Raeva (2007), A Cognitive Approach to Context Effects on Individual Decision Making Under Risk. In: Richard Topol and Bernard Walliser (eds.) *Cognitive Economics: New Trends (Contributions to Economic Analysis, Volume 280)*, Amsterdam: Elsevier, 99-116.
33. el-Mekkaoui-De Freitas, N., A. Lavigne & R. Mathieu (2001), La détention d'actifs risqués selon l'âge: une étude économétrique, *Revue d'Economie Politique*, 59-80.
34. Mangot, M. (2005), *Psychologie de l'investisseur et des marchés financiers*, Broché.
35. European Parliament and Council, Directive 2004/39/EC of 21 April 2004 on markets in financial instruments,
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:145:0001:0044:EN:PDF>
36. Raeva, D., L. Mittone & J. Schwarzbach, (2010), Regret now, take it now: On the Role of Experienced Regret on Intertemporal Choice, *Journal of Economic Psychology*, 31(4), 634-642.
37. Ritter, J. R. (2003), Behavioral finance, *Pacific-Basin Finance Journal*, 11(4), 429-437.
38. Schiller, R. (2003), *The New Financial Order: Risk in the 21th Century*, Princeton University Press.
39. Simmel, G. (1900), *The Philosophy of Money*, Routledge, 1978.
40. Thaler, R. (1999), Mental Accounting, *Journal of Behavioural Decision Making*, 12, 183-206.
41. Thaler, R. (2005), *Advances in Behavioural Finance, Vol. II*, Princeton University Press.
42. Tversky, A. & D. Kahneman (1992), Advances in Prospect Theory: Cumulative Representation of Uncertainty, *Journal of Risk and Uncertainty*, 5(4), 297-323.

Glossary

Artificial Score: optimal score that can be constructed from a given questionnaire. It corresponds to the estimation of the Risk Index derived from the optimised model.

Full model: explanatory model of the Risk Index, in which all the questions in a questionnaire are taken into account, whether or not they actually influence risk tolerance.

Multidimensional scoring: system that calculates several scores, each of which has a specific purpose and can be used separately; the scores are then aggregated into a single score, which is used as a first approximation. Multidimensional scoring contrasts with ordinary scoring. The system used in this report relies on the findings of behavioural finance to measure not only the investor's risk tolerance but also his loss aversion and tendency to distort probabilities.

Optimised model: model that selects only the variables that influence the Risk Index. This makes it possible to construct the best combination of questions for each questionnaire to explain the Risk Index. The advantage is that the number of questions is reduced, thereby streamlining the questionnaire (unless, however, the discarded questions are necessary for other aspects of MiFID).

Parsimony ratio: ratio between the number of variables included in the optimised model and the total number of variables derived from the questionnaire. The ratio is necessarily lower than 1.

R² and adjusted R²: measure of the explanatory power of a regression model. In this study, R² is the ratio between the variance of the share of risk tolerance explained by the regression model and the total variance of risk tolerance. R² is necessarily between 0 and 1. It increases automatically when an additional variable is included in the regression model, even if this variable has no real impact on risk tolerance. Adjusted R² corrects this unwanted effect and increases only if the variable added to the model has a material impact on risk tolerance. Exceptionally, adjusted R² may be negative if the quality of the regression is poor and none of the variables has a real impact on risk tolerance.

Risk Index: multidimensional score used as a benchmark in this study. It measures the investor's risk tolerance (i.e. risk appetite). The index is constructed using the benchmark questionnaire, and in particular the series of lotteries it contains.

Scoring: rating system used by financial institutions. The aim is to establish standard investor profiles and serve as the basis for determining whether a product is suitable for a client. Scoring consists in assigning a rating to a potential investor using the quantitative and qualitative variables available about him (socioeconomic data, risk behaviour, experience of financial markets, etc.).

Series of lotteries: sequence of hypothetical choices to be made between a safe investment and a risky investment. The lotteries in the series are "dynamic", insofar as the questions asked depend on the answers to the previous questions.

Risk-relevance ratio: ratio between the adjusted R^2 of the optimised model and the adjusted R^2 of the full model. The ratio makes it possible to compare a full questionnaire with its optimised form when calculating risk preferences. The risk-relevance ratio is necessarily greater than 1. The farther it is from 1, the more the full model differs from the optimised model.

Score model: model that explains the Risk Index by the variables used for a given questionnaire when calculating its own score. The model often differs from the full model because financial institutions do not generally use their entire questionnaire to calculate their score.

Score-relevance ratio: ratio between the adjusted R^2 of the optimised model and the adjusted R^2 of the score model. The ratio can be used to compare a score with its optimised form when calculating risk preferences. It is necessarily greater than 1. The farther the ratio is from 1, the more the score model differs from the optimised model.

Significance of a variable: measure of the extent of the variable's impact on the Risk Index, and of the precision with which the effect is measured. A "meaningful" variable has a significant impact on risk tolerance, *ceteris paribus*, and its influence has been measured fairly precisely, so it is almost certainly not negligible.

Significance of a correlation coefficient: the correlation between two variables is said to be meaningful if the correlation is almost certainly not null, i.e. the two variables are indeed linked.

VII. Annexes

A. Institutions taking part in the study

- Association des Petits Actionnaires Indépendants (APAI)
- BNP Paribas
- BPCE
- CGPLand
- Chambre des Indépendants du Patrimoine
- CM5-CIC
- Cortal Consors
- Crédit Agricole SA
- HSBC
- Lazard
- Rothschild
- Société Générale

B. Persons interviewed

1. Association pour la Promotion de l'Actionnariat Individuel (APAI)

Viviane Neiter, Honorary Chair

2. BNP Paribas

Marianne Attal, Head of the Market Integrity – Client Interests team.

Patrick Martin, Head of Marketing and Statistical Research

3. BPCE

Jean-Pierre Bornet, Head of Compliance and Ethics

4. CGPLand

Pierre-Laurent Fleury, Statutory manager

5. CM5-CIC

Pascal Gruner, Investment Services Compliance (Crédit Mutuel - Centre Est Europe)

6. Crédit Agricole SA

Christian Candelier, Head of Compliance, French Retail Banking

Philippe Gaud, Compliance Division, French Retail Banking unit

Serge Lamberet, Distribution

7. HSBC

Laurent Facque, Head of Compliance - Compliance and Ethics Division

Pierre Antraygues, Director, Strategy & PFS Clients Segments

Erik Verite, Head of Banking Network Compliance - Compliance and Ethics Division

Joanna Melodista, Assistant to Laurent Facque - Compliance Division

Olivier Gayno, Chief Investment Officer (HSBC Global Asset Management, France)

Keith Vosgien, Head of private banking compliance (HSBC Private Bank)

Amandine Charbonnier, Private Banking Compliance Division (HSBC Private Bank)

8. Lazard

Olivier Raynaud, Manager

Jean-Pierre Banzet, Manager

9. Rothschild

Carine de La Cotardière, Head of Compliance

Frédérique Bonnell, Manager

10. Société Générale

Philippe Gravey, Head of operational risks

Philippe Cheyssial, Head of market research

François-Henri Paroissin, Head of HNWI Clients

C. Key concepts addressed in the reference sources

KEY CONCEPTS	Directive 2006/73/EC of the Commission of 10 August 2006 [10] Section 3 Article 35	AMF briefing paper on MiFID, May 2006 [3] Chapter IV: ISPs' relations with their clients	A Consumer's Guide to MiFID, CESR, Mars 2008 [4] [9]	Delmas-Marsalet Report, November 2005 [23] Chapter II: RECOMMENDATIONS
Personal characteristics	Not addressed	Not addressed	Not addressed	2.2.1. Refining customer segmentation: "This segmentation should be rounded out (...) consideration of other factors, notably <i>age, marital situation and socio-professional status</i> "
Financial situation	"The information regarding the financial situation of the client or potential client shall include, where relevant, information on the source and extent of his regular income, his assets, including liquid assets, investments and real property, and his regular financial commitments"	"Information about the financial situation about the client or potential client must include relevant information about the source of his regular income, the assets he owns, including his real estate property, and his regular financial commitments."	Information regarding your financial situation may be obtained through questions about matters such as <i>the source and extent of your regular income, your assets, real estate property, any debts you have and other financial commitments.</i>	2.3.1.2. <u>Determining the scope of minimum diligence required in advice provision:</u> "The salesperson should first assess the customer's financial position, weighing factors such as <i>income and gross financial assets held, including, when applicable, in other institutions.</i> " 2.3.1.2. . <u>Determining the scope of minimum diligence required in advice provision:</u> "If the product that suits the customer's objectives is both liquid and fully capital protected (..), the obligation to provide additional advice to the customer is limited. The availability of the sum to be invested must be verified, and if the customer is carrying costly debt elsewhere, he should probably be advised to start by paying off the debts. If the product(s) suited to the customer's objectives is fully capital protected but entails a relatively long holding period to reap the full benefits, additional information is required concerning <i>the customer's investment timescale and ability to set aside the given sum for the required duration in the light of income, spending requirements and other liquid assets..</i> "
Investment objectives	"The information regarding the investment objectives of the client or potential client shall include, where relevant, information on the length of time for which the client wishes to hold the investment, his preferences regarding risk taking, his risk profile, and the purposes of the investment."	"Information about his <i>investment objectives concern in particular the length of time he wishes to hold the investment or the client's profile, e.g. his degree of risk aversion.</i> "	"This can include questions about <i>the length of time you wish to hold the investment, your risk appetite and profile, whether you wish to invest for income or growth, keep the capital safe and avoid any risk or accept a high level of risk.</i>	2.3.1.2. <u>Determining the scope of minimum diligence required in advice provision:</u> The salesperson must first ascertain the sum to be invested. The salesperson should then inquire about the <i>customer's investment objectives: interest on cash savings (held as a precaution or in anticipation of long-term investment), home financing, longer-term savings to generate additional income or capital appreciation and/or death protection, retirement planning, etc.</i> The obligation to "know your customer," impl[ies] an examination of their financial situation, investment targets, investment timescale and the obligation to "know your customer," implying an <i>examination of their financial situation, investment targets, investment timescale and appetite for risk.</i>
Investment horizon	Included in "investment objectives"	Included in "investment objectives"	Included in "investment objectives"	Included in "investment objectives"

Risk preferences	Included in "investment objectives"	Included in information about "investment objectives"	Included in information about "investment objectives"	<p><u>2.1.3. Better defining the target investor profile:</u> "Producers must strive to identify the savings needs that their products are designed to satisfy by determining the target investor profile [and] product suitability relative to <i>investor risk appetite/aversion</i>"</p> <p><u>2.3.1.2. Determining the scope of minimum diligence required in advice provision:</u> If the product(s) suited to the customer's objectives is comparatively basic but is not capital protected and consequently implies a relatively long holding period, the information gathered from the customer should cover <i>risk appetite/aversion</i>.</p>
Knowledge & experience of financial markets	<p>"the information regarding a client's or potential client's knowledge and experience in the investment field includes the following (...): a) the types of service, transaction and financial instrument with which the client is familiar; b) the nature, volume, and frequency of the client's transactions in financial instruments and the period over which they have been carried out; c) the level of education, and profession or relevant former profession of the client or potential client "</p>	<p>" client has the experience and knowledge needed to understand the risks inherent in the transaction of the management of his portfolio."</p>	<p>"Questions regarding your knowledge and experience can include the types of services and products you are familiar with,; the nature, volume and frequency of your previous transactions; and your level of education, profession or former profession</p>	<p><u>2.2.3.2. Adapting sales adviser expertise:</u> "Distributors could, in practice, reserve these types of products to customer groups best able to measure the impact and support the risks "</p> <p><u>2.3.1.2. Determining the scope of minimum diligence required in advice provision:</u> "Finally, if the product(s) suited to the customer's objectives is high-risk and/or complex, it will be necessary to ascertain <i>the customer's experience with these products and his net assets, particularly liquid assets.</i>"</p> <p><u>2.5.3.1. Educating financial product consumers:</u> "I Consumers of financial products will be unable to assume their responsibility <i>if they cannot understand key product-related information.</i></p>

D. Construction of compliance scores

Table 20 – Compliance scores of the 14 MiFID questionnaires

			MiFID		AMF		DM		CESR		MIFS		QB		QC		QD		QE		QF		QG		QH		QI		QJ		QK		QL		QM		QN		QO		Q*	
			p	P	p	P	p	P	p	P	p	P	p	P	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n	N	n			
Pers. character.	Gender		0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	0	11	2	0	0	0	0	0	0	0	0	0	0	0	2
	Age		0	0	0	0	7	1	0	0	5	1	10	2	0	0	11	2	5	1	11	1	0	0	10	2	0	0	11	2	0	0	7	2	0	0	0	0	0	0	0	5
	Profession		9	1	0	0	7	1	9	1	5	1	0	0	0	0	11	2	10	2	0	0	0	0	10	2	0	0	11	2	0	0	7	2	12	2	0	0	18	2	6	
	Education		9	1	0	0	0	0	9	1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Marital status		0	0	0	0	7	1	0	0	5	1	10	2	0	0	11	2	0	0	0	0	0	0	10	2	0	0	0	0	0	0	7	2	12	2	0	0	0	0	4	
Financial situation	Net worth		9	1	13	1	7	1	9	1	5	1	10	2	0	0	11	2	10	2	11	1	0	0	10	2	0	0	11	2	25	2	7	2	6	1	15	2	18	2	10	
	Regular income + source		9	1	13	1	7	1	9	1	5	1	10	2	0	0	11	2	10	2	0	0	0	0	10	2	0	0	11	2	25	2	7	2	0	0	15	2	9	1	8	
	Debt		0	0	0	0	7	1	9	1	5	1	10	2	0	0	5	1	5	1	0	0	0	0	5	1	0	0	0	0	13	1	0	0	0	0	8	1	9	1	4	
	Regular needs		9	1	13	1	7	1	9	1	5	1	10	2	20	1	5	1	10	2	0	0	0	0	5	1	0	0	0	0	0	0	4	1	6	1	0	0	0	0	4	
Investment objectives	Period		9	1	13	1	7	1	9	1	5	1	10	2	0	0	11	2	10	2	11	1	0	0	5	1	18	2	6	1	0	0	7	2	6	1	8	1	9	1	7	
	Liquidity		0	0	0	0	3	1	0	0	2	1	0	0	20	1	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	4	1	6	1	0	0	0	0	3	
	Purpose		9	1	0	0	7	1	0	0	5	1	10	2	0	0	5	1	10	2	11	1	0	0	10	2	9	1	11	2	13	1	0	0	6	1	8	1	9	1	7	
	Amount		0	0	0	0	7	1	0	0	5	1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	7	2	6	1	0	0	0	0	2	
	Source of funds to be invested		0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0		
	Preferences regarding risk taking	QANT	Risk aversion	9	1	13	1	7	1	9	1	5	1	0	0	0	0	5	1	5	1	11	1	29	2	0	0	9	1	6	1	0	0	7	2	6	1	8	1	0	0	6
			Loss aversion	0	0	0	0	0	0	0	0	5	1	0	0	0	0	5	1	0	0	0	0	29	2	0	0	9	1	0	0	0	0	7	2	6	1	0	0	0	0	4
			Probab. distorsion	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0		
			QUAL	Risk aversion	9	1	13	1	7	1	9	1	5	1	5	1	20	1	0	0	5	1	11	1	14	1	5	1	9	1	0	0	0	0	4	1	0	0	0	0	0	5
Loss aversion				0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	5	1	11	1	0	0	0	0	9	1	0	0	0	0	4	1	0	0	8	1	0	0	3
Probab. distorsion	0	0		0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Knowledge & exper.	Investment experience		9	1	13	1	7	1	9	1	5	1	5	1	20	1	5	1	10	2	11	1	0	0	10	2	18	2	0	0	0	0	7	2	12	2	15	2	9	1	9	
	Knowledge of financial products		9	1	13	1	7	1	9	1	5	1	5	1	0	0	5	1	10	2	11	1	14	1	5	1	0	0	11	2	25	2	4	1	12	2	15	2	18	2	10	
	Independence, confidence		0	0	0	0	0	0	0	0	2	1	0	0	20	1	0	0	0	0	0	0	14	1	0	0	9	1	6	1	0	0	0	0	6	1	0	0	0	0	4	
Total			-	11	-	8	-	15	-	11	-	23	-	20	-	5	-	19	-	21	-	9	-	7	-	21	-	11	-	18	-	8	-	27	-	17	-	13	-	11	-	
			MiFID compliance score										59	14	59	82	32	18	64	32	55	32	68	50	50	45	47															
			AMF compliance score										69	19	63	88	38	25	63	38	50	38	81	50	63	44	52															
			DM compliance score										69	14	62	69	28	14	66	28	52	28	76	52	41	38	45															
			CESR compliance score										59	14	59	77	27	18	59	27	45	32	68	45	50	45	45															
			MIFS compliance score										47	12	44	49	21	16	49	26	42	19	63	40	30	26	34															
			Mean compliance score										60	14	57	73	29	18	60	30	49	29	71	47	47	40	45															

E. Principal Component Analysis of MiFID questionnaires

1. Definition of the axes

The PCA is based on aggregating sets of relative qualities using the groupings in Table 21.

Table 21 – Aggregated compliance criteria

Caract_indiv	Gender, Age, Profession, Education and Marital Status
Sit_fin	Net Worth, Income, Debt and Regular Needs
Horizon	Minimum Period and Liquidity
But	Purpose
Montant	Amount and Source
Risque	Preferences Regarding Risk Taking: quantitative and qualitative
Con_exp	Experience, Knowledge and Confidence

Table 22 shows the means and ranges of the relative qualities obtained by the 14 questionnaires for each of the seven items.

Table 22 – Statistics for compliance scores in sets of seven items

Variables	No.	Mean	s.d.	Minimum	Maximum
Caract_indiv	14	15.2	13.7	0.0	38.1
Sit_fin	14	25.3	17.0	0.0	62.5
Horizon	14	9.6	5.6	0.0	20.0
But	14	7.2	4.3	0.0	12.5
Montant	14	2.2	3.9	0.0	11.1
Risque	14	18.2	19.1	0.0	71.4
Con_exp	14	22.3	9.0	10.0	40.0

Based on the usual criteria (Kaiser's criterion, an analysis of the graph of eigenvalues the elbow criterion), three factorial axes are selected to analyse the data. They summarise 79% of the information about the aggregated relative qualities of the questionnaires.

Figure 12 – Characteristic values of the analysis

Eigen Values				
Inertie totale : 7				
N°	Val.Pr.	Diff.	Pct	Cum
1	2.7324	.	39.03	39.03
2	1.6908	1.0416	24.15	63.19
3	1.1098	0.5810	15.85	79.04
4	0.6752	0.4346	9.65	88.69
5	0.5749	0.1003	8.21	96.90
6	0.2170	0.3579	3.10	100.0
7	0.0000	0.2170	0.00	100.0

Analysing the correlations between the factorial axes and the seven relative qualities defined in Table 21 makes it possible to interpret the axes.

Table 23 identifies the dimensions illustrated by each of the three factorial axes:

- ➔ **Factorial Axis 1** is positively correlated with risk preferences (83%) and negatively correlated with the financial situation of the investor (-80%) and the purpose of his investment (-71%). **Axis 1 therefore characterises the questionnaires that focus on risk preferences and that afford little importance to the person's financial situation and investment purpose**, relative to the average questionnaire;
- ➔ **Factorial Axis 2**: is positively correlated with the respondent's personal characteristics (67%) and the amount of his investment plan (69%). The correlation with his knowledge and experience of financial products and markets is negative (-65%). **Axis 2 therefore characterises the questionnaires that concentrate in particular on personal characteristics and the planned investment amount and pay less attention to the client's knowledge and experience**, relative to the average questionnaire;
- ➔ **Factorial Axis 3** is positively correlated with the investment period (76%) and negatively with risk preferences (-49%). **Axis 3 therefore characterises the questionnaires that seek to ascertain the person's investment horizon and concentrate less on his risk preferences**, relative to the average questionnaire.

Table 23 - Correlations between the 3 factorial axes and the variables

	Axis 1	Axis 2	Axis 3	Caract_indiv	Sit_fin	Horizon	But	Montant	Risque	Con_exp
Axis 1	1.000	0.000 <i>1.000</i>	0.000 <i>1.000</i>	-0.561 <i>0.037</i>	-0.803 <i>0.001</i>	0.373 <i>0.189</i>	-0.708 <i>0.005</i>	0.353 <i>0.216</i>	0.833 <i>0.000</i>	0.560 <i>0.038</i>
Axis 2		1.000	0.000 <i>1.000</i>	0.667 <i>0.009</i>	-0.362 <i>0.203</i>	0.434 <i>0.121</i>	-0.154 <i>0.600</i>	0.692 <i>0.006</i>	-0.084 <i>0.774</i>	-0.646 <i>0.013</i>
Axis 3			1.000	-0.190 <i>0.515</i>	0.140 <i>0.633</i>	0.760 <i>0.002</i>	0.222 <i>0.446</i>	0.153 <i>0.601</i>	-0.485 <i>0.079</i>	0.410 <i>0.145</i>
Caract_indiv				1.000	0.066 <i>0.823</i>	-0.013 <i>0.965</i>	0.173 <i>0.555</i>	0.020 <i>0.946</i>	-0.478 <i>0.084</i>	-0.716 <i>0.004</i>
Sit_fin					1.000	-0.395 <i>0.163</i>	0.470 <i>0.090</i>	-0.363 <i>0.202</i>	-0.755 <i>0.002</i>	-0.211 <i>0.468</i>
Horizon						1.000	-0.178 <i>0.542</i>	0.384 <i>0.175</i>	-0.067 <i>0.821</i>	0.206 <i>0.479</i>
But							1.000	-0.257 <i>0.375</i>	-0.549 <i>0.042</i>	-0.244 <i>0.400</i>
Montant								1.000	0.153 <i>0.601</i>	-0.217 <i>0.457</i>
Risque									1.000	0.270 <i>0.351</i>
Con_exp										1.000

In each square: top figure, Pearson's correlation coefficient, N=14; bottom figure, significance threshold.

2. Projection

Each questionnaire is characterised by its position on the three factorial axes.

We have also situated the reference sources used to construct the compliance grid (Table 20). The highest compliance scores are obtained by the questionnaires that are close to the directive or by analyses based on behavioural finance.

Further to the Hierarchical Ascendant Classification, we have defined four classes, the barycentres of which are positioned on Figure 13 and Figure 14 as G1, G2, G3 and G4.

The four classes derived from the classification are slightly different to the groups defined by the quadrant in Figure 2 presented in part III.D.2 which is limited of the axis 1/axis 2 plane of the Principal Component Analysis (section III.D.2). The quadrants of Figure 2 explain 63% of the information about the questionnaires' compliance, compared with 79% for the 3-axis analysis.

Questionnaire C lies farthest from the reference sources (the lowest compliance scores), while Questionnaires E and L are closest to them (the highest compliance scores).

Figure 13 - Projection of the questionnaires in the axis 1/axis 2 plane

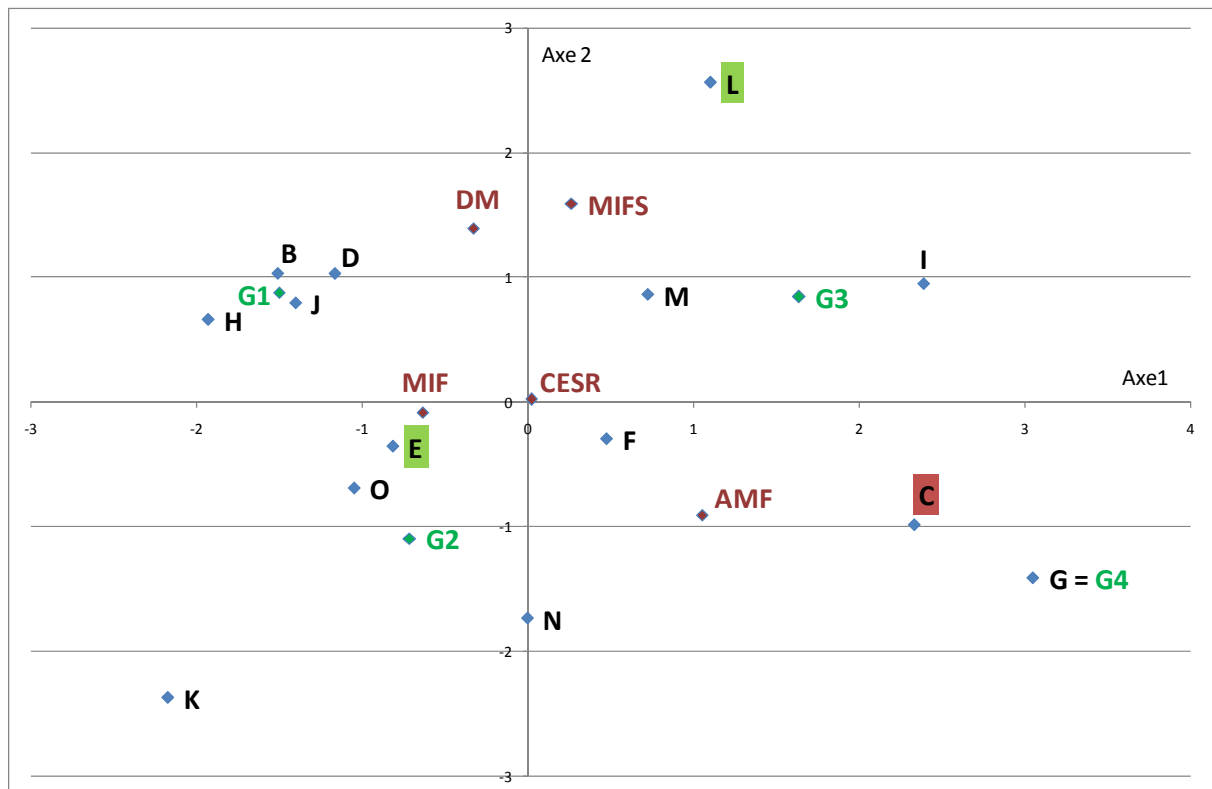
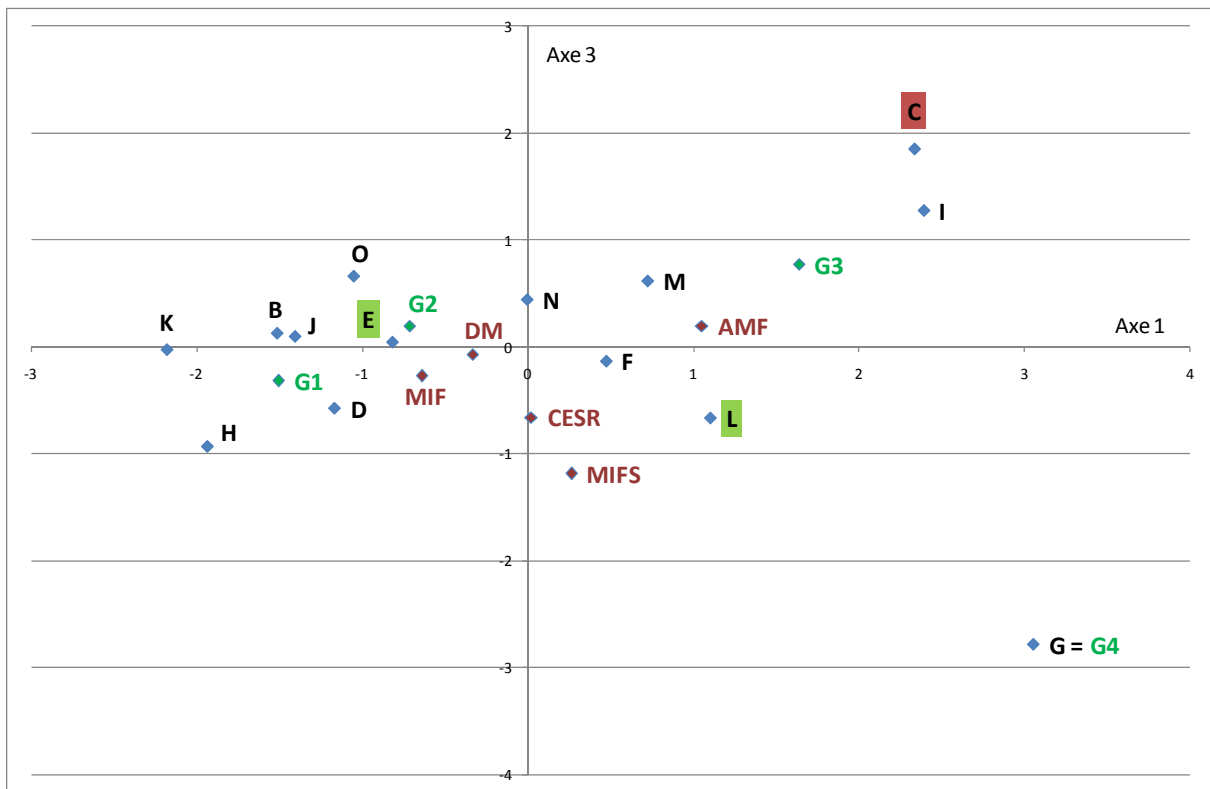


Figure 14 positions the questionnaires and reference sources along axis 3, which is correlated positively with the investment period and negatively with risk preferences.

Figure 14 - Projection of the questionnaires in the axis 1/axis 3 plane



F. Descriptive statistics: main findings

1. Personal characteristics

Figure 15 – Gender of respondents

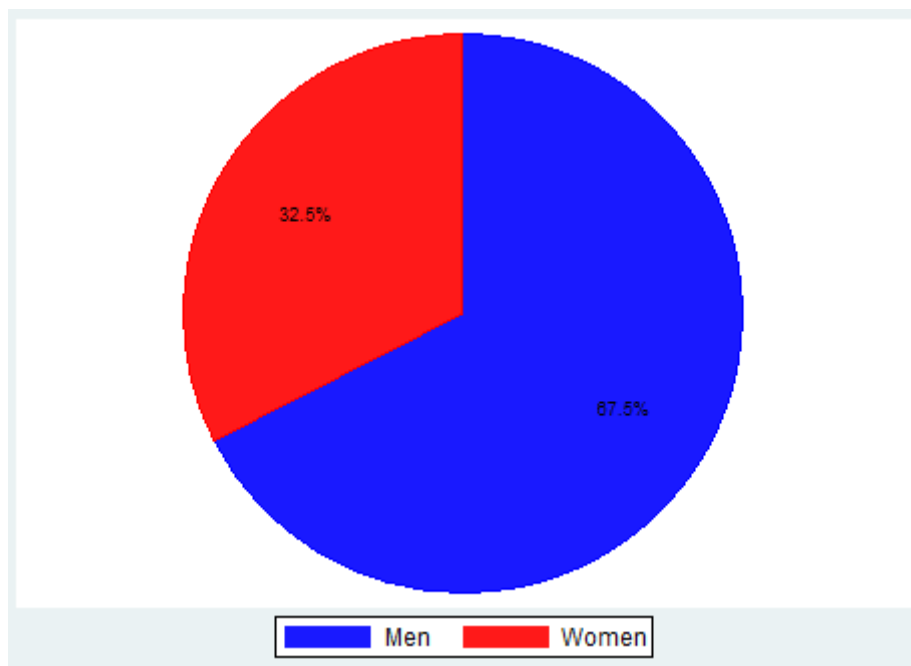


Figure 16 – Level of education

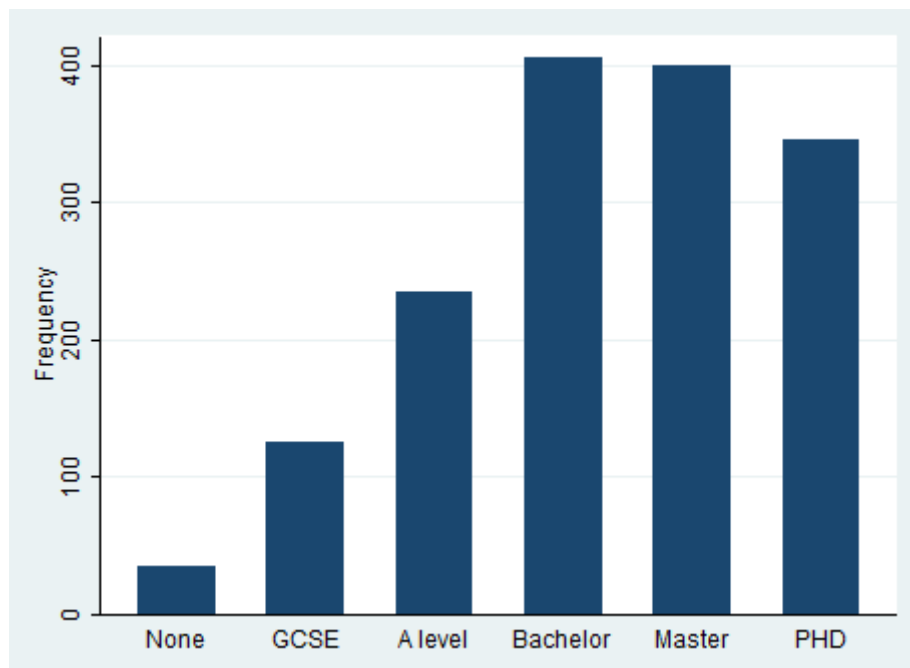


Figure 17 – Marital status

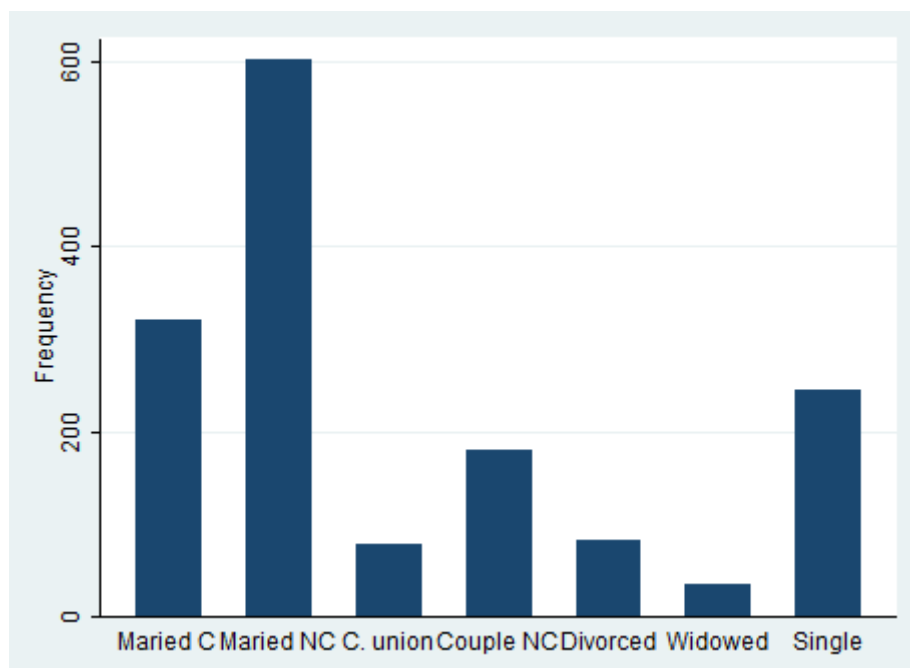
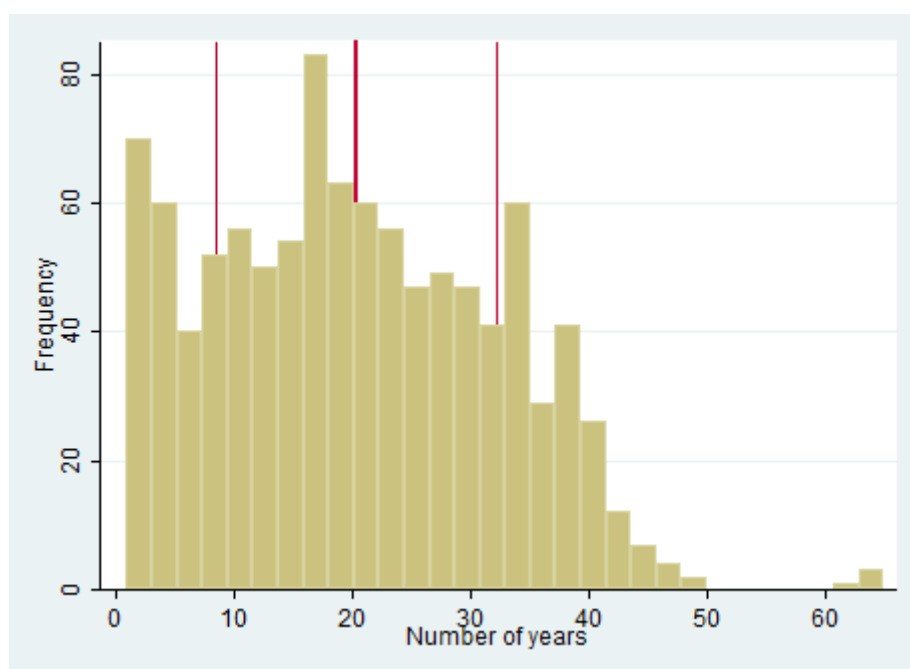


Figure 18 – Expected time before retirement



2. Financial situation

Figure 19 – Property ownership

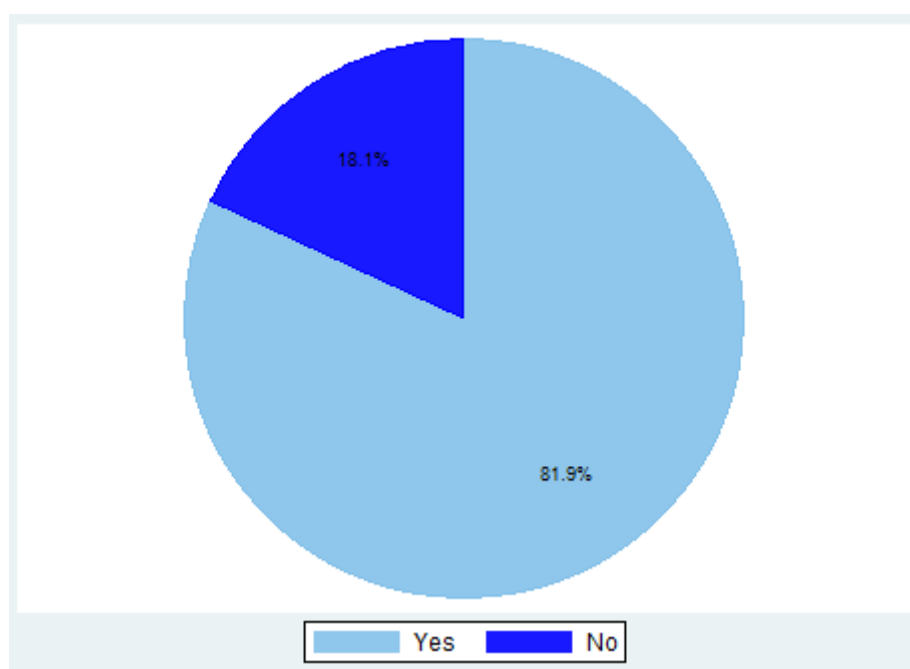


Figure 20 – Value of financial assets

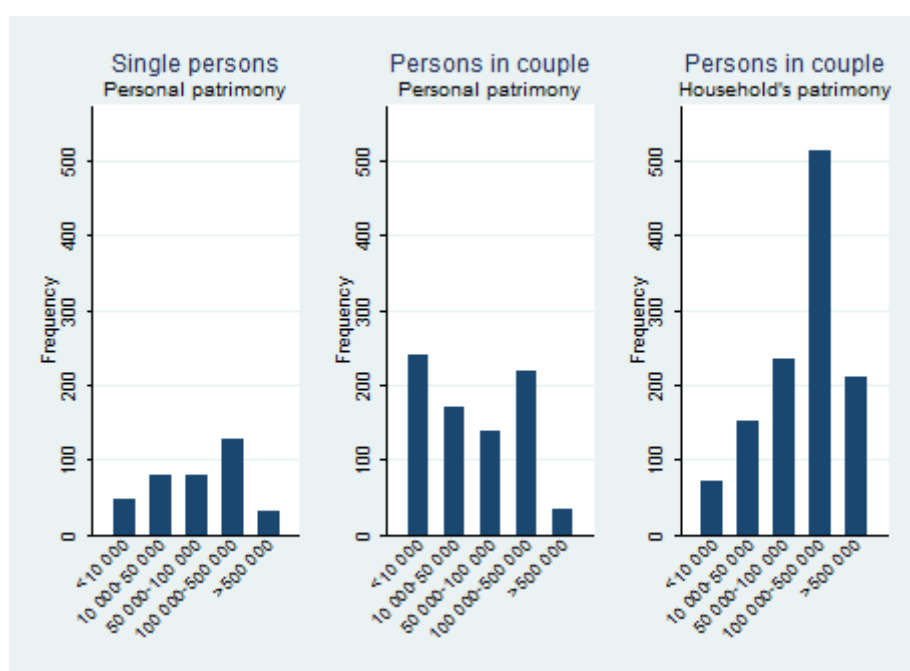


Figure 21 – Value of property

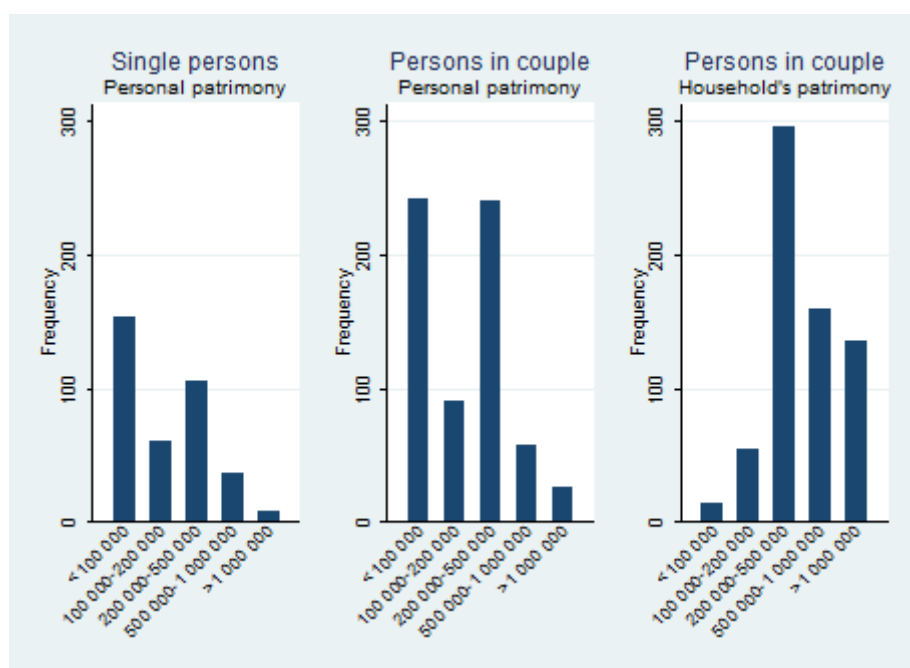
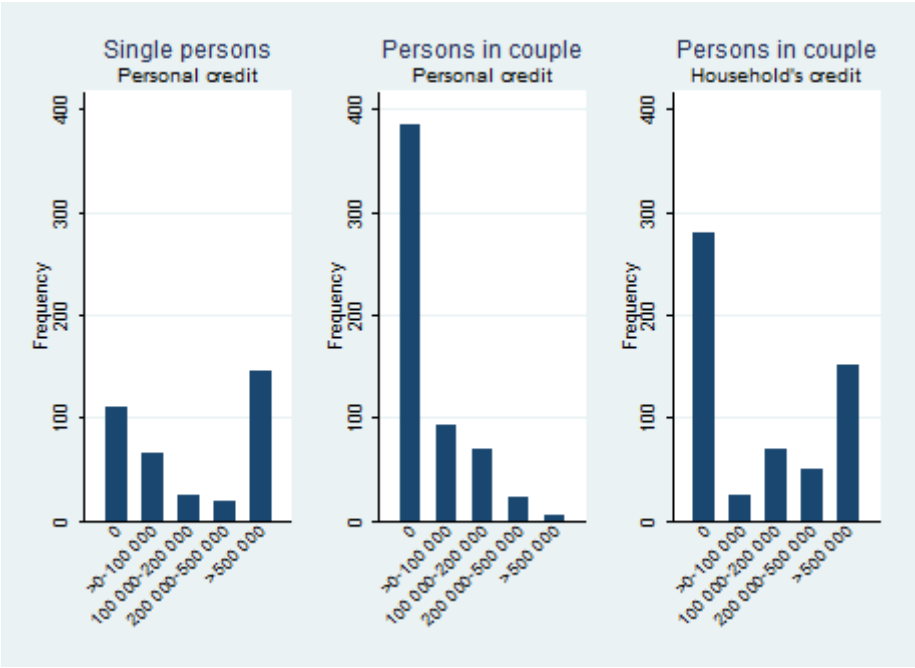


Figure 22 – Outstanding property debt



3. Knowledge and experience

Figure 23 – Number of investment products known

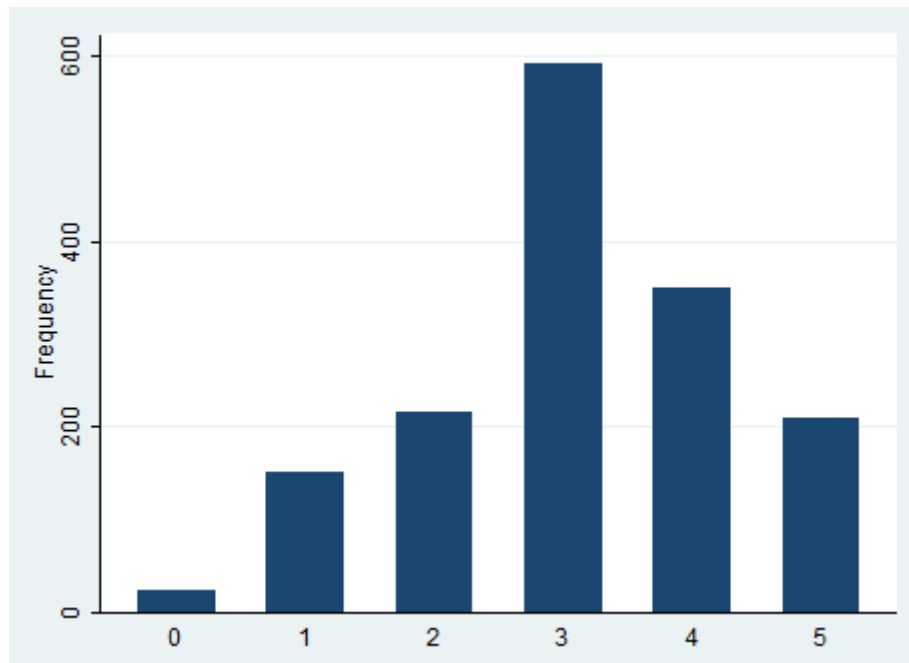


Figure 24 – Knowledge of investment products

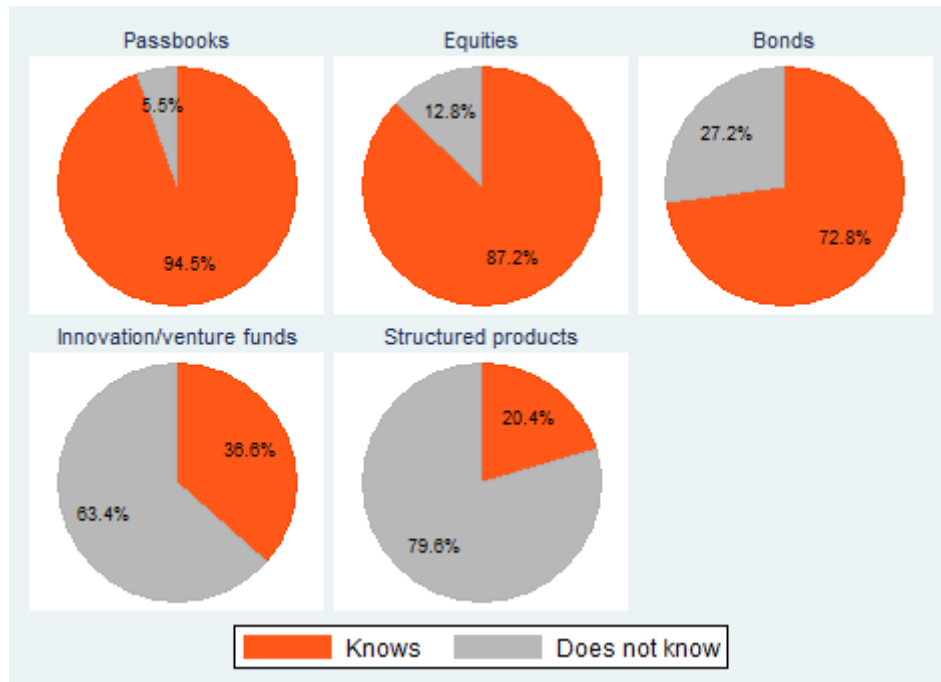


Figure 25 – Number of investment methods/strategies known

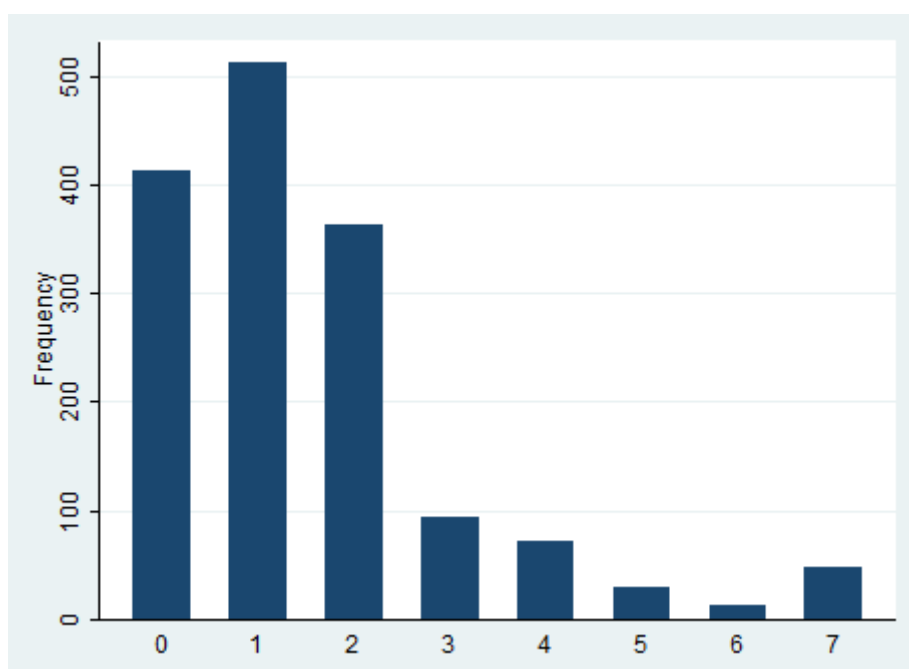


Figure 26 – Knowledge of investment methods /strategies

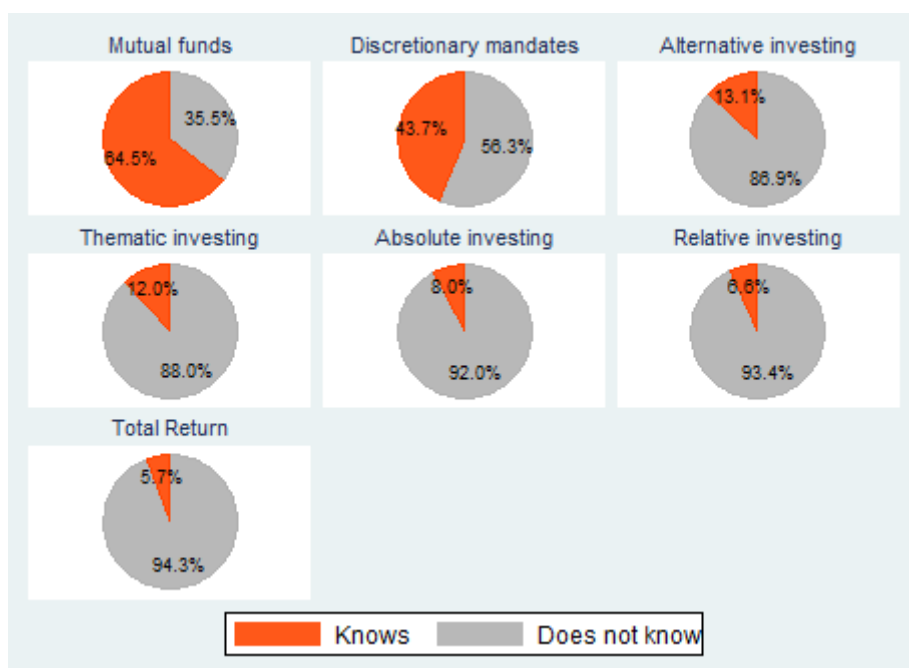


Figure 27 – Number of sources of information used

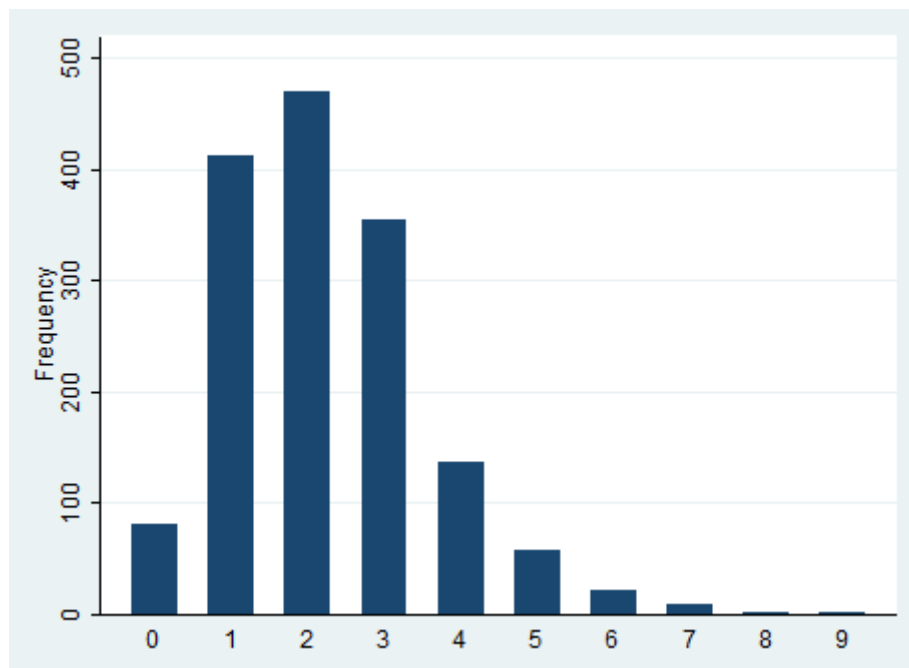
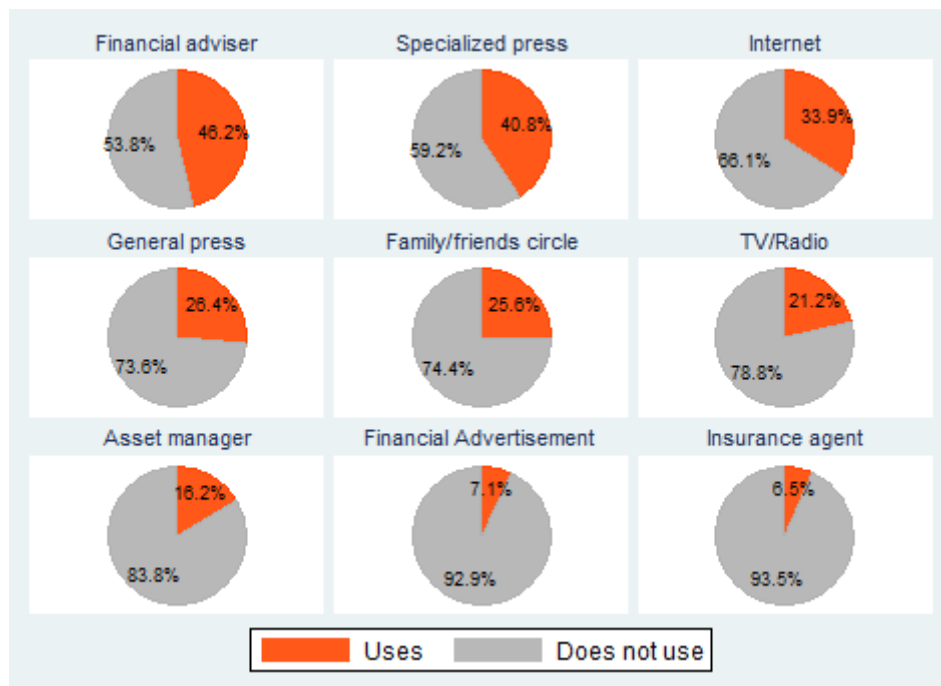


Figure 28 - Sources of information used



G. Distribution of scores and profiles

Each histogram shows the mean and the mean plus or minus one standard deviation (in red). The dotted blue line shows the theoretical bounds of the score defined by the institution.

1. Questionnaire B

Figure 29 - Distribution of the score defined by Questionnaire B

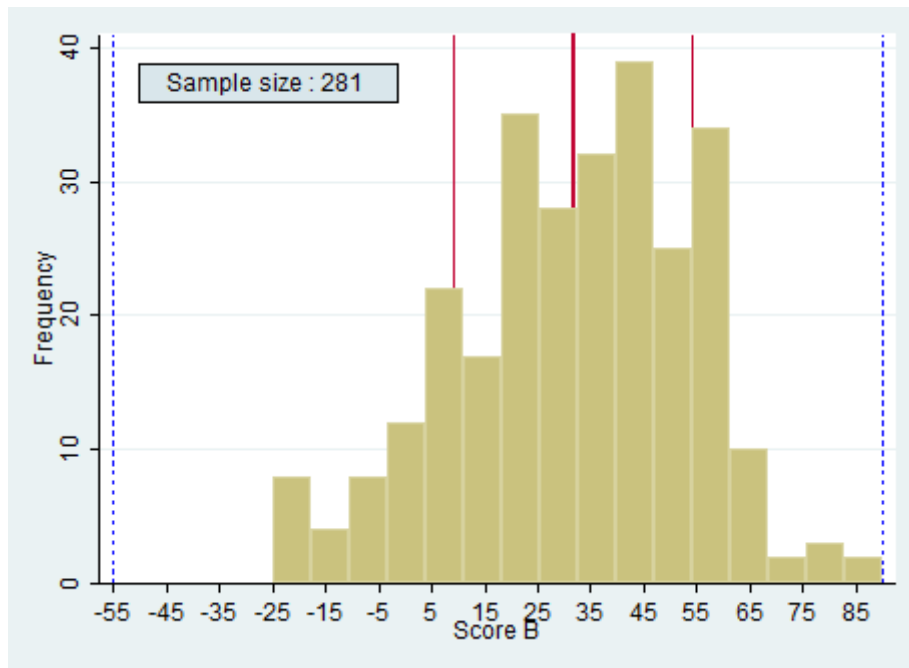
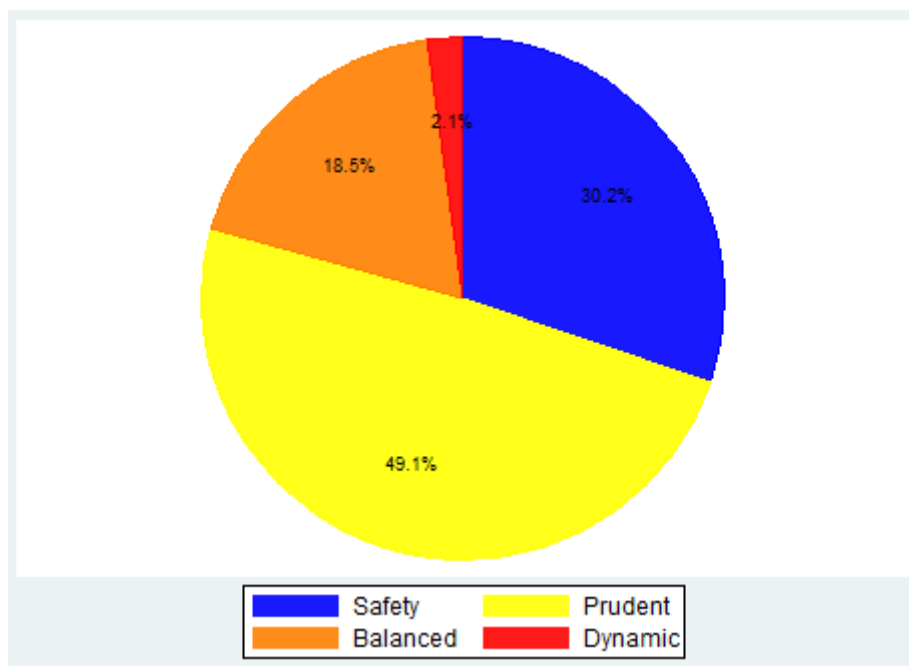
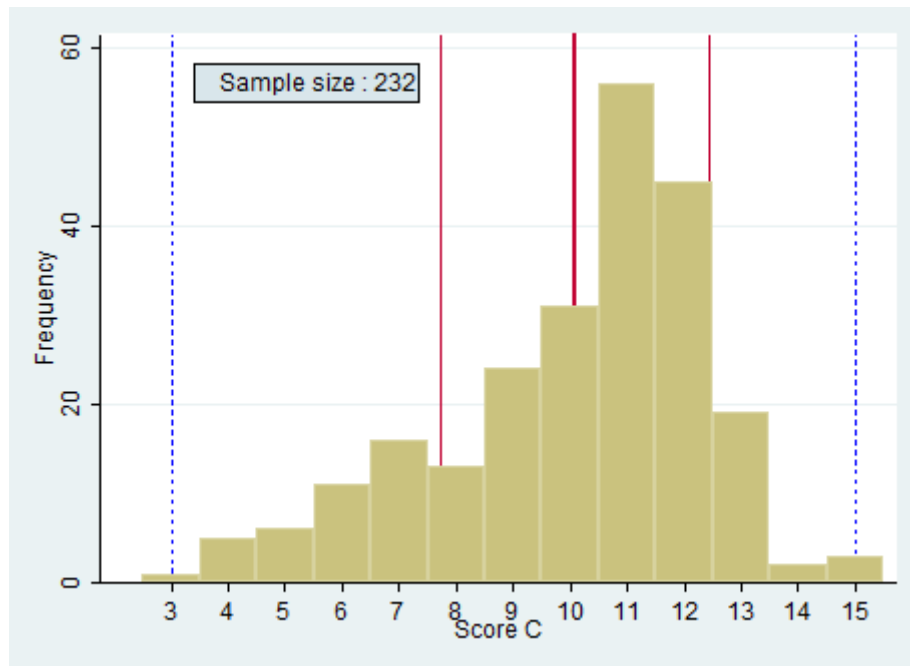


Figure 30 - Profiles defined by Questionnaire B



2. Questionnaire C

Figure 31 - Distribution of the score defined by Questionnaire C



3. Questionnaire D

Figure 32 - Distribution of the score defined by Questionnaire D

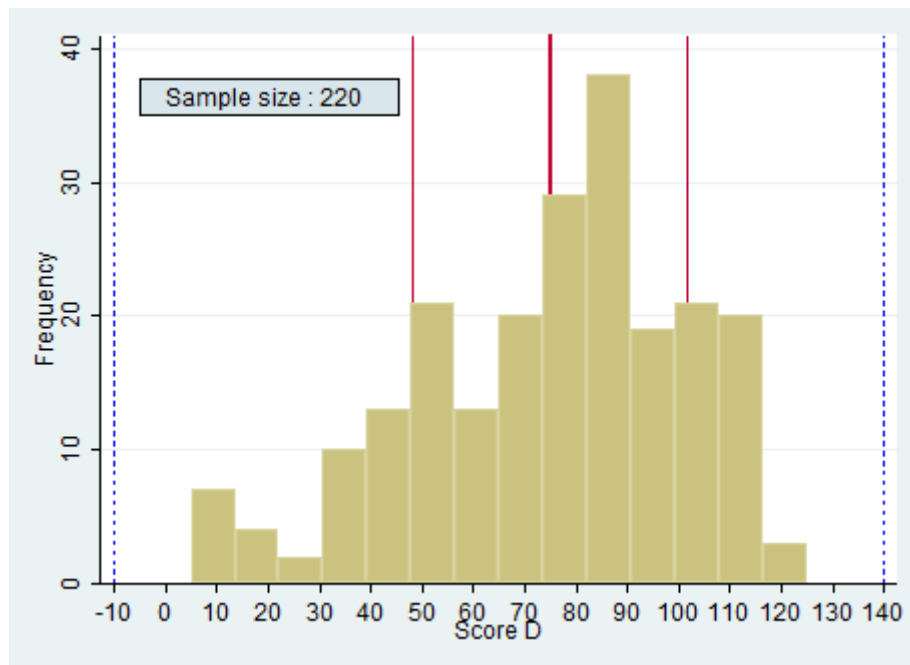
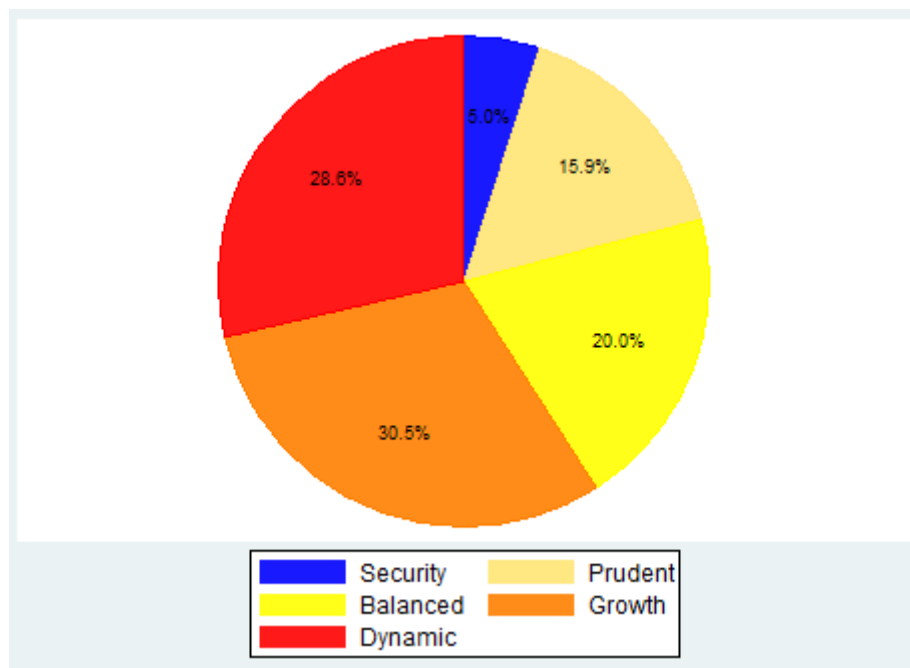
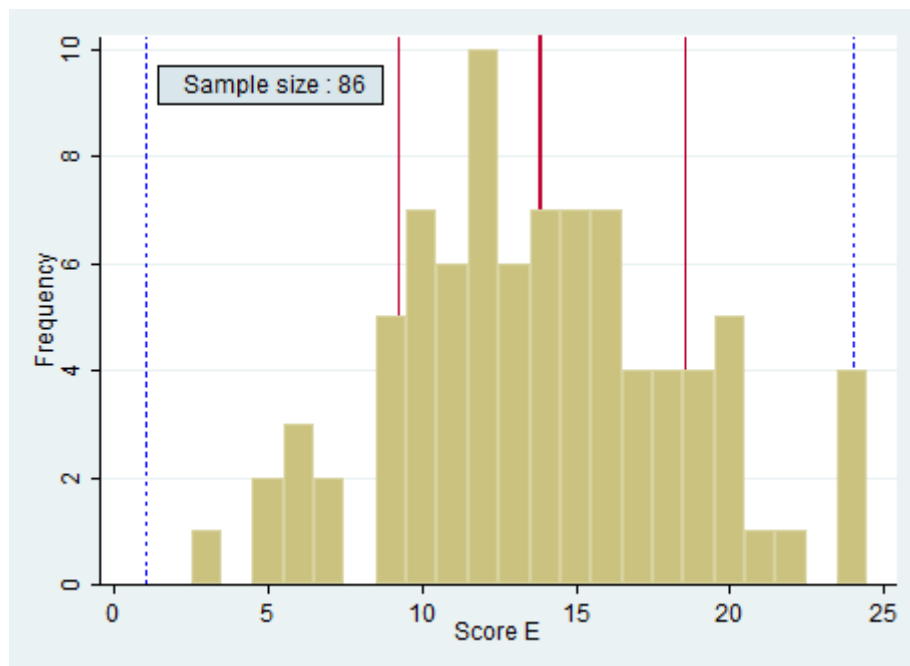


Figure 33 - Profiles defined by Questionnaire D



4. Questionnaire E

Figure 34 - Distribution of the score defined by Questionnaire E



5. Questionnaire F

Figure 35 - Distribution of the score defined by Questionnaire F

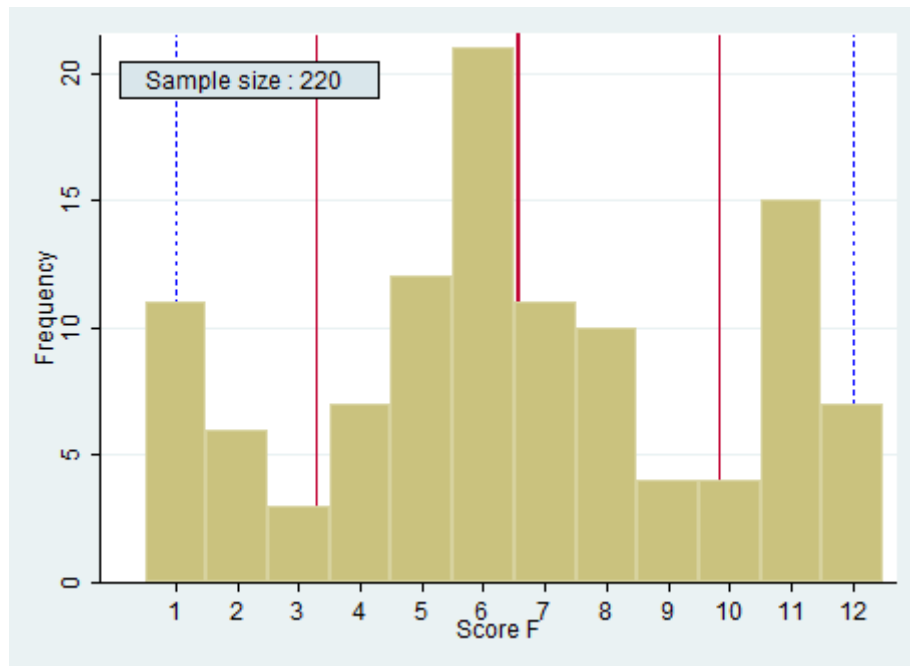
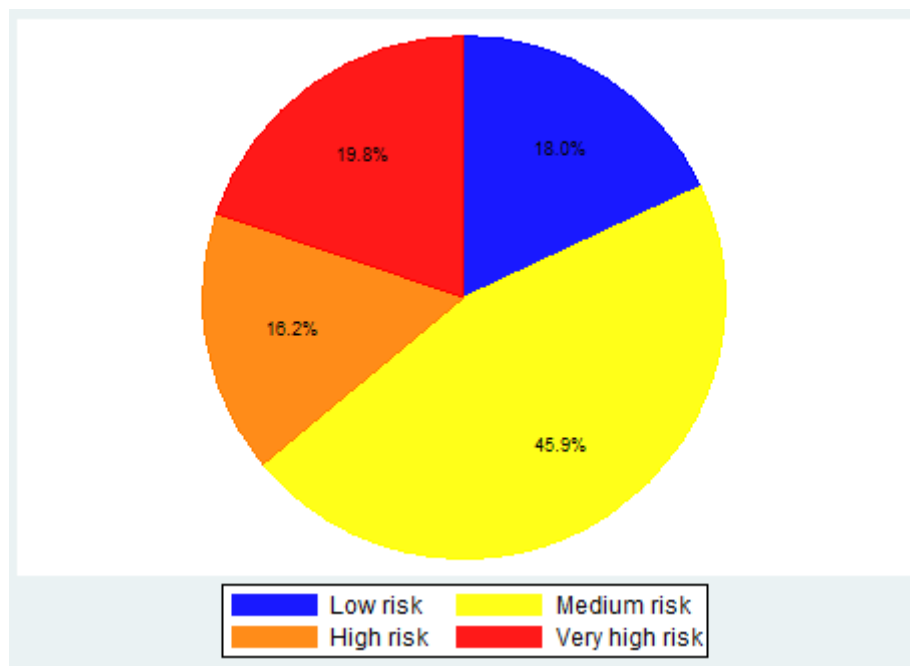
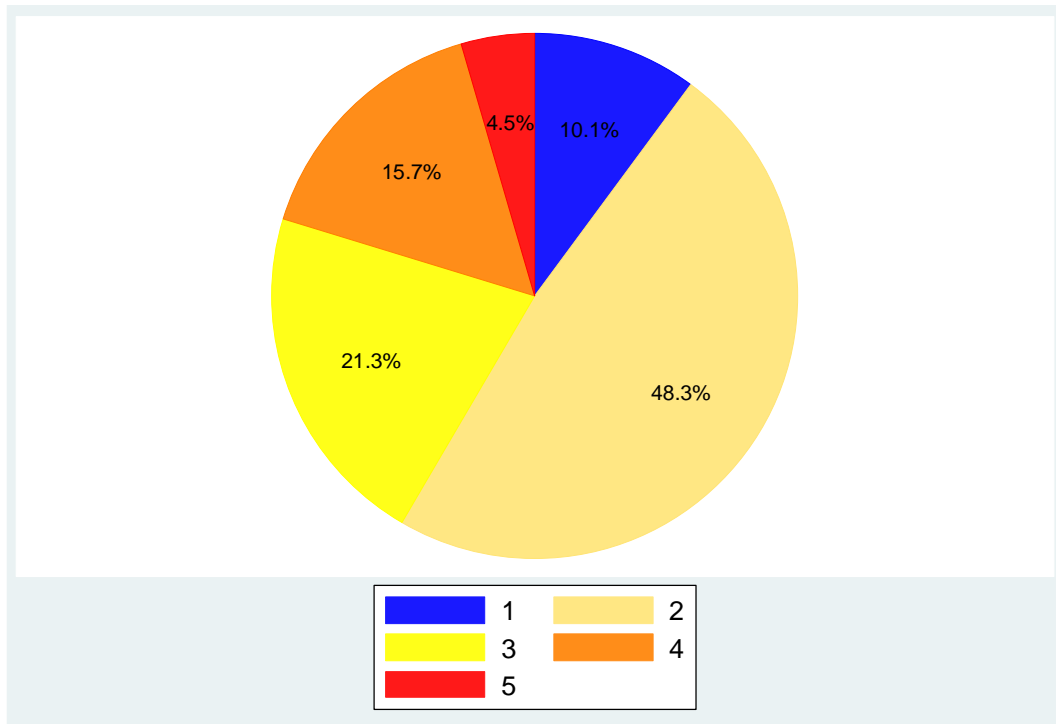


Figure 36 - Profiles defined by Questionnaire F



6. Questionnaire G

Figure 37 - Distribution of the score defined by Questionnaire G



H. Self-assessments

Figure 38 - Self-assessment defined by Questionnaire H

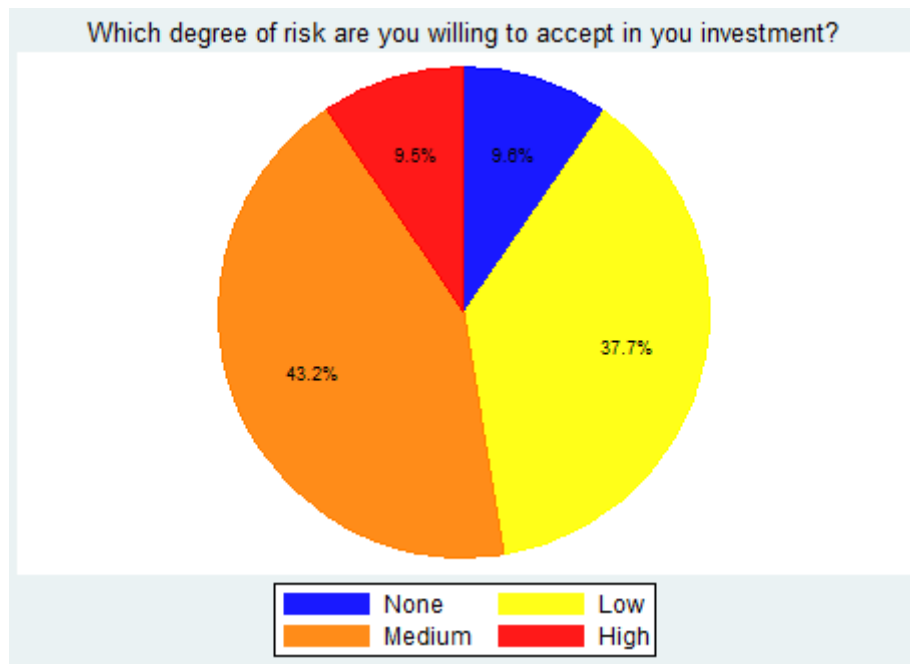


Figure 39 - Self-assessment defined by Questionnaire I

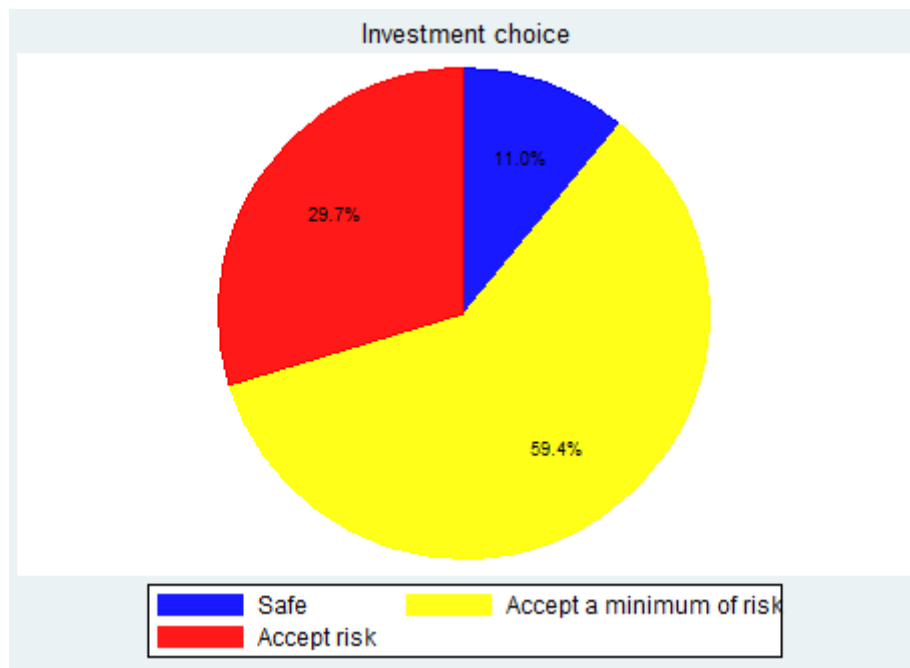


Figure 40 - Self-assessment defined by Questionnaire J

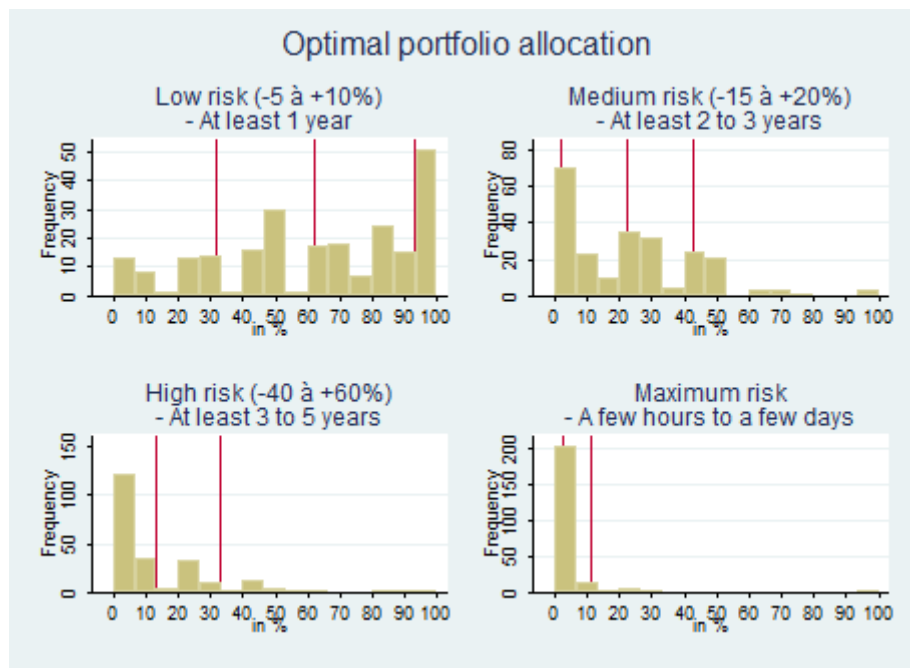
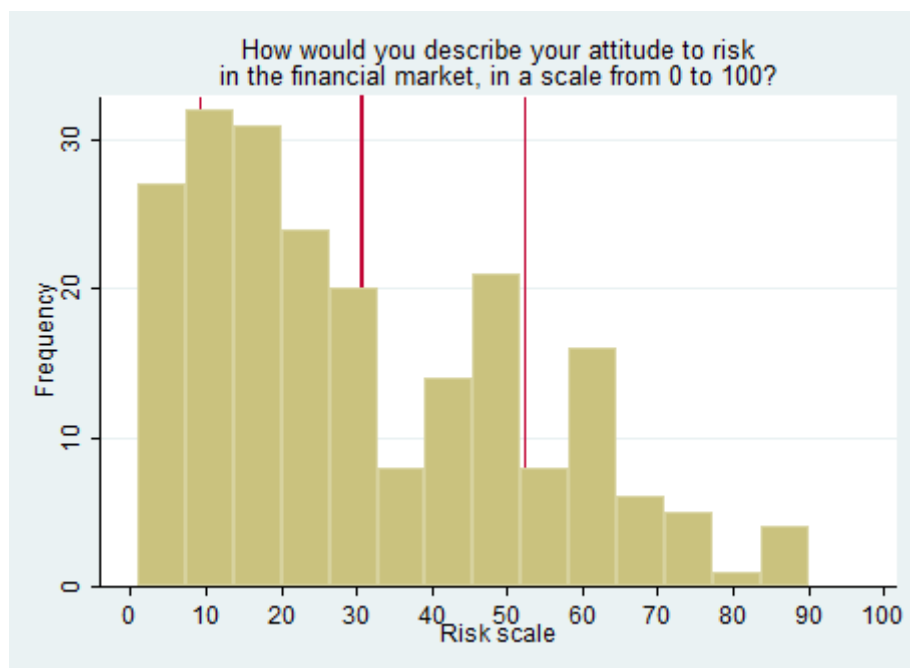


Figure 41 - Self-assessment defined by Questionnaire L



I. Consistency between financial institutions' own scores

Figure 42 - Comparison of scores B and C

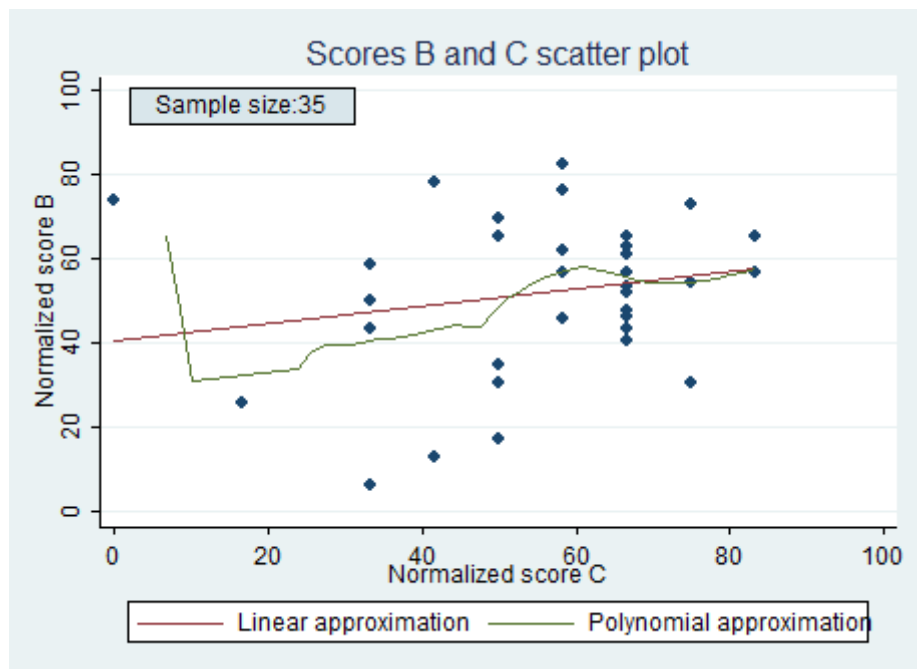


Figure 43 - Comparison of scores B and D

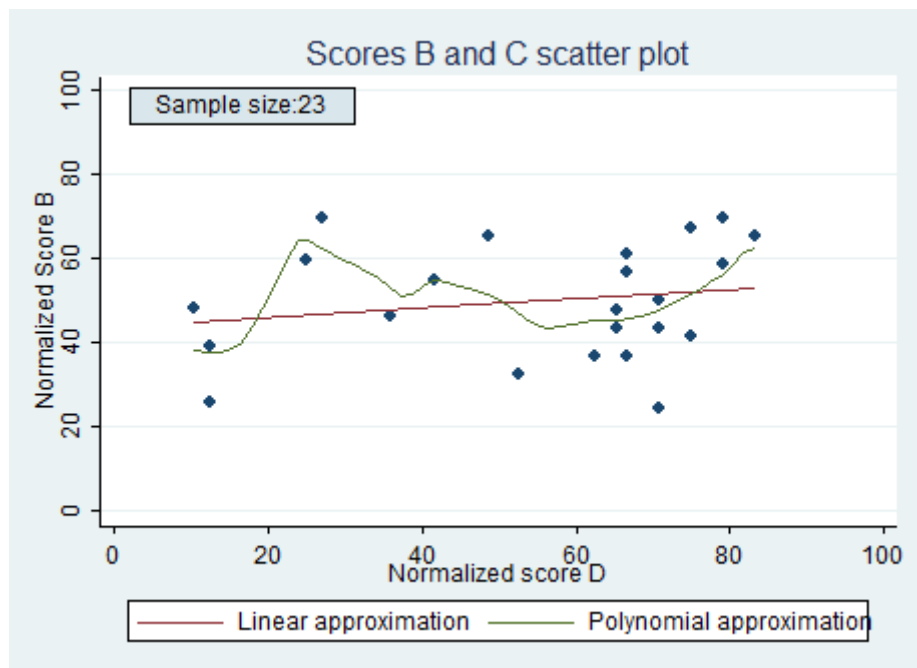


Figure 44 - Comparison of scores B and E

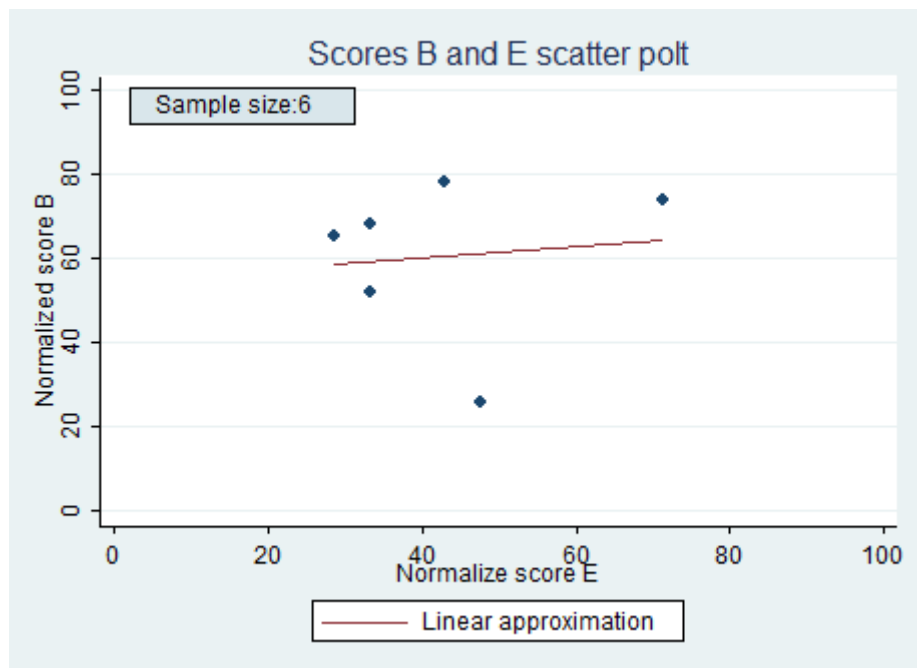


Figure 45 - Comparison of scores C and D

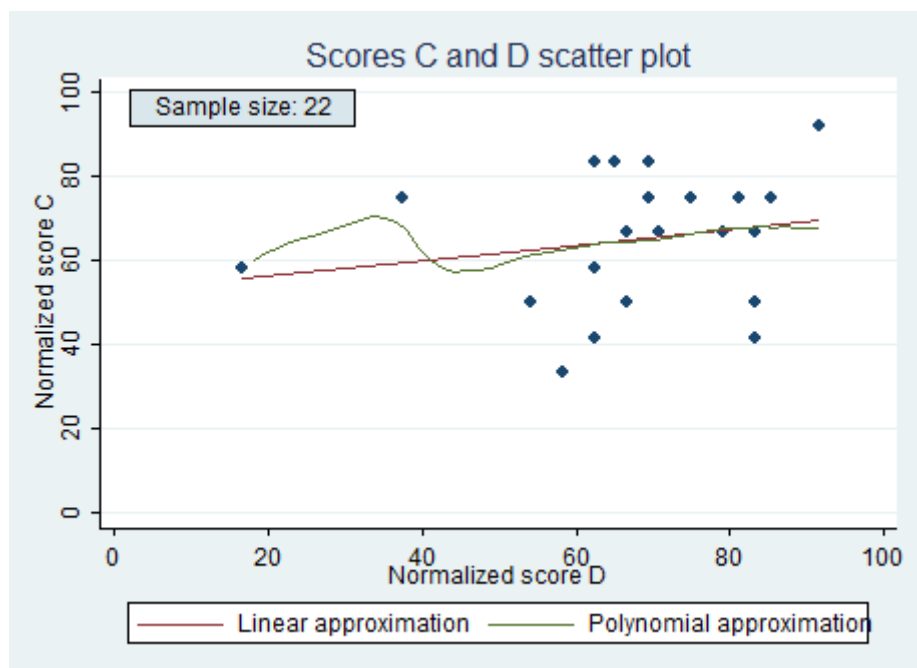


Figure 46 - Comparison of scores C and E

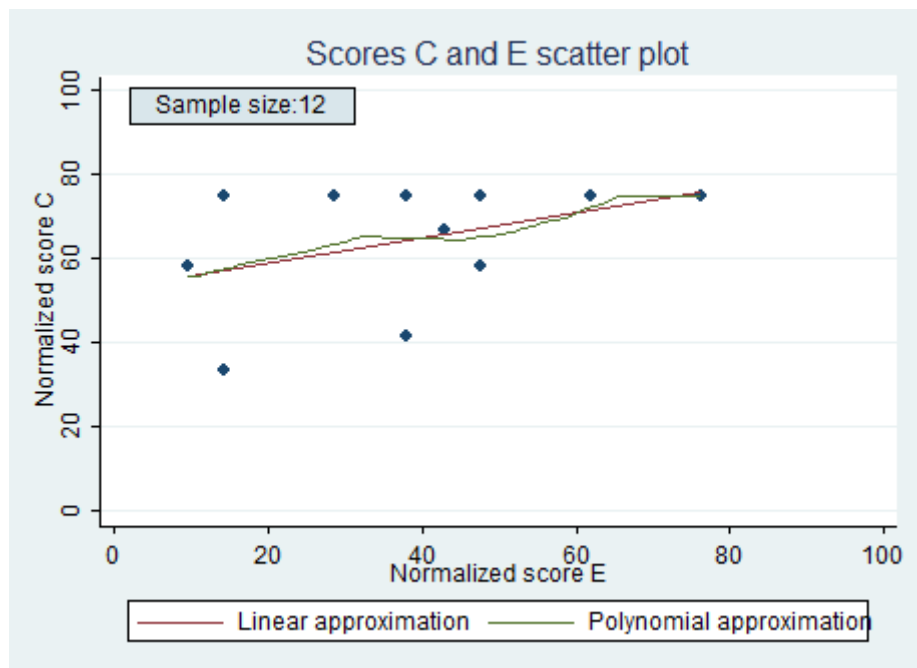
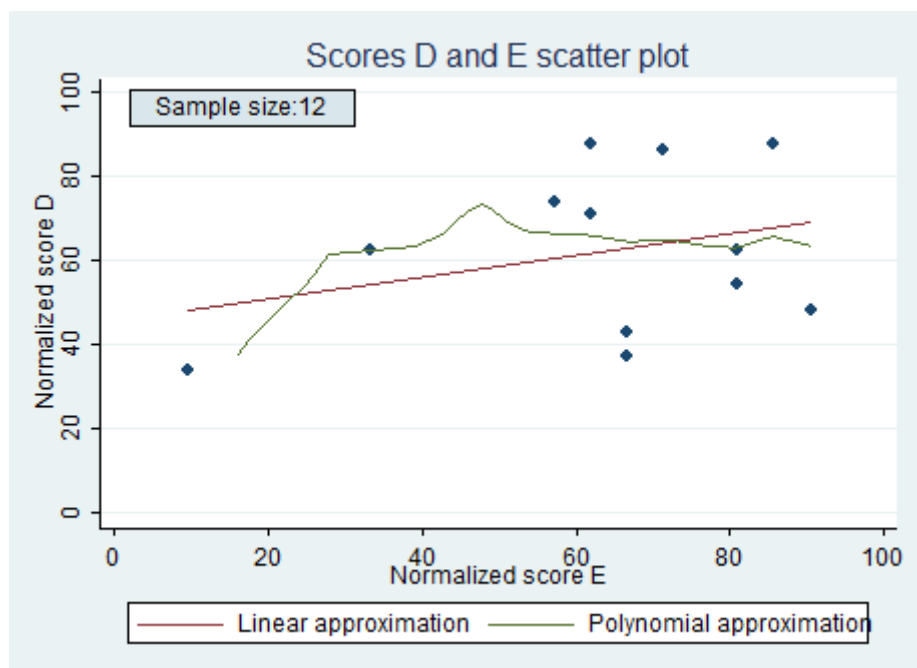
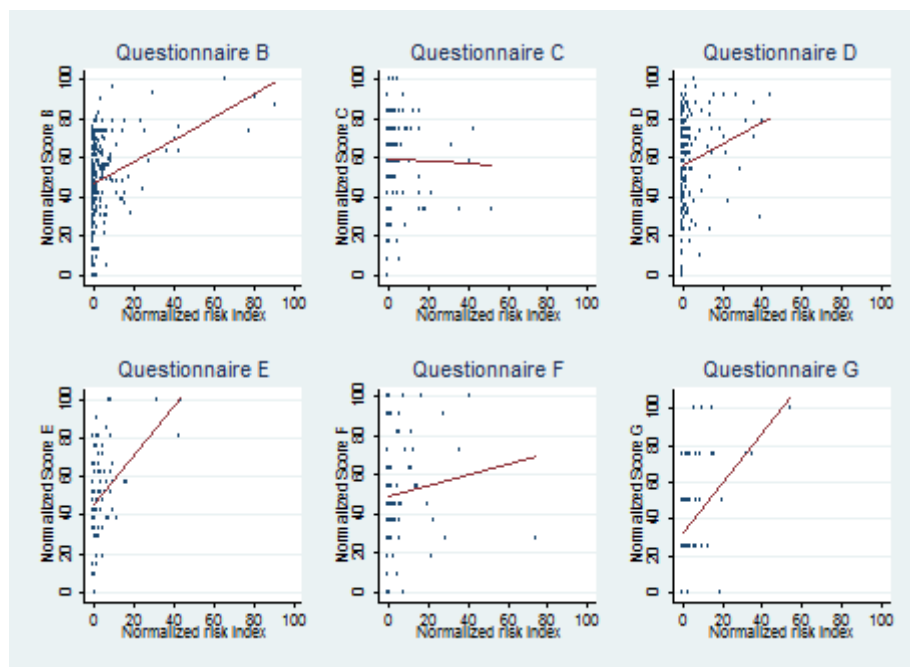


Figure 47 - Comparison of scores D and E



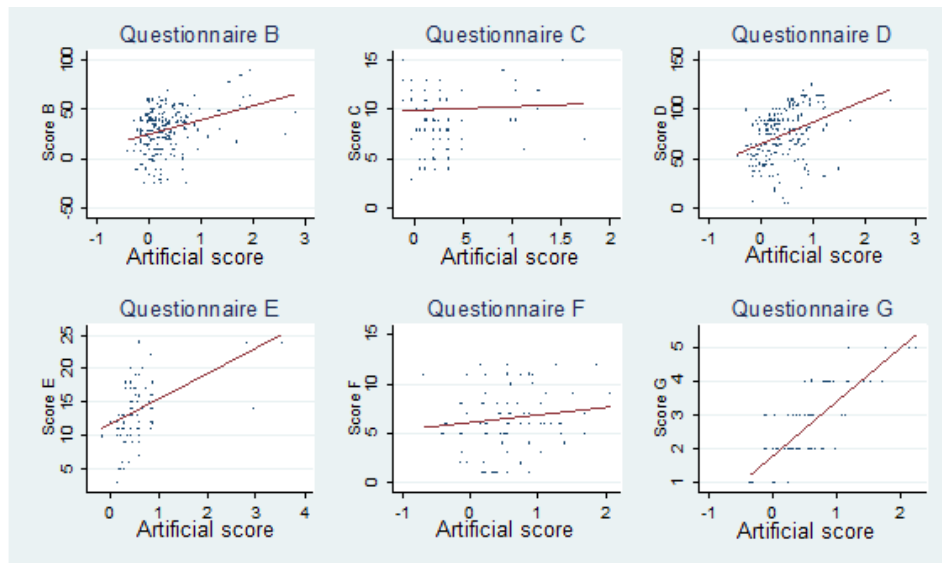
J. Consistency of financial institutions' scores with the Risk Index

Figure 48 – Link between the scores calculated by the institutions and the Risk Index



K. Comparison of institutions' scores with the Artificial Score

Figure 49 – Link between institutions' existing scores and their Artificial Score



List of tables

Table 1 – Use of questionnaires by financial institutions	34
Table 2 – SUMMARY: Key concepts addressed in the reference sources (extracts)	39
Table 3 – Importance of the various criteria according to the reference sources	41
Table 4 – Questionnaire compliance ratings by reference source	43
Table 5 – Data collection: response rates	51
Table 6 – Data collection: Number of respondents per questionnaire	52
Table 7 – Unadjusted statistics on the financial situation of respondents.....	56
Table 8 – Quality of the questionnaires by theme.....	66
Table 9 – The most significant questions for explaining the Risk Index	67
Table 10 - Ability of the questionnaires to explain the Risk Index.....	70
Table 11 - Questions used to calculate the scores.....	74
Table 12 - Effect of the various dimensions in the score calculation	75
Table 13 - Amplitude of the scores defined by the institutions.....	76
Table 14 - Number of respondents, correlation between existing scores and the Risk Index	78
Table 15 - Comparison of rankings, ex ante and ex post	82
Table 16 - Correlation between the financial institutions' scores and the Artificial Score	83
Table 17 - Scope for improvement in the financial institutions' scores	84
Table 18 - Optimisation of the number of questions.....	85
Table 19 – Match between the evaluations.....	86
Table 20 – Compliance scores of the 14 MiFID questionnaires	99
Table 21 – Aggregated compliance criteria.....	100
Table 22 – Statistics for compliance scores in sets of seven items.....	100
Table 23 - Correlations between the 3 factorial axes and the variables	102

List of figures

Figure 1 - Framing effects for a hypothetical portfolio	27
Figure 2 - Principal Component Analysis: representation of the first two axes	44
Figure 3 - Hierarchical Ascendant Classification of the 14 questionnaires.....	46
Figure 4 - Distribution of respondents' ages	54
Figure 5 - Profession of respondents	54
Figure 6 – Amount to be invested.....	57
Figure 7 – Log of amount to be invested	58
Figure 8 – Length of investment needed to complete project	58
Figure 9 – Reasons for project.....	59
Figure 10 – Subjective and objective measures of experience.....	60
Figure 11 - Correlation between score, <i>ex ante</i> and <i>ex post</i>	82
Figure 12 – Characteristic values of the analysis	100
Figure 13 - Projection of the questionnaires in the axis 1/axis 2 plane.....	103
Figure 14 - Projection of the questionnaires in the axis 1/axis 3 plane.....	104
Figure 15 – Gender of respondents	104
Figure 16 – Level of education	105
Figure 17 – Marital status	105
Figure 18 – Expected time before retirement	106
Figure 19 – Property ownership.....	106
Figure 20 – Value of financial assets	107
Figure 21 – Value of property	107
Figure 22 – Outstanding property debt	108
Figure 23 – Number of investment products known.....	109
Figure 24 – Knowledge of investment products	109
Figure 25 – Number of investment methods /strategies known.....	110
Figure 26 – Knowledge of investment methods /strategies.....	110
Figure 27 – Number of information sources used	111
Figure 28 - Sources of information used	111
Figure 29 - Distribution of the score defined by Questionnaire B.....	112
Figure 30 - Profiles defined by Questionnaire B	112
Figure 31 - Distribution of the score defined by Questionnaire C.....	113
Figure 32 - Distribution of the score defined by Questionnaire D.....	113
Figure 33 - Profiles defined by Questionnaire D	114

Figure 34 - Distribution of the score defined by Questionnaire E	114
Figure 35 - Distribution of the score defined by Questionnaire F	115
Figure 36 - Profiles defined by Questionnaire F.....	115
Figure 37 - Distribution of the score defined by Questionnaire G.....	116
Figure 38 - Self-assessment defined by Questionnaire H	116
Figure 39 - Self-assessment defined by Questionnaire I.....	117
Figure 40 - Self-assessment defined by Questionnaire J	118
Figure 41 - Self-assessment defined by Questionnaire L.....	118
Figure 42 - Comparison of scores B and C.....	119
Figure 43 - Comparison of scores B and D	119
Figure 44 - Comparison of scores B and E.....	120
Figure 45 - Comparison of scores C and D	120
Figure 46 - Comparison of scores C and E.....	121
Figure 47 - Comparison of scores D and E.....	121
Figure 48 – Link between the scores calculated by the institutions and the Risk Index	122
Figure 49 – Link between institutions’ existing scores and their Artificial Score	123