Suitability and the Professional Judgement Matrix

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1. Overview

This document provides details on the methodology underlying the default "suitability" framework in SuitabilityPro™. We call this framework the Professional Judgement Matrix (PJM). Firms can customise the 'rules' to align with their policies on professional judgement.

2. Defining the Components of Risk Profiling

As an outcome of research completed by Morningstar on behalf of the Ontario Securities Commission in 2015 , a framework was articulated based on a review of the latest research in the field that helped to define many of the factors that come into play in arriving at a "risk profile" for a client. The project also highlighted some surprising gaps in academic research where the industry must still rely on "professional judgement".

We have mapped the best understanding from the academic world to the articulated requirements of the regulators to arrive at a defensible and effective model that encapsulates the decision rules used by advisors. We call this model the "Professional Judgement Matrix" (PJM).

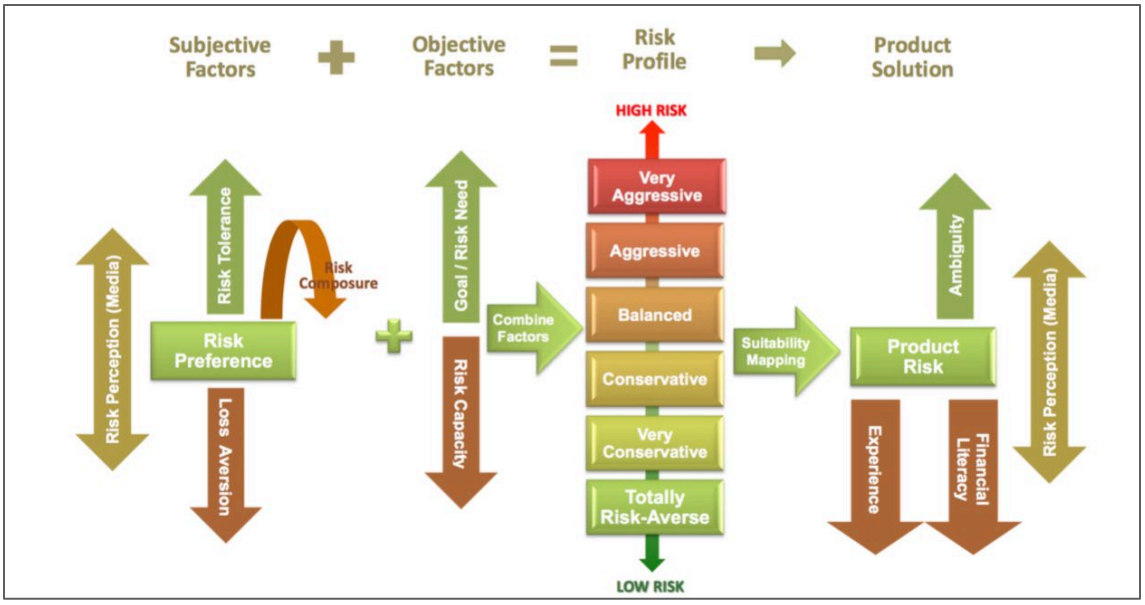


Figure 1: Visual Summary of Risk Concepts

There are four discrete stages in the process to support suitability:

- Risk Tolerance - assessing the psychological or subjective traits of the investor.
- Risk Profile - adjust for other personal factors like composure, experience and knowledge, and for each portfolio the need, liquidity and time horizon.
- Risk Capacity - back-test to ensure the investor is aware of and can live with a worst-case outcome from the strategy
- Implementation - selecting products that are suitable for the investor and the specific portfolio.

The subsequent sections of this document outline the specifics of each stage.

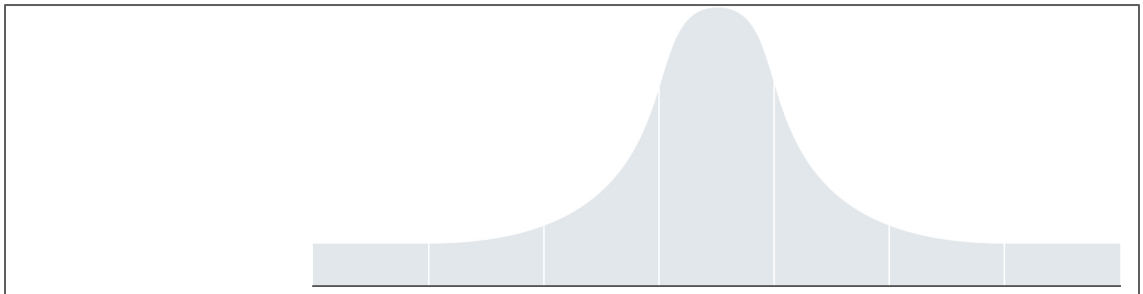
3. Assessing Risk Tolerance

A foundational attribute of the individual recognized by every regulator is "risk tolerance". Risk tolerance is a psychological trait, it is how emotionally comfortable a person is with taking financial risk[i]. For example, how much a person is willing for their portfolio to diminish for a chance to make bigger returns. Generally, the higher the risk tolerance the higher the level of risk a person prefers to take.

Underlying the Professional Judgement Matrix (PJM) is the FinaMetrica risk tolerance score, a scientifically validated psychometric[ii] risk tolerance test. For more information on the test, please refer to the technical manual available on our website.

In summary:

- clients are scored on a scale of 1 to 100, where the higher the score the more risk seeking,
- scores are normally distributed with mean of 50 and standard deviation of 10, and
- the test has a reliability of 0.9 (Cronbach's Alpha) for the 25-question version and 0.84 for the 10-question version. Typically, researchers consider a score of 0 to 0.69 as Poor; 0.70 to 0.79 as Fair; 0.80 to 0.89 as Good and 0.90 to 0.99 as Excellent.



Risk Group	1	2	3	4	5	6	7
Score Range	< 25	25–34	35–44	45–54	55–64	65–74	> 74
% in Group	1%	6%	24%	38%	24%	6%	1%

Figure 2: Distribution of risk tolerance scores

For the 25-question test we divide the population into 7 risk groups. This allows illustrative descriptions. Although it would be possible to have "more bands", the reality is that the reliability of the measure would be less than a band. (Picture a thermometer with ¼ degree increments but it can only measure to the nearest degree. It is a false "accuracy". For the 10-question assessment which has a slightly lower reliability, we simplify to 5 bands effectively combining risk groups 1 and 2 and combining risk groups 6 and 7.

3.1 Adjusted Risk Score and Consistency Check

People do not necessarily answer the questionnaire consistently. If you consider that the score reflects overall risk tolerance, some answers will be less risky than would be expected from the score and others will be more risky. These differences are what makes each individual unique. Our objective is to recognize these differences and determine if they are material in our understanding of the client and will impact the advice or guidance we will deliver.

Some firms have professional advisors whose job it is to work with clients – usually high net worth (HNW) or Ultra High Net Worth (UHNW). For these channels, building the relationship and engagement with the client is paramount and the risk tolerance test is used as a starting point for discussion and exploration. Other firms may deal with mid or mass market clients with more basic advisory channels or even Do-It-Yourself (DIY) tools. In this case firms are usually looking for reduced questions and automated processes as opposed to bespoke dialogue.

Adjusted Score – Manually

Most of the time the differences are not material but sometimes, about 3%, they are. In such cases, the simplest solution is to adjust the score. The descriptions for each risk groups (people of similar risk tolerance) provide a basis for adjusting the score. For example, those in risk group 5 typically say they can (emotionally) handle a 20% fall in the value of their investments. However, it is possible that somebody who scores 57, which falls into risk group 5, could say that they cannot handle any fall in the value of their investments, which answer is more typical of someone in risk group 2.

The ensuing discussion with the advisor will almost certainly result in a decision that the client's risk tolerance with regard to an investment strategy is less than the reported score indicates and that it would be more appropriate to work with a reduced score for the purposes of determining an investment strategy. This discussion and the agreed score should be documented and signed-off by the client. The agreed score would be used for further analysis.

Adjusted Score - Automatically

In the 25-question risk tolerance test, we recommend that advisors resolve any inconsistencies in the client's answers through discussion and adjusting the score manually, whereas the 10-question test uses an adjustment algorithm[iii] to automatically adjust the score where necessary based on the differences and highlight this under the Adjustment section of the report.

The adjusted score should be documented as an agreed score (if accepted), signed-off by the client and used for further analysis as per above. In DIY implementations the adjusted score is automatically utilized.

Inconsistency Alert

Some sets of answers are so inconsistent as to make algorithmic adjustment too difficult/dangerous. To deal with this there is a consistency algorithm[iv] which is applied before the adjustment algorithm for the 10-question risk tolerance test only. If the answers are too inconsistent, an Inconsistency Alert is included in the report. If they are not too inconsistent, the adjustment algorithm is used to determine whether there should be an Adjusted Risk Score which may lead to an Adjusted Risk Group.

Inconsistencies are not a negative characteristic - some people are just less consistent that others. However, it is helpful to both client and advisor for this to have been identified openly at the very start of the relationship. In an automated advice process, the inconsistency alert can be used as an "off-ramp" to recognize clients where automated recommendations are inappropriate.

3.2 Risk Tolerance Mappings

The FinaMetrica risk tolerance mapping is aimed at providing a link from the plain-English of the risk tolerance questionnaire, via a score, to a portfolio parameter indicative of risk that would be meaningful to both clients and advisors[v]. Assuming that the portfolio is well diversified, we believe that the percentage of growth assets is a suitable portfolio parameter. We do acknowledge that particular investments in an asset class may have varying

characteristics, but it is the overall characteristics of the portfolio that matter. We are not trying to be precisely accurate here. What we want to do is avoid gross errors.

In summary, a FinaMetrica risk tolerance score can be expressed in terms of the percentage of growth assets. For example, a risk tolerance score of 50 translates to 45% growth assets, meaning that a client with a risk tolerance score of 50 will be comfortable with an asset allocation that has 45% growth assets (and 55% defensive assets). However, in a well-constructed portfolio, a client who is comfortable with 45% growth assets will also be comfortable with 46% or 44%, 47% or 43% and so on.

Risk tolerance is not just an upper limit on a negative. Rather, it is where the individual balances the chance of a positive outcome against the chance of a negative outcome. So, not only can a person be exposed to too much risk, they can also be exposed to too little risk.

Hence, there will be a shading-in between comfort and discomfort on both the upside and the downside. For an individual with a risk tolerance score of 50 there should be a comfort zone from 36% to 55% growth assets and discomfort from either too much risk or too little risk shouldn't begin to occur until the proportion of growth assets goes outside this range. The chart below shows the gradation from Comfort (green) through to Discomfort (red) for the 0 -100 risk tolerance score range and the comfort zones for a score of 50.

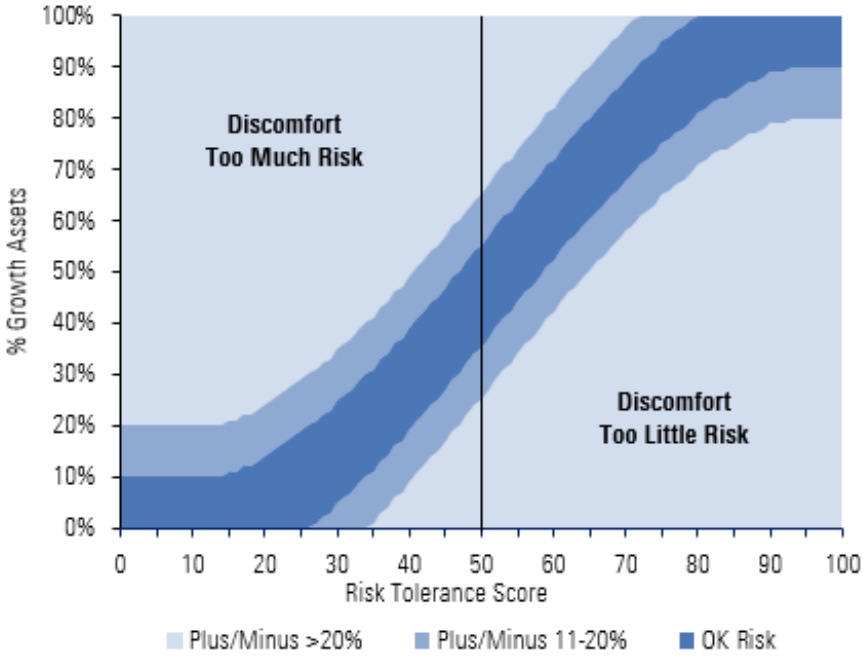


Figure 3: Risk Tolerance Comfort Zones

The chart can be used to see how asset allocations fit with a particular risk tolerance score, e.g. for a score of 50, or how risk tolerance scores fit with a particular asset allocation, e.g. for an asset allocation with 60% growth assets.

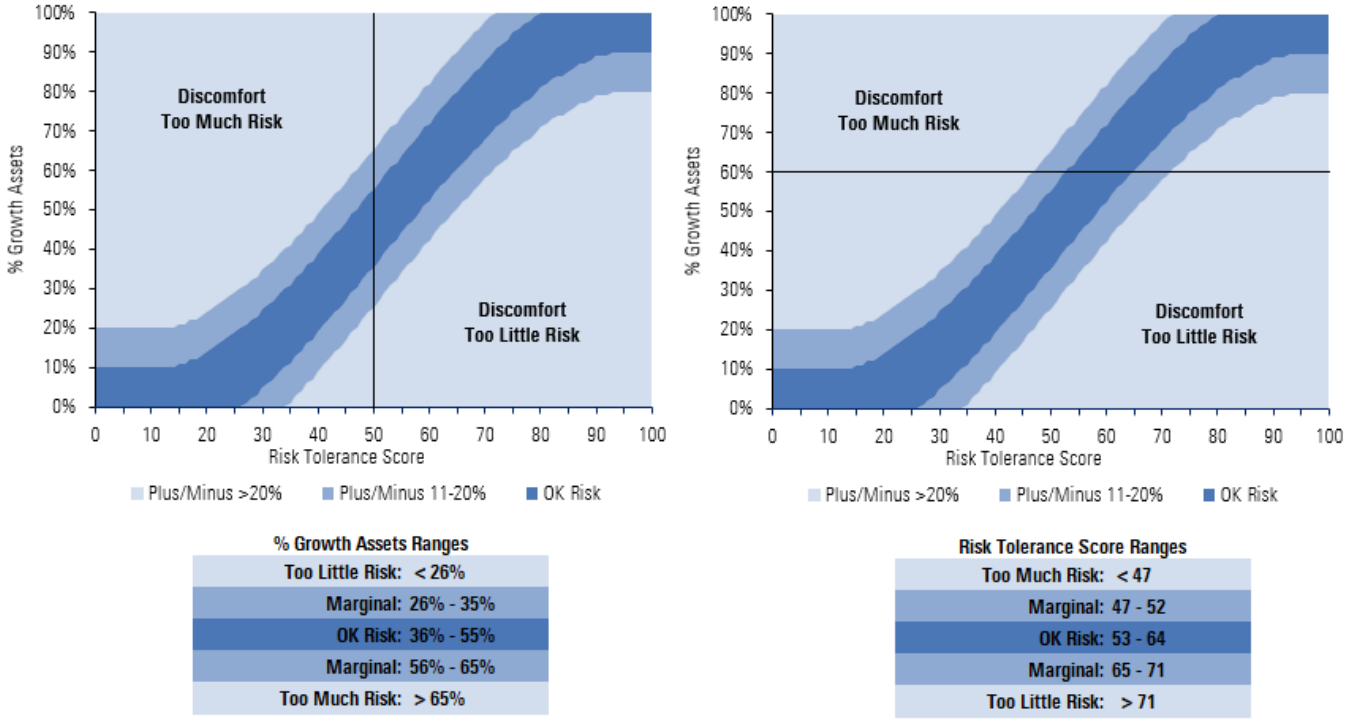


Figure 4: Risk Tolerance Scores and Growth Assets

In SuitabilityPro™, you'll be able to see the growth assets comfort ranges for each portfolio and how this aligns with the client's score. For example, below is the comfort/discomfort scores ranges for a 60% growth asset portfolio. A client with a score of 40 would find that a 60% growth assets portfolio falls in the *Too Much Risk* zone.

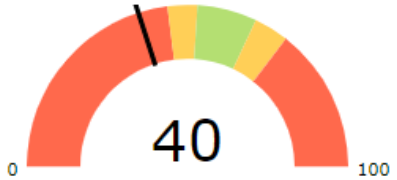


Figure 5: Comfort Zones in SuitabilityPro™

3.3 Mapping Risk Tolerance to Investment Policies

The result of the risk tolerance test and the growth asset mapping sets the initial "high water mark" for the suitable investment profile. In SuitabilityPro™, you'll find a suite of seven default investment policies (with corresponding portfolios), their risk tolerance mapping is shown below.

Investment Policy	Policy Range*	Growth Asset**	Comfort Range***
All Income	0 - 24	0%	0 - 25
Income	25 - 34	15%	21 - 37
Income & Growth	35 - 44	30%	34 - 46
Balanced	45 - 54	45%	44 - 55
Growth & Income	55 - 64	60%	53 - 64
Growth	65 - 74	78%	64 - 77
All Equity	75 - 100	95%	75 - 100

*These ranges are set to align with the FinaMetrica seven risk groups as shown in Figure 2.
** The growth proportion of the corresponding portfolios.
*** The comfort range based on the growth proportion of each portfolio. Note that the growth component for each portfolio were selected to provide the best comfort range coverage of the policy ranges, while not perfectly align it is a good fit.

Figure 6: Default Investment Policies

Research[vi] on the different approaches to mapping an investment portfolio from a corresponding risk profile suggests that using downside (largest fall), while not perfect, is most closely aligned with how consumers perceive risks. This is consistent with Davey (2015)[vii], which presents a detailed relationship between risk tolerance (based on 80,000 respondents to the FinaMetrica risk tolerance assessment) and clients' expectations for a percentage of growth assets in a portfolio and largest falls. These expectations were back-tested using historical data to confirm alignment with the largest historical falls.

4. Professional Judgement Factors

4.1 Risk Required – The Client's Goals

Risk required is the risk associated with the return required to achieve a person's goals from the financial resources available. Risk and return go hand in hand, higher returns require higher risk.

The SuitabilityPro™ FinaMetrica **Pro**filer assumes a single grow wealth goal with a time horizon question on when the client expects to withdraw a significant portion (more than 30%) of the money in the investment portfolio.

In SuitabilityPro™ **Pro**Planner (and automated advice process), which allows for multiple goals, further questions are ultilised to understand not only time horizon, but also duration and magnitude. This allows us to evaluate liquidity requirements and risk need (i.e. what is required for the client to be able to fund the goal).

The issue of the "liquidity needs" is tied to several factors, e.g. how long until funds need to be withdrawn, how long must the funds last and the amount of the withdrawals. The Professional Judgement Matrix (PJM) automatically estimates a time horizon. If the goal is a lump sum/point in time goal, then the initial date is the horizon. If it is a multi-year goal the system uses a parameter (default is 33%, which can be customised) and calculates the estimated point at which 33% of the goal has been realized. As a simple example, consider a goal of $10,000 a year starting in five years that will run for 10 years (assuming no inflation). In this case 33% of the funds will be required by year four of the goal, or nine years from now.

Where the client has multiple goals, the system combines all goals being funded from the portfolio and estimates the total amount from all goals and when the threshold is crossed.

4.2 Mapping Time Horizon to Investment Policies

The PJM will never recommend a client take on more risk than indicated by their risk tolerance assessment based on the "need" to achieve a stated goal, although in an advised relationship an advisor may do so. Our systems are configured to provide "warnings" to an advisor or a consumer in cases where the goals are significantly underfunded or over-funded (e.g. see *6. Other Considerations*.) Only the time horizon factor, which is a function of the goals or expected use of funds, is directly applied in adjusting the recommended suitable client profile.

The PJM approach is to look at different factors and determine at what levels it should act as a "cap" to restrict recommendation from exceeding a given threshold unless the response/value is above a certain limit or an advisor documents why in their professional judgement the factor can be over-ridden. For time horizon, academics and regulators generally agree that shorter time horizons should normally be implemented with lower volatility portfolio recommendations.

The default caps for time horizon are:

- Less than 1 year – the portfolio should hold no or very little equity to minimize any short-term volatility. We've set a risk tolerance score cap of 14, which translates to between 0% to 10% equity (using the methodology described in *3.2 Risk Tolerance Mappin*gs) and best aligns with the *All Income* investment policy.

- Less than 3 years – the portfolio should have around 25% equity. Our back-testing shows that generally it takes up to three years to recover from the worst fall for portfolios with 20% to 30% equity. We've set a risk tolerance score cap of 37, which translates to between 15% to 34% equity and best aligns with the *Income & Growth* investment policy.

- 3 or 4 years – the portfolio should have around 50% equity. Our back-testing shows that generally it takes up to five years to recover from the worst fall for portfolios with up to 50% equity. We've set a risk tolerance score cap of 52, which translates to between 40% to 59% equity and best aligns with the *Balanced* investment policy.

- 5 to 6 years – the portfolio should have around 75% equity. Our back-testing shows that generally it takes up to 6 years to recover from the worst fall for portfolios with 70% to 80% equity. We've set a risk tolerance score cap of 68, which translates to between 66% to 85% equity and best aligns with the *Growth* investment policy. This is also consistent with Morningstar' ongoing research into professional judgement showing that majority of advisors (65%), Figure 7, considers a time horizon of seven or more years to no longer be a factor of concern. This appears to be based on the ability for the portfolio to recover in a downturn to at least initial values. Many advisors believe time horizon remains a concern for longer periods, which appears to be based on a planning desire for the portfolio to revert to the mean (not simply recover loses) and the client to achieve their goals.

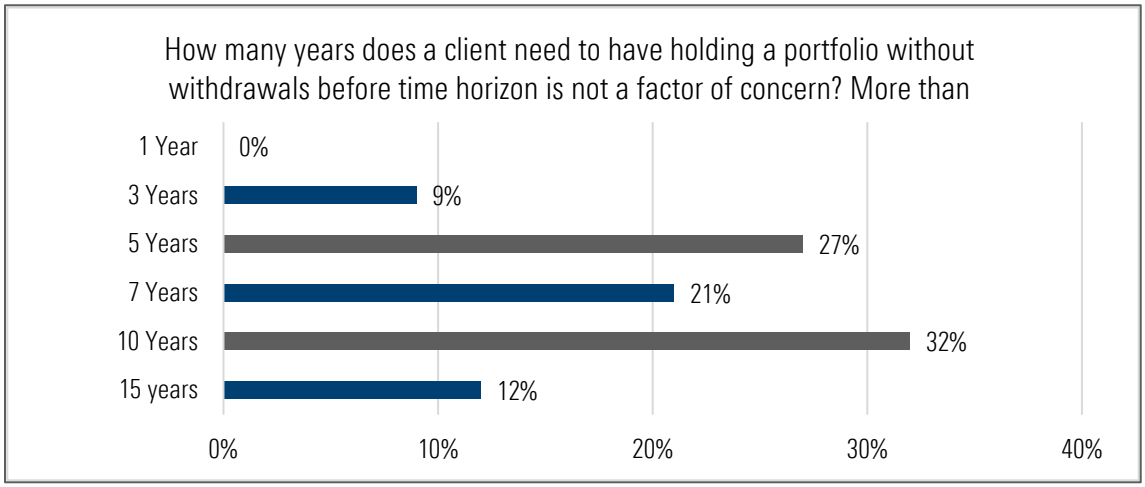


Figure 7: Time Horizon Consideration

The mapping of risk tolerance and time horizon is shown below. For example, a client with a risk tolerance score of 65 and a time horizon of 3 years would be mapped to *Balanced* investment policy (the score of 65 is adjusted to 52 as a result of the time horizon cap).

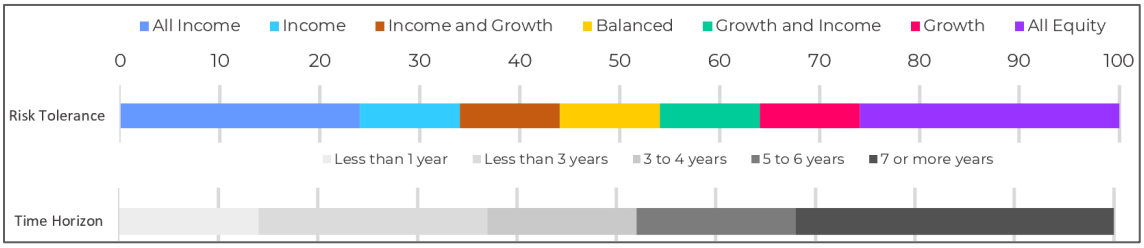


Figure 8: Risk Tolerance and Time Horizon Mapping

4.3 Mapping Composure, Experience and Knowledge to Investment Policies

Professional advisors, compliance managers and regulators have always appreciated that there are additional factors that must be considered when we determine the client's risk profile. These include:

- Composure: a measure of a person's emotional state when markets drop sharply in value. When things are going well it's easy to be comfortable with investment risk, but when things are going badly, we may find we are not as resilient as we might have thought. Generally, a more conservative approach is recommended for those who are less composed during market downturns. Ideally composure can be observed in historical transactional data, but without access to this data we ask a question about composure. If an individual has previously demonstrated a "lack of composure" by crystalizing losses in a downturn, this may be used as a cautionary sign to restrict high-equity portfolio.

- Experience and knowledge: Generally, the more knowledge and experience a person has with financial markets the more resilient they are to fluctuating markets. If a person has no prior experience with equity, this is used as a cap to restrict a high equity portfolio. Similarly, with knowledge, if a person has no or very little knowledge about investing, this is also used as a cap to restrict high-equity portfolio. Based on Morningstar' ongoing research into professional judgement, when asked if they would limit the amount of equities in the portfolio for a client with a high tolerance for risk and a long time horizon, the majority of advisors (61%) would limit the amount of equities. See known consideration 4 below for further discusson on this.

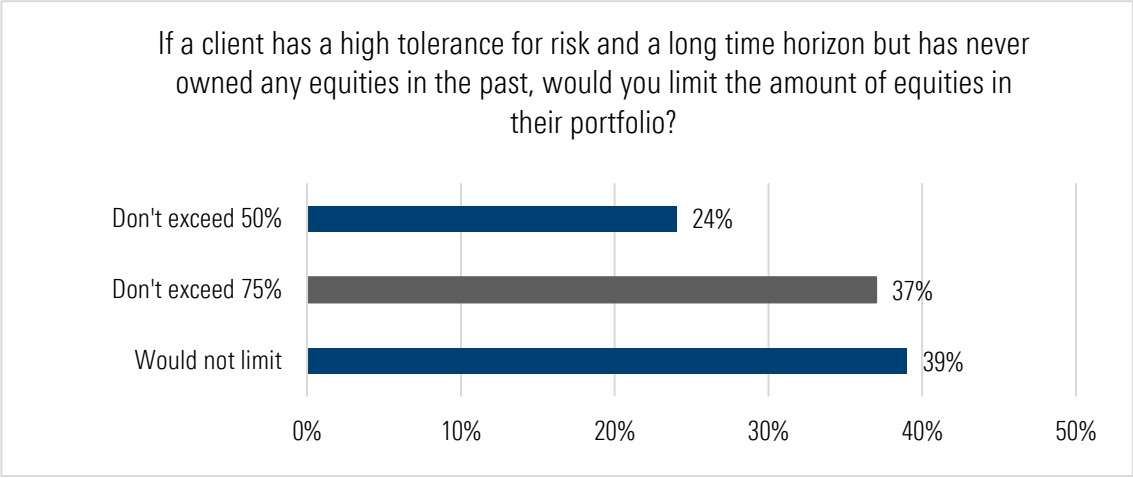


Figure 9: Experience Consideration

The default caps for composure, knowledge and experience are:

- Composure: Nervous and sold equity during a financial downturn – the portfolio should have around 75% equity. We've set a risk tolerance score cap of 68, which translates to between 66% to 85% equity and best aligns with the *Growth* investment policy.

- Composure: Never experienced a financial downturn – the portfolio should have around 75% equity. We've set a risk tolerance score cap of 68, which translates to between 66% to 85% equity and best aligns with the *Growth* investment policy.

- Experience: No prior equity experience – the portfolio should have around 75% equity. We've set a risk tolerance score cap of 68, which translates to between 66% to 85% equity and best aligns with the *Growth* investment policy.

- Knowledge: No or very little knowledge about investing – the portfolio should have around 65% equity. We've set a risk tolerance score cap of 61, which translates to between 55% to 74% equity and best aligns with the *Growth & Income* investment policy.

- Knowledge: Basic knowledge about investing – the portfolio should have around 75% equity. We've set a risk tolerance score cap of 68, which translates to between 66% to 85% equity and best aligns with the *Growth* investment policy. Implicitly this means clients with all equity portfolios must be very knowledgeable.

- If composure, experience or knowledge is unknown – We've set a risk tolerance score cap of 100. Implicitly this means that these factors have not been taken into consideration and a warning is provided in the system.

The mapping with risk tolerance, time horizon, composure, experience and knowledge is shown below. Let's consider our client with a risk tolerance score of 65 and a time horizon of 3 years again, now let's assume this client has never experienced a downturn and had prior experience with equity and basic knowledge of investing. As the caps for composure, experience and knowledge (68, 100, 68 respectively) are all above the adjusted score of 52 (due to time horizon), no further adjustment is required, and the client would be mapped to a *Balanced* investment policy.

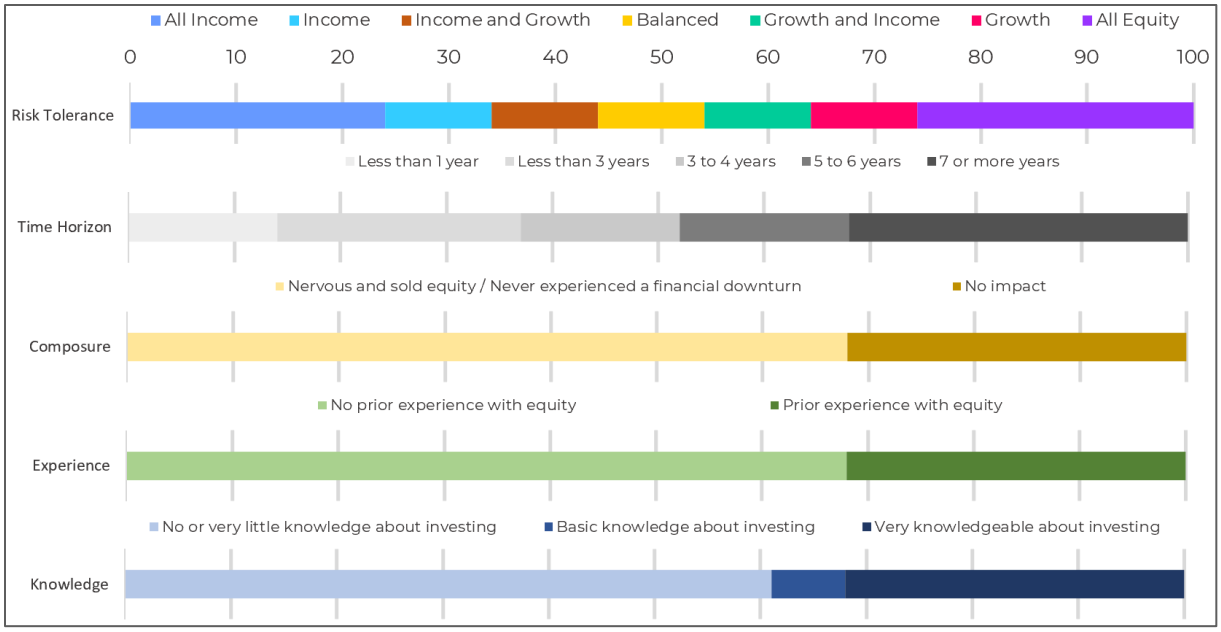


Figure 10: Risk Tolerance, Time Horizon, Composure and Experience and Knowledge

Advisors implementing the PJM should review the parameters outlined above and ensure they are consistent with their beliefs in respect to professional judgement in the application of investment advice.

5. Risk Capacity

Risk capacity is the level of financial risk the client can afford to take without jeopardising the achievement of important financial goals. Risk capacity is generally assessed by stress-testing the financial plan to identify any unexpected negative outcomes.

Almost all regulators recommend the need to assess risk capacity, yet there is little definition on how to do so. A variety of factors can be considered in assessing capacity:

- Pensions/other incomes – When a client has other sources of income to help fund a goal, even if the portfolio performs poorly the client may be fine, therefore is considered to have more risk capacity.

- Required/desired – When we understand a goal for a client and know the amounts required (no flexibility) or desired, it provides a "floor" to how low the income can go before the client has a serious problem. Some goals may be of low importance meaning that an underperforming portfolio is not material, while funding of other goals may be very important to the client.

- Debt – the level of debt and future cash flow requirements to service debt increases the level of required income for a goal, as the debt must be serviced (i.e. it is required). Low debt can provide increased flexibility and capacity.

- Tax optimization & Other Strategies – if an advisor can reduce the tax liability of a client, this means less money can stretch further in funding the goal. This will increase the capacity.

There are a significant number of subtleties as outlined above that can influence the "risk capacity" of a client which makes it time consuming to ask the client each one of the additional questions unless the advisor is doing more comprehensive planning and would do so regardless. A more practical and dynamic process is by asking the client to specifically confirm their acceptance of the relationship between the downside risk and achieving the goal. We believe this incorporates the client's level of flexibility for the goal and acceptance of the risks with the recommended or desired investment profile.

The risk capacity analysis in SuitabilityPro™ consists of:

- **Certainty of Outcome**: Showing the range of possible outcome over the time horizon using stochastic modelling.

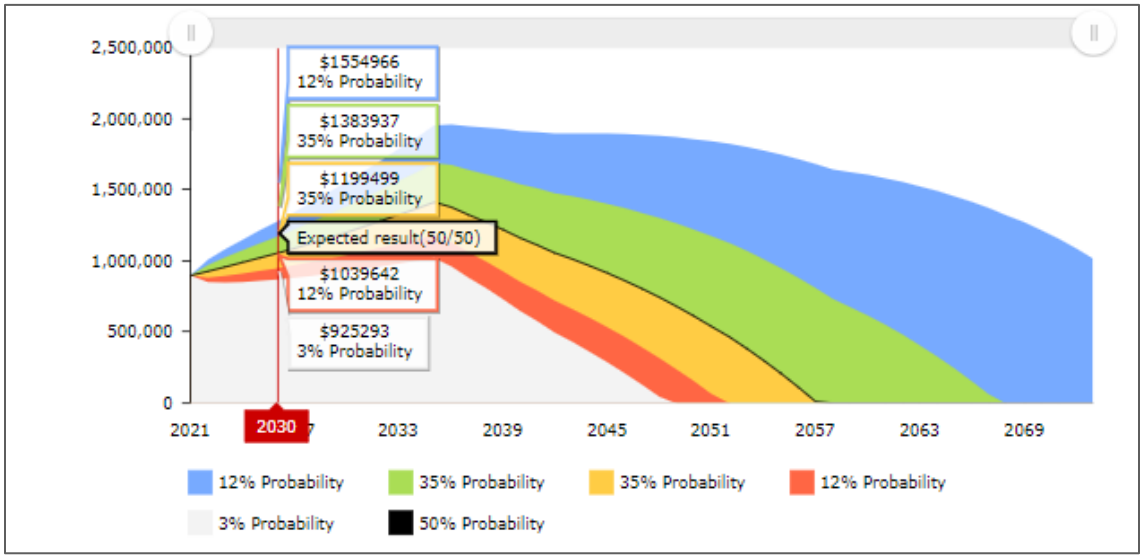


Figure 11: Certainty of Outcome

- **Favorable and Unfavorable Markets:** Another way of viewing the certainty of outcome is by showing the capital and savings base, the income range if we have unfavourable markets and the income range if we have better than expected markets. Research has shown that most people can relate better to an income value than a capital value from a framing perspective. People with low incomes tend to overvalue lump sums while those with higher incomes undervalue them.

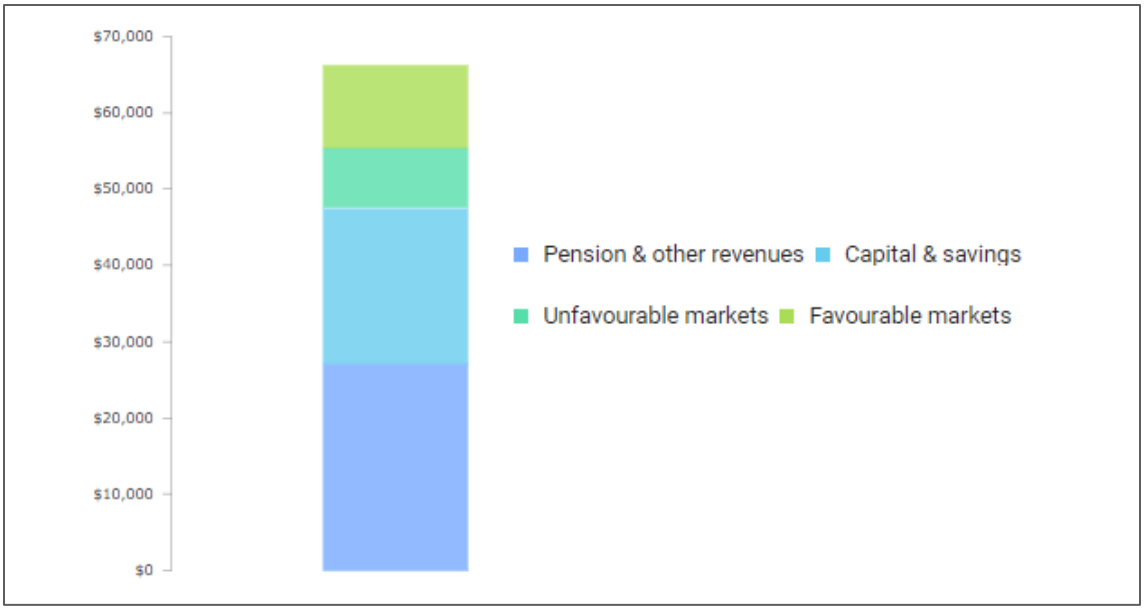


Figure 12: Favourable and Unfavourable Markets

- **Value at Risk (VaR):** Showing the size of potential falls on a year by year basis and how long it would take to recover in value. It should be observed that VaR is really more of a tolerance issue than capacity if the client has no immediate need for the funds. Any drop in value does not necessarily impact achieving the goal so long as the investor allows markets to recover.

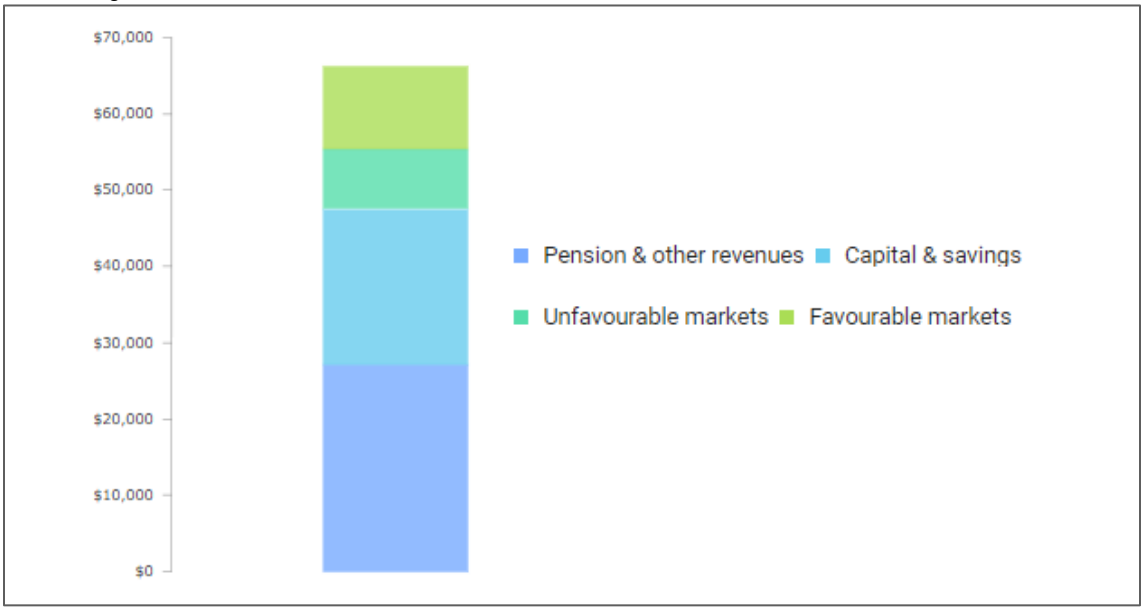


Figure 13: Value at Risk

By allowing clients to toggle between different Investment Policies and seeing the effect it has on potential outcomes, income ranges and potential falls, and confirming their acceptance of the risk they are comfortable with, it is a more engaging and robust assessment of risk capacity than ever before.

6. Other Considerations

In this section we've identified several known considerations that fall outside the automated professional judgement adjustment where an advisor needs to discuss with the client a suitable course of action and then adjust the Suitability Score accordingly.

6.1 Fund Depletion

In a complex case, funds will rarely be evenly depleted. Pensions may be deferred and begin being paid later than the start of the goal, requiring proportionately more investment funds to be used sooner. There will be a rate of return attached to the investments, which means that in early years of the goal there will be higher income replenishing the funds utilized. This will result in a more conservative depletion than estimated. The selection of the 33% factor and the offset of the two factors herein are considered reasonable.

6.2 Insufficient Funding

Where the client has a stated goal that significantly exceeds their ability to fund it, capital might be depleted sooner during the lifetime of the goal or the client would need to take more risk. This could or would be a "poor plan". The system stores the percentage of the goal expected to be achieved and if a plan is generated with unreasonable funding requirements (the default is that the goal is less than 75% funded), a warning is generated for the advisor to discuss this with the client.

In a survey of financial advisors, when asked whether clients should take on more risk or remain within tolerance level when a higher level of risk is required, the result is fairly even as shown below. In SuitabilityPro™, advisors can adjust the client's Suitability Score higher to meet risk required.

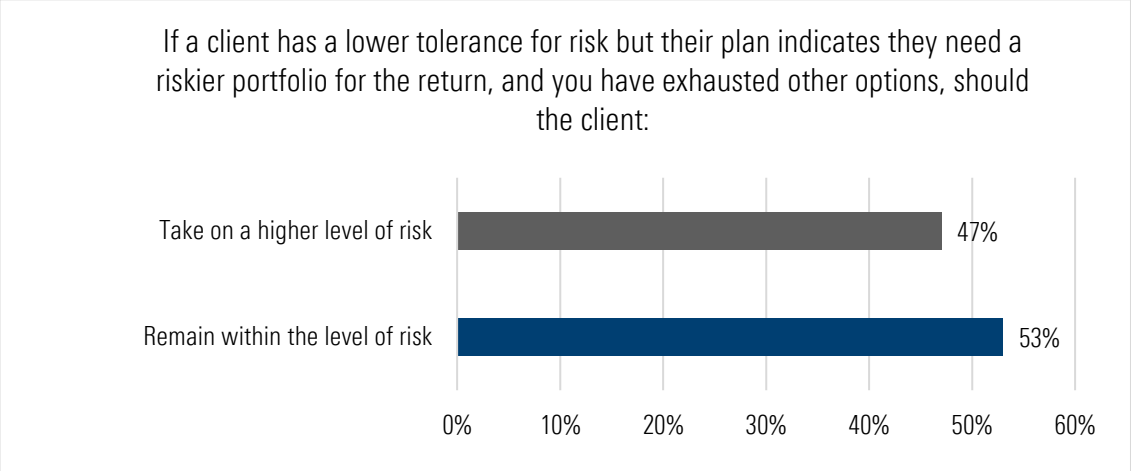


Figure 14: Insufficient Funding

6.3 Over Funding

Where the client has more than enough money to fund the goal (default is greater than 120%), the client may choose to take less risk than what they are able to tolerate or, to "spend more money" on the goal, which would drop the percentage of the goal funded.

In a survey of financial advisors, when asked whether clients should take less risk or remain within tolerance level when the portfolio is expected to return more capital than required, majority of advisors would choose to take less risk. In SuitabilityPro™, advisors can adjust the client's Suitability Score lower when there is a capital surplus.

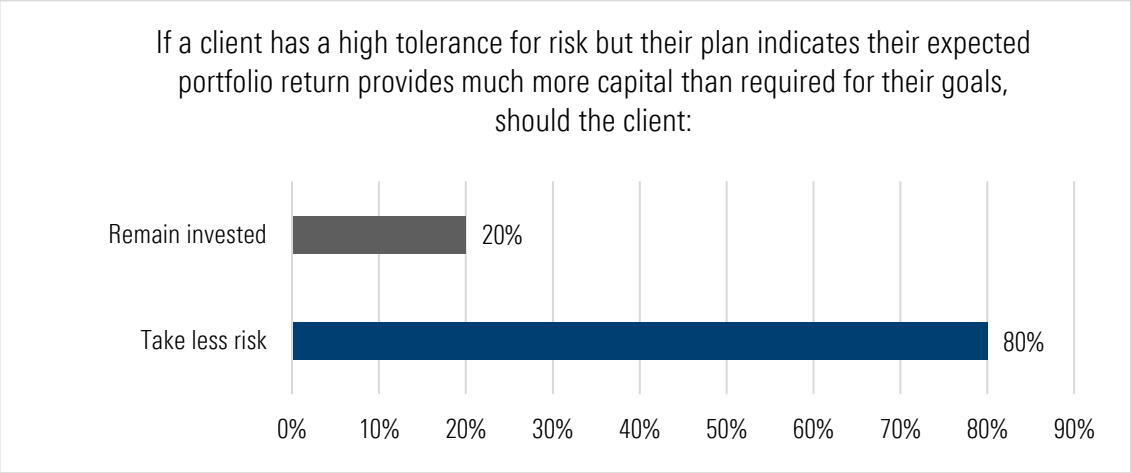


Figure 15: Over Funding

6.4 No Experience, High Risk Tolerance and a Long Time Horizon

Where a client has very little or no investment knowledge and/or experience but has high risk tolerance and a long-time horizon. The latter two would usually lead to a relatively high risk/return strategy. It may be worth considering and discussing with the client a 'start slow' approach whereby a low-to-moderate risk/return strategy is adopted initially to allow for the client to gain some knowledge and experience before shifting to the long-term high risk/return strategy. While this may not be financially optimal it is behaviourally sound and over the long term any cost should be relatively small.

Our research has found (as evident in Figure 8) that advisors are extremely divided on this topic. In interviews of recognized global leaders in the space as well as broader surveys some advisors made statements like "I do not recommend training wheels" or "the client is hiring my experience". Our approach with default settings in the PJM are to err on the side of the conservative.

6.5 High Capacity, No Experience or Short Time Horizon

Consider a case where a client has significant assets (perhaps from the sale of a business), has never invested in equities outside their business and their desire is specifically to open a stock trading account to "play". Since there is no prior equity experience, a Suitability Score cap of 74 would apply. However, high capacity may offset lack of experience if the portfolio is a small amount of the client's holdings. In SuitabilityPro™, advisors can adjust the client's Suitability Score higher to account for the higher capacity.

6.6 Wealth

Research indicates that although a client may have one risk tolerance that is stable, they can have different "buckets of money" earmarked for different goals, and that these buckets can have different "investment profiles". If a bucket comprises a small portion of a client's overall wealth and they have a high-risk tolerance, this could override

considerations like time horizon as other resources may be able to help address the need if the client experiences short term declines.

7. The Suitability Score™

As discussed earlier in 3.2, the result of the risk tolerance test and the growth asset mapping sets the initial "high water mark" for the suitable investment profile.

The process of accounting for other factors, both behavioural and financial (the PJM, risk capacity analysis and other considerations), has in effect adjusted the "risk tolerance score" to a "suitability score".

While guidance on how to make the adjustments is provided and recommended as part of the FinaMetrica risk tolerance process, ultimately the advisor would need to apply their own professional judgement. SuitabilityPro™ and the PJM is designed to provide a formal framework for advisors to apply their professional judgement in a consistent and defensible manner to arrive at the world's first Suitability Score™. In SuitabilityPro™, the Suitability Score™ is marked with a badge as shown below for a score of 50.

Figure 16: The Suitability Badge

8. Implementation

Generally, the work up to this stage is considered education or guidance rather than "regulated advice", as specific investment products have not been recommended. The Implementation stage is where we cross that threshold and begin using the Know-Your-Client (KYC) data gathered to recommend a portfolio and disclose specifics about the products, the risk, costs and so forth. The determination of "suitability" and "know your product" is by itself very complex and relies on the professional judgement of the regulated firm or advisors.

8.1 Defining Investment Policies and Capital Market Assumptions

In SuitabilityPro™, there is a suite of default Investment Policies for each country with corresponding target portfolios that are not linked to specific products. The target portfolios' asset allocations were determined using historical index data and efficient frontier analysis to represent typical portfolios selected by advisors across the risk spectrum.

SuitabilityPro™ also estimates the portfolio's interest income, dividends, deferred gains, realized gains and non-taxable income. These different types of income are incorporated into the projected income from non-registered portfolios to trigger proper tax treatment.

Advisors who do not want to try and recreate and maintain scientific models for psychometric testing or the intricacies of taxation, benefits, cash flow modeling, stochastic projections and more, can choose to accept and use the default assumptions provided in SuitabilityPro™. For those advisors who provide investment advice and products in particular, we do recommend they review and validate or adjust the default assumptions provided to align with their investment

beliefs and expectations.

8.2 Defining Preferred Solutions

In SuitabilityPro™, advisors can define a set of preferred solutions to select from for implementation. A preferred solution can be a single product or a variety of products/portfolios. Advisors will need to apply their professional judgement in the construction of portfolios that are suitable for each investment policy.

Some considerations are:

- Diversification across asset classes and the risk/return of the portfolio;
- The distribution of the solution between defensive classes (cash, fixed income) and growth asset classes (equities);
- Currency distribution in more complex portfolios;
- Liquidity and downside exposure.

Once a solution is defined, it's comfort and discomfort zones are calculated using the FinaMetrica mapping methodology (or apply a custom mapping) to show suitability across your investment policies.

8.3 Additional Implementation Criteria

SuitabilityPro™ also provides support for a more sophisticated selections from different Preferred Solutions based on factors outside of or in addition to the Investor Profile. These may include:

- Socially Responsible Investing (SRI): Preferences can be mapped to different solutions utilizing more or less SRI investments.
- Domestic Bias: Preferences can be mapped to solutions that bias the equity content to the home country while maintaining the same equivalent investment policy.
- Fee Structure: Where multiple fee options exist and are linked to different product types.

These and other selection criteria can be configured into the implementation process.

8.4 Managing Clients' Expectations

While recognising that the future will not be an unvarying repetition of the past, the patterns evident in the past are the best guide we have to the patterns we will experience in the future. It is a feel for, and understanding of, patterns and relationships that is the goal.

Rising, Falling and Recovery and Biggest Falls

For example, to test volatility it is not sufficient to consider just fixed time periods, even rolling periods. A fall can start at any time and has no fixed length. Clients experience falls as they happen, not on any fixed schedule. To emulate reality as experienced by clients, the value of the current and implemented solutions are tracked month-by-month using the historical monthly performance of representative indices with each month being categorized as Falling, Recovering or Rising. The historical data can illustrate patterns of falls such as top falls by Depth, along with the month in which the Fall began, the duration of the Fall, the duration of the Recovery and the month in which the Recovery occurred.

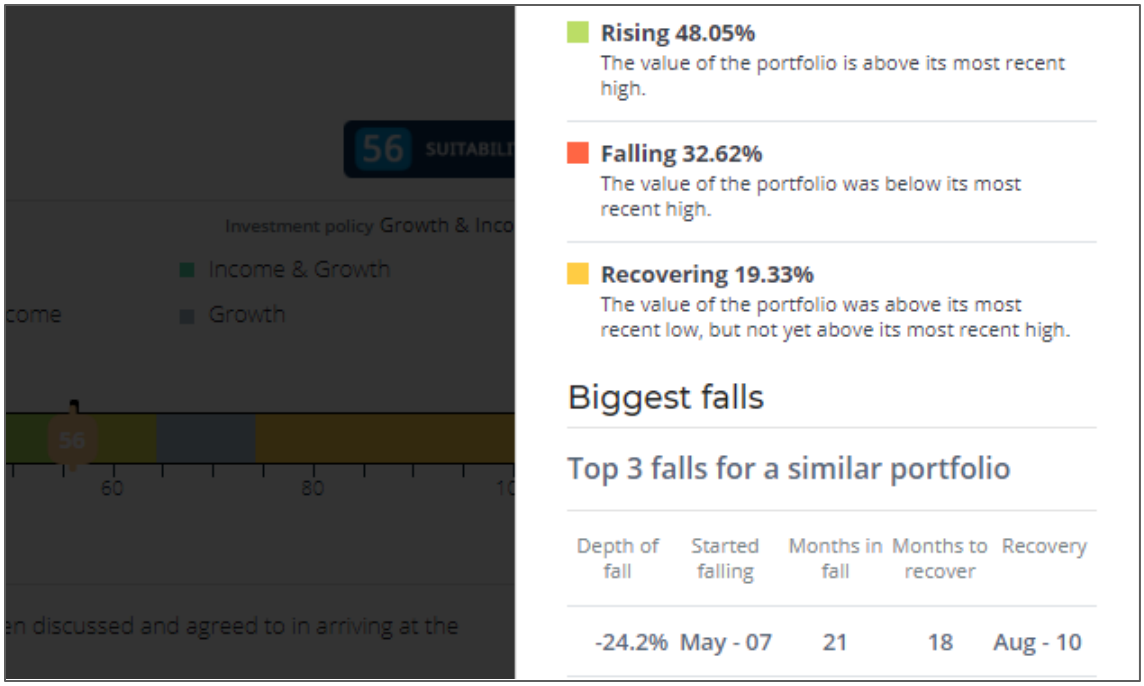


Figure 17: Rising, Falling and Recovery and Biggest Falls

Cash Wedge

In SuitabilityPro™ **Pro**Planner, advisors can also identify any short-term liquidity shortfall that may arise over the next three years, this is particularly useful where the client has multiple goals over different time frames. The system identifies how much liquidity is needed by calculating the pre-taxed net present value of all revenues expected over the next three years and subtracting from that the pre-taxed present value of all goals that fall due over the same period. Liquid investments capable of funding the gap are shown as a 'cash wedge'. The objective is to highlight funding needs that can only be met by liquid investments as ideally you do not liquidate equities in the depth of a market decline. If there are no goals in the next three years, the cash wedge is not shown.

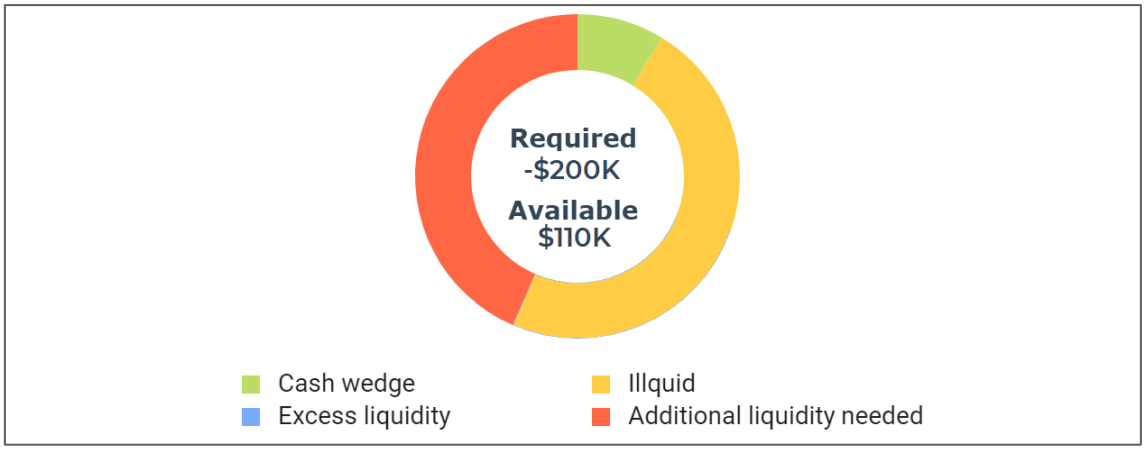


Figure 18: Cash Wedge

These analyses are designed to educate clients about risk and return so as to manage their expectations and explain the risks of the investment strategy being recommended. Clients should confirm their understanding and acceptance of the possible downside and liquidity risk of the solution recommended and if required adjust the investment policy accordingly

9. Appendix

9.1 Adjustment and Consistency Algorithms

The adjustment algorithm isolates five of the ten questions for consideration Q4, Q5, Q7, Q8 and Q10. Where there is a difference for any of these questions, a low (the difference is less risky) or high (the difference is more risky) adjustment factor is applied. A lower response is weighted more heavily than a higher response, we apply a high factor of 0.5 so that a low different is double the weight of a high difference.

Question	Low Factor	High Factor
Q4: Losses v Gains	0.166667	0.083333
Q5: Current Risk-Taking	0.083333	0.041667
Q7: Downside Comfort	0.333333	0.166667
Q8: Preferred Portfolio	0.25	0.125
Q10: 10-year Returns	0.166667	0.083333

Although the psychometric score is unchanged, we want to avoid a client generally answering like an aggressive person, and then generating complaints based on "… but I said in Q7 that no falls in value were acceptable", so a final factor of 10 is applied to the overall Adjustment Factor.

Recommended Adjusted score = Psychometric score + 10 x Adjustment Factor

This means that for a client that was "on the border" of two risk bands, even a minor adjustment may be sufficient to which them from one band to another. For example, a client with a raw scored 38 and answered Q4 and Q7 one risk group lower, the recommended adjusted score is 33 (38-5).

Question	Difference	Low Factor	High Factor	
Q4: Losses v Gains	-1	0.166667	0.083333	-0.166667
Q5: Current Risk-Taking	0	0.083333	0.041667	
Q7: Downside Comfort	-1	0.333333	0.166667	-0.333333
Q8: Preferred Portfolio	0	0.25	0.125	
Q10: 10-year Returns	0	0.166667	0.083333	
			Total factor	-0.5
			Final adjustment to score (Total factor x 10)	-5

The system applies four consistency tests, if any one of them fails then an inconsistency alert will be triggered.

- Test 1: Sum of the absolute difference for all 10 questions >=6
- Test 2: Each individually difference for all 10 questions >=4
- Test 3: Sum of the absolute difference for the five key questions (4,5,7,8,10) >=5
- Test 2: Each individually difference for the five key questions (4,5,7,8,10) >=3

9.1 A Note on Comfort

"Risk tolerance" is often confused with "loss tolerance". How somebody feels about taking risk in choosing between

alternative courses of action which include the possibility of unfavourable outcomes ("risk tolerance") is one thing. How somebody will subsequently feel if one of the possible unfavourable outcomes actually occurs ("loss tolerance") is another. Risk tolerance is relevant to how someone makes decisions. Loss tolerance is relevant to how someone reacts to an event.
When we talk about a client being "comfortable" with a portfolio we mean comfortable with the level of risk inherent in that portfolio. We are not predicting how the client will feel if one of the "bad" risks eventuates. How the client will react to an unfavourable outcome ("loss tolerance") is not predictable with any certainty.

Essentially, the FinaMetrica test enables your client to give you clear instructions about the level of risk they choose to take at the time decisions are being made. You are entitled to rely on those instructions. While nobody enjoys an unfavourable outcome, there is a significant difference between being unhappy with the outcome and being unhappy with the advice that lead to the outcome.

It is likely, though by no means certain, that a client's reaction to an unfavourable outcome will be consistent with what they said about the level of risk they were willing to take. The better the client knows themselves the more consistent the reaction will be. But in any event, with FinaMetrica you are able to take them back to what they said at the time the decision was made and to show them step-by-step how they decided on the course of action they followed. This may make them feel better and it may not. But it will demonstrate that they have no cause for complaint about the advice that led to the decision.

9.2 Psychometrics

Over the past 100 years considerable effort has been devoted to establishing standards for measuring value-expressive attributes, such as risk tolerance. The research was done by psychologists and statisticians, and the discipline they developed is known as psychometrics.

Psychometric standards can be applied to questionnaires ranging from opinion polls and market surveys, through to tests of IQ, personality, aptitude, etc.

A robust questionnaire is, in psychometric terms, one that is valid and reliable, where,

- Valid means that it measures what it purports to, and
- Reliable means that it does so consistently, with a known level of accuracy.

A psychometric test must go through a rigorous development process comprising Usability Trials and Norming Trials, and must meet an internationally accepted set of psychometric standards.

- In Usability Trials, a large pool of questions is tested for understandability and answerability. This can involve researchers sitting with subjects who are encouraged to verbalise their thoughts as they examine the questions. Questions which seem straightforward are often revealed to have poor understandability and/or answerability.

- In Norming Trials, questionnaires comprising questions with high Usability are tested on representative samples to determine the statistical value of the questions and the scoring algorithm. Questions which appear insightful often have little or no statistical value in differentiating one respondent from another.

Typically, development requires multiple loops through both trial processes. The FinaMetrica risk tolerance

questionnaire has been through four such loops.

A detailed discussion of the application of psychometrics in risk tolerance testing can be found in "Insights on Measuring Risk Tolerance from Psychology and Psychometrics"[viii].

Certification by the University of New South Wales' Applied Psychology Unit that FinaMetrica meets international psychometric standards can be found at http://www.riskprofiling.com/Downloads/UNSWFinaMetricaCertification.pdf.

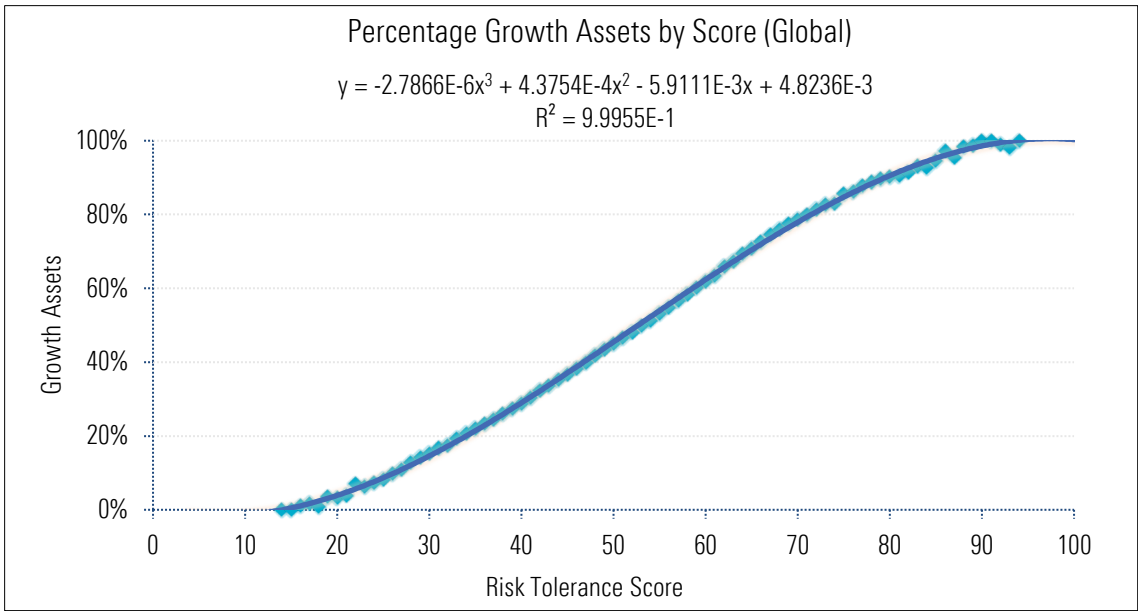
9.3 Risk Tolerance Research

Q16 in the FinaMetrica risk tolerance questionnaire asks respondents to select their preferred portfolio from a set of seven portfolios. Each portfolio is expressed as a mix of investments categorised as low risk/return, medium risk/return and high risk/return. Cash and interest-bearing bank deposits are given as examples of low risk/return investments and stocks/shares/equities and property/real estate are given as examples of high risk/return investments.

To analyse the answers in terms of a Defensive/Growth split, these mixes were converted by equating Low to defensive, High to growth and splitting Medium 50/50. This conversion allows each of the seven portfolios to be categorised in terms of their percentage of Growth Assets as shown below.

	Risk/Return			Growth
Portfolio	Low	Medium	High	Assets
1	100%	0%	0%	0%
2	70%	30%	0%	15%
3	50%	40%	10%	30%
4	30%	40%	30%	50%
5	10%	40%	50%	70%
6	0%	30%	70%	85%
7	0%	0%	100%	100%

Using our database of completed risk profiles, the average % growth assets was calculated for each specific risk tolerance score by using the answers to Q16 (Q8 on the 10-Question test). These averages are consistent with answers to other investment-related questions. The averages were plotted and a line-of-best-fit was calculated[ix]. The line-of-best-fit equation is used to determine (from a risk tolerance score) a specific percentage of growth assets compatible with that score. In the Comfort/Discomfort charts in the guide proper, the line-of-best-fit equation corresponds to the midpoint of the OK Risk comfort zone.



i See 9.2 A Note on Comfort in the Appendix for more details.
ii See 9.3 Psychometrics in the Appendix for more details.
iii See 9.1 Adjustment and Consistency Algorithms in the Appendix for more details.
iv See 9.1 Adjustment and Consistency Algorithms in the Appendix for more details.
v See 9.4 Risk Tolerance Research in the Appendix for more details.
vi "Profile to Portfolio – Which Map to Follow?" presented at the 2018 FPA annual conference in Chicago by Shawn Brayman.
vii Getting Risk Right, Investments and Wealth Institute March/April 2015
https://www.riskprofiling.com/Downloads/IWM15MarApr_GettingRiskRight.pdf
viii "Insights on Measuring Risk Tolerance from Psychology and Psychometrics" , Geoff Davey, Michael J. Roszkowski and John E. Grable, Journal of Financial Planning, April 2005, pp 66 - 77, a copy of which can be downloaded at
http://www.onefpa.org/journal/Pages/Insights%20from%20Psychology%20and%20Psychometrics%20on%20Measuring%20Risk%20Tolerance.aspx
ix Analysis of the other quantitative questions in the risk questionnaire revealed similarly, but not identically, shaped correlation curves. Given that we are trying to match the quirks of human personality to the vagaries of investment markets, identical correlations would be highly problematic. Having in mind that we are not trying to do a one to one mapping but rather to identify comfort zones we are confident in using answers to Question 16 as the key indicator.