Finbotx

Goal Based Investing

It's all Relative

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Goal Based Investing; It's all Relative

This whitepaper discusses the various risk profiling techniques currently used by the private wealth industry, and how to embed scenario analysis and goal based investing in the risk profiling process in order to deliver superior financial advice. The aim is to provide ideas and techniques to make risk a less abstract concept to private investors, and link investment risk to the client's investment objectives rather than to short term volatility.

Risk Profiling; less art and more science

Traditionally, advisors use questionnaires to determine clients' risk profiles. A risk profile usually corresponds to bandwidths of how much to invest in risky assets such as equities versus more defensive assets such as bonds. This process generally centers around the following points:

(1) **Ability to take risk.** Based on the financial situation of the client. How severe would the impact be of a loss? The ability to take risk is often scaled down for important goals such as pensions or income requirements, even though this might not always be the best cause of action.

(2) **Willingness to take risk.** How comfortable is a client with volatility? This is the most difficult to access and is traditionally done using questionnaires. In practice however, clients seem to be willing to take more risk when markets do well, and less risk when markets are bad. Managing clients to adhere to their strategic objectives is likely to remain a challenge regardless of the care taken to determine the clients risk appetite. A major issue often left unaddressed is that a client's risk appetite might not be the same for the variety of goals the client has.

(3) **Investment horizon.** Generally speaking, the longer the horizon, the more risk an investor can take. The general idea is that investors with longer investment horizons have more time to absorb the volatility of risky instruments.

The challenge is to balance and subsequently knit all these factors together and propose an asset allocation which is best suited for the client. Often investment advisors say this is more of an art. And although assessing a client's willingness to take risk can be a subjective matter, utilizing proper tooling and scenario analysis can actually help making this more of a science.

Traditional Investment Intake

1
Willingness

2
Ability

3
Horizon

4
Monitoring
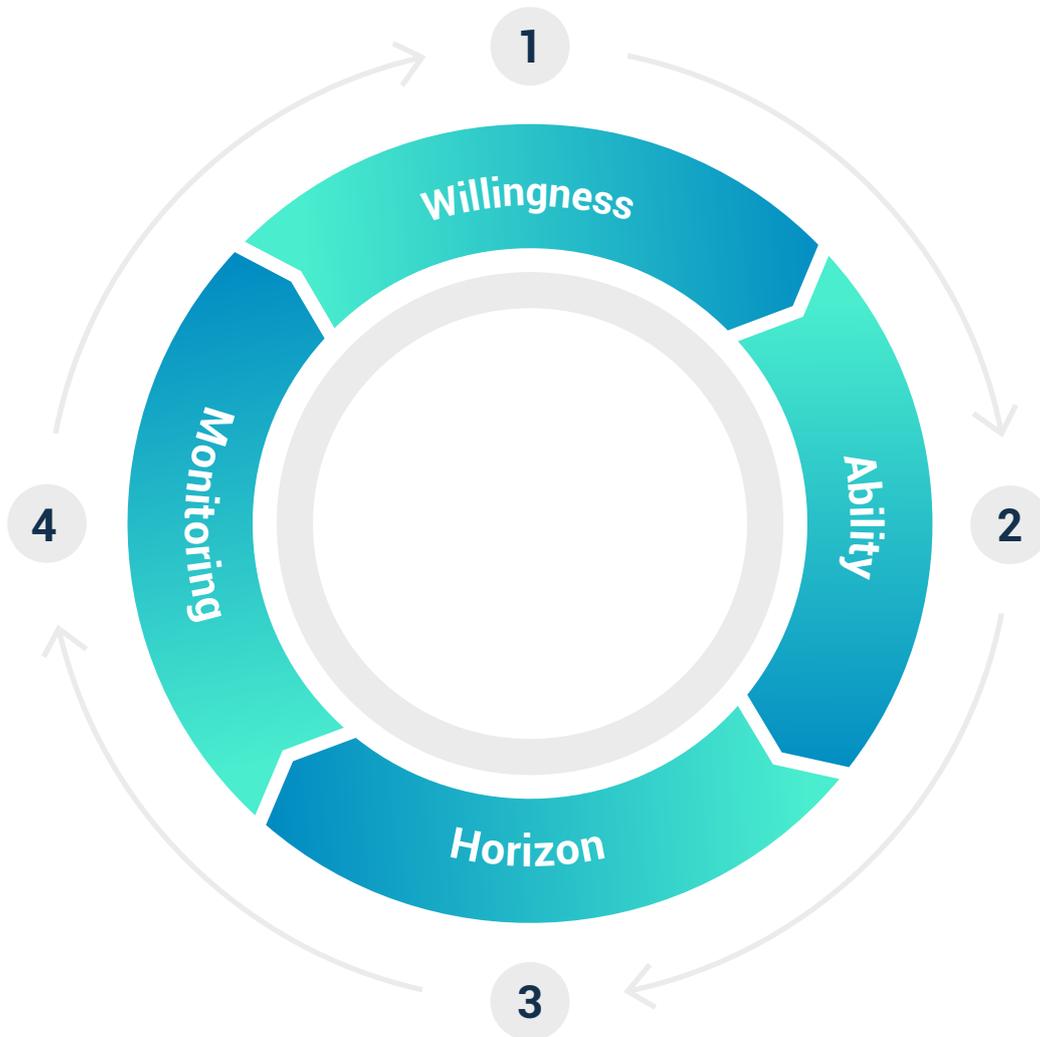
1 • Psychometric profiling

2 • Analyse Personal balance sheet
• Analyse income vs expenses

3 • Scale risk down for if
horizon becomes shorter

4 • Monitor whether asset allocation
is still within the agreed boundaries

Finbotx

Figure 1.

A practical implementation of the goal priority matrix, linked to Finbotx, by Van Lanschot Bankiers (a Dutch Private Bank)
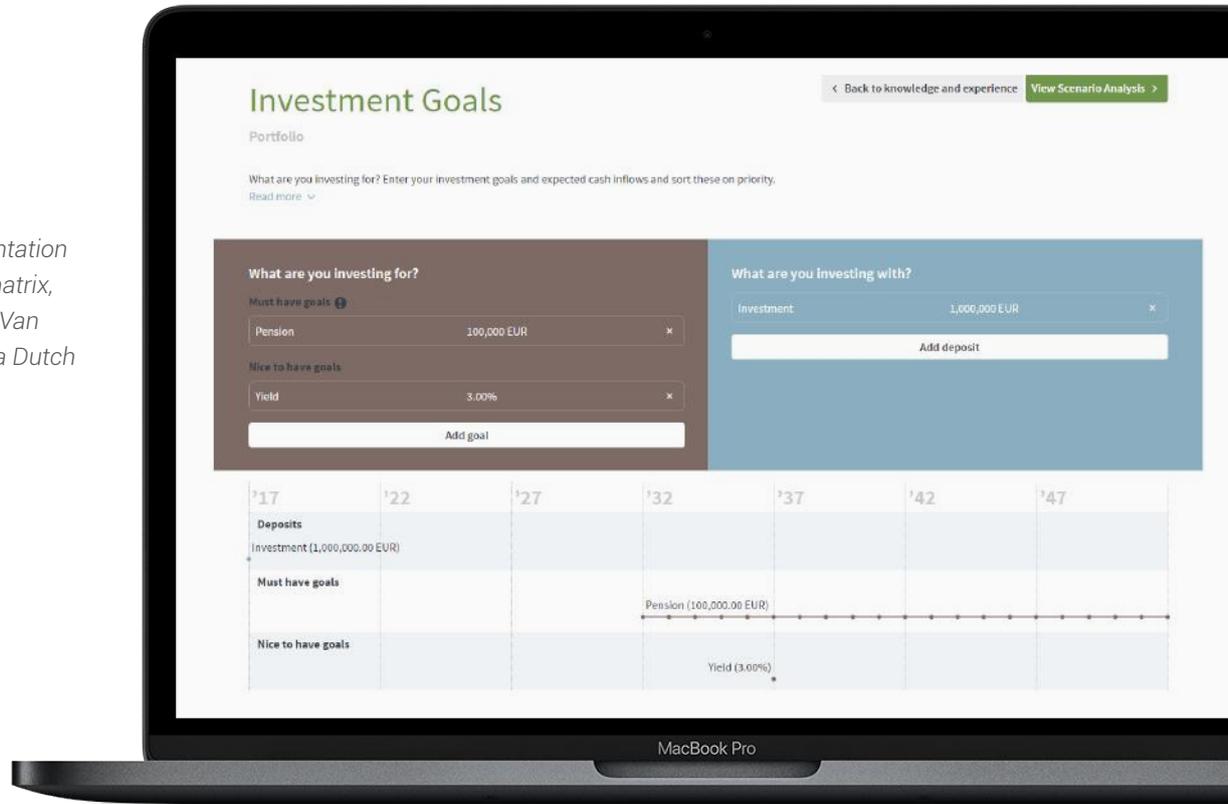
Goals as the Glue

There is one thing that acts as the glue between all of the above mentioned components, namely the investment goals. When we properly identify the various goals and assess how important these goals are to the client, we can link investment horizon with both the willingness and ability to take risk. A good way of doing so, is by placing the various goals in a matrix which plots goals in a diagram based on priority and time.

Distinguishing by priority does not mean one needs to have a separate portfolio for high and low priority goals respectively; this would likely result in less efficient portfolios. A total return approach would be desirable, whereby the portfolio is managed as one portfolio, but keeping track of the achievability of the various investment goals, ensuring important goals such as pension income have a higher probability of being reached compared to less important goals. When doing so, it is key to properly model market events (i.e. crashes) as to not overestimate the likelihood important goals can be met.

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Components of Risk Acceptance

Willingness to take risk

Traditionally, psychometric profiling is used to determine a client's appetite for risk; i.e. to what extend does a person choose risking a less favorable outcome in pursuit of a more favorable outcome. What this fails to address however, is whether this risk relates to the risk of not meeting the client's investment objectives or to short term volatility, i.e. the fluctuation of absolute valuation. The question that should be asked first and foremost is what constitutes risk for the client in the first place. Is risk perceived as the risk of not meeting an investment goal (e.g. not being able to retire when you want to), or is risk indeed simply the volatility of returns? Would a client be content, and not lie awake at night as long as his/her investment objectives can still be reached? Or would we need to find a balance, between short term volatility and long term objectives? This is something which needs to be discussed with the client, and this paper will discuss some powerful tools which would help advisors to do just that.

Ability to take risk

Assuming free investible assets, the ability of a client to take risk can nearly always be related to investment goals and the level of available wealth. Most traditional questionnaires will ask whether the client is investing for a pension, or whether the client is already drawing an income from the investments. The questionnaire will subsequently scale down the risk ability if any of those questions is answered in the affirmative. It is however a misconception that the "ability" to take risk, can be assessed completely in isolation from the "willingness" to take risk. There is no objective measure of how much risk is acceptable for a specific goal; ultimately, it is the client who needs to decide what risk is acceptable or not for a specific goal. Indeed, the "willingness" to take risk should really be focused on the risk the client is willing to take relative to their investment goals. Sometimes, investing in more risky assets will actually lower the risk of not meeting a very important pension objective, in other cases it can be advisable to not invest at all. Simply deducting points in a risk questionnaire and scaling down risk once investment goals are considered to be "important" is a gross oversimplification.

Absolute versus Relative Risk

Absolute Risk

The traditional way to describe absolute portfolio risk to private clients is by volatility, expressed by the standard deviation of the client's portfolio. Standard deviation is defined as the average deviation from the average return. The idea is that when the standard deviation is higher, the return is less predictable and hence the investment is considered more risky. This is indeed the case when the client wants to sell its investments before the original goal is due, but as a measure for long term risk it falls short by not taking into account the client's investment objectives (i.e. its an absolute measure) and assuming that returns of financial markets are normally distributed, which they are not. This can become problematic, as depending on investment horizon and investment goals, more volatile portfolios can be the ones who are the least risky when it comes to reaching longer term goals. Assuming normality also underestimates the downside risk of financial markets as these tend to have "fat tails", i.e. there is a higher probability on a negative return than a normal distribution would suggest.
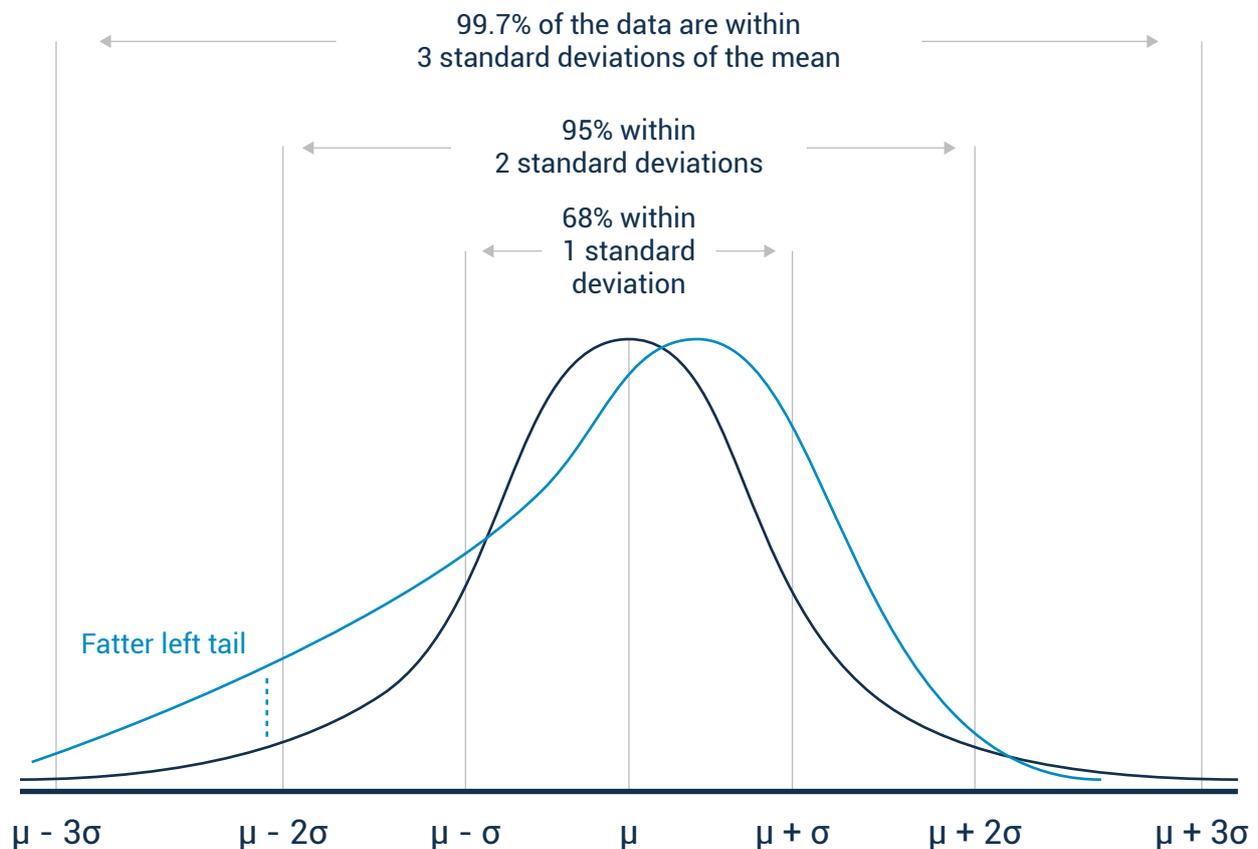

Figure 2. A Standard Normal Probability Curve versus observed behaviour

Maximum Draw Down

We don't want to argue that volatility as a measure of risk is fully irrelevant. Clients should know, and often be educated, what kind of volatility to expect when they invest in a specific portfolio. But rather than showing a standard deviation, we prefer showing well known historical events to which clients can relate as a way to visualize what can happen to a portfolio. Using back-tests, one can show clients what would have happened to their portfolio during, for example, the Credit Crisis, or the September 11 attacks. Not only can advisors use this to show what maximum drawdown (% drop from highest to lowest point in a given period) a portfolio would have during such period of market stress, but they can also show clients how long it would take for their portfolio to recover from such an event, if at all. Showing such a scenario, one can validate whether or not the client would find this absolute risk acceptable.
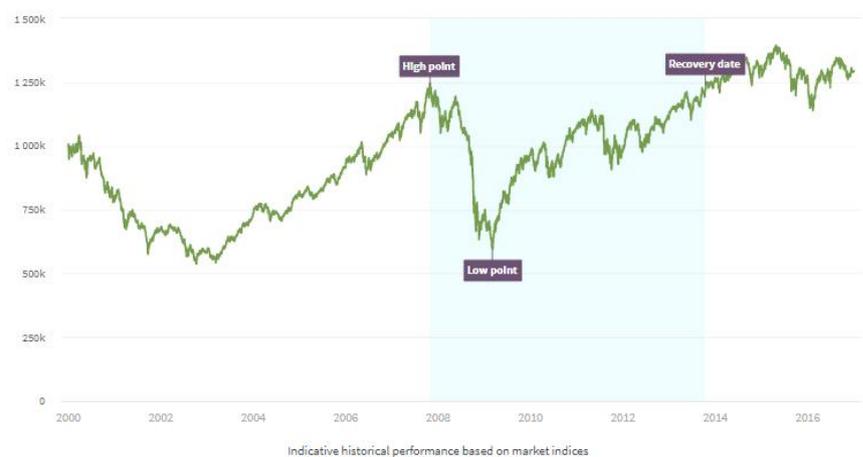
Figure 3. Using the Finbotx back-test to the client show historical stress scenarios

Relative Risk

Professional asset managers are used to thinking in terms of relative risk, but for them risk is measured relative to a benchmark, such as an index or liabilities such as pension or insurance liabilities. Private clients however rarely take interest in relative performance and tend to be more absolute return oriented. That said, and as argued before, the risk of not reaching their investment goal(s) is very real and very tangible. An advisor who is able to clearly make this risk visible, and show the various options/impacts to the client will create significant added value to the financial plan.

Probability

Scenario analysis can give clients insight in the probability of reaching their investment goals. For example, what would be the chance a client can retire early with a specific investment portfolio? Or, what are the chances the client can preserve its capital, corrected for inflation, taxes and costs? Or the other way round; how much would the client need to invest now in order to reach a retirement goal given a certain probability?

In order to determine the probability, multiple scenarios (generally 1,000 scenarios are deemed sufficient) will be generated, all taking into account the characteristics of the various asset classes of the investment portfolio such as non-normal return distributions, the chance of sudden market crashes and increasing correlations during market events. We can then count in how many scenarios the investment goals are met; if in 800 out of 1,000 scenarios the goals are met, we can say that the likelihood of reaching the investment goals is 80%.

It is important to understand however, that probability alone does not give an indication of the dispersion of returns around the goal. Either the goal is met, or not, and probability in itself does not say by how much the client would have missed its goal, or how much the outcome exceeds the goal. Especially with important goals, it would be useful to know by how much a goal is missed. The client can then assess whether this is acceptable and what the impact of such an event will be.

Average Shortfall

When we look at relative risk towards investment goals, a very useful risk metric is the "average shortfall". Although it is good to know that in 95% of all cases a client would be able to reach an investment goal, it would also be very useful to know, what would happen in those 5% of the times the goal hasn't been met. For example; would it mean the client cannot retire at all, or would it mean the client just has to skip a third holiday? The average shortfall will show exactly that; if the goal isn't met, by how much wouldn't it be met? There are advisors and asset managers who manage and optimize portfolios based on this metric; the portfolio which has the lowest average shortfall would be the optimum portfolio for the client.
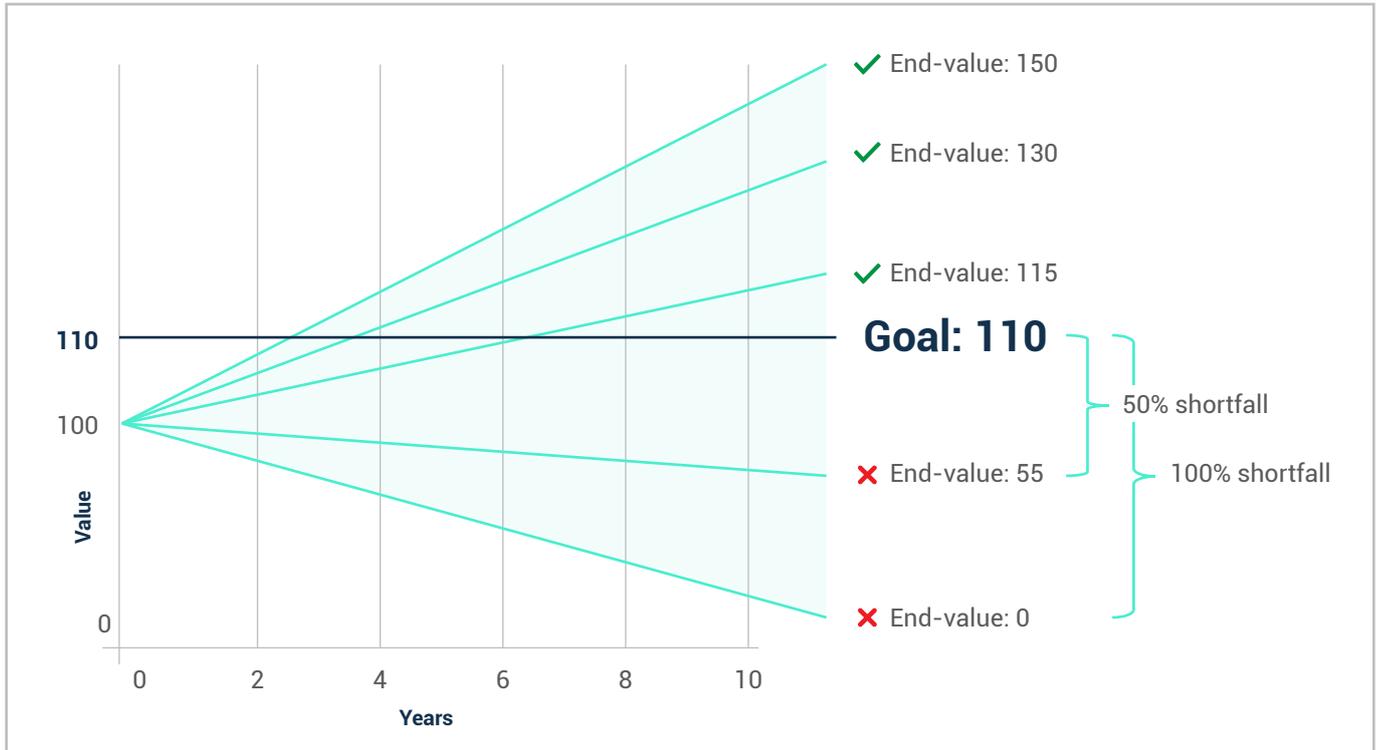
Figure 3. Probability & Average Shortfall Explained using 5 scenario paths

> **Probability**
>
> In 3 out of 5 scenarios the goal is met = 60% chance

> **Average Shortfall**
>
> In the two scenarios where the goal isn't met, the average shortfall is (100 %+ 50%) /2 = 75%

Deposit Calculation

One can also use this below analysis the other way round, by calculating how much one needs to invest in order to reach a goal with a certain probability. This functionality can, for example, be used to determine how much investment is needed now in order to derive a specific retirement income in the future. Or to show how much a client would need to add to his pension plan in order to reach his/her pension goals with a certain probability. The Finbotx deposit calculator uses goal seeking algorithms to find the (additional) investment needed in order to reach a goal with a given likelihood and investment portfolio.
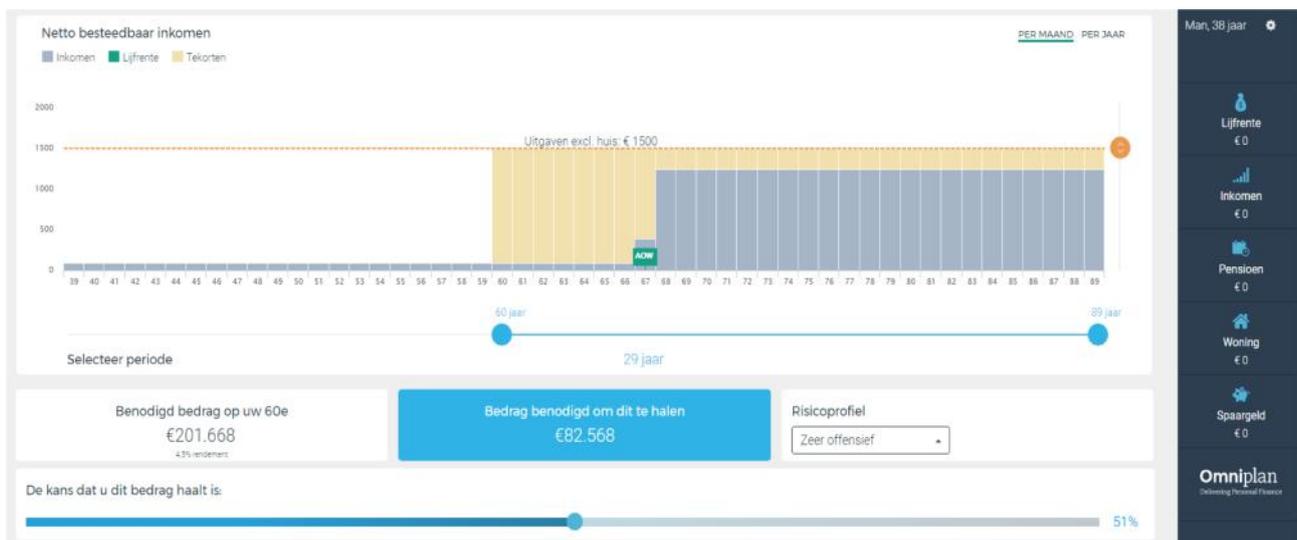

Figure 4. Omniplan's pension planner, using the Finbotx deposit calculator to determine the investment needed

Forward Projected Back Test

Scenario analysis and back-testing can help to give clients insight in what kind of volatility they can expect, and to validate whether or not this type of volatility is acceptable for the client. As discussed above, to make the concept of volatility less abstract, one can show actual historical events. By using a forward projection of such a historical scenario, one can even show what the impact of such an event would be on the achievability of the clients' future investment goals. For example, a typical client question could be: "Would I still be able to retire if there is another credit crunch two years from now?". By specifically showing this historical scenario in the scenario analysis, and subsequently showing the change in the likelihood of achieving the clients investment goals, an advisor can give the client superior insight in how short to medium term volatility can influence achieving long term goals.
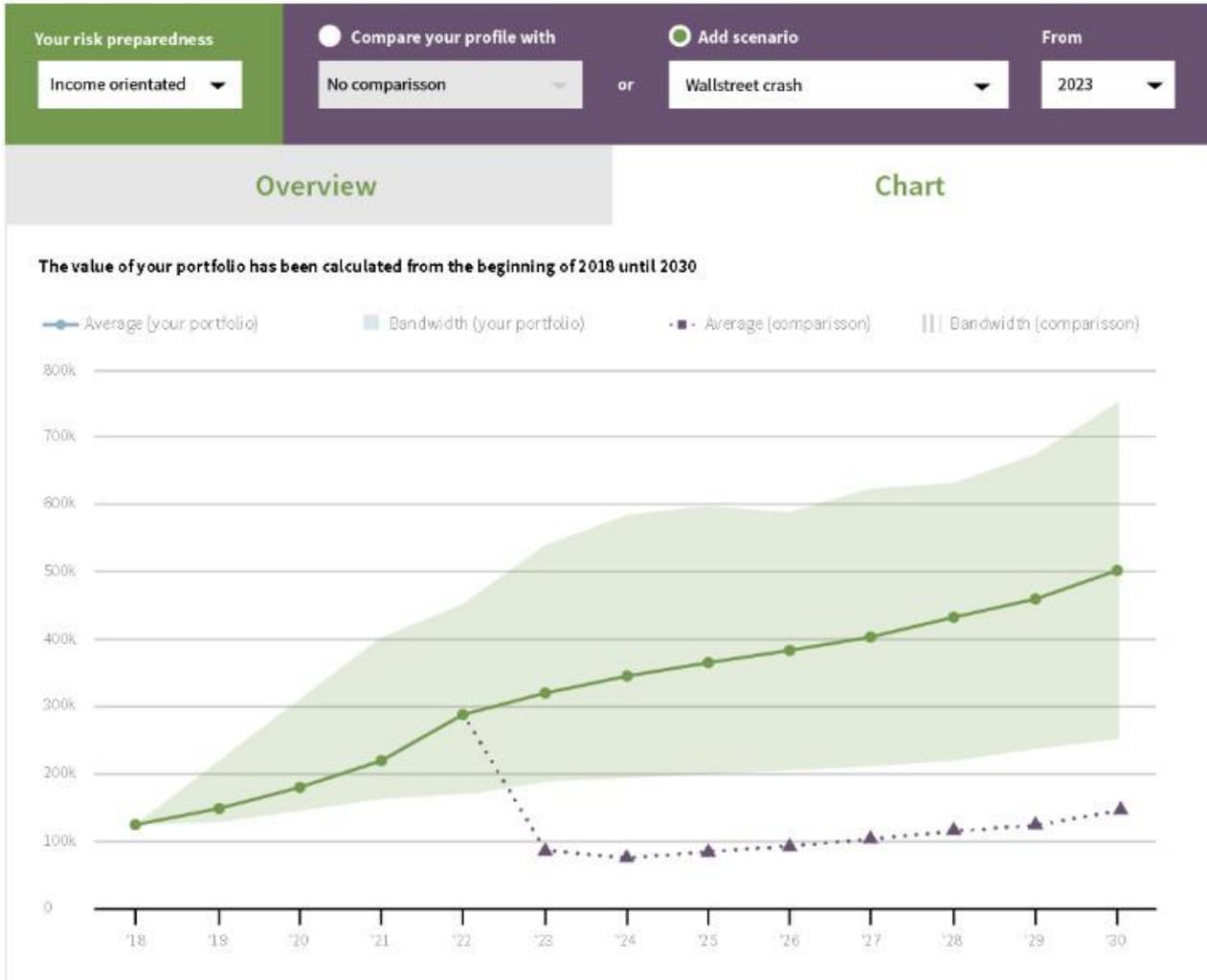
Figure 5. *Using the Finbotx forward projected back-test to see the impact of severe market events on the achievability of the client's goals*

Knitting it all together

We argue that in order to provide superior financial planning, the following three steps need to be embedded in any investment onboarding process:

1   **Identify goals & priority;** why does the client want to invest? Is this merely to get a higher return compared to a savings account? Or does the client want to preserve his wealth for inflation and taxes? Or is it a more specific goal, such as an extra income? And how important are these goals?

2   **Analyze;** use scenario generation to access how realistic it is to meet these goals with various portfolios.

3   **Access;** check relative versus absolute risk: use historical back-tests as well as forward projected what-if scenarios to show the client what the impact of market events on the chosen portfolios will be. In al likelihood, the client would need to decide what is more important; minimizing absolute risk or relative risk.

Wealth Managers and advisors should create an investment intake process that is centered around investors' investment goals, their priorities and the risks of not reaching those goals. Measures of absolute risk by means of back-testing, should be used to test and validate the clients risk tolerance. Encouraging clients to focus on their investment goals makes sense and is definitely best practice, but every-day reality does come with unexpected volatility. Furthermore, as it is the change in absolute value that clients see on their portfolio statements, a proper investment onboarding process should also include an analysis of absolute volatility. It is good to keep one's eye on the prize, i.e. one's goal, but clients do need to be able to withstand the pressure that comes with investing. The "art" required by the advisor, is to keep the client on track and the "science" to relate short-term volatility to the impact on the client's goals.

Goal Based Investment Intake

1
• Psychometric profiling
• Relative or absolute risk?
• Prioritizing of goals

2
• Scenario analysis
• Average shortfall
• Probability calculation
• Personal Balance sheet
• Analysis Income & Expenses

3
• What-if Scenario Generation
• Backtesting

4
• Absolute Risk (risk profile)
• Goal monitoring (relative risk)

Case Study

Income Goal (High Priority)

Let's consider the following client: **John** is a small business owner who is getting a bit worried about his retirement. He realizes he is quite late to properly look into this, but he has focused on paying off his mortgage over the past few years and additionally set aside some cash every month for his retirement fund. The value of his retirement fund is now EUR 250,000. He also has a portfolio which he uses to trade with an online broker worth EUR 150,000.

As a small business owner, John only has a small state pension to look forward to, and he now wants to know whether he can supplement this income with EUR 1,500 a month, corrected for inflation, from his investments. At the same time, he wonders whether he could aggressively grow his portfolio in order to derive an income from his portfolio whilst preserving his capital for his children. Although he is used to trading and is comfortable taking risk, the thought of not having enough income for retirement worries him, and he wouldn't like to take much risk with his pension savings. His capital preservation goal he definitely finds less important and he is willing to take risk in order to achieve it.

- **Age**
  > 55
- **Investment**
  > EUR 250,000
- **Goals**
  > High Priority: Additional pension income of 18k per annum, corrected for inflation, starting at age 65 until age 85

  > Low Priority: Preserve initial capital corrected for inflation

Outcome psychometric profiling: **Aggressive**

Scenario Analysis EUR 250,000

Chances

	Savings	Income	Defensive	Neutral	Growth	Aggressive	Very Aggressive
• **Pension Income**	**0%**	14%	52%	59%	64%	**66%**	**66%**
• **Capital Preservation**	**0%**	**0%**	7%	18%	33%	43%	**47%**

Figure 1: Chance of reaching goal

As the sum available for investment is relatively low compared to the required additional pension income, we can see that the more risk the client takes, the higher the chances are he will reach his goal. With the client's risk attitude, only an above average chance of reaching his pension goals is achievable. The chances of reaching both his pension goal and preserving his capital for inflation as well, are below average even for an aggressive risk profile.

Shortfall:

	Savings	Income	Defensive	Neutral	Growth	Aggressive	Very Aggressive
• **Pension Income**	**41%**	19%	**12%**	**13%**	**12%**	14%	15%
• **Capital Preservation**	**100%**	98%	76%	64%	53%	47%	**45%**

Figure 2: Average % shortfall if goal not met

The consequences of missing his goal are the greatest with the very low-risk alternatives such as savings and a predominantly fixed income profile. When choosing for an aggressive risk profile, the client should feel comfortable with the possibility of coping with less pension income as desired.

Expected End Values

	Savings	Income	Defensive	Neutral	Growth	Aggressive	Very Aggressive
• **Average**	0	7.698	118,189	217.553	401,241	673,575	1.030.236
• **Good**	0	63.940	497.340	882.056	1.580.752	2.779.639	4.561.517
• **Bad**	0	.0	0	0	0	0	0

Figure 3: Average and 95 percentile end-values at age 85

As the sum available for investment is relatively low compared to the required additional pension income, we can see that the more risk the client takes, the higher the chances are he will reach his goal. With the client's risk attitude, only an above average chance of reaching his pension goals is achievable. The chances of reaching both his pension goal and preserving his capital for inflation as well, are below average even for an aggressive risk profile.

Deciding on Priorities:

When presented with these findings, John decided pursuing his wealth preservation goal is not worth the extra risk to his pension income. In fact, he appeared somewhat offset by the relatively low chances of reaching his investment goals. He now wonders how much extra he would need to invest to have at least an 85% chance of reaching his retirement goal.

Using the Finbotx deposit Calculator, he learns that an additional investment of EUR 127,000 is needed in order to achieve this. Because of this finding, John decides to include his trading portfolio worth EUR 150,000 in his pension account.

Portfolio	Target Probability	Goal	Additional funds needed
● **Aggressive**	85%	Pension	**127.066**

Figure 4: Results of the Finbotx Deposit Calculator

The output by the Finbotx Scenario Generator for this combined portfolio looks as follows:

Scenario Analysis EUR 400,000

Chances

	Savings	Income	Defensive	Neutral	Growth	Aggressive	Very Aggressive
● **Pension Income**	58%	**96%**	94%	90%	89%	86%	**82%**
● **Capital Preservation**	**0%**	1%	34%	45%	56%	59%	**62%**

Figure 5: Chance reaching goal

Interestingly, with the additional capital, increasing risk no longer increases the chances of reaching the client's pension goal. In fact, an income portfolio consisting out of mostly fixed income instruments would now be the safest option. However, one could now consider increasing the chances of reaching the capital preservation goal. With an aggressive portfolio, the chances of reaching the client's pension goals are still a respectable 86% with the chance of preserving the initial capital corrected for inflation at an above average 59%.

Shortfall:

	Savings	Income	Defensive	Neutral	Growth	Aggressive	Very Aggressive
• Pension Income	**3%**	**1%**	**1%**	2%	3%	5%	**7%**
• Capital Preservation	**96%**	59%	35%	32%	**28%**	**28%**	29%

Figure 6: Average % shortfall if goal not met

We can now see that even if the client's pension goal isn't fully met, it is likely to still be pretty close. In line with the client's priority and risk tolerance for each goal, there is a higher risk when not reaching his capital preservation goal.

Expected End Values

	Savings	Income	Defensive	Neutral	Growth	Aggressive	Very Aggressive
• Average	26,098	300,104	598,207	784,698	1,127,239	1,604,529	2,221,837
• Good	91,1180	623,499	1,423,467	2,085,545	3,312,712	5,340,829	8,392,708
• Bad	0	.8,908	0	0	0	0	0

Figure 7: Average and 95 percentile end-values at age 85

As can be seen from the calculated end-values, under an average scenario, the client would still be able to pass on 1.6mln to his children when he reaches the age of 85.

Confirm:

In order to confirm whether the client is comfortable with the volatility of the chosen growth profile, the client is shown the below graph.
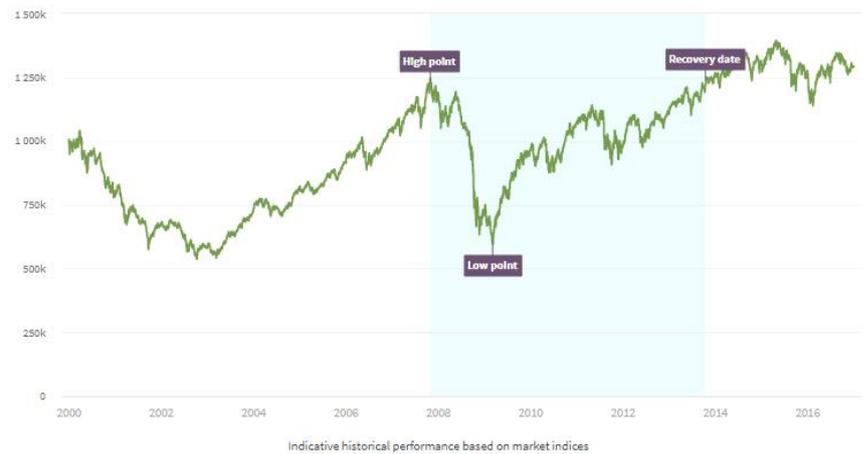
Figure 8: *Finbotx Backtest Credit Crunch as used by Van Lanschot Switzerland*

The client says he fully understands markets can crash, but he is confident these are temporary phenomena. This confirms the psychometric profiling of the client having an aggressive attitude towards taking risk. The advisor can now go back to the office to prepare an investment proposal, aligned with the derived risk profile.

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About the Authors

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Years of Experience: 20

Bart has spend over 20 years in the world of international private banking and asset management.

He frequently authored articles and provided training on various investment related subjects. He has lead the product development efforts of leading Dutch Private Banks both in Asia as in Switzerland, where he was responsible for the implementation of MIFID I and II throughout the bank.

Bart is passionate in translating highly complex investment problems and concepts into easy to understand articles, tooling and solutions for clients.
He co-founded Finbotx in 2016.

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Years of Experience: 10

Alexander is Assistant Professor of Finance and Risk Management at the Vrije Universiteit Amsterdam. He holds a MSc Econometrics from the Vrije Universiteit and a PhD in Financial Mathematics from the University of Amsterdam. Next to this, Alexander is the owner of Risk at Work consultancy, which aims to come up with state-of-the-art solutions for complex risk management matters.

He combines several years of practical experience in risk management with comprehensive academic knowledge. This enables him to quickly come up with suitable solutions for complex risk management issues.

His research has been published in high-ranked actuarial and financial mathematics journals such as the International Journal of Theoretical and Applied Finance, Insurance: Mathematics and Economics, and Quantitative Finance.

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About Finbotx

Finbotx was founded with the aim to offer superior, flexible and cost efficient financial modeling services.

It currently offers the most advanced economic scenario generator for personal financial planning available; latest state of the art academic insights are incorporated in close collaboration with the VU University in Amsterdam

Contact us!

Contact us for more information about our services and goal based investing.

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