



## Optimal Behaviour

## Issue 2: How not to measure risk tolerance

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### Abstract

Since MiFID came into force in November 2007, banks in Europe have been required by law to assess their clients' preferences on risk-taking. Unfortunately MiFID gives no guidance on how to do this accurately...and what banks don't tell you is that for the most part, they have no idea either.

Accurate measurement requires a well-designed, objective, and statistically robust process, based on years of psychological research into risk tolerance. The overwhelming majority of banks' risk tolerance questionnaires simply do not meet these standards.

This issue of *Optimal Behaviour* discusses some of the ways that industry questionnaires typically fail. Common errors include confusing risk tolerance with investment objectives or other aspects of personality, or expecting clients to have extensive financial knowledge. Above all, questionnaires cannot simply guess which questions to include, but must be based on rigorous statistical and psychometric research.

It is also important that risk tolerance measures are properly tested and shown to be stable across the market cycle. If not they reflect only future beliefs and lose their use as a guide to appropriate long-term portfolio optimisation.

Avoid investing your money on recommendations based on risk tolerance questionnaires with any of the features we describe in this issue of *Optimal Behaviour*.

### A low hurdle?

For many years now banks and wealth managers have given questionnaires to clients in an attempt to measure their 'risk tolerance' and thereby ensure that their portfolios take on an appropriate amount of risk. With the advent of the EU Markets in Financial Instruments Directive (MiFID) which came into force in November 2007 it is now mandatory in Europe for banks to assess clients' 'preferences regarding risk taking'<sup>1</sup>. Unfortunately MiFID gives absolutely no guidance on how to do this accurately...and what the banks don't tell you is that for the most part they have no idea either.

Risk attitude is a highly abstract and amorphous constellation of different psychological attributes. Of these, what the finance industry calls 'risk tolerance'<sup>2</sup> is only one component. Investors simply do not have good introspective access to each of these components separately, which makes it extremely difficult for anyone to assess their own risk tolerance objectively and accurately. In addition, the last few decades of research into the psychology of risk and decision-making tell us a lot about what not to do when trying to study and assess risk attitudes.

Accurate measurement requires a carefully designed, objective, and statistically robust risk tolerance questionnaire using established psychometric techniques. The overwhelming majority of risk tolerance questionnaires used by banks simply do not meet these standards, and frequently fall foul of pitfalls long known to experimental psychologists. And yet they satisfy the regulatory requirements. This issue of *Optimal Behaviour* will discuss some of the ways that industry questionnaires fail to measure what they purport to measure. You should avoid investing your money on recommendations based on risk tolerance questionnaires that have any of these features.

### Coping with confounds

The most fundamental problem with trying to measure risk tolerance is that it is all too easy to measure something else by accident. A pure assessment of risk tolerance needs the

<sup>1</sup> Article 36(4), The European Parliament and the European Council 2006.

<sup>2</sup> Precisely what is, or should be, meant by 'risk tolerance' was discussed in Issue 1 of *Optimal Behaviour*.

questions asked to be free of ‘confounding factors’ – these are incidental factors that can cause the risk tolerance score to be systematically biased upward or downwards, meaning that the final score reflects not only the factor we are interested in, but also other factors that hide the true psychological risk tolerance. Some of these other factors are important when determining how to invest, but they should be measured and understood separately from risk tolerance.

## Investment objectives

### Principle 1: Do not confound risk tolerance with investment objectives

The most common mistake in the industry is succumbing to the temptation to add questions about *investment objectives* to the questionnaire. All financial advisors know that objectives such as the investor’s time horizon, annual income requirements, and liquidity requirements are important when determining how much risk is appropriate for the portfolio... so it seems natural to include them when ascertaining the investor’s risk tolerance. But these are not psychological factors – they may influence the appropriate risk of a portfolio, but they do not change the investor’s fundamental psychological ability to cope with risk and loss. As the investor’s financial circumstances change, the appropriate portfolio will change, but the risk tolerance, if properly measured, will be quite stable. It is not that investment objectives should be ignored, but rather that they should be considered separately to risk tolerance. Risk tolerance needs to be seen in the context of the investment objectives, not obscured by them.

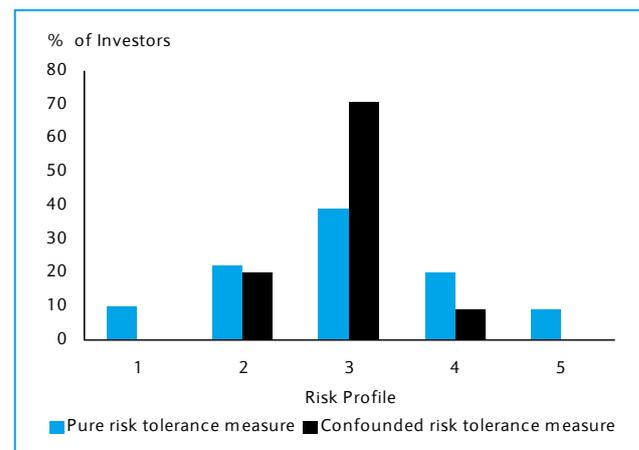
	Investor 1	Investor 2
Psychological risk tolerance	High	Low
Investment horizon	Short-term	Long-term
Traditional risk tolerance profiling output	Medium	Medium

As a simple illustration of this problem the table above shows two potential investors, one with high and one with low psychological risk tolerance. However, investor 1 should not take on a large amount of risk despite high risk tolerance because of a short-term time horizon. Investor 2 on the other hand could take on a reasonable amount of risk despite low risk tolerance as the investment would be over a long period. Both risk tolerance and time horizon affect the optimal level of risk in a portfolio, but it is important to reflect them separately. By bundling questions on time horizon into the risk tolerance questionnaire, both investors emerge looking exactly the same, as if they have moderate risk tolerance. The use of time horizon confounds the accurate measurement of risk tolerance.

With just the two dimensions in this example it is easy to see what is going on behind the final profile output. However, when there are a large number of different investment factors confounding the measure<sup>3</sup> it becomes impossible to discern what is driving the ultimate score, and impossible to say what is the actual risk tolerance. By combining scores on a number of distinct dimensions, this approach also tends to push all investors towards the middle. Figure 1 shows how the distribution of scores on the Barclays Wealth pure risk tolerance measure<sup>4</sup> is pushed towards the middle profile

when investment objective questions are included in the measure. A high resolution view, which tracks each dimension separately, permits a more tailored portfolio design.

Figure 1 – Effect of confounding factors



Source: Barclays Wealth risk behavioural research

## Other personality dimensions

### Principle 2: Do not confound with other aspects of risk attitude or other personality dimensions

It is not only non-psychological objectives that can be confounded with risk tolerance. More difficult to separate out from the measure are other personality dimensions and other aspects of risk attitude. In particular it has been clearly shown that attitudes to risk in domains other than financial investing, such as health risks (smoking, unsafe sex, drug use), participation in dangerous sports, or risk taking in a gambling environment, are unrelated to financial risk attitudes. And yet such questions, particularly involving attitudes to gambles, are frequently used in assessing financial risk tolerance.

In general, ensuring that risk tolerance measures are not confounded by other aspects of financial personality is far more difficult than simply excluding financial objectives. This is particularly true when trying to separate it from other closely-related aspects of risk attitude. For example, investors’ portfolios should be optimised to reflect their long-run *rational* tolerance for risk. But we also all have strong short-run emotional reactions to risk which can cause us to take actions detrimental to our own long-run objectives. To isolate the risk tolerance score from these other influences means that risk tolerance questionnaire cannot simply be drawn up by bankers including questions they think are relevant, but need to be developed using robust psychometric techniques by researchers with detailed knowledge of the psychology of risk.

<sup>3</sup> E.g., liquidity requirements, tax situation, income requirements, personal inflation rate, etc.

<sup>4</sup> On this scale individuals are spread throughout the full range of scores on the scale, which is one desirable attribute of a differentiating personality measure.

<sup>5</sup> Weber, E. U., A. R. Blais, et al. (2002). "A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors." *Journal of Behavioral Decision Making* 15(4): 263-290.

## Knowledge, experience and skill

**Principle 3: Do not require respondents to have knowledge of finance or investing**

**Principle 4: Do not require respondent to perform numerical computation or probabilistic reasoning**

Should your knowledge of finance feature in your risk tolerance? Or your mathematical ability? Clearly not. These are just further confounds that mask the true risk tolerance of the investor. If people with specific knowledge or ability find it easier to respond to the questions assessing risk tolerance then the resulting scores are not an unbiased measure of how much risk they can cope with psychologically. This is particularly true of those without strong financial knowledge, experience or numeracy skills, who are as a result at risk of always being allocated to portfolios that achieve systematically lower returns than they could and should achieve given the true amount of risk they should take on. However, even those with considerable knowledge and experience risk having their risk tolerance mis-assessed if the questions reflect these aspects rather than a fundamental ability to bear risk.

Questions that require the respondent to perform calculations become a test of the individual's numeracy rather than their risk tolerance.<sup>5</sup> People are particularly inconsistent at expressing their preferences when it comes to probabilistic reasoning, so explicit trade-offs between potential returns and probabilistic representations of risk are extremely difficult to interpret.<sup>6</sup>

Answering the questions should not require any specific financial knowledge. Questions should not refer to investment types, financial instruments or asset classes of which some people may have low experience or understanding.

## Past behaviour and future belief

**Principle 5: Do not require respondent to have knowledge about current market conditions**

**Principle 6: Do not confuse past behaviours with optimal actions**

**Principle 7: Do not rely on future beliefs/expectations more than risk tolerance**

It is equally important that a measure of risk tolerance reflects an investor's innate long-term ability to cope with *future* risks, rather than just their reactions to past investment performance. In some risk questionnaires there is a tendency to confuse past actions with optimal actions. Questionnaires mistakenly ask about what individuals have done in the past without any kind of assessment about whether those past decisions were optimal, or even appropriate. Without this assessment it is impossible to rely on past decisions as a reliable indicator of risk tolerance. Referring to past investment outcomes carries a strong risk of biasing the results by focussing attention on previous gains or losses.

<sup>6</sup> Unless these are extremely well designed and thoroughly tested. Decades of research into the psychology of financial decision making show that it is possible to elicit risk attitudes quantitatively, but that, in general, individuals' responses to such questions are highly unstable and inconsistent. Responses also vary widely depending on minor changes in how the question is asked.

<sup>7</sup> Not to mention that almost all questions of this sort used in industry questionnaires use representations of risk that fail to reflect risk as actually perceived by investors (see previous issue of *Optimal Behaviour*).

Past decisions may have been good or bad, or may through sheer luck or misfortune have turned out well or badly... but this should not affect the optimal portfolio decision for the future, which should be to get the best possible expected returns given an accurate assessment of how much risk the individual can cope with. Past investment behaviour is often not a reliable indicator of the optimal action for an investor.

A further error is to confuse risk tolerance with future beliefs. We often see comments in the media that 'investors' risk tolerance has decreased' when they avoid more risky investments after a market downturn. This statement is invariably misleading. Although risk tolerance can change to some degree after a market downturn, much more of the change in behaviour can be explained not by changes in risk tolerance, but by changes in belief. Investors could have exactly the same degree of risk tolerance before and after a downturn, but if their beliefs change so that they think there is now a much higher likelihood of assets decreasing in value, they will quite rationally reduce exposure to these assets. To provide investors with an optimal portfolio we need to match the future risks in the market with their level of risk tolerance. When market expectations change the appropriate portfolio can and should change, even if investors' psychological ability to bear risk is unchanged<sup>7</sup>. The risks themselves have increased, not attitudes to them.

## Stability over the market cycle

**Principle 8: Ensure stability over the market cycle**

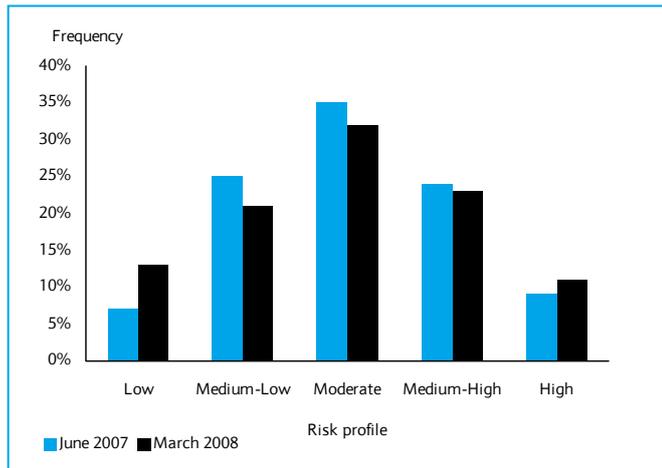
In fact, because investing is a long-term activity, it is highly undesirable to use a measure of risk tolerance that is unstable over the market cycle. Risk tolerance should reflect a deep-seated and stable aspect of personality, changing only slowly or infrequently over a lifetime<sup>8</sup>. Measures that show dramatic changes in response to investment outcomes or changing beliefs are measuring the wrong thing.

At Barclays Wealth we have had a somewhat unwelcome and yet reassuring test of our customer profiling. Our questionnaire was designed in mid-2007 when markets were booming; since then, there has been a period of losses and market volatility. To put our measures through an extreme test we ran a follow-up survey on a similar subject pool to the original test group in March 2008. The graph below shows the results. The distribution of scores is remarkably similar for both periods. Interestingly, insofar as risk tolerance has changed over this period, it has not systematically decreased. Instead, there has been a slight tendency for individuals to become more extreme in both directions: more low risk takers than before, but also a bigger proportion of highly risk-tolerant people.

<sup>7</sup> Though this change in portfolio composition should usually be far smaller than the short-term changes in future beliefs would suggest, reflecting the appropriate long-term nature of risky investing.

<sup>8</sup> Though significant life event such as marriage, births, deaths and large changes in financial circumstances can cause changes and should trigger a re-evaluations of risk tolerance

Figure 2 – Stability across market cycle



Source: Barclays Wealth behavioural research surveys

## Choosing questions

**Principle 9: Only use questions that discriminate effectively between individuals**

**Principle 10: Avoid 'social context' questions**

**Principle 11: Avoid multi-clause statements**

Avoiding confounds is not the only issue that a bank faces in building an effective risk tolerance measure. A number of other apparently insignificant features of questions can cause the scale to be ineffective. For example, a seemingly sensible question may fail in statistical tests because it doesn't elicit sufficient disagreement amongst respondents. If all respondents give the same answer to a question, then it serves no function at all in discriminating between different degrees of risk tolerance. A good question will elicit responses across the whole range of options.

Another issue is that the respondent knows that at some stage somebody else is going to look at their responses and determine their risk tolerance. For some individuals this may lead to them wanting to reflect a certain personality to look like a clever or particularly sophisticated investor. To minimise this problem the available responses to each question should not have a social context. That is, people should not feel uncomfortable if they respond to a question honestly. The risk of people portraying a false image of themselves can also be minimised if the questions are randomly mixed with questions serving other purposes (e.g., determining other dimensions of financial personality). This makes the purpose of each question far less transparent.

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Finally, all this talk of robust methodology, statistical confounds and psychometrics doesn't mean that the questionnaire needs to be a complex affair. Simplicity is desirable above all – all questions should be clear and simple enough to be answered by any investor without having to ask for clarification from the banker, and without wondering whether there is a right answer. Questions that include many clauses or even run to many sentences are often complex and become difficult to understand. They can disengage the respondent from the process, so should be avoided wherever possible. It is also likely that questions that involve multiple clauses and sentences will lead to greater confounding of elements other than risk tolerance.

Simpler questions are less ambiguous, more likely to be interpreted similarly by different individuals regardless of differences in background, less susceptible to inaccurate answers through lapses in understanding or comprehension, and faster to answer. This last point is particularly important in a service industry where clients want insight and not administrative burdens. The Barclays Wealth psychometric profiling tool measures six different dimensions of financial personality using 35 questions and only takes five to six minutes to complete. This compares to 12-15 minutes for some industry tools with many fewer questions that measure only risk tolerance.<sup>9</sup>

## Beware of imitations

**Principle 12: Don't guess what questions to include – use rigorous statistical and psychometric techniques**

As the above discussion shows, there are many pitfalls to be aware of when designing risk tolerance assessment tools. Almost every questionnaire used currently in the industry falls foul of one or (usually) more of these problems, and yet each easily passes the standard set by EU regulators. The clear implication is that many investors are being built 'optimal' portfolios on the basis of purported risk tolerance questionnaires that in reality measure a jumble of objectives and attitudes and ignore by now well-known results from behavioural research. An accurate objective measure of risk tolerance is invaluable in helping investors determine an appropriate level of long-term risk in their portfolio – but make sure the assessment tool your banker gives you has the proper pedigree.

<sup>9</sup> Badly!