



The University of Manchester
Alliance Manchester Business School

Risk Tolerance, Return Expectations and Other Factors Impacting Investment Decisions

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Abstract

Do investment portfolios meet the needs and preferences of investors? Can the portfolio selection process be improved? Traditionally, investor preferences have been identified using risk tolerance questionnaires. These questionnaires have recently attracted a fair deal of criticism. However, there has been little focus as to whether the questionnaires are useful in predicting investors' risk-taking behaviour. In this thesis, an explanatory sequential mixed methods approach was employed to find answers to the primary research question: what factors determine risk-taking behaviour in investment decisions?

This thesis looked at the risk-taking behaviour of investors in Canada (N=192) and the risk-taking advice provided by financial advisers in Canada (N=155), collectively risk-taking decisions. The results suggested that return expectations and demographic variables were important predictors of risk-taking decisions, whereas risk tolerance questionnaires were not.

Further investigation suggested that investment literacy impacted risk-taking decisions while investment experience impacted both return expectations and risk-taking decisions. In a novel contribution by this thesis, additional perspective was provided by qualitative analysis using semi-structured interviews with investors and advisers.

From the results of the qualitative analysis, the author suggests that discovery and self-discovery, a consistent approach and a focus on process versus outcome are key attributes valued by both investors and advisers. The thesis concluded with implications and recommendations for stakeholders, including a greater focus on return expectations, more training in discovery for advisers, simulating investment experience for prospective investors and including investment literacy in school curricula.

Keywords: Risk tolerance questionnaires, risk-taking behaviour, investor preferences, mixed methods methodology, investment decisions, behavioural research, financial advice, financial decision-making

Declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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sounding board, a source of advice, perspective and inspiration. This DBA would not have been possible without them. They are my greatest boosters and I am eternally grateful for their support in this, and all other, endeavours.

Preface

Swaminathan (Sam) Sivarajan

- Bachelor of Arts (Honours Economics), University of Western Ontario, London, Ontario, Canada
- Master of Business Administration, University of Toronto, Toronto, Ontario, Canada
- Juris Doctor, University of Toronto, Toronto, Ontario, Canada
- Lawyer – 1996 – 1998
- Mergers & Acquisitions Investment Banker – 1998 – 2005
- Investment Management Executive – 2005 - Present

Glossary

Adviser: an individual whose profession it is to advise individuals on money matters including investing strategy. In this thesis, the term is used to refer to a participant who is making recommendations to investors about their investments. In the Canadian study, participants include IIROC, MFDA, ICPM and Insurance licensed advisers (see below). Note, in this thesis the term adviser (the individual is regulated) is distinguished from the term advisor (the individual is not regulated).

Cognitive-experiential self-theory (CEST): a dual-process model of perception developed by Seymour Epstein and is based on the idea that people operate using two separate systems for information processing: analytical-rational and intuitive-experiential.

Discretionary money management: refers to an arrangement where broad investment strategy is agreed between investor and adviser. Subsequent transactions that fall within the ambit of the strategy do not require investor involvement or approval.

Expected Utility Theory (EUT): where a choice is given between several uncertain outcomes, the theory suggests that, if certain axioms are satisfied, the best choice is the one that results in the highest expected reward. For example, consider choice A and choice B where A has a 60% probability of occurring and providing an outcome of \$2 and B has a 40% probability of occurring and providing an outcome of \$2.50 (with the alternative being an outcome of \$0 in each case). EUT would suggest that A is the better choice as the expected value is \$1.20 (i.e. $60\% \times \$2$) while B has an expected value of \$1.00 (i.e. $40\% \times \$2.50$).

Grounded Theory Methodology (GTM): a type of analytical methodology used in qualitative analysis; the methodology used in this thesis for the qualitative analysis.

High Net Worth Investor (HNWI): investors who have CAD 1 Million (or equivalent) or more of investable assets.

Investment Industry Regulatory Organization of Canada (IIROC): an organization that licenses advisers. An IIROC licensed adviser can advise clients on the purchase and sale of any listed security sold under a retail prospectus in Canada.

Investment Counsel / Portfolio Manager (ICPM): an ICPM licensed adviser can advise clients on the purchase and sale of any listed security sold under a retail prospectus in Canada. ICPM advisers provide discretionary and non-discretionary money management services.

Insurance adviser: an Insurance licensed adviser can advise clients on the purchase of any insurance policy as well as the purchase and sell of any insurance-wrapped investment fund in Canada.

Investor: an individual who has money to invest. In this thesis, the term is used to refer to a participant who is making decisions about their own investments (or working with an adviser to do so). Note, an investor who uses the services of an adviser is also referred to as a client and the terms are used interchangeably.

International Investor: an investor who lives outside Canada (in this thesis, primarily the US, UK, Germany, Switzerland and Austria).

Multivariate Analysis of Variance (MANOVA): a type of analysis used to analyze data featuring multiple dependent variables simultaneously. Using this approach, the effect of more than one independent variable on more than one dependent variable can be tested.

Mass Affluent Investor (MA1 / MA2): investors typically defined as having between CAD 250,000 and CAD 1 Million (or equivalent) of investable assets. MA investors are further segmented into MA1 (investors who have CAD 250,000 to CAD 500,000 in investable assets) and MA2 (investors who have between CAD 500,000 and CAD 1 Million in investable assets).

Mutual Fund: a retail pooled investment vehicle that invests in a diversified pool of securities and is professionally managed. Retail investors purchase units in the mutual fund.

Mutual Fund Dealers Association (MFDA): an association that licenses advisers. A MFDA licensed adviser can advise clients on the purchase and sale of any mutual fund sold under a retail prospectus in Canada.

Mean-Variance Optimization (MVO): a portfolio framework proposed by Harry Markowitz. The MVO framework is the prevalent paradigm in the investment industry today for portfolio construction.

Planner: a planner is in the business of providing clients financial advice which may include investment guidance (i.e. asset allocation). The planner may have a financial planning certification (e.g. CFP) but cannot provide specific investment advice without being licensed as an MFDA, IROC or ICPM advisor.

Retail Investor: investors who have less than CAD 250,000 in investable assets.

Risk preferences: an individual's "gut feeling towards or against taking a specific risk". (Brayman et al., 2015, p. 3).

Risk tolerance: the willingness of an individual to take on risk with respect to their investments, usually in the form of a possible loss of capital. "The larger the client's 'risk tolerance' the better the client will cope with swings in the markets and the more volatility they should be able to handle" (Brayman et al., 2015, p. 3).

Risk tolerance questionnaire (RTQ): a questionnaire used by investment firms to evaluate the risk tolerance of an investment client. In this thesis, the RTQ used was an anonymized version of a standard industry questionnaire.

Risk-taking advice: investment recommendations by advisers to clients on how to allocate a given amount of money between risky and risk-free assets. Specifically, in this thesis, risk-taking advice is measured by the level of stock market participation in the home country equity market recommended by advisers.

Risk-taking behaviour: investment decisions made by investors on how to allocate a given amount of money to risky vs. risk-free assets. Specifically, in this thesis, risk-taking behaviour is measured by the level of stock market participation in the home country equity market by investors.

Risk-taking decisions: refers collectively to risk-taking behaviour and risk-taking advice.

Risk-taking measure: the result of a hypothetical investment task employed in this thesis where the individual must allocate a given amount of money between a risky and risk-free asset. The higher the percentage allocated to the risky asset, the greater the risk-taking measure.

Somatic Marker Hypothesis (SMH): a theory by Antonio Damasio proposing that emotional processes guide (or bias) decision-making behaviour. “Marker” signals that arise out of bio-regulatory processes (e.g. heart rate, perspiration, blood flow to face, etc.) influence the processing of an individual’s response to stimuli. Damasio refers to these marker signals as somatic to highlight the fact that they may arise not only in the body but in the brain’s representation of the body

Structural Equations Modelling (SEM): a multivariate statistical analysis technique that is used to analyze structural relationships and is the combination of factor analysis and multiple regression analysis. It is used to analyze the structural relationship between measured variables and latent constructs.

S&P / TSX Composite (TSX): the main benchmark tracking the broad Canadian stock market. Hereinafter, the S&P / TSX Composite is referred to as the TSX.

Theory of Planned Behaviour (TPB): a theory by Icek Ajzen proposing that attitude toward behaviour, subjective norms, and perceived behavioural control shape an individual's behavioural intentions and behaviours.

Chapter 1 Introduction

John Smith was having a panic attack. It had been days since he had slept properly and he was losing weight. Normally, weight loss would have been a cause for celebration, but not these days. John couldn't tear his eyes from the television screen - every pundit was declaring the end of the world. Bankruptcies were at record rates and the stock market was cratering. John was afraid to look at his online portfolio statements, yet he couldn't stop himself. And sure enough, his investment portfolio - the one that he and his wife, Jane, had worked long and hard to build - was down almost 20% in value over the last six months.

It was only two short years ago, as John remembered, that he and Jane were sitting in front of their adviser¹ deciding their investment strategy for their future retirement needs. They had done their homework and had asked their friends for recommendations. Then John and Jane had interviewed five advisers before choosing Sandra, a top adviser with a highly reputable firm. Sandra had extensive professional credentials and experience in advising clients like John and Jane. Sandra had spent a number of hours over several meetings with the Smiths to understand their goals and their attitudes to investing. She had even given them a risk tolerance questionnaire, something she explained would allow her to properly match them with the right portfolio for their risk appetite.

After all of this work, Sandra recommended a portfolio that, in the Smiths' opinion, fit the bill perfectly. And so it did, for the first 18 months. The statements that the Smiths' received showed their retirement nest-egg growing nicely. But that all ended six months ago. The stock market felt like it was in freefall and with it, or so it felt to John, the Smiths' retirement dreams. This wasn't supposed to happen - was it? John kept looking at the phone - he had tried picking up the phone three times over the last few hours to call

¹ In this thesis, an adviser is regulated by the relevant regulators whereas an "advisor" is not regulated.

Sandra and fire her. He wanted to tell her to move the Smiths' retirement money, or what was left of it, to cash. He breathed deeply, sighed, and picked up the phone ...

* * *

The fictional scene described above played itself over and over again during the Great Recession of 2008 - 2009. That period has served as a wake-up call for investors, advisers, investment firms and regulators alike. Carefully constructed long-term portfolios, designed after extensive discussions with investors, were abandoned at the height of the crisis, crystallizing significant losses. Retirement savers in the US lost on average 14% of their savings in 2008, and more at higher levels of wealth.²

Worse, the psychological trauma caused by events like the Great Recession has had long term adverse consequences for investors and society alike. Consider data from the U.S. Federal Reserve that showed that “cash on the sidelines” for American investors, i.e. money held in cash, bank accounts and money-market funds, had increased from around USD 8.5 trillion in 2008 to USD 10.8 trillion in 2013.³ This was money that was not invested in the economy, thus delaying or muting the economic recovery. And this was money that was not earning enough to offset inflation and taxes, let alone adequately provide for investors’ retirement lifestyles. The experience in Canada has not been different.

What are the lessons from the Great Recession? What factors do investors consider as they decide on a long-term investment portfolio? What questions are advisers asking their clients? What assumptions are advisers making about their clients when they make investment recommendations? Addressing these questions is of critical interest to all stakeholders – investors,

² Brandon, E., & Marquardt, K. (2009, February 12). How Did Your 401(k) Really Stack Up in 2008? Retrieved February 18, 2017, from <http://money.usnews.com/money/retirement/articles/2009/02/12/how-did-your-401k-really-stack-up-in-2008?page=2>

³ Nutting, R. (2014, August 18). The 10.8 trillion failures of the Federal Reserve. Retrieved February 18, 2017, from <http://www.marketwatch.com/story/the-108-trillion-failures-of-the-federal-reserve-2014-08-18>

advisers, investment firms and regulators – as departures from agreed-upon long-term investment strategies tend to result, as we shall see, in investment underperformance.

Investment underperformance leads to financial and emotional stress and may lead to additional strain on public resources for support in retirement. An unhappy investor who leaves an adviser causes reduced business volumes, reputational damage, or even litigation. This impacts all stakeholders.

1.1 Context of this Thesis

How does an adviser arrive at the investment recommendations put forth to a client? Current industry practice revolves largely around three steps. The adviser: (i) constructs a variety of portfolios with differing risk and return trade-offs based on available financial instruments; (ii) obtains an understanding of the preferences, in particular the risk preferences, of the investor; and (iii) matches (i) and (ii), resulting in the “optimal” portfolio for that individual investor.

The least developed and structured of these steps is step (ii), and that is the focus of this thesis: what is the current approach to understanding the client’s risk preferences; what are the deficiencies in this approach; and what steps can be taken to improve it? The underlying premise of this thesis is that a better approach to understanding (ii) will result in a better match in (iii), thereby minimizing the problems outlined earlier.

1.2 Problem Statement

The identification of investor preferences regarding risk tolerance (defined primarily as the short-term volatility of investment returns, as measured by the standard deviation of returns), return, and time horizon is currently established through discussions between the adviser and investor, as well as questionnaires completed by the investor. However, there are marked differences in the stated investor preferences ex ante and ex post market

events such as the Great Recession. This is the case even when there is explicit contemplation of such market events at the outset. Furthermore, anecdotal evidence and prior research indicate that the exact same investor exhibiting the same preferences will likely receive different recommendations from different advisers.

Can the identification of investor preferences be improved at the outset? Are there factors, including implicit assumptions on the part of advisers and investors, that are not being captured and considered in designing an investment strategy? A better understanding of these factors, prior to agreeing to an investment strategy, should lead to a greater likelihood of remaining on plan during times of market upheavals.

Specifically, expectations of future portfolio returns are believed to play a role in investment decisions by investors and recommendations made by advisers and this hypothesis will be tested. In addition, this thesis investigates what factors impact these return expectations.

The approach to this thesis is influenced by recent literature that argues that the prevailing investment decision process has a number of critical weaknesses. The first such weakness is that this prevailing process is built on a foundation of assumptions - assumptions that are necessary for the model to function but are not completely reflective of the world we actually live in (Bookstaber, 2017; Lo, 2017). A second flaw is that the "physics envy", or the belief that human behaviour can be completely captured in a mathematical model, that is said to underpin much of neo-classical economic theory (Lo & Mueller, 2010; Lo, 2017) does not reflect the complexity that is human behaviour - the idea of reflexivity and human uncertainty that George Soros advocates (Soros, 2013).⁴ As a simple example, a weather forecaster remarking that it is going to rain tomorrow (i.e. a natural phenomenon) does

⁴ In this thesis, the definition of neo-classical economic or finance theory is that used by Bookstaber (2017, p. 19): "Modern neo-classical economics sweeps humanity off the stage. It prefers to use mathematical models of a representative agent with stable preferences – one that doesn't have temper tantrums or unexpected medical expenses - operating under a specified probability distribution." In other words, it refers to the traditional model-based, representative agent approach to determining preferences and equilibria.

not increase the likelihood of rain. However, the Chair of the U.S. Federal Reserve remarking that inflation is a concern (i.e. a social science phenomenon) may in fact change the level of inflation.

Some have argued that this “physics envy” has pushed focus and resources on the development of mathematical models used for economic and financial decision-making. Such models “disregard key factors — including heterogeneity of decision rules, revisions of forecasting strategies, and changes in the social context — that drive outcomes in asset and other markets. It is obvious, even to the casual observer that these models fail to account for the actual evolution of the real-world economy” (Colander et al., 2014). Indeed, the same authors criticize the unquestioning use of these models as playing a part in the cause of the Great Recession (p. 3):

Many of the financial economists who developed the theoretical models upon which the modern financial structure is built were well aware of the strong and highly unrealistic restrictions imposed on their models to assure stability. Yet, financial economists gave little warning to the public about the fragility of their models even as they saw individuals and businesses build a financial system based on their work.

1.3 Research Questions

The fundamental research question motivating this thesis is:

What determines risk-taking decisions in the practice of financial advice?

The practice of financial advice in the context of this thesis is focused primarily on the interaction between investors and financial advisers that result in personal investment decisions. These decisions are based on investment recommendations from the latter to the former. However, it also encapsulates the investment suitability processes embedded into the services of online brokers or “robo-advisors” (the online algorithm-based investment services) supporting personal investment decisions that are still required by regulators. This fundamental research question has many layers. Recent literature has brought behavioural finance and the impact of biases on decision-making into the mainstream. In addition, attention has been given to the role of

personality and decision-making in all walks of life - from choice of career to choice of spouse. The use of risk tolerance questionnaires has been challenged (see section 2.5). Together, these developments prompted a number of sub-questions that are investigated in this thesis:

1. Do behavioural biases affect investors' return expectations and risk-taking behaviour?
2. Do personality traits or demographics affect investors' risk-taking behaviour?
3. Do risk tolerance or return expectations predict investors' risk-taking behaviour?
4. Do behavioural biases affect advisers' return expectations and risk-taking advice?
5. Do personality trait or demographics affect advisers' risk-taking advice?
6. Do advisers' return expectations predict their risk-taking advice?
7. Do investment literacy, experience or risk aversion affect investors' return expectations and risk-taking behaviour?
8. Do investors update their risk-taking behaviour when new information is provided?
9. Does advisers' perception of their clients' investment literacy or experience affect their return expectations and risk-taking advice?
10. Does advisers' risk aversion affect their return expectations and risk-taking advice?

Each of these research questions lead to specific hypotheses to be tested through quantitative questionnaires and qualitative interviews.

1.4 Methodology

This thesis is a sequential explanatory mixed methods study. Questionnaires, including previously validated scales, are employed together with an experimental manipulation to test whether factors such as personality traits, demographic factors, behavioural biases, investment experience and literacy are predictive of return expectations and risk-taking decisions. The

methodology is loosely patterned on that employed by Weber, Weber, and Nosić (2013) and Hoffmann, Post, and Pennings (2013b). One of the sample sets for these questionnaires was predominantly wealthy Canadian investors, where the relationships between the independent variables noted above and the investors' return expectations and risk-taking behaviour were investigated. A second comparable questionnaire was targeted to Canadian advisers and sought to identify a relationship between the independent variables noted above and the advisers' return expectations as well as their risk-taking advice to a hypothetical investor. A follow-up investigation with samples of international investors and international advisers (i.e. those living and working outside of Canada), respectively, was also conducted to determine whether Canadian findings are unique or ubiquitous.

Following the collection of data from the quantitative portion of the study, semi-structured interviews were conducted with select subjects from both the investor and adviser samples from Canada. The purpose was to gain a deeper understanding of belief formation and updating, and of the investment decision process, as well as to identify ways in which stakeholders can use this understanding to drive optimum outcomes.

1.5 Significance of the Thesis

Previous studies have predominantly focused either on aggregate market behaviour (cf. Barber & Odean (2000)) or laboratory experiments involving choice of gambles (cf. Benartzi & Thaler (1995)). Such approaches, however, shed little light on the decision-making process that people follow when they invest (Merkle & Weber, 2014). Furthermore, relatively few studies have considered the role advisers play in the investment decision process (cf. Diacon (2004), Bhattacharya, Hackethal, Kaesler, Loos, & Meyer (2012)).

To the author's knowledge, this is the first study that has considered the factors involved in portfolio choice decisions both from an investor's perspective as well as from the perspective of an adviser making

recommendations. It is also the first study to simultaneously compare risk tolerance questionnaires versus return expectations, personality traits and demographic variables in predicting risk-taking decisions in the practice of financial advice. In addition, the sequential mixed methods approach in this thesis provides a unique perspective, as the quantitative analysis obtained through experimental manipulation and questionnaires is supplemented with detailed qualitative interviews of a sample of investors and advisers.

Equally, the author believes this to be the first study with data from high net-worth Canadians and Canadian advisers. This data is further supplemented with data from investors and advisers from other developed countries. The intended outcome of this thesis is to provide insight into what drives the risk-taking decisions of investors and advisers as well as to provide recommendations for investors, advisers and regulators.

1.6 Overview of the Thesis

This thesis consists of 10 chapters. After the introduction in Chapter 1, the foundations for this thesis are set in chapters 2 and 3 through a review of the related background literature. This includes a critical review of the current practice for developing investment recommendations, the substantive factors that are currently considered in arriving at the recommendation, and the consequences if these recommendations are wrong. In addition, the emerging fields of behavioural finance and neuro-economics are consulted to highlight some of the psychological, behavioural and emotional factors that may impact investment decisions. To the best of the author's knowledge, there are no studies that have explored the impact of these factors on risk-taking decisions by advisers and wealthy investors from the perspective of the practice of financial advice.

In Chapter 4, methodology and research design are discussed to set the philosophical foundations for this thesis, the choice of experimental design and survey instruments.

In Chapter 5, the results of the empirical analysis of the core samples in this thesis, investors and advisers in Canada, are presented. The answered questions, and unanswered gaps, set the stage for the follow-up study of Canadian investors and advisers (please refer to glossary, as investor and adviser are defined terms in this thesis) presented in Chapter 6.

Chapter 7 extends the discussion of Chapters 5 and 6 by presenting a data set of investors and advisers from other countries (primarily the US, UK, and Germany) to determine whether the findings in Canada are unique or can be extended to other markets.

In Chapter 8, the results presented in Chapters 5 and 6 are used to inform and conduct a series of semi-structured interviews of representative investors and advisers. Their reactions, concerns and perceptions of shortcomings in the current investment approach are noted and help form the basis of policy recommendations set out and discussed in Chapters 9 and 10.

Chapter 9 provides a detailed discussion of the key findings of this thesis and the contributions made by the findings to the body of knowledge. These findings are compared and contrasted to the literature discussed in Chapters 2 and 3. Further, implications of the findings are discussed that may help create a more complete picture of the investor as the basis for investment decisions.

Finally, Chapter 10 concludes with a reflective evaluation of this thesis, a discussion of some of its limitations, suggestions for future research in this area and implications for stakeholders.

Chapter 2 Homo Economicus - The Rise of Rationality

2.1 Introduction

This illustrates an important problem with traditional economic theory. Economists discount any factors that would not influence the thinking of a rational person. These things are supposedly irrelevant. But unfortunately for the theory, many supposedly irrelevant factors do matter.

Economists create this problem with their insistence on studying mythical creatures often known as Homo economicus. Richard Thaler⁵

In most developed markets, investment advice provided by advisers follows three broad steps (Yook & Everett, 2003). The first step is the construction of an “investment opportunity set” using expected return, expected risk and correlations of various products and asset classes the adviser has at her disposal. The second step is the identification of the risk preferences of an individual investor by constructing his or her risk-return indifference curve. This step is much harder than the first. The third step is to identify the portfolio(s) out of the universe of available portfolios from step 1 that meets the risk preferences of the investor from step 2.

While Step 1 and Step 3 are relatively well-defined, Step 2 is much harder to implement (see Section 2.2.2 and Section 2.3). Failure to get the second step right can have dire consequences. At best, an investor may not meet her financial objectives and ultimately fire the adviser; at worst, it can involve lawsuits or regulatory action taken against the adviser. The focus of this thesis is on step 2.

This chapter reviews the prevailing paradigm in the investment world, some of the literature around the current advice process underlying step 2, and

⁵ Thaler, R. H. (2015, May 08). Unless You Are Spock, Irrelevant Things Matter in Economic Behavior. The New York Times, retrieved April 02, 2018 from newspaper homepage <https://www.nytimes.com/2015/05/10/upshot/unless-you-are-spock-irrelevant-things-matter-in-economic-behavior.html>

what the implications are of wrong advice or failure to follow that advice. The chapter then sets the stage for a discussion in the next chapter of some of the cracks that are developing in the foundations of the rational investor paradigm.

The rest of this chapter is organized as follows. Section 2.2 describes the theoretical underpinnings of the current industry framework. Section 2.3 highlights the research problem of correctly identifying investor preferences from a normative and descriptive perspective. In Section 2.4 and Section 2.5, arguments are presented that the industry's focus on identifying investor preferences from a risk tolerance perspective has its share of problems. Section 2.6 describes the investment performance gap that may result from mis-interpreting investor preferences. Section 2.7 argues that perceptions of risk may be more important than preferences for risk in risk-taking decisions. Section 2.8 further extends the discussion in Section 2.7 to address the role of expectations in investment decisions while Section 2.9 outlines how expectations may translate into behaviour. Section 2.10 concludes this chapter.

2.2 Theoretical Underpinnings

2.2.1 Step 1 - The Mean-Variance Framework

In 1952, Harry Markowitz revolutionized the financial world with a new approach to portfolio construction. Until then, portfolio construction used the principle of diversification but applied it as an art rather than a science. Markowitz (1952) showed, mathematically, that the correlation between securities was an important consideration in designing an optimal portfolio. He defined an investor's primary objective as maximizing her investment returns while minimizing the risk of those returns.

Risk in Markowitz's framework is defined as the volatility of returns. Using standard statistical methodology, Markowitz further elaborated that volatility is calculated as the variance (or the standard deviation) of those

returns. Leveraging optimization techniques from linear algebra, Markowitz used the expected returns of securities (i.e. mean), the standard deviations of those returns (i.e. variance) and the covariance of those assets (i.e. how individual security returns moved together) to construct efficient portfolios. An efficient portfolio, in this Mean-Variance Optimization (MVO) framework, is one that yields the highest return for a level of risk or the lowest risk for a specific level of return. While there are some commentators that have argued that optimizing other criteria is preferable (cf. Stutzer, 2004 who argues that shortfall minimization should be the optimization criteria), the focus of this thesis is not on portfolio construction but identifying investor preferences accurately in the practice of financial advice.

Portfolios can vary by the number and weighting of different securities or asset classes. The universe of all possible portfolios, the investment opportunity set, can then be plotted on a graph with risk and return as the axes. Furthermore, an efficient frontier can be constructed containing the set of all efficient portfolios. This is the first step in the portfolio construction process that is prevalent today in the investment industry.^{6,7}

2.2.2 Step 2 - Identifying Investor Risk Preferences

With the investment opportunity set identified, the second step of identifying investor risk preferences begins. An investor's utility function, with return and risk as parameters, can be used to determine the investor's level of risk aversion. This type of decision is a "choice under uncertainty" which is typically approached using Expected Utility Theory (EUT) (Von Neumann & Morgenstern, 2007).

⁶ "The near universally adopted modern portfolio theory (MPT) put forward by Nobel laureate Harry Markowitz in 1952 is blind to the effect of portfolio investment on the capital markets' overall risk/return profile and on the macro systems upon which the market relies for stability." <https://www.unpri.org/academic-research/beyond-modern-portfolio-theory-how-investors-can-mitigate-systemic-risk-through-the-portfolio/538.article> accessed on October 12, 2018

⁷ "The MPT thought process is now so ingrained in our capital markets that the theories are taken for gospel and their results viewed as "the truth"- whether allocating assets in a diversified portfolio, making corporate finance decisions, developing a risk management strategy, or valuing companies and securities such as mortgage derivatives or just about any financial instrument". Vincent, Scott, Is Portfolio Theory Harming Your Portfolio? (April 29, 2011) [Page 4]. Available at SSRN: <https://ssrn.com/abstract=1840734> or <http://dx.doi.org/10.2139/ssrn.1840734>

As an aside, the MVO framework can be considered a specific case of the Expected Utility Theory. One of two circumstances are necessary for this convergence to occur: (i) all asset returns are assumed to be normally distributed; or (ii) the utility function the investor wishes to maximize is either quadratic in nature or a sufficient approximation to the true utility function (Sharpe, 2007).

As a further aside, a distinction needs to be drawn between risk and uncertainty. The noted economist Frank Knight (2012) argued in his seminal work in 1921 that risk can be measured while uncertainty cannot. Or in the layman's terms used by Donald Rumsfeld, risk is "known unknowns" while uncertainty is "unknown unknowns".⁸ Gigerenzer (2014, p. 40) argues that "smart scholars have invented many tricks to treat uncertainty as if it were a known risk so that they can apply their standard mathematical models rather than face the real world". For example, one attempt to reconcile risk and uncertainty has been to incorporate subjective probability assumptions rather than objective probability into the models and the expected utility framework. However, that does not address unforeseen or unforeseeable events like, for example, the fall of the Berlin Wall, the Arab Spring or the introduction of Apple's iPhone:

More fundamentally there are things we do not know because we cannot imagine them. If you had described your smartphone to Mr. [Milton] Friedman in 1976 he would not have understood what you were talking about, far less been able to speculate intelligently on the probability that it would be invented or bought.⁹

John Kay further observes:¹⁰

[Frank] Knight and [John Maynard] Keynes believed in the ubiquity of "radical uncertainty". Not only did we not know what was going to happen, we had a very limited ability to even describe the things that

⁸ US Department of Defense news briefing (12 February 2002)

⁹ Kay, J. (2016, April 5). The enduring certainty of radical uncertainty. The Financial Times, retrieved April 21, 2018 from newspaper homepage <https://www.ft.com/content/ec5520c4-fb23-11e5-8f41-df5bda8beb40>

¹⁰ Kay, J. (2018, April 16). Embrace radical uncertainty. Retrieved April 21, 2018, from <https://www.johnkay.com/2018/04/16/embrace-radical-uncertainty/>

might happen. They distinguished risk, which could be described with the aid of probabilities, from real uncertainty—which could not. ...

Their opponents insisted instead that all uncertainties could be described probabilistically. And their opponents won, not least because their probabilistic world was convenient: it could be described axiomatically and mathematically. ...

Keynes and Knight were right, and their opponents wrong. And recognition of that is a necessary preliminary to the rebuilding of a more relevant economic theory.

The distinction between risk and uncertainty is important because while risk-based models for investment or financial decisions are useful in the majority of situations, ignoring the potential for uncertainty may lead to events like the Great Recession as commentators noted in the immediate aftermath (Dowd, Cotter, Humphrey, & Woods, 2011):

That Vinier [Goldman's CFO at the time]. What a comic. According to Goldman's mathematical models, August, Year of Our Lord 2007, was a very special month. **Things were happening that were only supposed to happen once in every 100,000 years. Either that ... or Goldman's models were wrong** (Bonner, 2007b). [p. 1] [emphasis added]

No, according to the masters of the universe, downgrades by Moody's and Fitch's were completely unexpected ... like the eruption of Vesuvius; even the gods were caught off guard. **Apparently, as of September 30th [2008], Citigroup's subprime portfolio was worth every penny of the \$55 billion that Citi's models said it was worth. Then, whoa, in came one of those 25-sigma events. Citi was whacked by a once-in-a-blue-moon fat tail.** [p. 1] [emphasis added]

The terms risk and uncertainty are used interchangeably in this thesis because (i) this distinction is not the focus of the research problem and (ii) the investment industry continues, for the most part and despite the inherent dangers, to treat these two terms interchangeably.

Equally, the viability of the assumptions necessary for MVO to be a specific case of EUT are also not a matter for discussion in this thesis. Moving on to the focus of this thesis, under EUT an individual faced with a decision under uncertainty would, assuming certain axioms are true, act as if he was maximizing the expected value of a utility function. While many investors would be willing to assume some risk for a higher expected return, the risk-

return trade-off differs for everyone. A more risk-averse investor would typically require a higher return for a given amount of risk than a less risk-averse investor.

With the utility function specified, the Arrow-Pratt measures of absolute and relative risk aversion can be measured for each individual (Maccheroni, Marinacci, & Ruffino, 2013; Norstad, 1999).¹¹ For any given investor, the set of portfolios with the same utility score, or level of risk aversion, can be plotted as a risk-indifference curve – where an investor finds any portfolio on that curve equally acceptable as it has the same level of risk aversion. The optimal portfolio for that investor is simply the point where a risk-indifference curve is tangential to the efficient frontier. This is the investment paradigm prevalent in the industry (see footnote 6 and 7 on p. 29).¹²

2.2.3 Challenges to the Mean-Variance Framework

The MVO framework earned a Nobel-prize for Markowitz but it has also earned its share of criticism. For example, criticisms of the MVO framework, and its underlying assumptions, include: (i) the underlying utility function is assumed to be quadratic; or (ii) the security returns are assumed to be normally distributed. In addition, the time frame is assumed to be only a single period.¹³ Subsequent research has questioned the viability of these assumptions. Another criticism of the MVO framework points to the use of volatility of stock prices as an appropriate measure of risk (see cf. Shiller (1981, 1983)). Volatility

¹¹ Named for economists Kenneth Arrow and John Pratt, the Arrow-Pratt measure of risk-aversion leverages the fact that EUT assumes a twice-differentiable utility function where the first derivative is negative (reflecting diminishing marginal utility). In this context, the Arrow-Pratt measure of absolute risk aversion for a level of wealth w is $-U''(w)/U'(w)$ where $U(x)$ is the utility of wealth at a given level of x . Relative risk aversion reflects the fact that at different absolute levels of wealth risk aversion changes and is measured as: $-w*[U''(w)/U'(w)]$

¹² Modern Portfolio Theory (MPT) is based on Markowitz's MVO framework which was then independently extended by Sharpe (1964) (who shared the 1990 Nobel with Harry Markowitz and Merton Miller) to develop a framework for pricing of financial assets and Fama (1970) who further extended the rational investor concept underlying MVO to arrive at the Efficient Market Hypothesis wherein financial asset prices incorporate all relevant information. Fama won the Nobel-prize in 2013. For the purposes of this thesis, the discussion is focused on the MVO framework.

¹³ Subsequent work [cf. (Fama, 1970)] has shown that the MVO single-period framework can be extended to solve a multi-period problem (the typical investor scenario). However, the resulting optimal portfolio is different than that obtained in a single-period solution.

of returns is not the intuitive definition that comes to mind for most investors.

In fact, Warren Buffett, the famous investor, has been quoted as saying¹⁴:

That lesson has not customarily been taught in business schools, where volatility is almost universally used as a proxy for risk. Though this pedagogic assumption makes for easy teaching, it is dead wrong: Volatility is far from synonymous with risk. Popular formulas that equate the two terms lead students, investors and CEOs astray.

A numerical example demonstrates the distinction between volatility and investment risk from an investor perspective (Keppler, 1990, p. 1):

Suppose the price of a stock goes up 10 percent in one month, 5 percent the next, and 15 percent in the third month. The standard deviation would be five with a return of 32.8 percent. Compare this to a stock that declines 15 percent three months in a row. The standard deviation would be zero with a loss of 38.6 percent. An investor holding the falling stock might find solace knowing that the loss was incurred completely “risk-free”.

Rather, most individuals would define investment risk as their inability to meet a future goal that the investment was supposed to help them achieve (e.g. a given level of retirement lifestyle). Furthermore, Markowitz’s definition of risk is symmetric – both volatility above and below the expected return are captured in his framework. There are very few investors who will complain about upside volatility; most care only about downside volatility.

The implementation of the MVO framework in practice is also substantially more difficult than the theory would suggest. For instance, what does one use for expected returns and standard deviation of an asset class? Markowitz suggested a “select” period of historical returns and standard deviations. First, that suggestion assumes that asset price returns are not mean-reverting over longer periods of time, which some (but not all) academic evidence suggests may be the case.¹⁵ Secondly, what time frame of historical returns are to be used? The last month, the last year, the last decade?

¹⁴ p. 18, 2014 Berkshire Hathaway Shareholder Letter

¹⁵ See, for example, Poterba and Summers (1988) who found that stock prices were serially autocorrelated in the short term and negatively autocorrelated in the longer term. On the other hand, Lo and MacKinlay (1988) find that while stock prices do not follow a random walk their data also does not support a mean-reverting model of asset prices.

Also, how can an individual's subjective view of expected returns and standard deviations be effectively incorporated into the framework? In theory, an investor or her adviser can construct a personalized efficient frontier for each situation. In practice, the math, calculations and uncertainty involved mean that even firms that use a disciplined MVO approach have a limited set of efficient frontiers that they use with all investors. This set may be updated periodically to reflect more recent historical returns and standard deviations. These factors raise questions regarding the reliability of the inputs for the optimization model. However, this is an issue that exists not just for the MVO model but for any model that requires making assumptions about future asset prices.

In perhaps a somewhat ironic indictment, Harry Markowitz confessed to not following his own advice. In an interview, Markowitz talked about his investing strategy for his retirement account:

I should have computed the historical co-variances of the asset classes and drawn an efficient frontier [but] I visualized my grief if the stock market went way up and I wasn't in it — or if it went way down and I was completely in it. So I split my contributions 50/50 between stocks and bonds.¹⁶

This concept of "naive diversification" embodied in Markowitz's quote above has itself been the subject of much research. For example, DeMiguel, Garlappi, and Uppal (2007) found that no model, including Markowitz's MVO framework, is consistently better than the 1/N naive diversification rule - i.e. if there are N risky assets, divide the portfolio equally among the N assets. In fact, DeMiguel et al. (2007) found that for a sample portfolio of 25 assets, an estimation window of 3000 months (or 250 years) is needed for the MVO portfolio to outperform the 1/N benchmark. DeMiguel et al. (2007) point out that industry models are typically estimated using only 60 or 120 months of data.

¹⁶ Nocera, J., (2007, September 29), Can we turn off our emotions when investing?, The New York Times, retrieved April 21, 2018 from newspaper homepage <http://www.nytimes.com/2007/09/29/business/29nocera.html>

This gap between MVO theory and actual practice has proven difficult to bridge and, as DeMiguel et al. (2007) observe, "there are still many 'miles to go' before the gains promised by optimal portfolio choice can actually be realized out of sample" (p. 1915). Gigerenzer (2014, p. 93) argues that the MVO framework is "optimal in an ideal world of known risks, but not necessarily in the world of the stock market, where so much is unknown".

2.3 The Research Problem - Correctly Identifying Investor Risk Preferences

The MVO framework is conceptually elegant and theoretically rigorous and highlights the need for portfolio diversification – a principle that is not in question. The preceding discussion outlined some of the key criticisms of the MVO framework. However, construction of the efficient frontier is not the focus of this thesis. The focus here is the second step in the investment decision process, namely identifying investor preferences.

As mentioned earlier, this requires the specification of the investor's utility function. How is the utility from an investment portfolio accurately defined and measured? Is being able to sleep at night without worrying about the portfolio a factor that should be measured by a utility function? Should not regretting past choices be included in any measure of investment utility? Most would argue in favour. However, at present, we do not know how to adequately quantify and incorporate these factors into a utility function. Therefore, defining the specific utility function for each investor is difficult and impractical in real life. As a result, so is estimating the Arrow-Pratt measures of risk aversion.

2.3.1 The Behavioural Finance Lens

There is ample evidence that individuals are assessing probabilities non-linearly (Fehr-Duda & Epper, 2012; Kahneman & Tversky, 1979). Violations of EUT are often attributed to the narrow definition of utility which ignores factors

such as hopes and fears associated with risky situations (Fehr-Duda & Epper, 2012; Loewenstein et al., 2001; Lopes, 1987; Weber et al., 2013). In fact, research by Hsee and Rottenstreich (2004) suggests that when individuals use a cognitive approach to evaluation, as is inherent in EUT, there is relatively more constant (i.e. linear) sensitivity to probability. This is different from when people rely on feelings in evaluating probabilities, which happens quite frequently. Thus, evidence of non-linear probability weighting provides further support that the narrow definition of utility used in identifying investor preferences may be problematic.

Markowitz's interview suggests that emotions need to be incorporated into any assessment of investor preferences. Regret is a "comparison-based emotion of self-blame, experienced when people realize or imagine that their present situation would have been better had they decided differently in the past" (Zeelenberg & Pieters, 2007, p. 6). Regret aversion, the tendency to choose so as to avoid regret, is distinct from risk aversion (Zeelenberg & Beattie, 1997), the tendency to choose so as to avoid risk, and is not captured adequately in most existing risk tolerance questionnaires (Pan & Statman, 2012).

Proponents of behavioural finance believe that investor behaviour should be considered at the individual level rather than in the aggregate. At its heart, behavioural finance is built on the proposition that individuals do not have the time or ability to fully comprehend their decision environment nor do they have the processing resources to calculate the optimal course of action. Kahneman and Tversky (1979) formalized the concept of loss aversion, wherein individuals have a stronger preference to avoid losses than to seek gains. In addition, behavioural heuristics (cognitive shortcuts such as representativeness, 1/N, etc., used to process information quickly) and psychological traits (such as extraversion, neuroticism, etc.) all have an impact on individual risk preferences. Risk preferences are, therefore, not just innate (or dispositional) but also context-dependent (or situational) (Lopes, 1987).

These emotions and heuristics are all examples of departures from the model of the "rational investor". Yet, as Gigerenzer (2014), Bookstaber (2017), Lo (1988) and others argue, there is no irrationality here. Rather, neo-classical theory makes a substantial number of assumptions that help create a coherent model; the model just does not reflect our complex reality.

De Bondt, Muradoglu, Shefrin, and Staikouras (2015, p. 9) suggest that behavioural finance's strengths include its ability to bring "a pragmatic approach to the study of financial decisions". They also highlight the additional discipline it brings to financial decisions, namely that "(d)iscipline fundamentally implies triangulation i.e. the synthesis of data from multiple sources." (De Bondt et al., 2015, p. 9)

Behavioural finance has also earned its share of criticism. Choice experiments conducted in controlled laboratory environments may not transfer well in the real world (Levitt & List, 2007). De Bondt et al. (2015, p. 9) argue that behavioural finance lacks the unified theoretical core and discipline of neo-classical finance: "there is no single preference framework to accommodate the features in prospect theory, SP/A theory, regret theory, self-control theory, and affect theory." And, as Bookstaber argues, behavioural finance is evolutionary, not revolutionary, and is an incremental expansion of neo-classical theory (Bookstaber, 2017). Perhaps the most significant criticism is that the findings of behavioural finance have yet to find their way into a useable set of rules for investors and advisers.

2.3.2 Reconciling the Rational and Behavioural Investor

While there are these competing schools of thought, both agree that in equilibrium the law of one price (between supply and demand) holds. However, neo-classical theory argues that the norm is equilibrium, and that this price is achieved through efficient markets and arbitrage; behavioural finance argues that the norm is disequilibrium because of behavioural biases and cognitive limitations of individuals. In the author's view, however, the two are

not competing but rather complementary theories. Neo-classical theory is a normative theory focused at the aggregate market level, while behavioural finance is a descriptive theory focused at the individual level.

Greenwood and Shleifer (2014), for example, reconcile the discrepancy between model and survey-generated expected returns by positing a market where extrapolationist investors trade and fundamentalist investors accommodate those trades. By seeking to explain the causes of disequilibrium in the market, behavioural finance can facilitate a better understanding of the conditions necessary for the equilibrium postulated by neo-classical theory. Further, in this author's opinion, the key useable insight of behavioural finance that can be applied is that investor preferences and investor beliefs, both of which interact when forming optimal portfolios, are impacted by several factors: the investor's affective (or emotional) response to the anticipated and actual outcomes of investment decisions, the investor's personality traits, behavioural biases, experience, and literacy. These factors are not fully accounted for in the current paradigm, and this gap has contributed to the problems identified by various regulators.

2.4 Current Practice in Identifying Investor Preferences

Given the practical difficulty of constructing individual utility functions, the prevailing approach in the industry has been to identify the risk tolerance of an investor so that alternative portfolios may be compared and selected. Two broad sets of measurement tools have been put forward to measure investor risk tolerance: (i) quantitative; and (ii) qualitative. The first category uses quantitative techniques to approximate an investor's utility function and estimate the Arrow-Pratt coefficient of risk aversion. Typically, the Arrow-Pratt measure is estimated in controlled choice experiments where subjects are asked to make hypothetical choices designed to proxy real-life situations. An example of this methodology is the Multiple Price List used by Holt and Laury (2002) who asked subjects to choose between a menu of "lotteries" with higher

and lower payoff alternatives. The crossover point, from one option to the other, is modelled as the measure of risk aversion.

The second category of tools used to measure investor risk tolerance is questionnaires, which seek to assess an individual's risk tolerance by "exploring past experiences and their intentions with respect to the future" (Linciano & Soccorso, 2012). Only some of these risk tolerance questionnaires have been psychometrically validated. Nevertheless, questionnaires are the most prevalent methodology in use in the investment industry as they are typically easier and cheaper to implement than choice experiments. These risk tolerance questionnaires seek to determine attitudes to short-term portfolio volatility, investment time horizon and investment objectives. The answers are weighted, the points are tallied for each answer, and a total score is tabulated to indicate the individual's overall willingness to pursue investment portfolios with a certain level of return volatility.

Although the rest of this chapter discusses the problems with the use of risk tolerance questionnaires, the reader should not conclude that the first category of tools to measure risk preferences is problem-free. For instance, research by Lönnqvist, Varkasalo, Walkowitz, and Wichardt (2015) compared risk attitudes of subjects, as measured by a Holt-Laury type lottery choice task, to a multi-item questionnaire. Lönnqvist et al. (2015) found that the two measures were uncorrelated and that only the questionnaire had test-retest stability. Furthermore, only the questionnaire showed correlations with personality traits and actual risk-taking behaviour, prompting the authors to conclude that the questionnaire was a better approach for measuring individual risk attitudes. Similarly, Ert and Haruvy (2017, p. 94) concluded that "(t)o the extent that the Holt–Laury task does measure a preference, whatever that preference might be, the current study reveals that it is not stable, and could be modified even by the simplest form of experience".

2.5 The Problems with Risk Tolerance Questionnaires

Ease of use does not mean that questionnaires are without controversy. Indeed, Pan and Statman (2012, p. 54) argued that “(m)any investors who were assessed as risk tolerant in 2007 and assigned portfolios heavy in equities dumped their equities in 2008 and 2009 and some even dumped their advisers.” Clearly, questionnaires fail to capture key investor factors if equity-heavy portfolios, which by their very nature carry significant short-term volatility, are dumped virtually overnight.

In one of the first critiques of the questionnaire method, Yook and Everett (2003) administered questionnaires from six different investment firms to their business school students. They standardized the scores from these questionnaires and compared the results, finding “that the 0.56 average correlation coefficient [between the 6 questionnaires] is much lower than what we should expect it to be to warrant the use of the questionnaire method without qualm” (Yook & Everett, 2003, p. 50). Their argument has merit even if the results from business school students may not have external validity with actual investors (as students typically do not have much of their own money to invest or the same financial goals and responsibilities as the population of interest – i.e. typical investment clients are in full-time employment, save for retirement, pay bills and are responsible for dependents). If the assessed risk tolerance of the same individual differs from questionnaire to questionnaire, what exactly is being measured and what value is there in measuring it?

The differences in results between questionnaires are partly due to the fact that there are no established standards as to what questions are to be asked, how the scoring is to be established and where the cut-offs are to be set for different categories of risk tolerance. Rice (2005 as cited in Klement, 2015) found that scorings and mappings of the answers to a risk tolerance questionnaire were highly subjective, questions were usually equally weighted and the level of confidence an investor had in their answers was typically

ignored. Pan and Statman (2012, p. 54) identified several shortcomings of the prevailing questionnaire methodology:

- investors have many risk tolerances, one for each individual goal (retirement, children's education, etc.);
- there is no clear linkage between scores on a risk tolerance questionnaire and resulting portfolio recommendations;
- risk tolerance is situational - it varies by "circumstances and associated emotions";
- ex ante and ex post risk tolerance are different - high post-decisional regret may lead to a re-evaluation of the appropriate risk tolerance and ex ante investment decisions; and
- propensities other than risk tolerance impact the measure of risk aversion inherent in EUT - e.g. overconfidence, mental accounting and other behavioural biases.

Linciano and Soccorso (2012) point out that the level of financial risk measured in a typical questionnaire, usually termed risk tolerance, is not equivalent to the Arrow-Pratt measure of risk aversion. Risk aversion is more nuanced and broader than risk tolerance. Indeed, Cordell (2001) proposed that risk tolerance should be broken down into four sub-factors: propensity (how an individual actually behaves in real-life situations); attitude (an individual's willingness to take on monetary risk, which is what is measured in most questionnaires); capacity (an individual's financial ability to bear risk); and knowledge (an individual's knowledge of risk and the risk-return trade-off). Thus, what is typically measured by a risk tolerance questionnaire is less multi-dimensional than theory or practice would recommend.

The Italian regulators, in their review of the questionnaires employed by 20 Italian financial institutions (Linciano & Soccorso, 2012), found several deficiencies: (i) questions rely on individuals' self-assessments and do not seek to verify risk knowledge as suggested by Cordell (2001); (ii) the measurement of factors, such as holding period and purpose of the investments, has no relation to risk tolerance (as highlighted by Roszkowski and Grable (2005)); (iii)

questions are not controlled for cognitive and behavioural biases¹⁷; and (iv) questions are often poorly or confusingly worded. These findings by the Italian regulator have been broadly echoed by other regulators, including the UK regulator (FSA) (FSA, 2011), the French regulator (AMF) (Palma & Picard, 2010) and the Canadian regulator (OSC) (Brayman et al., 2015).

Roszkowski and Grable (2005, p. 67) argued that questionnaires can effectively measure risk, stating that “appropriately designed questionnaires can validly and reliably assess risk tolerance, provided that (1) *no* inappropriate questions are asked and that (2) *enough* appropriate questions are asked. In fact, we would go further and say that best practice requires the use of a valid and reliable questionnaire (emphasis added).” Today, there are psychometrically validated scales that measure personality traits. Given that this is the case, Roszkowski and Grable may well be correct that this should be equally possible for risk tolerance questionnaires.

However, one of the key differentiating factors about risk tolerance from other personality traits is that while the latter are dispositional and broadly stable, the former can be situational and context-specific (Lopes, 1987; Pan & Statman, 2012; Shefrin & Statman, 2000). Any risk tolerance questionnaire methodology needs to account for this distinguishing feature.

A further consideration is that individuals are notoriously bad at self-assessment, which is what risk tolerance questionnaires ask investors to do. Dunning, Heath, and Suls (2004) found that individuals’ self-views are only modestly predictive of actual behaviour and performance. Further, individuals tend to overrate themselves, overestimate their likelihood of engaging in desirable behaviours, and avoiding undesirable behaviours and reach judgments with too much confidence. In this sense, the information contained in the

¹⁷ For example, Benartzi, Iyengar, and Previtro (2007 as cited in Linciano and Soccorso (2012, p. 17)) found that different investment decisions are made depending on how the outcome of a particular choice is presented.

answers to a risk tolerance questionnaire carries the flaws that Dunning et al. (2004) have identified.

In a recent study, Foerster, Linnainmaa, Melzer, and Previtero (2017, p. 1443) found that client characteristics, such as risk tolerance, gender and age, jointly explain only "12% of the cross-sectional variation in risky share".¹⁸ Klement and Miranda (2012) agree and point out that traditional industry approaches focus on socio-economic (or demographic) factors such as age, income, wealth, marital status, and gender to determine appropriate portfolios, but that such factors explain only a fraction of the variation in portfolios. Other factors may account for some of the unexplained variation in risky share: e.g. genetic predisposition to financial risk (Barnea, Cronqvist, & Siegel, 2010); the advisers' own characteristics (Foerster et al., 2017); whether the investor lives in a country with lower political stability or social cohesion (Wang, Rieger, & Hens, 2016); or life experiences with financial risk (Malmendier & Nagel, 2011; Ehrmann & Tzamourani, 2012). In addition, investors' measured risk preferences may vary depending on context (Harrison & List, 2004; Levitt & List, 2007). As such, "an investor might exhibit one set of risk preferences in a low stakes game in a laboratory setting or in answers to a questionnaire and quite a different set in real life" (Klement & Miranda, 2012, p. 12).

What can be derived from the above discussion is that the current questionnaire methodology is lacking in its ability to accurately measure an investor's risk tolerance and, as a result, to appropriately match the investor with the right portfolio allocation. While the problem appears to be primarily due to the poor content of the questionnaires (including issues of reliability and validity), the lack of linkage to investment recommendations, and the omission of other critical factors, there remain many questions as to whether risk tolerance is a stable trait that can be accurately captured by a questionnaire. Indeed, many practitioners question the stability or value of risk tolerance

¹⁸ i.e. the amount of equity risk taken by investors in their portfolios

questionnaires when they see clients act contrary to their stated risk tolerance.¹⁹

2.6 The Behaviour Gap

Why should it be of concern to regulators and policy-makers that questionnaires are not aligning investor preferences with the suitable investment? There is a demonstrated performance gap which creates long-term issues in an environment that is increasingly moving from defined benefit (DB) to defined contribution (DC) pension plans. As a member of a DB plan, individuals will receive defined retirement benefits without having to choose investments nor worry about the impact of market movements on the value of their pensions. Under a DC plan, the individual investor is responsible for properly investing her savings to generate the required rate of return to fund her future retirement lifestyle. Insufficient contributions and insufficient returns (i.e. performance gaps) may negatively impact her ability to fund her retirement lifestyle. In the aggregate, this will create public policy issues in the long-term.

How big is this performance gap? DALBAR, an industry research firm, reports that the average US equity mutual fund investor underperformed the US equity benchmark, the S&P500, by 3.6% in 2015.²⁰ On average, the holding period for these equity mutual funds is 3.46 years. DALBAR associates buying and selling at the wrong time as the chief cause of this underperformance. In fact, an academic study of mutual fund investors found that poor timing decisions resulted in annual underperformance of 1.56% over the period 1991 to 2004 (Friesen & Sapp, 2007).

This performance gap is not limited to retail investors (defined here as those with less than \$250,000 to invest). Even wealthier and presumably more

¹⁹ See, for example, <https://www.fa-mag.com/news/risk-tolerance-questionnaire-failure-14807.html> accessed on October 12, 2018 "Worse yet, research by the London office of Barclays Wealth Management on decision-making processes used by consumers and investors recognizes that risk is not a one-dimensional attribute (as assumed by risk tolerance questionnaires), but instead entails a complex and unstable multi-dimensional array of factors. This multi-dimensional attribute all but dooms risk tolerance questionnaires to the irrelevant (at best) or the misleading (at worst)"

²⁰ Source: "Quantitative Analysis of Investor Behavior, 2016," DALBAR, Inc. www.dalbar.com

sophisticated high net worth investors (HNWI) fall prey to the same behaviour. An analysis of more than 10,000 hedge funds (typically limited to investment by HNWI) found that poor timing decisions by hedge fund investors resulted in annual underperformance between 3 – 7% over the period 1980 to 2008 (Dichev & Yu, 2011).

Research on individual investor behaviour identifies four key groups of anomalies that are not captured in the current investment process which help crystallize the performance gaps highlighted above. First, investors typically do not understand the process by which security prices change. Indeed, they tend to view this process as deterministic rather than stochastic. This can be seen by the fact that investor sentiment tends to be largely a function of market performance in the most recent 100 days (De Bondt, 1998). Second, investors' perception of value is often misguided and easily influenced by external factors (Ariely, Loewenstein, & Prelec, 2006) or tips from friends or advisers (Shiller, 1990). Third, investors manage risk and return inadequately. Indeed, they underestimate the level of covariation between their holdings and the market (a key feature of the traditional risk-return model of investments) (De Bondt, 1998). Furthermore, while practitioners and academics view risk and return as positively correlated, they are negatively related in many people's minds (Ganzach, 2000; Loewenstein et al., 2001). Finally, their trading practices reflect an overly optimistic approach to life (Lovallo & Kahneman, 2003). As well, investors' trading practices tend to lag the market so that they are buying in bull markets and selling in bear markets (De Bondt, 1998). Thus, the evidence suggests that humans act in ways that are contrary to what the models assume and, as a result, they experience investment underperformance compared to what the models predict.

2.7 Perceptions vs. Preferences

The core question is whether risk-taking behaviour is linearly and positively correlated with risk tolerance, as the use of industry risk tolerance questionnaires would seem to suggest. For example, research into the factors

that MBA students used to assess whether they would start a new venture or not suggested that the key determinant was not their inherent risk preferences (i.e. is the person risk-averse or not) but rather their perception of the risk inherent in the venture (i.e. is the venture risky or not). The identical hypothetical scenario with the same information led some students to conclude that the venture was risky while others concluded that it was not (Simon et al., 2000). This difference in risk perception accounted for 33% of the variation in the decision of whether or not to invest in the new venture, despite the fact that all individuals had exactly the same information (Simon et al., 2000). Thus, there is a need to distinguish between the perception of risk and the propensity to take risk (Sitkin & Pablo, 1992).

In this context, whether one perceives a situation as risky or not has everything to do with one's beliefs about the decision, associated possible outcomes, and the desirability of those outcomes. Consider the case where two investors have similar risk preferences but one invests more in the equity market. The investor who demonstrates greater risk-taking behaviour may simply not perceive equity market investing to be as risky as does the other investor. This distinction between risk perception and risk preference is not captured in most risk tolerance questionnaires.

Barberis (2013) distinguishes between beliefs (the estimated subjective probability of an event occurring) and preferences (the value attached to that event occurring). Individuals frequently err in judging probabilities. Examples of such errors include fear of rare causes of death (Lichtenstein, Slovic, Fischhoff, Layman, & Combs, 1978) or buying insurance with low deductibles (Barseghyan, Molinari, O'Donoghue, & Teitelbaum, 2013). Even the classic example by Friedman and Savage (1948) of the same individual who buys both insurance (a risk-averse act) and lottery tickets (a risk-seeking act) can be explained, at least partially, in terms of errors in probability weighting - (overestimation of small probabilities in both cases). Similarly, Payne et al.

(2005) found that the overall probability of a gain or loss was critical in determining risk preferences.

However, as pointed out by Knight (2012), probability estimation - correct or incorrect - assumes that the decision is a choice under risk and not a choice under uncertainty. In the former, future outcomes will unfold as per a stable and predictable probability distribution (e.g. casino card games, slot machines, lotteries); in the latter, future outcomes will unfold in a manner wherein the probability distribution is unknown, i.e. not calculable (e.g. stocks, health, etc.) (Gigerenzer, 2014). While the following discusses choice under risk (which implies probability judgments), the reader is reminded that most investment decisions are more appropriately characterized as decisions under uncertainty, where probabilities of future outcomes may not be known.

Overestimation of small probabilities plays a role in individual decisions to bet on the long shot in a horse race (Snowberg & Wolfers, 2010) or on the next Google. Indeed, “(e)mpirical studies typically find that long shots (favorites) tend to have greater (smaller) subjective probabilities than objective probabilities.” (Golec & Tamarkin, 1998, p. 206). Further, “(o)ur results support risk aversion and skewness preference for race bets and could explain why individuals make other gambles such as lottery tickets. Moreover, we describe some observed bettor behavior that is consistent with skewness preference but inconsistent with risk preference.” (Golec & Tamarkin, 1998, p. 206).

Barberis (2013, p. 614) suggested that the Google example above can be characterized as an over-estimation of the probability that the stock you buy is the next Google; or, it can be that you over-weight “the state of the world in which the stock turns out to be ‘the next Google’”. He suggested that the distinction was important, as under- or over-estimation of probabilities (i.e. beliefs) is a mistake, while it is not clear if under- or over-weighting of outcomes (i.e. preferences) is a mistake. Such errors in estimation of probabilities may occur even if all parties have access to the same information. For instance,

attention and availability biases may impact the use of that information and confirmation bias, framing, overconfidence and other biases may influence the interpretation of that information. Therefore, access to the same information does not guarantee that all individuals will share homogenous beliefs.

Consider, for example, the variation in the decisions of subjects to start a venture in the research by Simon et al. (2000). All subjects were provided the same information about the venture and the risks involved. Therefore, following Barberis' argument, any differences in decisions can only be due to differences in preferences. As noted by other researchers, however, interpretation of information is subject to over-optimism and attentional and confirmation biases that lead to errors in the way information is processed (Barber & Odean, 2008; Lovallo & Kahneman, 2003; Shiller, Kon-Ya, & Tsutsui, 1996). Similarly, Sitkin and Weingart (1995) argue that risk propensity affects risk perceptions by impacting an individual's ability to notice and process risky attributes. Perceptions of risk are also impacted by experienced outcomes, positive or negative (Barberis, 2013; Lichtenstein et al., 1978). Simon et al. (2000) found that their subjects differed on their decision to start a new venture largely based on their heterogenous beliefs as to whether the venture was risky or not.

In a similar fashion, risk perceptions of market volatility increased dramatically after the 9/11 terrorist attack (Glaser & Weber, 2005). Citing market statistics, Weber et al. (2013) argued that risk-taking behaviour of individuals changes according to market conditions. Crucially, the data from Weber et al. (2013) supports the view that individuals' risk attitudes (i.e. what is typically measured in a risk tolerance questionnaire) are relatively stable even in periods of volatile market conditions; rather, it is the individuals' subjective expectation of risk that changes and thereby impacts their risk-taking behaviour. Furthermore, experimental findings suggest that the MVO concept of risk - standard deviation of returns - bears little relation to how investors actually perceive risk (Klos, Weber, & Weber, 2005; Weber et al., 2013).

Subjective evaluations of risk are more reflective of how individuals think about risk than numerical evaluations (Weber et al., 2013), mostly because they allow individuals to incorporate their hopes, fears and aspirations (Hoffmann, Henry, & Kalogeras, 2013a; Loewenstein et al., 2001; Lopes, 1987). The question of what impacts an individual's risk propensity and risk perception will be discussed later in Sections 3.3 – 3.6, but it is sufficient for the time being to conclude that perceptions (i.e. beliefs) of risk and return may have a greater role to play in investors' risk-taking behaviour than currently contemplated. If that is the case, the emphasis in the current industry practice of measuring risk attitude or tolerance will have shortcomings.

Interestingly, the perception of risk in investments differs markedly between investors and advisers, highlighting a potential area of concern. Typically, advisers, who are better equipped to recognize and incorporate uncertainty into their assessments, perceive financial products as less risky than do investors (Diacon, 2004). Diacon (2004, p. 82) attributes this difference in perception to reflect their "different understandings, values and measures". His observation that factors other than risk and return play a critical role in investment decisions for both investors and advisers is particularly noteworthy in the context of this thesis (Capon, Fitzsimons, & Prince, 1996; Diacon, 2004; MacGregor, Slovic, Berry, & Evensky, 1999). These findings were supported by research from Shapira and Venezia (2001) who studied performance of Israeli investors' portfolios that were either professionally or independently managed. The researchers found that the former group outperformed the latter and suggested that "differences may exist in the information the two groups possess or in the way they process it" (Shapira & Venezia, 2001, p. 17).

The preceding discussion supports the view that perceptions or beliefs may play a larger role in risk-taking decisions than previously contemplated. Beliefs can be characterized as one's general view on a current state of the world; expectations can be characterized as one's view on a specific outcome occurring in the future. In what follows, and for the purposes of this thesis,

perceptions, beliefs and expectations are used interchangeably as they relate to one's view of a specific outcome occurring, now or in the future.

2.8 Beliefs and Expectations

John Maynard Keynes and others argued that ex ante heterogeneity of beliefs is not only common but necessary for the efficient functioning of markets (Keynes, 1937 as cited in Dominitz and Manski (2011, p. 352)). Others have argued that perfectly informationally efficient markets (i.e. homogenous beliefs) are impossible, because if that view was correct there would be little reason to trade and markets would cease to exist (Grossman, 1976; Grossman & Stiglitz, 1980). One argument for heterogenous beliefs, even in the face of similar information, is that individuals process information differently, a central tenet to the emerging field of behavioural finance. The business students in the study by Simon et al. (2000) processed the same information differently to decide whether to invest in a new venture or not.

Further evidence of differential processing of the same information comes from stock trading behaviour. Barber and Odean (2008) found that active traders were overwhelmed by the amount of information available. Therefore, they only paid attention to a limited subset, something that Barber and Odean (2008) refer to as an attentional bias. Similarly, Shiller et al. (1996) found that the run up in Japanese equity prices in the late 1980s prior to the Nikkei crash was due largely to short-term price expectations. Shiller et al. (1996) found that despite having access to much of the same information, 73.5% of American respondents thought the Japanese market was overvalued in Q2 of 1989 compared to 26.6% of Japanese respondents. In managerial decisions, Lovallo and Kahneman (2003) found confirmation bias where individuals focused on information that confirmed their decisions or preferred course of action.

Evidence from neuroscience suggests that even when information is provided to correct prior beliefs, individuals are selective in the information

they choose to use to update their beliefs. For instance, individuals were asked to estimate their likelihood of experiencing certain events (e.g. a home robbery) and were then presented with the statistics of the likelihood of that event occurring to someone in a similar socio-cultural environment. When individuals were then asked to re-estimate the likelihood of personally experiencing these events, the researchers found that individuals selectively updated their beliefs, incorporating information that was better than expected, while not incorporating information that was worse than expected (Sharot, 2011; Sharot & Garrett, 2016). Thus, access to the same information does not mean that the same conclusions are drawn. This is a key departure that behavioural finance takes from neo-classical theory.

Other research found that Olympic athletes who won bronze were happier than those who won silver – even though the latter was objectively a better outcome. The authors attribute this phenomena to expectations of the athlete: the bronze medalist who was not expecting a medal was happier than the silver medalist who was expecting gold (McGraw, Mellers, & Tetlock, 2005, p. 440). The effect of expectations on emotions plays out as a counterfactual comparison – comparing the obtained outcome with what might have been. What is chosen as the benchmark can be the unchosen option (cf. Reb & Connolly, 2009; Zeelenberg & Beattie, 1997), aspiration levels (cf. Heath, Larrick, & Wu, 1999; Hoffmann et al., 2013a; Lopes, 1987) or even social peers (Buunk, Collins, Taylor, VanYperen, & Dakof, 1990).

Choices and decisions, such as whether to invest in the stock market or take an out of court settlement, are made on the basis of beliefs and expectations about the outcomes of different courses of action (Fox & Tversky, 1998). For instance, return expectations have been found to be a key determinant in investor decisions (Malmendier & Nagel, 2011; Vissing-Jorgensen, 2003; Weber et al., 2013). Expectations are based, in part, on the different interpretation of the same information. In researching investor and adviser behaviour, Linnainmaa, Melzer, Previtero, and Grace (2015) found that

most advisers invested their own money similarly to what they recommended for their clients. Frequent trading and return chasing behaviour was present in both advisers' own portfolios and the portfolios that the advisers recommended to their investors, leading the authors to conclude that it was differences in adviser beliefs that lead to the variation in the quality of advice provided to their clients (Linnainmaa et al., 2015).

2.9 From Expectations to Behaviour

How can we measure individual beliefs or expectations? Fox and Tversky (1998) argued that the classical approach of deriving beliefs from the observed choices of individuals is fraught with problems where, typically, beliefs precede preferences, which precede choice (or behaviour). They emphasized that decisions under uncertainty (where the probabilities are not known), which most real-world decisions fall into, are even further removed from the predictions of EUT than decisions under risk (where the probabilities are known).

In such decisions under uncertainty, they argued for a two-stage model: in the first stage, the individual assigns a probability P to an event (i.e. a belief); in the second stage, the individual transforms this probability P into a value using a risk-weighting function (i.e. a preference) (Fox & Tversky, 1998). This two-stage model differs from other models of decision under uncertainty as it deconstructs the decision under uncertainty into decisions under risk, which is assumed to satisfy the requirements of prospect theory (Kahneman & Tversky, 1979), and probability judgments.²¹

How are beliefs translated into behaviour? In his Theory of Planned Behaviour (TPB), Ajzen (1991, 2002) argued that human behaviour is largely determined by three types of beliefs: behavioural beliefs (beliefs regarding the outcome or consequences of a particular behaviour); normative beliefs (beliefs

²¹ See however, Section 2.7 for more discussion about the difference between decisions under uncertainty and decisions under risk.

with respect to how others, including family, friends and peers, expect one to behave); and control beliefs (beliefs individuals have regarding the factors that are within and outside of their control). Ajzen (1991, 2002) suggested that behavioural beliefs determine the attitude an individual has towards a particular behaviour, normative beliefs generate social pressure to act or not in a particular way, while control beliefs reflect how difficult or simple the individual believes the behaviour to be.

Ajzen (2002) argued that these three sets of beliefs lead to the formation of an intention to perform the behaviour, a view largely supported by meta-analytic research conducted by Armitage and Conner (2001). If, in addition, the individual has enough actual control over whether he or she can perform the behaviour, individuals will carry out their intention to perform the behaviour when the opportunity presents itself. The TPB suggests that individuals form beliefs about an item or decision by associating it with specific attributes; in the case of a belief or an attitude about a behaviour the link is between the attitude and the expected benefit or cost of that behaviour. Ajzen (1991) suggested that the attributes linked to a behaviour are automatically valued positively or negatively²² and, as a result, an individual automatically forms an attitude about that behaviour. Thus, individuals learn to favour behaviours associated with largely desirable consequences, and avoid behaviours associated with largely undesirable consequences.

Furthermore, there is an almost “prisoners’ dilemma” game theory approach to beliefs. Research by Egan, Merkle, and Weber (2011) suggests that investors use not only their own beliefs about investment returns but also their beliefs about the stock market expectations of others in their investment decisions. In addition, there is evidence that individuals hold onto erroneous beliefs even in the face of evidence to the contrary and choose to interpret new information in a manner that supports previously held views (Cohen, Aronson, & Steele, 2000; Sharot, Korn, & Dolan, 2011). This mindset is one explanation

²² see section 3.2 The Role of Emotions

of why the recovery from the Great Recession has been so slow and painful – no one believed it to be a likely event in 2007 and, ex post, individuals re-assessed the macro risk of the economy and their new beliefs endured long after the recovery had started and continued to impact their investment decisions (Venkateswaran, Veldkamp, & Kozlowski, 2015).

The preceding discussion supports the view that: (i) investment decisions are decisions under uncertainty and not decisions under risk; (ii) the departures from neo-classical theory imply a two-stage model where the critical first step is the formation of beliefs (which involves assigning probabilities to outcomes); (iii) individuals form beliefs about the behaviours, about social norms, and about control over these behaviours; and these beliefs form the intention to behave in a particular way; and (iv) intention, coupled with actual control over behaviour, will lead to an individual behaving in that particular way when given an opportunity to do so. This view is supported by the findings of Greenwood and Shleifer (2014) who found that there was a positive correlation between expected returns of investors and subsequent mutual fund inflows.

Similarly, Dominitz and Manski (2011, p. 352) argued that “(e)xpectations of equity returns are widely thought to be central determinants of investment in equities and other assets”. In the context of this thesis, the TPB can be applied as follows: investors believe that investing in equities will generate specific returns (behavioural beliefs); they believe that social norms would expect them to invest a portion of their portfolio in equities; and given their behavioural beliefs and their personal situation, they form beliefs as to how simple or difficult this behaviour is – not just in terms of making the investment decision, but also considering the fear, regret and excitement that may result from this decision.

Individual beliefs in these three areas are heterogeneous and, according to Dominitz and Manski (2011, p. 369), the variation in expectations they observed in their experiments must have come from “differences in the way people use public information”. Further, “understanding expectations

formation will also require intensive probing of persons to learn how they perceive their environments and how they process such new information as they may receive” (Manski, 2004, p. 1369).

In a similar vein, Hoffmann et al. (2013b) analyzed brokerage records and monthly surveys of individual investors from Holland between April 2008 and March 2009 – over the peak of the Great Recession. Their analysis found that investors’ past returns have a positive influence on return expectations and risk tolerance and a negative influence on risk perception. Interestingly, actual realized risk, even during extremely volatile markets, did not appear to be a key factor for investors in updating their return and risk expectations. The biggest driver of an individual’s future return expectations appears to be their past return experiences (Amromin & Sharpe, 2009; Greenwood & Shleifer, 2014; Hoffmann et al., 2013b, 2017).

In an analysis of the trading behaviour of HNWI for the period 1998 – 2002, Vissing-Jorgensen (2003, p. 147) found that expected returns were high at the peak of the bull market, contrary to what “the historical statistical relations would have predicted”. She also found that higher expected stock returns were strongly correlated with higher equity shares in an investor’s portfolio. Strong equity market performance in the recent past gives rise to expectations that these returns will persist in the future. As Shiller (2000, p. 53) noted in his classic book, “despite a sharply rising stock market over the past decade, average expectations among high-income individuals have on the whole also been rising since 1989”. It is no coincidence that this period of high expectations also contributed to the tech bubble of the 1990s, driving equity ownership of tech companies to a frenzy.

One of the key research questions in this thesis focuses on the role of individual beliefs (i.e. of return and risk expectations) in risk-taking decisions. This thesis tests if beliefs play a much larger role in risk-taking decisions than the current industry approach would suggest. The prevailing view of belief formation and updating is an information processing approach. What

information is processed and what heuristics are used in processing that information drive the beliefs that are formed. Research by Sharot (2011) and Sharot and Garrett (2016) supports the view that individuals process new information so that beliefs are updated selectively – a neurobiological basis for the confirmation / optimism bias. Therefore, personality traits²³ and learning from past experiences²⁴ may have a significant impact on how beliefs are updated.

2.10 Chapter Summary

The foundations of the investment industry are based on neo-classical finance. Industry practice involves three basic steps in constructing investment portfolios: (i) step 1 - identifying the universe of available investment portfolios; (ii) step 2 - identifying investor preferences, specifically risk preferences; and (iii) step 3 - pinpointing the portfolio that satisfies (i) and (ii). There are legitimate criticisms that can be made about some of the assumptions underlying the MVO framework in executing step 1. In the author's opinion, however, the main challenge lies in step 2 and that is the focus of this thesis: how to more accurately identify investor preferences.

The prevailing use of questionnaires to identify an investor's risk tolerance is fraught with challenges and has come under close scrutiny by regulators in recent years. Greater rigour in constructing questionnaires is needed, although the issue remains that individuals have limited ability to accurately self-assess. Research suggests that risk-taking decisions may be less a function of risk preferences (which is typically the focus of risk tolerance questionnaires) and more a function of risk perceptions. Risk perceptions define whether the investor believes her course of action to be risky or not.

Perception (or belief or expectation - used interchangeably in this chapter) has been shown to be the precursor to behaviour given the right

²³ such as the Big 5 - see Section 3.4

²⁴ see Section 3.6

circumstances. Return expectations, for example, have been shown to predict investing behaviour somewhat independently of risk attitudes or preferences. The role of return expectations in risk-taking decisions is a core area of investigation of this thesis.

If return expectations do predict risk-taking decisions, then what factors predict the formation of these expectations? This question is another key area of investigation for this thesis.

Chapter 3 Expectations

3.1 Introduction

We love to expect, and when expectation is either disappointed or gratified, we want to be again expecting. Samuel Johnson

... behavior is a function of salient information, or beliefs, relevant to the behavior. Izek Ajzen

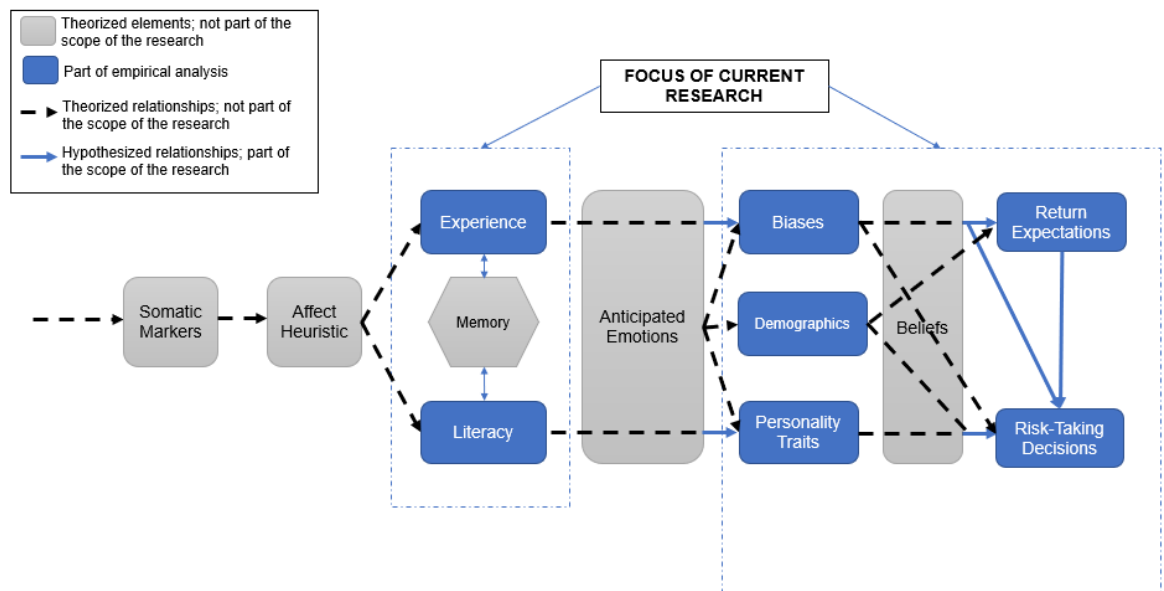
The preceding chapter presented the prevailing industry methodology in identifying investor risk preferences and highlighted some of the criticisms levelled against that approach. Prior research was also presented that argued that risk perception, rather than risk preference, was a key factor in risk-taking decisions. This view is supported by prior research that provided evidence that investors' return expectations drive their investing behaviour.

This then leads to the question of how expectations are formed and updated. This chapter reviews some of the current research on factors that influence the formation and updating of expectations. Figure 1 summarizes the theorized framework through which external stimuli work through emotions and expectations to drive individual behaviour. It also defines the scope of the research undertaken in the thesis. Certain aspects of the framework, for example the role of emotions, are discussed to provide the reader with the necessary foundation for the rest of this thesis. However, these elements are not exhaustively treated as they are not the focus of the research or analysis undertaken in the thesis.

The chapter is organized as follows. Section 3.2 outlines the role of emotions and feelings, specifically the affect heuristic and regret. Behavioural biases and their impact on expectations are discussed in Section 3.3. Section 3.4 explores the role of personality traits in risk-taking behaviour and the formation of expectations while section 3.5 describes the role of demographic traits in risk-taking behaviour. Experiential learning and associated memories are discussed in Section 3.6, while Section 3.7 covers the role of investment

literacy. Finally, Section 3.8 positions the background literature in the context of this thesis and its objectives, while Section 3.9 provides a brief summary.

Figure 1: The Emotion-Expectations-Decision Framework



Note: This figure represents the conceptual decision framework as it applies to risk-taking decisions. It is necessarily simplified and highlights the key mechanisms based on the literature. In particular, it should be noted that the relationship is portrayed as linear for illustration purposes; in reality, the different factors are highly inter-connected and the relationships are multi-directional. The figure also identifies what the subsequent material in this thesis covers and what it does not.

3.2 The Role of Emotions

Expected Utility Theory (EUT) is based on the premise that the processing of information, evaluation of outcomes, and decision to act or not are all based on purely cognitive processes. This “rational choice” model postulates that individuals evaluate the options that are available to them in a logical and objective fashion and then choose the preferred option according to some clearly defined criteria (usually utility maximization) (Levin & Milgrom, 2004).

Experimental work over the last several decades has demonstrated that individuals systematically violate the principles of EUT (Barberis & Thaler, 2003). The fact that the way a choice is worded can stimulate a 30% to 40% shift in preferences highlights the limitations of the rational choice model (Barberis & Thaler, 2003). Numerous axioms of decision theory are violated in

experiments, providing further support to the view that there are limits to the rational choice model (Kahneman & Tversky, 1979). Other factors must be at play, but what are these factors?

Increasingly, many researchers believe that emotions are one key factor in decision-making. In fact, in his Nobel-prize lecture, Daniel Kahneman described the affect heuristic (i.e. a type of emotional response – see below) as “probably the most important development in the study of judgment heuristics in the last decades” (Kahneman, 2003, p. 22). Weber and Klement (2018, p. 3) argue:

It is the emotional state of the individual investor that can change rapidly over time as circumstances change. Emotional responses are generally not "objectively reproducible": The same set of external circumstances might elicit very different emotions depending on the way these circumstances are "experienced" or processed by the individual.

Emotional reactions to outcomes are broader than simply the utility of the outcomes. Kahneman, Wakker and Sarin (1997) distinguished between experienced utility (the pleasure or pain of an outcome) from decision utility (the satisfaction of an outcome inferred from choice). Mellers et al. (1999, p. 342) found “that decision utilities are a component of the emotional experience, but not all of it. Emotional experiences also depend systematically on beliefs and counterfactual comparisons.” Recent work welcomes the role of emotions in providing additional inputs into decision-making (Damasio, 1994; Loewenstein et al., 2001). Slovic et al. (2004, p. 311) suggested that two complementary systems of thought – analytical and experiential – work in tandem and argued that “analytic reasoning cannot be effective unless it is guided by emotion and affect”. In this sense, part of the difference between experienced utility and decision utility may be the emotional experience. This allows us to fit emotions into the EUT framework. However, we do not yet know how to appropriately quantify emotions and therefore cannot mathematically calculate the impact of emotional experience on expected utility.

3.2.1 The Affect Heuristic

Zajonc (1980) was one of the first to suggest that feelings preceded rather than followed the cognitive evaluation of a choice. Zajonc (1980, p. 158) also argued that affective reactions do not depend on cognition: “(t)he cognition-based solutions to these problems [of preferences, attitudes, etc.] have rarely predicted more than 20% of the total variance”. Affective reactions are more rapid and instinctive than cognitive evaluations and are an evolutionary adaptation enabling quick reactions to threatening situations (Cosmides & Tooby, 2000; Loewenstein et al., 2001). Baumeister, Vohs, DeWall, and Zhang (2007, p. 170) suggested that such affective responses do not involve the “intense conscious experience” associated with emotions, although there may be some passing awareness of liking or disliking the stimulus. Furthermore, affective responses may “inform cognition and behavioral choice (p. 168)”, reminding individuals of past choices and their emotional outcomes, and serve as a map to what emotions may be anticipated because of the current choice.

Affective evaluations may differ from cognitive evaluations and, indeed, the former may overrule the latter. An interesting illustration of this phenomenon was demonstrated by Denes-Raj and Epstein (1994) where subjects had an opportunity to win \$1 every time they drew one red jelly bean from either: (i) a bowl with 9 white jelly beans and 1 red jelly bean; or (ii) a bowl with 100 jelly beans with between 5 and 9 red jelly beans. Subjects typically chose from the second bowl despite knowing that their objective odds were better in the first bowl, because the second bowl had “more” – “(s)ubjects reported that although they *knew* the probabilities were against them, they *felt* they had a better chance when there were more red beans (p. 819)”.²⁵

Other studies have demonstrated that affect is often a strong precursor to expression of preferences even without awareness and is independent of

²⁵ For further evidence that individuals do not handle probabilities well see, for example, Gigerenzer (2014).

cognition (Slovic et al., 2007). That is, an affect heuristic (or mental shortcut) is at work. People react to risks based on feelings that may only be loosely connected to cognitive evaluations of risk (Loewenstein et al., 2001; Slovic et al., 2007). Research by Shiv and Fedorikhin (1999) showed that affective responses are different from cognitive evaluations. In a series of experiments where subjects had to choose between fruit (low affect, high cognition) and chocolate cake (high affect, low cognition), the high affect alternative was chosen when processing resources were low and vice versa.

In addition, affective reactions differ from cognitive evaluations as situational factors play a significant role in the former. For example, (i) the temporal distance between decision and outcome, (ii) the vividness of memories or associations evoked, and (iii) the “evolutionary preparedness for certain emotional reactions” (Loewenstein et al., 2001, p. 274) are all situational factors that influence affective reactions. In a similar vein, Cosmides and Tooby (2000) approached emotions from an evolutionary psychology perspective and suggested that emotions have developed through natural selection. As such, emotions are master programs that trigger various physiological and mental sub-routines in the face of an external stimulus.

Damasio (1994) suggested that how vividly future outcomes are described (or visualized) is one of the key determinants of emotional reactions to that outcome. For instance, vivid imagers salivated significantly more than non-vivid imagers when imagining their favourite food (White, 1978). Loewenstein et al. (2001) cited a number of prior studies that illustrated this point. For example, how outcomes are described (e.g. factual vs. descriptive explanation of a car accident - Nisbett & Ross, 1980), use of specific emotionally charged wording (e.g. the specification of terrorist attacks as a covered risk in an insurance policy - Johnson, Hershey, Meszaros, & Kunreuther, 1993) or personal experience of adverse consequences (Weinstein, 1989) can all impact individual emotional reactions to risky choices.

The influence of vividness on emotional responses is one reason why there is insensitivity to variations in probability. Mid-range changes in probability of winning a lottery (e.g. a change from 30% to 40%) have little impact on the mental image of winning (Loewenstein et al., 2001). Thus, the affect heuristic is independent of probability calculations, a cognitive process, and instead depends on the feeling that an anticipated outcome evokes. The affective impact of increasing the probability of winning a lottery (for example, from 1 in 10,000,000 to 1 in 10,000) is much less than the impact of increasing the amount to be won (for example, USD 10,000,000 instead of USD 10,000). Loewenstein et al. (2001) argue that this is because the mental image created by the latter scenario is greater than the former – in other words, the affective response dominates the cognitive calculation. This is what Loewenstein et al. (2001) call the “all-or-nothing” characteristic of risky choice – feelings of fear in the face of decisions under risk or uncertainty cause individuals to be more sensitive to the possibility rather than the probability of a negative outcome.

Research by Hsee and Rottenstreich (2004) suggests that affective responses drive both assessments of the value of an outcome as well as the probability of that outcome. The authors tested two psychological processes to construct preferences: valuation by feeling and valuation by calculation. Valuation by feeling is highly sensitive to the presence or absence of a stimulus but is largely insensitive to further changes in scope. In contrast, under valuation by calculation, changes in scope are expected to have a relatively constant influence on value throughout the possible range. In an experiment with the purchase of Madonna CDs, valuation by feelings suggests that the amount a Madonna fan would be willing to pay is relatively insensitive to whether there are 5 or 10 CDs offered for sale; a non-Madonna fan, however, would likely employ a valuation by calculation methodology and is therefore willing to pay roughly double for ten CDs versus five.

Similarly, Rottenstreich and Hsee (2001) considered the impact of affective responses on judgments of probability in decisions under risk. In this

context, the authors conducted experiments which found that, for affect-rich outcomes, individuals are more sensitive to departures from impossibility (i.e. a probability of 0) and certainty (i.e. a probability of 100%) than intermediate probabilities. They found that under certainty an affect-poor prize (e.g. cash) is preferred to an affect-rich prize (e.g. kiss from your favourite movie star); however, under low probability there is a preference reversal.

Damasio proposed his somatic marker hypothesis ("SMH") as a way of explaining how emotions influence behaviour (Bechara & Damasio, 2005; Damasio, Everitt, & Bishop, 1996). In the SMH model, "marker" signals arising out of bioregulatory processes (e.g. heart rate, perspiration, blood flow to face, etc.) influence the processing of an individual's response to stimuli. Damasio refers to these marker signals as somatic to highlight the fact that they may arise not only in the body but in the part of the brain controlling that body part or function.

Damasio suggested that the body-state memories created by these marker signals, associated with specific situations and their associated outcomes, are not held permanently but are re-enacted when similar stimuli manifest themselves. The individual relies on these body-state memories, or affective responses, in processing the response to the stimuli (Damasio et al., 1996). Cosmides and Tooby (2000) suggested that emotions evolved as a form of natural selection to regulate physiological and mental responses to stimuli, closely reflecting the somatic marker hypothesis of Damasio (Bechara & Damasio, 2005; Damasio et al., 1996).

How does the affect heuristic impact investment decisions? Research in the investment domain suggests that affective responses to the image of a company drive expectations of future returns from investing in that company's stock (Ackert & Church, 2006). Negative perception of a company leads to poor return expectations; this leads to under-investment or dis-investment in that stock. The resulting downward pressure on the stock price leads to subsequent strong investment returns.

This process can be seen in the studies of “sin stock” returns (e.g. tobacco companies which generate negative affective sentiment in investors) by Fabozzi, Ma, and Oliphant (2008) and Hong and Kacperczyk (2009). These studies showed that subsequent stock price returns outperformed the market. Similarly, the affect heuristic and Damasio’s SMH model can be seen as playing a role in investment behaviour. The somatic markers and body-state memories of prior investment experiences, positive or negative, may exert an influence in subsequent investment behaviour. For example, some of these body-state memories (such as a positive prior experience) may manifest themselves as future behavioural biases (such as overconfidence), a topic discussed later in this chapter.

The interplay between emotions and expectations is complex and is beginning to be explored by both psychologists and economists. Frijda and Mesquita (2000) argued that emotion influences belief in two ways: (i) enhancing or diminishing existing beliefs; or (ii) giving rise to previously non-existent beliefs. Epstein’s cognitive–experiential self-theory (CEST) (Epstein, 1994) is a compelling argument that emotions serve as a trigger to recollect and recreate behaviour that produced pleasant outcomes in the past and vigorously avoid behaviour that resulted in unpleasant outcomes in the past, a view echoed by Cosmides and Tooby (2000). In this model, the recreation or avoidance of the behaviour stimulated by the emotion is due to the individual’s expectation that the same behaviour as in the past will result in the same outcome in the future. The experimental findings of Kuhnen and Knutson (2011) support the view that emotions not only drive individual preferences but also point to the way expectations are formed and updated.

3.2.2 Regret

Another emotion that is particularly relevant to investment decisions is regret. Regret is a negative counterfactual emotion that is experienced “when realizing or imagining that our current situation would have been better, if only we had decided differently. It is a backward looking emotion signaling an

unfavourable evaluation of a decision and is coupled with a clear sense of self-blame concerning its causes and strong wishes to undo the current situation.” (Zeelenberg & Pieters, 2007, p. 3).

The main tenets of Regret Theory are that: (i) making a choice has an emotional consequence for every decision-maker; (ii) these emotions include regret when the outcome of the foregone option would have been better and rejoice when the outcome of the foregone option would have been worse than the chosen option (e.g. Bell, 1983); (iii) these emotions have an impact on how decision-makers evaluate their decision over and above the evaluation of the outcome itself; and (iv) the impact of these emotions is often anticipated prior to the decision being made in the first place (i.e. anticipated regret) (e.g. Mellers et al., 1997, Zeelenberg & Pieters, 2007).

Regret affects decisions in two distinct ways: (i) post-decisional regret – regret leading to individuals attempting to question or undo a prior decision to mitigate experienced regret; and (ii) pre-decisional regret – an individual chooses so as to avoid or minimize the regret she believes may result from a particular decision (anticipated regret) (Zeelenberg, Beattie, Van der Pligt, & De Vries, 1996). Anticipated regret has led some researchers to the view that it leads to risk aversion, “(c)oncern about regret that may follow a bad decision promotes extreme risk-aversion” (Kardes, 1994 as cited in Zeelenberg et al., 1996, p. 149). However, Bell (1985) described a real-life consumer example (e.g. the purchase of a snow-blower) where anticipated regret can also result in risk-seeking behaviour. As such, assuming that people are regret-averse (as opposed to risk-averse) and thereby driven to choices that minimize regret (rather than minimize risk) is an alternative formulation of the classic choice problem (Bell, 1985, p. 119).

Thus, regret is another emotion that impacts investment decisions. As Pan and Statman (2012) observed, regret is not a factor that is explicitly explored in most risk tolerance questionnaires (see Section 2.5). Indeed, industry experience supports the view that a significant portion of the

behaviour gap described in Section 2.6 is attributable to regret (anticipated and post-decision).

3.2.3 Applicability of Emotions to this Research

As mentioned at the beginning of this chapter, emotions are a broad topic and the preceding discussion is not meant to be exhaustive. Further, the research questions and analysis of this thesis do not explore the nature or role of emotions. However, this section introduced two key elements of emotion – affect heuristic and regret – as prior research suggests they play a key role as the mechanism through which stimuli translate to behaviour in investment decisions. The purpose of the discussion, therefore, was to highlight the role that these emotional elements play in investment decisions.

3.3 Behavioural Biases

The rational model underpinning the neo-classical framework has considerable value as a normative model (or how one should behave), but performs markedly worse as a descriptive model (or how one actually behaves). Nobel-prize winner Herbert Simon recognized that natural limits to rationality, or “bounded rationality”, are common due to lack of information, limits on the abilities of humans to process information, and time pressures under which to act (Simon, 1957; Simon, 1972). Simon introduced, at the time, a very revolutionary concept: that individuals did not always seek to maximize utility (a core principle of EUT) but often were happy to satisfice (accept any option that meets a minimum threshold). Simon viewed this behaviour as not inherently irrational, despite contradicting EUT, as it meant that a satisficer saved time, effort and resources in not continually searching for the optimal solution.²⁶

²⁶ One of the main arguments against Simon's bounded rationality explanation was how one determined the point at which to stop maximizing and start satisficing. Lo addressed this issue by arguing that such points are determined through trial and error, and through natural selection, rather than analytically (Lo, 2004).

3.3.1 Heuristics

Tversky and Kahneman (1975) leveraged Simon's work to identify "heuristics", or mental shortcuts that individuals take, as well as behavioural or cognitive biases that unconsciously affect their decisions. Tversky and Kahneman (1975, p. 1124) pointed out that mistakes individuals make in subjective estimates of probability are similar to subjective assessments of size and distance. In other words, these estimates are susceptible to errors because "(t)hese judgments are all based on data of limited validity, which are processed according to heuristic rules."

They argued that these errors arise from the representativeness heuristic where the probability estimate is based on how representative one's experience to date is of the full spectrum of outcomes that are possible. As such, individuals are notoriously prone to: (i) ignoring the size of the sample (i.e. the larger the sample, the more likely that the probability of an outcome is representative of the population); (ii) misconceptions of chance (i.e. that a sequence or variability in a population is identically represented in a small sample); and (iii) failing to understand regression to the mean (e.g. that children will not always be taller or smarter than their parents).

Gigerenzer (2008) suggested that the use of heuristics is not due to cognitive limitations but rather due to their tractability and robustness. The former reflects the fact that many real-world problems are computationally intractable, meaning that no man or machine can calculate an optimal strategy even if one exists (this is arguably true, for example, for investing - see naive diversification in Section 2.2.3). Predicting uncertain future outcomes based on past data requires the noise in past information to be ignored. Heuristics that are robust function effectively by ignoring, limiting, or forgetting "noise". Lo agrees with Gigerenzer's characterization of heuristics (2004, p. 22):

Individuals make choices based on past experience and their best guess as to what might be optimal, and they learn by receiving positive or negative reinforcement from the outcomes. If they receive no such reinforcement, they do not learn. In this fashion, individuals develop

heuristics to solve various economic challenges, and as long as those challenges remain stable, the heuristics will eventually adapt to yield approximately optimal solutions to them.

Further, Lo (2004) explained behavioural biases as simply heuristics from an old environment that are no longer suited to the new environment. He argued that such biases are "maladaptive" rather than irrational, citing the example of a fish flopping on land whose actions appear as strange and unproductive but those same motions in the proper environment (underwater) are highly rational and effective.

3.3.2 Anchoring Bias

Maladaptive or irrational, behavioural biases are human tendencies to think in ways that lead to systematic deviations from what would be predicted under a neo-classical framework. One such bias that is prevalent in the investment context is the anchoring bias. In anchoring, individuals tend to use an initial data point for making subsequent judgments. Ariely, Loewenstein, and Prelec (2003) found that the act of writing down the last two digits of their social security number had a significant positive correlation with the price subjects were willing to pay for a bottle of wine. In an experiment involving a hypothetical shoplifting case, Englich et al. (2006) found that the act of rolling a pair of dice prior to the sentencing demand significantly influenced the sentence passed by experienced lawyers.

Similarly, Kaustia and Knüpfer (2008) found that professional investors anchored on their historical estimates, which were typically over-estimates, regardless of experience. Thus, the anchoring bias is both pernicious and unconscious, even in professionals who are well-trained and experienced to focus only on the facts pertinent to the case. The findings of Shapira and Venezia (2001) support the view that experience and training does not insulate individuals from the effects of biases. Their results illustrated that behavioural biases affect both professional and non-professional investors even though the effect was significantly larger in the latter (note, that in this case the bias was

the disposition effect, a behavioural bias reflecting the tendency to hold losing stocks and sell winners).

3.3.3 Herd Behaviour

Another bias is herd behaviour (also called peer group effect, bandwagon effect, or social comparison). Brown, Ivković, Smith, and Weisbenner (2008, p. 1511) found that individuals are more likely to be active in the stock market “when a higher fraction of individuals in the local community are stock market investors”. Social proof was found to be the driver of Wall Street analysts initiating research coverage of new firms. In other words, many research analysts began coverage of a new stock when peers had recently launched coverage (Rao, Greve, & Davis, 2001).

Engelberg and Parsons (2011) found that local media coverage of S&P 500 companies strongly predicted local trading of those stocks – a reflection of both attention bias and herd behaviour. Similarly, Engelberg, Sasseville, and Williams (2012) provided evidence that stock recommendations on a popular TV stock show in the US generated abnormal overnight returns on that stock of more than 3% on average. Counterfactual comparisons (i.e. comparisons to what has not occurred) are also prone to social comparisons and add to post-decisional regret (Huang & Zeelenberg, 2012).

3.3.4 Recency Bias

Recency bias is another common affliction affecting investors. It involves focusing on recent experience at the exclusion of earlier experiences when making decisions. For example, Nofsinger and Varma (2005) examined investors and their tendency to repurchase stocks previously held and sold. They found that a recency bias played a more significant role than the profitability experience with the stock being considered. This bias is another example of individuals having limited processing capacity and using rules of thumb to narrow their field of vision. The “hot hand fallacy” is similar to the

recency bias. For example, there is a belief that a basketball player is more likely to sink the next basket after a string of hits than after a miss (Gilovich, Vallone, & Tversky, 1985). In an experiment to analyze investment behavior, subjects could bet on a series of coin tosses based on a randomized expert's opinion, their own opinion or could choose a risk-free alternative (Huber, Kirchler, & Stöckl, 2010). Subjects who relied on the randomized expert chose in accordance with the hot hand fallacy – picking those who were successful in the recent past. An analysis of retirement investors in Sweden found that about 30% displayed classic “return-chasing” behaviour by choosing to invest in the previous year's best performing fund (Cesarini, Johannesson, Lichtenstein, Sandewall, & Wallace, 2010).

Research by Oechssler, Roider, and Schmitz (2009) suggests that the behavioural biases discussed above (see Hoffmann, Shefrin, and Pennings (2010) for other common biases) are not an indication of low cognitive ability. They found that although incidences of biases such as conjunction fallacy, conservatism and anchoring were lower for those with higher cognitive abilities, there nevertheless remained a substantial effect. This process may not even be conscious. For example, Lim (2001) suggested that perceived biases in analyst reports of earnings forecasts by companies may simply reflect a rational calculation by the investment analysts that such reporting will improve access to management and thereby improve future earnings forecasts.

Behavioural finance has helped dispel the myth that cognitive errors are only made by irrational actors. The reality is that an overabundance of information, limits to individual processing power and time constraints force individuals to take mental shortcuts. In many cases, these shortcuts make perfect sense and are an optimal solution husbanding scarce processing resources - this is the argument of tractability and robustness of heuristics made by Gigerenzer (2008). Occasionally, however, these shortcuts lead to errors which can have significant consequences. This can be particularly acute in the case of investing, given the plethora of information, the narrow framing

of outcomes and payoffs, and the propensity to engage in herd behaviour. Too often, unfortunately, biases drive sub-optimal decisions resulting in the type of performance gap highlighted in Section 2.6.

3.4 Personality Traits as a Predictor of Investor Behaviour

Carl Jung, the famous psychologist, was one of the first to observe that “it is one's psychological type which from the outset determines and limits a person's judgment.” (Jung, 1989, p. 207). Personality (or Jung's psychological type) is defined as “individual differences in characteristic patterns of thinking, feeling and behaving”.²⁷

Research has tied personality to transient affective states. There is increasing agreement among personality researchers that there are five main higher-order factors or personality traits (i.e. the “Big 5”): neuroticism, extraversion, openness, agreeableness, and conscientiousness (McCrae & John, 1992). In fact, extraversion predicted positive affect while neuroticism predicted negative affect, even when affect was measured again a decade later (Costa & McCrae, 1980). This suggests that personality traits are reasonably stable over time and that they are predictive of affective states and behaviour.

The concept of personality typology, and its relative stability, has been employed in many fields, including investing. A study by Filbeck, Hatfield, and Horvath (2005) explored whether personality types, as measured by one leading measure (the Myers-Briggs Type Indicator (MBTI)), was predictive of risk tolerance. Using variance and skewness of returns as the measure of risk tolerance, the authors found that: (i) MBTI-type does account, in part, for individual differences in risk tolerance; and (ii) the relationship between MBTI-type and risk tolerance is non-linear. Similarly, Pompian and Longo (2004) studied the biases and MBTI-types of 100 investors. They found that personality types and gender accounted for individual differences in

²⁷ <http://www.apa.org/topics/personality/> accessed on March 2, 2017

susceptibility to investor biases, prompting them to observe that “(i)n our view, investment policy statements should include investor personality type and gender profiles, so that investment programs can be adjusted accordingly (p. 9).”

Mooradian and Olver (1997) found that extraversion and neuroticism predicted positive and negative consumption-related affect respectively and, through the impact on affect, influenced post-purchase behaviour such as satisfaction, motivation to complain, to recommend, or to repeat the purchase decision. Are the Big 5 personality traits related to trading behaviour and investment performance? Durand, Newby, and Sanghani (2008) found that extraversion was linked to a lower propensity to trade and better investment performance while those higher in negative emotion and openness to experience chose higher risk in their portfolio and engaged in more trading activity. However, their use of a very small sample (21 investors who were all self-directed, which arguably already defines a personality type) restricts the generalizability of their findings.

Mayfield, Perdue, and Wooten (2008) investigated the link between the Big 5 traits, risk aversion and investment intentions of undergraduate students. They found that these traits did predict risk aversion and investment intentions: those high in extraversion were more likely to engage in short-term investing while openness to experience suggested an intention to invest for the long-term. Bucciol and Zarri (2017) found that agreeableness, cynical hostility and anxiety were negatively correlated with financial risk-taking. This study was based on large-scale survey data from the 2006–2012 waves of the US Health and Retirement Study (HRS).

Weber and Milliman (1997) argued that the distinction between risk perception (whether a course of action is seen as risky or not) and risk preference (whether a riskier action is preferred to a less risky action) is important. Risk propensity or “the tendency of a decision maker either to take or avoid risks” (Sitkin & Pablo, 1992, p. 12) is particularly relevant in the

investment context. Zuckerman and Kuhlman (2000, p. 1001) suggested that “(h)igh sensation seekers tend to appraise risk as lower than do low sensation seekers even for activities that they have never tried.”

MacCrimmon and Wehrung (1986) studied 500 business executives across a variety of risk measures based on theoretical grounds, naturally occurring situations or attitudes. The authors found consistent responses across distinct measures of risk-taking and were able to categorize the executives as consistent risk-seekers or consistent risk-avoiders. Weber, Blais, & Betz (2002) found that while risk perception may vary depending on the situational context, attitude to perceived risk was found to be broadly stable across a variety of situations. In addition, both general (sensation-seeking), across domains, as well as domain-specific (e.g. perceived risk) risk propensities were found. Weber et al. (2002, p. 283) argued that situational as well as person-centered characteristics jointly influence risk-taking:

Situational constraints include the content domain of the risky decision [i.e. investing, gambling, sports, etc.] as well as contextual variables such as outcome framing and aspiration levels (Lopes, 1987; March and Shapira, 1992). Person-centered characteristics include age, gender, culture and personality. Our results suggest that both sets of variables seem to influence risk-taking mostly by changing people's perception of the riskiness and benefits of decision alternatives, rather than affecting their willingness to take on more or less risk.

In this context, those who are inconsistent in their approaches to risk across different domains can be viewed as lacking a strong propensity to take or avoid risks. Further research by Nicholson et al. (2005, p. 170) suggests that risk behaviour is highly patterned at the individual difference level with some people likely to be consistently risk seeking, some consistently risk averse, “while a third group exhibit(s) domain-specific patterns of risk behaviour.” They suggest that risk taking in any domain is the result of a combination of general factors including age, gender, and several personality characteristics. Of particular relevance to this thesis, they suggest that (p. 170):

... personality profiles can be used to predict risk-taking in all of the measured domains as well as overall risk-taking. The general profile is strong and distinctive in terms of the Big Five. The pattern observed can be interpreted as follows: high extraversion (especially sensation-seeking) and openness supply the motivational force for risk-taking; low neuroticism and agreeableness supply the insulation against guilt or anxiety about negative consequences, and low conscientiousness makes it easier to cross the cognitive barriers of need for control, deliberation and conformity.

Other research looked at the interaction of personal factors and the phenomena of default options in many purchase decisions. Van Rooij and Teppa (2014) found that personal factors (procrastination – immediate or delayed execution of tasks; advice seeking – extent to which individuals seek advice before deciding; inertia – intensity of the *status quo* bias; and endorsement – the willingness to conform to the views of others) had significant impact on whether the default option was chosen or not. In other research, Huang and Zeelenberg (2012) found that personality had a significant impact on the choice of reference points for counterfactual comparisons.

Section 2.8 above discussed beliefs and how they may be formed and updated. Research by Olver and Mooradian (2003) suggested a link between beliefs and personality traits. These researchers found that personal values – “learned beliefs about preferred ways of acting” (p. 111) – are influenced in predictable ways by the Big 5 dimensions. Furthermore, in research involving twins, Loehlin, McCrae, Costa, and John (1998) found that more than 50% of variation along the Big 5 dimensions were genetic in origin with the remainder attributed to experiences unique to the individual, situational factors, etc. However, while personality traits may be heritable to an extent and may influence beliefs, general personality traits have limited ability to predict behaviour in specific situations (Ajzen, 1991). Ajzen’s TPB suggests that personality traits have an impact on specific behaviours by indirectly influencing how beliefs are formed (Ajzen, 1991).

Similarly, a connection between personality and emotion has been established by several researchers. For example, Franken, van Strien, Nijs, and

Muris (2008) found that those scoring high on impulsiveness as a trait were less able to manage their behaviour in the face of emotional responses to stimuli. Personality has been found, through a mediating effect on mood, to impact emotional processing of cues and the recall and use of information (Rusting, 1998). For instance, given the same mood induction task, individuals high in extraversion reported stronger positive affect than those low in extraversion (Rusting, 1998). A similar connection between personality and behavioural biases exists. A desire to preserve or maintain one's self-image, for example, magnifies the self-serving bias wherein individuals attribute failures to external factors and successes to internal factors (Campbell & Sedikides, 1999).

The preceding discussion, although not meant to be an exhaustive review of the literature in this area, suggests that personality traits, both general and specific, are linked to individual differences in risk tolerance and risk-taking behaviour. The mechanisms through which these personality factors affect risk-taking behaviour is an interesting question but beyond the scope of this thesis.

3.5 Demographic traits and risk-taking behaviour

Demographic traits have also been identified as a source of individual differences in risk aversion. Zuckerman (1994, p. 123) argues that "(d)emographic differences suggest alternative hypotheses of explanation, some to do with social learning and some with biological-developmental tendencies." Halek and Eisenhauer (2001) suggest that hormonal changes (through aging, exercise, etc.) as well as socialization and learning (through education, marriage, parenting, etc.) alter attitudes towards risk that manifest themselves as differences across demographic domains.

Gender and attitudes to risk has been widely investigated. In a meta-analysis on gender and attitudes to risk, for example, Byrnes, Miller, & Schafer (1999), found that women, in general, take less risk than men. This finding is supported by similar research findings (cf. Charness & Gneezy, 2012; Barber &

Odean, 2001). Research from Weber et al. (2002) suggests that this gender variation in risk taking is due more to systematic differences in risk perception between men and women than differences in attitudes to perceived risk. Roszkowski et al. (1993) attribute the difference to a greater tendency of men to have sensation-seeking personality traits compared to women. In contrast, Grable and Joo (1999) found the relationship between gender and risk-taking to be insignificant.

Age has been identified as another factor that affects risk taking. Sahm (2008) found that risk tolerance decreases with age (cf. Grable & Lytton, 1999a, 1999b). Riley and Chow (1992) found a parabolic relationship with risk aversion declining with increasing age, education and wealth until age 65, at which point risk aversion increased. In contrast, Wang and Hanna (1997) found that risk tolerance increases with age when other factors are controlled.

Marital status has been hypothesized as a factor linked to risk taking. Greater responsibilities, financial commitments and more dependents suggest that married people are more risk averse than their single counterparts. This view has been supported by several researchers, including Sung and Hanna (1996), Hallahan et al., (2004), and Yao and Hanna (2005).

Another factor associated with risk-taking is level of education. Grable (2000) argued that higher levels of education were associated with higher levels of risk tolerance. Increased levels of education (especially post-secondary) have been found to be linked to higher levels of financial risk tolerance (Hallahan et al., 2004; Grable & Lytton, 1999a; Sung & Hanna, 1996).

Wealth is an additional factor thought to be linked to risk tolerance and risk-taking. Hallahan et al. (2004) found a positive relationship between wealth and risk tolerance. McInish et al. (1993) found that both net worth and income are negatively related to risk aversion.

Thus, there is wide, though not unanimous, support that demographic traits are linked to risk tolerance and risk-taking behaviour. Indeed, Klement

and Miranda (2012) argue that these socio-economic factors explain a portion of the variation in portfolio choices. However, they caution that too many advisors and policy-makers rely almost exclusively on these factors to identify risk preferences of investors. Similarly, Grable and Lytton (1999a, 1999b) worry that an over-reliance on demographic factors could result in a mis-specification of the investors' financial risk tolerance. The mechanisms through which these demographic factors affect risk-taking behaviour is an interesting question but beyond the scope of this thesis.

3.6 Experiential Learning and Memory

In Section 3.2, emotions, in particular the affect heuristic and the associated somatic markers, were shown to have an impact on behaviour. Behaviour is predicted to be congruent with past actions that generated the outcome (or more specifically, the hedonic outcome) that an individual wishes to repeat (Epstein, 1994). In this model, affect heuristic and somatic markers trigger the recall of information from memory congruent with an individual's current feelings (Schwarz, 2000). Memory and experience, therefore, are key factors that influence belief formation.

What we choose to remember is linked to the mood that we are in. Mood is different from emotion in that it is a general positive or negative feeling unassociated with a specific stimulus. Isen, Shalke, Clark, and Karp (1978) postulated a cognitive loop whereby a good mood acts as a cue to congruent memories, which affects the individual's evaluation of the current situation and the associated expected outcome, which then drives decisions towards achieving the expected and desired outcome. As Hinson, Jameson, and Whitney (2002) found, affective responses need to be transferred from working memory into long-term memory to be coded into somatic markers in order for learning to occur and future behaviour to change.

Three types of memories can be distinguished: (i) procedural memory, which deals with how things are done; (ii) semantic memory, which is where

facts, rules and definitions are captured; and (iii) episodic memory, which is where personally experienced and unique episodes are stored (Tulving, 1985). Semantic memory reflects knowledge and is known; whereas episodic memory is relived and remembered. Tulving (1986, p. 1) states that "(t)o remember an event means to be consciously aware now of something that happened on an earlier occasion".

In experiments with undergraduate students, Rubin, Schrauf, and Greenberg (2003) found that the extent to which subjects recollected their memories was predicted by visual imagery, auditory imagery, and emotions, and that highly relived memories were almost always associated with strong visual imagery. But recollection of a past event does not mean that memory rebroadcasts a "play-by-play" of the dinner party or sporting event being relived. As such, how does one extract meaning from past experiences that occur over an extended period of time or "change in intensity or quality over time"? (Fredrickson, 2000, p. 579). There is ample evidence to suggest that evaluations of past affective experiences are as much constructed as they are relived.

For example, in one experiment subjects were asked to immerse their hand in ice-cold water for a short period of time; they were then asked to immerse their hand in water of the same temperature for a longer period of time but towards the end the temperature of the water was gradually raised (Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993). Subjects were then given the option of repeating the short or the long trial. A majority of subjects preferred the long trial; apparently, evaluations of episodic memories depend on the peak intensity experienced and the experience at the end of the episode, giving rise to the peak-and-end rule (Fredrickson, 2000; Kahneman et al., 1993). This is in line with the argument of Loewenstein et al. (2001, p. 271), that emotional reactions to risk depend on a variety of situational factors, including the "vividness with which consequences can be imagined, personal exposure to or experience with outcomes, and history of conditioning".

Thus, while a “play-by-play” review of an experience may be more objective, the peak-and-end rule is likely to be of more predictive value with respect to future behaviour. For instance, even though online (i.e. contemporaneous) reviews of a three-week bicycling tour highlighted bad weather, exhaustion and tiresome companions, the post-ride evaluation was significantly more positive (Mitchell, Thompson, Peterson, & Cronk, 1997). In an experiment of students’ predicted, online (i.e. contemporaneous), and remembered view of their spring break experiences, the best predictor of a desire to engage in a similar experience in the future was the remembered view (Wirtz, Kruger, Scollon, & Diener, 2003).

A similar model can be seen in investor behaviour. For example, investors who have recently experienced particularly rewarding outcomes, i.e. either a higher than average return or lower variability of returns, tend to increase their retirement savings rates compared to those who have had less rewarding experiences (Choi, Laibson, Madrian, & Metrick, 2009). Thus, investors, through a process of reinforcement learning, chase their own historical returns. As Choi et al. (2009) argue, such behaviour may be a sensible heuristic in many domains, as future rewards are often positively correlated with recent experience. However, this is not the case for investment returns which may follow a mean-reversion process (Lo & MacKinlay, 1988; Poterba & Summers, 1988). The results in their research led Choi et al. (2009, p. 211) to conclude that “we find no evidence that superior performance is persistent.”

Research suggests that reinforcement learning is the only effective way for individuals to learn about experience goods (e.g. wine). In this context, product information is useful, but personal experience is a precondition to determining the utility from consumption of that good. Equally, experimentation is necessary where it is a prerequisite to gathering information (Kaustia & Knüpfer, 2008). In risky choice decisions, research by Hertwig, Barron, Weber, and Erev (2004) found that decisions based on experience (e.g.

having gone on a date) led to dramatically different behaviour than decisions based on description (e.g. reading about someone else's date). In decisions based on description, individuals act as if they overweight the probability of rare events. In decisions based on experience, individuals act as if they underweight the probability of rare events due to reliance on small samples (i.e. adaptive sampling – see Denrell and March (2001) below) and overweight recently sampled information.

Similar behaviour was found among investors. Personally experienced positive returns in past IPOs was a key determinant of subscriptions to future IPOs for Finnish investors (Kaustia & Knüpfer, 2008). The authors used these results as evidence that investors learn through reinforcement learning where direct and actual outcomes affect future choices. This contrasts with the standard Bayesian model underpinning the EUT framework where all sources of available information are included. This “self-herding” behaviour describes a model, in contrast to the EUT framework, where actions do not just reveal but actually create preferences (Ariely & Norton, 2008). Ariely and Norton (2008) argue that, when individuals are called on to make a choice, they assess their own utilities but in doing so rely not only on their hedonic utilities (i.e. relatively stable preferences), but also on memories of their utility from their own past behaviours. The fact that the latter are often situation- and context-specific can lead to a view that this past “remembered” utility is indeed reflective of current preferences.

Underlying traditional models of choice is the presumption that individuals know the outcome distributions of the options before them, i.e. that individuals face decisions under risk and not decisions under uncertainty. In most real-life cases, however, individuals face the latter type of decision and there are no descriptions of the outcome distributions available to them; individuals must therefore rely on their sample of past outcomes. An interesting observation in this regard is that decisions under uncertainty that produce seemingly risk-seeking behaviour may, in fact, simply be a product of

an individual's evaluation of a small sample of a favourable sequence of outcomes (Denrell, 2007).

Poor past outcomes prompt individuals to reduce the probability of sampling the uncertain alternative. This model of adaptive sampling explains, in part, risk-averse behaviour where personal experience of success, and a desire to repeat success in the future, leads to a bias against risky and novel situations – something that Denrell and March (2001) refer to as the hot-stove effect. They used the example of a cat that steps on a hot stove and argue that this cat will likely never step on another stove – hot or not. That effect applies to investors as well. Similarly, Malmendier and Nagel (2011) found that individuals who experienced lower equity returns or higher volatility earlier in their lives had lower equity exposure in later years, providing further support to this model of reinforcement learning. Thus, the sample size of experiences and the order of those experiences play a significant role in subsequent decision-making.

Past preferences and behaviour may not have any direct impact on underlying tastes or on the intrinsic evaluation of a bottle of wine or an investment choice. However, the perception or memory of that past preference or behaviour that one recalls causes a different evaluation of the current choice than otherwise warranted. Ariely and Norton (2008, p. 15) argued that “behavior is based in part on observations of past actions, actions that have been influenced by essentially random situational factors – such as the weather – but that people interpret as reflective of their stable preferences”. Experience teaches people to anticipate future emotions and to behave in a way that is likely to produce the desired emotion (Baumeister et al., 2007). In this sense, beliefs are selectively updated and may result in more optimistic expectations for the future than objectively warranted (Sharot, 2011; Sharot & Garrett, 2016).

3.7 Financial Knowledge and Investment Literacy

Changing regulations (e.g. financial disclosure in Canada, fiduciary duty of care in the US), new technologies (e.g. robo-advisers) and changing public policies (e.g. increasing shift from defined benefit to defined contribution pension plans) place greater onus on investors for the management of their financial affairs. Worryingly, a substantial body of research suggests that: (i) financial literacy is lacking; and (ii) there is a direct link between financial literacy and savings behaviour and investment performance. Financial literacy can be viewed as acquiring relevant knowledge, facts, and rules, that are subsequently encoded into semantic memory, as described in the previous section.

For example, research by Lusardi (2011) and Lusardi and Mitchell (2011a) found that the majority of Americans cannot perform simple economic calculations and do not grasp basic financial concepts, such as compound interest, the difference between nominal and real values, and the basics of risk diversification (see Cordell (2001) above in Section 2.5, who argued that risk knowledge is a critical component of risk tolerance). Understanding of more complex concepts such as differentiating between stocks and bonds or basic asset pricing is even rarer. These findings are not restricted to the United States. In countries with developed financial markets such as Germany, the Netherlands, Sweden, Italy and Japan, low financial literacy continues to be a concern (Lusardi & Mitchell, 2011b). Notably, financial knowledge follows a U-shaped pattern - being lowest for the youngest and oldest age groups and peaking at middle age. This is consistent with knowledge growing with experience to middle age and decaying as one ages (cf. Agarwal, Driscoll, Gabaix, & Laibson, 2009).

Those who have planned for retirement accumulated three times as much wealth as those who did not (Lusardi & Mitchell, 2011a). Failure to plan is linked to a lack of financial sophistication. According to research findings by van Rooij et al. (2007), greater financial literacy is also linked to increased stock

market participation. Interestingly, however, these findings suggested that even a large majority of those with a university education do not hold stocks (van Rooij et al., 2007). Further, financial literacy was found to affect stock ownership over and above what pure measures of cognitive and numerative ability would predict (van Rooij et al., 2007). Thus, higher levels of education were not found to be positively correlated with financial literacy.

Lack of financial literacy was also found to be the key factor driving under-diversification of portfolios (Guiso & Jappelli, 2008). This research also found that investors who tended to be more risk-averse, older, with lower income or lower education levels also tended to be less financially sophisticated. Interestingly, the researchers found that self-assessed financial knowledge was often higher than actual knowledge (Lusardi & Mitchell, 2011b), an area of note for practitioners and policy-makers. Financial literacy was also linked to the likelihood that individuals chose the default option. Individuals with low financial knowledge experienced information overload more easily, and as a result, chose the default option more often (20%) than individuals with high financial knowledge (2%) (Agnew & Szykman, 2005). These findings have significant implications for the design and delivery of advice associated with investment solutions, which will be discussed in greater detail in Chapters 8 and 9.

Individuals with low financial literacy could presumably offset this gap by seeking advice from advisers, much as one would for tax advice from accountants or legal advice from lawyers. However, research by Calcagno and Monticone (2015) suggested that, contrary to expectations, those with greater financial knowledge tended to partner with advisers, while those low in financial literacy tended to either invest on their own or fully delegate their investment decisions. Research by Bhattacharya et al. (2012), based on a sample of 8,000 German retail clients, found that investors who need the most advice were the least likely to seek it. Furthermore, even those who obtain

advice rarely follow the advice and therefore are less likely to see improvements in their portfolio returns.

Taken together, this suggests that those lacking financial literacy are either not aware of their deficiency (reflecting the view of Dunning et al. (2004) that individuals are notoriously poor at self-assessments), or they are not convinced that consulting an adviser will suitably address the knowledge gap. Further, when that lack of financial literacy is not addressed by either skill or knowledge development or the willingness to seek advice, the behaviour gap identified in Section 2.6 is exacerbated. This creates problems for investors, advisers and regulators. It is also a major problem for public policy, as there is a higher risk that individuals do not accumulate sufficient resources for retirement and often are not even aware of this gap.

Research by Glaser and Weber (2007) suggests that in order for investors to learn (i.e. develop greater investment literacy) they need to understand, in an unbiased way, how they performed in the past. A study of 215 online investors found that experienced investors were better able to estimate their portfolio performance compared to inexperienced investors (Glaser & Weber, 2007). The researchers concluded that experience improves the ability to estimate and understand returns even if it does not reduce the impact of behavioural biases.

Prevailing theories of decision making assume that information is publicly available to all participants and a Bayesian learning model implies that all available information is incorporated into the decision-making. But availability is also influenced by an individuals' ability to recall pertinent information at decision time and the robustness of the heuristics employed by the individual (Gigerenzer, 2008). Research has shown that the conditions under which the information is encoded and the conditions under which the information is retrieved will usually differ. This has been found to have a significant impact on recall.

One study tested scuba divers who learned a list of words either underwater or on land and were then asked to recall the list either underwater or on land (Godden & Baddeley, 1975). Those who learned the words (i.e. had the information encoded) underwater had better recall (i.e. information retrieval) underwater than on land and vice versa. Similar research suggests that replicating the conditions of encoding at time of retrieval significantly improves recall. Experiments by Ryack and Kida (2006) suggested that recreating the conditions of encoding through mental imagery substantially improves the recall of financial information. Ryack and Kida (2006, p. 219) concluded that “the use of simple techniques to improve memory by mitigating the detrimental effects of an encoding and retrieval mismatch could result in more informed investment decisions”.

3.8 Positioning this Thesis

There are several gaps in the existing literature. To the best of the author’s knowledge, little research exists that examines the behaviour of Canadian investors or Canadian advisers (one recent exception is Foerster et al., 2017), while such research exists for the US (cf. Barber & Odean, 2000; Durand et al., 2008), the UK (cf. Diacon, 2004; Weber et al., 2013), and Germany (cf. Bhattacharya et al., 2012) to name a few. Also, there has been little research on the investment decision process from the point of view of both the investor and the adviser (rare exceptions include Shapira and Venezia (2001)).

Furthermore, most research in this field was in the form of evaluating aggregate trading data (cf. Barber & Odean, 2000; Barber & Odean, 2008; Bhattacharya et al., 2012; Weber et al., 2013) or conducting choice experiments (cf. Fox & Tversky, 1998; Kahneman & Tversky, 1979). This thesis aims to fill the gap by (i) analyzing behaviour of Canadian investors and advisers and (ii) complementing a quantitative analysis of the determinants of individual expectation formation and risk-taking decisions with qualitative interview data from a small sample of investors and advisers.

In addition, to the extent that the behaviour of individual investors has been analyzed (cf. Hoffmann et al., 2013b; Merkle & Weber, 2014; Weber et al., 2013), short-term trading behaviour (1-3 months) of largely self-directed investors was analyzed. This thesis contributes to the literature in that it focuses on investors' behaviour with respect to longer-term investments (for retirement in 15 years' time) and investors who delegate a significant part of their investment decisions to advisers.

Specifically, this thesis aims to answer the following primary research question:

What determines risk-taking decisions in the practice of financial advice?

This primary research question developments prompted a number of sub-questions that are investigated in this thesis:

1. Do behavioural biases affect investors' return expectations and risk-taking behaviour?
2. Do personality traits or demographics affect investors' risk-taking behaviour?
3. Do risk tolerance or return expectations predict investors' risk-taking behaviour?
4. Do behavioural biases affect advisers' return expectations and risk-taking advice?
5. Do personality trait or demographics affect advisers' risk-taking advice?
6. Do advisers' return expectations predict their risk-taking advice?
7. Do investment literacy, experience or risk aversion affect investors' return expectations and risk-taking behaviour?
8. Do investors update their risk-taking behaviour when new information is provided?
9. Does advisers' perception of their clients' investment literacy or experience affect their return expectations and risk-taking advice?

10. Does advisers' risk aversion affect their return expectations and risk-taking advice?

In the empirical chapters to follow, the specific hypotheses developed to answer these questions are described in greater detail. The qualitative chapter focuses on semi-structured interviews with a purposive sample of investors and advisers. The objective of the qualitative chapter is to explore the same research questions but from a different perspective. Creswell (2014, p. 2) suggests that a "core assumption of this approach is that when an investigator combines statistical trends (quantitative data) with stories and personal experiences (qualitative data), this collective strength provides a better understanding of the research problem than either form of data alone."

3.9 Chapter Summary

The discussion in this chapter outlines how expectations are impacted by affective responses to stimuli, episodic and semantic memory, personality traits, behavioural biases, and reinforcement learning. In the context of investment behaviour, financial literacy has been shown to be a key determinant of both expectations and stock market participation.

Revisiting Figure 1 from earlier in this chapter, an investor is faced with an investment decision (the stimulus), for example whether to invest in the equity or fixed income markets, which triggers somatic markers captured in the body from prior investment experiences. These somatic markers trigger an affect heuristic towards the investment decision, creating a preliminary, almost instinctual, reaction whether to invest or not. The affect heuristic then causes the individual to recall episodic memories (i.e. of past investment experiences) and semantic memories (i.e. of current investment knowledge or financial literacy) that generate anticipated emotions of the outcomes the individual expects from his or her investment decision. Taken together, memories of past decisions and anticipated emotions of likely outcomes from the current decision generate expectations, for instance, what types of returns the investor expects from an investment in the equity markets and what the likely emotional

reaction would be if she either receives those returns or does not receive those returns.

These expectations are also influenced and impacted by personality traits (e.g. extraversion, openness, neuroticism, etc.) and by behavioural biases (e.g. anchoring, recency, social proof, etc.). An investor's expectations, formed by a combination of memories of past experiences, financial literacy, anticipated emotions, personality traits and behavioural biases, then manifest themselves as return expectations and risk-taking behaviour (e.g. to invest in the equity markets). Research has also shown that demographic variables (such as gender) play a role in trading behaviour (Barber & Odean, 2001). Furthermore, research has also shown that differences in investing behaviour between investors and advisers are, in large part, due to differences in expectations. Therefore, understanding the expectations, as well as the investing and advising experience of investors and advisers, will be key to ensuring that investment recommendations are suitable. This is of profound interest to investors, advisers, investment firms and regulators.

Chapter 4 Methods

4.1 Introduction

This thesis sought to determine what factors drive risk-taking behaviour in investors and risk-taking advice from advisers. An explanatory sequential mixed methods design was used to answer the research questions. Data, quantitative and qualitative, was collected and analyzed in two distinct phases. In Phase 1, quantitative data was collected from representative samples of investors and advisers using an analytic survey and a quasi-experimental design. In Phase 2, the findings from Phase 1 were used to inform and design qualitative data collection using semi-structured interviews. The rationale for choosing a mixed methods approach was that “both forms of data [quantitative and qualitative] provide different types of information ... each type of data collection has both limitations and strengths ... [t]his ‘mixing’ or blending of data, it can be argued, provides a stronger understanding of the problem or question than either by itself” (Creswell, 2013, p. 215).

Prior investigations of risk preferences, attitudes and behaviours in the investing context have been overwhelmingly quantitative in nature. However, the nuances that drive different behaviours under similar circumstances are better understood from a qualitative perspective.

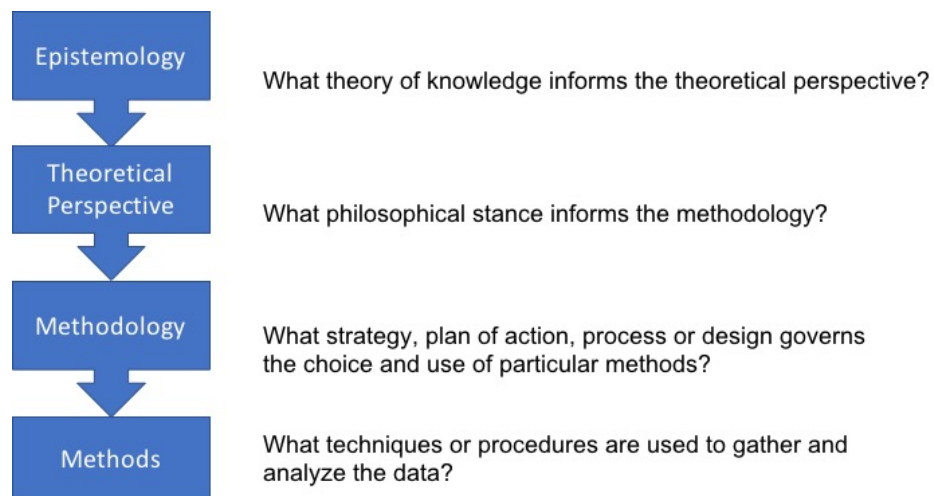
This chapter is laid out as follows. The philosophical underpinnings of this thesis are set out in Section 4.2. Section 4.3 summarizes the pilot project that was the foundation for the present thesis. Section 4.4 describes the quantitative and experimental methodology used in this thesis and is grounded to referent quantitative studies. The described methodology, including overviews of the instruments used to measure personality traits, experimental manipulations, measures of expectations, etc., informs the research design employed in the subsequent empirical chapters. Section 4.5 describes the

rationale, data collection and analytical methods used in the qualitative analysis of this thesis. Finally, Section 4.6 provides a summary of this chapter.

4.2 Philosophical Paradigms: A Pragmatic Worldview

As summarized in Figure 2, Crotty (1998) suggested four broad questions that should guide the research process in the social sciences:

Figure 2: The Four Questions in the Social Science Research Process



The following sections outline the answers to these four questions for the purposes of this thesis.

4.2.1 Epistemology

Epistemology in the social sciences is the general underlying theory of how knowledge is gained, or the “worldview” of knowledge. The research in this thesis is grounded in a pragmatic worldview. Creswell (2013) describes it as an approach that stems from a focus on solutions to problems. In this view, the methodology is secondary to the research problem and all approaches are employed to understand the problem. As Cherryholmes (1992, p. 13) explained, “(f)or pragmatists, values and visions of human action and interaction precede a search for descriptions, theories, explanations, and narratives.” He further elaborated (p. 14):

Beginning with what he or she thinks is known and looking to the consequences he or she desires, our pragmatist would pick and choose how and what to research and what to do. Because some of these strategies work at cross-purposes to his or her desired community and ways of interacting, our pragmatist simply eliminates them as possibilities for his or her classroom.

A pragmatist's choice of explanations or theories is driven by whether the theories produce the desired results. In this sense, pragmatists are less concerned with whether explanations are accurate pictures of reality and more concerned with whether the chosen approach is appropriate to produce the desired outcome (Cherryholmes, 1992).

Summarizing Creswell (2013, p. 11):

- Pragmatism is not committed to any one system of philosophy and reality.
- Truth or reality is what works in the particular time and context of the study.
- Pragmatists approach the what and how of research with the intended consequences in mind.
- Pragmatists believe that research always occurs in social, historical, political and other contexts.
- For pragmatic researchers, multiple methods, different worldviews and different assumptions lead to different forms of data collection and analyses.

The aim of this thesis was to understand the behaviour of individual investors and advisers from a descriptive rather than a normative stance. In this context, the primary focus was on identifying factors that explained and predicted behaviour in investment decisions. Knowing these factors is expected to provide all stakeholders with insight into how to improve the current practice. Given this aim, a pragmatic worldview is appropriate.

4.2.2 Theoretical Perspective

In a pragmatic worldview, one single theory may not be enough to fully address the research questions at hand. There is a gap in the existing

literature in investor behaviour, as much of the prior research has focused on a quantitative perspective, i.e. aggregate trading data analysis, general economic surveys or specialized questionnaires, laboratory experiments, etc. The results have painted only a part of the picture of why, when and how investors take risks.

To fill this gap, both phases of this thesis, quantitative and qualitative, have taken a postpositivist theoretical perspective. Postpositivists hold the view that an objective and independent reality does exist and that knowledge is gained through careful observations and measurement. However, because all observation and measurement is inherently fallible, the truth can only be approximated and can never be completely discovered (Gray, 2004).

Given the pragmatic perspective of this thesis, the ontological and epistemological debates about the nature of reality and the role of knowledge were not considered. The primary focus was centred on the research objectives and the questions motivating this thesis. The empirical nature of the problem at hand – the risk-taking decisions of investors and advisers – led to a deductive and inductive approach. A top-down deductive quantitative analysis was used to provide an understanding of the factors involved, while a bottoms-up inductive qualitative analysis was used to provide a more nuanced view of the personalized experiences of the individual participants.

4.2.3 Research Approach and Methodology

Creswell (2015, p. 2) argues that mixed methods research is an approach where the “investigator gathers both quantitative (closed-ended) and qualitative (open-ended) data, integrates the two, and then draws interpretations based on the combined strengths of both sets of data to understand research problems.” The explanatory sequential mixed methods design is one where the researcher collects quantitative data in the first phase and then uses the results to “plan (or build on to) the second, qualitative phase.” (Creswell, 2014, p. 224). Typically, the process involves collecting

survey data in the first phase, analyzing the data which then informs the design and collection of interview data to further help explain the survey responses. Creswell (2014) suggests that the explanatory sequential mixed methods design may be appropriate for fields relatively new to qualitative approaches.

The author selected this approach to the current thesis. As per Creswell (2014)'s caution, qualitative approaches to studying investment decision-making is relatively new. The prior literature in this field was the starting point for the current research and all of the key authors explored similar issues using analytic surveys and hypothetical investment tasks or actual trading data (cf. Weber et al., 2013; Merkle & Weber, 2014; Hoffmann et al., 2013b). Thus, the quantitative analysis phase was the necessary first step. The survey questions used in this phase were entirely closed-ended and the response categories were either developed (i) by the researchers who created the instrument or measure used or (ii) in consultation with industry professionals and the author's supervisors.

The qualitative phase was designed to be conducted after the quantitative phase and the former was designed to be informed by the latter. This is the main reason that participants to the quantitative study were encouraged to provide email addresses so that they could participate in follow-up studies. However, the exact nature of the questions that would form the starting point for the semi-structured interviews and the sample of participants that would be interviewed was not designed at the outset; instead, the analysis of the results of the quantitative phase were used to inform both sample selection and interview question content. The subsequent in-depth, semi-structured interviews consisted of individualized questions intended to be open-ended (as opposed to the closed-ended questions in the first phase). In this manner, the intent was to explore particularly interesting results or unanswered questions from the first phase. Indeed, Gray (2004, p. 370) suggests:

There are a number of situations in which the interview is the most logical research technique. If the objective of the research, for example, is largely exploratory, involving, say, the examination of feelings or attitudes, then interviews may be the best approach. The use of semi-structured interviews also allows the researcher to 'probe' for more detailed responses where the respondent is asked to clarify what they have said.

The quantitative phase of this thesis utilized a deductive approach where one starts with a universal view of a situation and then works towards the particulars (Gray, 2004). In this thesis, two methodologies were used for this deductive approach: (i) an analytic survey; and (ii) quasi-experimental research. Analytic surveys seek to test a theory in the field by exploring the association between independent and dependent variables. Quasi-experimental research goes beyond observing variables in the field and seeks to manipulate the independent variable(s) to measure the resulting effect on dependent variables. In this thesis, an analytic survey was used to identify demographic variables and personality traits and their association with return expectations and risk-taking decisions. In addition, an experimental manipulation was used to determine whether return expectations and risk-taking decisions would be affected by exposure to scenarios designed to stimulate various behavioural biases.

The qualitative phase of this thesis utilized a thematic analysis approach. Braun and Clarke (2006, p. 79) define the approach as follows:

Thematic analysis is a "method for identifying, analysing and reporting patterns (themes) within data. It minimally organizes and describes your data set in (rich) detail.

Furthermore, the analysis relied on the systematic analysis and processes described in grounded theory methodology. Charmaz (2006, p. 2) defined grounded theory as "systematic, yet flexible guidelines for collecting and analyzing qualitative data to construct theories 'grounded' in the data themselves". However, the approach to data collection and the sequential nature of the design does not support a claim that the approach used is pure grounded theory. Nevertheless, this approach of thematic analysis informed

by the structure of grounded theory has been employed successfully in other research (cf. Tuckett, 2005). Semi-structured interviews were used with investors and advisers to explore, *inter alia*: (i) the factors that influence how return expectations are formed and updated; (ii) what investment risk actually means to them and how they measure it; and (iii) other factors involved in the investment decision process.

4.2.4 Research Design and Methods

Research design refers to the type of inquiry and procedures employed by the researcher in answering her research questions (Creswell, 2013). The research design in this thesis is mixed methods and is an explanatory sequential design beginning with a quantitative analysis followed by a qualitative analysis, providing colour to the first (Creswell, 2014).

The benefit of using a mixed methods approach is that data may be mixed. As a result, the knowledge gained is more meaningful than either model could deliver independently (Creswell & Clark, 2007) and therefore this method of inquiry is most suited for addressing the research aims of this thesis. The quantitative analysis was critical in establishing a generalizable model of factors that impact investment decisions. Most prior research in this field has stopped with the quantitative analysis.

However, there is much to be gained from supplementing the quantitative analysis with qualitative data. What do individual investors and advisers think about when they choose or recommend portfolios? How does one factor in prior experience, knowledge, peer pressure or personality traits? What process do investors and advisers follow? The relationship between an adviser and investor is one based on trust and mutual chemistry. Can quantitative data alone capture why some advisers have happy clients and others do not? Investment performance by itself cannot be the whole explanation.

In this thesis, the implementation of the explanatory sequential design started with questionnaires, including previously validated instruments, and a quasi-experimental design, followed by semi-structured interviews. The data from the questionnaires was analyzed using robust statistical analyses including, but not limited to, Multivariate Analysis of Variance (MANOVAs), multiple linear regression, logistic regression and Structural Equations Modelling (SEM).

Using a criterion-based purposive sampling approach (see Section 4.5.2.1 below), a subset of the participants from the quantitative phase were then the subjects of semi-structured interviews. The interview findings were coded and analyzed with a view to develop broader insights above and beyond the conclusions derived from the quantitative data. A unique feature of this thesis was that the design and methodology used for investors was replicated for advisers, providing a more holistic view of the investment decision process.

4.3 Pilot Project

This thesis was motivated by a pilot project undertaken in the fall of 2015 and completed in early 2016. The objective of this pilot project was to assess whether risk tolerance questionnaires were accurate predictors of an individual's risk-taking behaviour. Specifically, whether different advisers, provided with these risk tolerance questionnaire results for the same individuals and a given investment opportunity set, would arrive at similar portfolio recommendations.

Hypothesis A: Portfolio recommendations of different advisers, given one set of client data and risk tolerance scores, and one investment opportunity set, are similar for the same client.

The design of the pilot project was a between-subjects, experimental design involving a planned intervention. Experiment 1 involved 10 HNWI clients of the author's prior firm that had their investments managed on a discretionary basis ("PP investors"). All PP investors were asked to complete an anonymized industry risk tolerance questionnaire and provide their

demographic data. Two of these clients each had two portfolios being managed for different investment objectives. However, the demographic information and risk tolerance scores were the same for both of their respective portfolios ("PP multi-goal investors").

The subjects of the pilot project were advisers that the author approached to participate in this pilot project ("PP advisers"). Seven PP advisers, each with more than 10 years of experience working with HNWI at third-party firms, participated in this pilot project. In Experiment 1, the PP advisers were provided with the background materials for the 12 portfolios (8 PP investors, 2 PP multi-goal investors with 2 portfolios each). The available investment opportunity set was composed of 8 specified mixes of traditional asset classes (i.e. Canadian equity, US equity, International equity, fixed income, etc.) ranging from 30% equity (least risky) to 100% equity (most risky). No information was provided to the PP advisers at this stage regarding the expected return and risk of these portfolios.

Non-parametric tests resulted in the rejection of hypothesis A as the 7 PP advisers did not make similar portfolio recommendations when provided with identical information. Friedman's ANOVA, which was significant with a $\chi^2(2, N = 12) = 26.074, p = .000$, indicated that there were differences between the recommendations by the PP advisers. Kendall's W test produced a coefficient of concordance of 0.362, indicating fairly strong differences among the 7 PP advisers. An analysis of correlations between the risk tolerance scores and the PP adviser recommendations illustrated that there was a very low correlation for at least 2 PP advisers. These results suggested that factors other than risk tolerance scores had influenced the portfolio recommendations. For the PP multi-goal investors, the correlations between each of their 2 respective portfolios was 0.696 and 0.500 respectively. This was much lower than one would intuitively have expected, given identical risk tolerance scores and demographic data for each of the two portfolios.

Once the PP advisers' responses to Experiment 1 were received, Experiment 2 commenced. The PP advisers were provided with two additional pieces of information ("Additional Data"): (i) the required rate of return to meet the investment objectives of each PP investor and each PP multi-goal investor; and (ii) the expected rate of return and risk for each of the 8 portfolios in the investment opportunity set.

Hypothesis B: The advisers incorporate the investors' required rate of return and choose the portfolio out of the available set that most likely meets the return requirement of the investor.

In Experiment 2, the PP advisers were asked to evaluate the Additional Data and to confirm whether they would maintain or change their initial recommendation and provide their reasons. Responses from 4 PP advisers indicated that only one of them would use the Additional Data to change their initial recommendations and that this PP adviser would change 6 out of the 12 PP investor recommendations, in each case now recommending a riskier (i.e. more equity exposure) portfolio. The other 3 PP advisers did not make any changes as they viewed the implied risk associated with the required rate of return as inconsistent with the investors' risk tolerance scores. In the face of this conflict, these 3 PP advisers chose to rely on the risk tolerance scores over the PP investors' required rate of return. However, each of these PP advisers indicated that they would engage in further dialogue with the PP investors to reconcile this discrepancy.

The results of this pilot project raised a number of questions: (i) were the PP advisers incorporating different beliefs about the risk and return of each of the specified asset classes in arriving at their different portfolio recommendations for the same client?; (ii) how did these beliefs get formed?; (iii) were the PP advisers relying on factors other than that provided by the demographic data and risk tolerance details?; and (iv) when faced with multi-goal investors, why did PP advisers relying on the same risk tolerance

questionnaire results recommend two completely different portfolios? This thesis was designed to answer these questions.

4.4 Quantitative and Experimental Study Design

The analysis described in the forthcoming chapters was inspired by prior research into investor and adviser behaviour. To that extent, it may be useful for the reader to have a brief overview of the approaches taken in some of these earlier studies.

As stated earlier, one of the aims of this thesis was to understand: (i) how expectations of return and risk shape risk-taking decisions; and (ii) what factors influence belief formation and updating. Given these objectives, the quantitative phase of this thesis was designed to investigate the impact of the following on risk-taking decisions: (i) expected return and risk; (ii) demographic and personality traits; (iii) investment experience; (iv) investment literacy; and (v) behavioural biases. This analysis was conducted from both the perspective of the investor and of the adviser.

4.4.1 Expected Return and Risk-Taking Behaviour

Greenwood and Shleifer (2014) reported that investor expectations about return were positively correlated to mutual fund inflows. Vissing-Jorgensen (2003) argued that there was value in directly analyzing investor expectations, rather than modelling aggregate market behaviour. As such, expectations may be considered a good proxy of actual behaviour and are a key focus of this thesis. Weber et al. (2013) investigated how investors' expectations of risk and return, self-reported risk attitude and willingness to take risk, changed during the period between September 2008 and June 2009 – the height of the Great Recession. The sample was drawn from Barclay's online brokerage customers in the United Kingdom, and the participants were surveyed online every 3 months.

The sample of participants (479 completed the survey out of 19,251 who were invited to do so) was determined to be representative of the client base. To rule out selection biases, Weber et al. (2013) compared the sample to the British population. While the sample was not reflective of the British adult population, the authors concluded that the sample (skewed male and higher income) was representative of the population of online investors. The low response rate was similar to other studies in the field, reflecting the difficulties of gathering data. For their subsequent surveys (every 3 months), the number of respondents declined (259 investors participated only once, 138 twice, 131 three times and 89 all four times), a reflection of the difficulty in conducting longitudinal research. Both factors (low response rate and fall-off in participation) informed the methodology for this thesis to (i) use online snowball sampling and (ii) limit data collection to cross-sectional data.

The design of Weber et al. (2013) included questions to determine quantitative judgments of expected returns and risk (calculated using median, worst and best-case estimates for future returns) as well as qualitative judgments of expected return and risk (using 7-point Likert scales). A similar methodology was employed in this thesis with questions focusing on return but adapted to the different populations being studied. A hypothetical investment task designed to measure financial risk-taking was included in Weber et al. (2013) where subjects were asked to invest £100,000 in either the UK stock market or a risk-free asset (i.e. the risk-taking measure). This thesis had a similar question adapted to the different populations being studied.

Weber et al. (2013) found that there was substantial change in risk-taking over the survey period even though reported risk attitudes did not change. This is consistent with the earlier discussion about the limitations of industry risk tolerance questionnaires. Risk expectations, and to a lesser extent, return expectations, changed over time, mostly in line with market events. Interestingly, in contrast to prior research (De Bondt, 1998; Finucane, Alhakami, Slovic, & Johnson, 2000) which found that individuals incorrectly

viewed risk and return as being negatively correlated, Weber et al. (2013) found that their investors did view risk as increasing with return expectations. However, they found that qualitative measures of risk and return expectations, and to a lesser extent quantitative return expectations, predicted risk-taking behaviour, while quantitative measures of risk did not.

4.4.2 Personality Traits

4.4.2.1 Theoretical underpinnings

One of the research questions in this thesis was whether personality traits influence the formation and updating of beliefs and risk-taking decisions. Mooradian and Olver (1997) researched whether personality traits (extraversion and neuroticism from the Big 5) were predictive of consumption-based emotions (satisfaction, complaining, recommending) with respect to individual's feelings, attitudes and behaviours in relation to their current automobile. Mayfield et al. (2008) also found a link between the Big 5 traits and risk aversion and investment intentions of undergraduate students. Thus, it was hypothesized that the Big 5 personality traits would be linked to risk-taking decisions in this thesis.

The debate as to whether the Big 5 personality traits are exhaustive or whether measuring specific personality traits has value has been mixed and vigorous. Saucier and Goldberg (1998) argue that there is little need to venture beyond the Big 5 in describing what is conventionally thought of as personality. However, Paunonen and Jackson (2000, p. 832) disagree:

We believe that there is much important variance in human behaviour not accounted for by the Big Five personality factors. This variance is nonrandom and is related to internally consistent, theoretically meaningful classes of behaviour that have, both historically and in Saucier and Goldberg's (1998) own data, failed to correlate highly with traditional Big Five dimensions.

Duckworth et al. (2007, p. 1089) agree with Paunonen and Jackson (2000):

Thus, although we recognize the utility of the Big Five taxonomy as a descriptive framework in which newly characterized personality traits

should be situated, we do not believe that it provides an exhaustive list of traits worth studying.

This view that the Big 5 may not be exhaustive is supported by prior research that linked specific personality traits to aspects of investor behaviour. For example, Markowitz's quote in Chapter 2 highlights the propensity for regret in investment decisions. Regret was further highlighted as a factor affecting investment behaviour by Pan and Statman (2012) and Huang and Zeelenberg (2012). Thus, it was hypothesized that regret would be linked to risk-taking decisions.

Oechssler et al. (2009) found that subjects' performance on the Cognitive Reflection Task was linked to the impact of behavioural biases as well as their time and risk preferences. De Bondt et al. (2013) also argued that cognitive style was a factor of interest in financial decision-making. Thus, it was hypothesized that decision-making style (rational vs. intuitive) would be linked to risk-taking decisions.

The concept of maximizing vs. satisficing behaviour was first introduced by Herbert Simon (1957, 1972). Zeelenberg (2015) argued that regret minimization can often be achieved by robust satisficing behaviour. Fellner et al. (2009) tested this concept in an investment game and argue that satisficing behaviour does reflect a more natural way of decision-making and is evident in their results. Thus, it was hypothesized that maximizing vs. satisficing behaviour would be linked to risk-taking decisions.

In investment decisions, as seen in section 2.6, time frames of investment matter. Investors' self-control (grit) in holding equity investments through periods of market volatility often result in better investment returns (Shiller, 1998; Benartzi & Thaler, 1995). Statman (1999) suggests that self-control is a factor for investors, "Behavioral investors are subject to temptation and, as Thaler and Shefrin (1981) noted, they look for tools to improve control." Thus, it was hypothesized that grit or self-control would be linked to risk-taking decisions.

Kahneman and Tversky (1978) introduced the concept of loss aversion as a factor affecting decision-makers. Benartzi and Thaler (1995) argued that the equity premium puzzle (i.e. the fact that stocks have outperformed bonds by a surprisingly large margin) is due, in part, to investors' loss aversion. Thus, it was hypothesized that loss aversion would be linked to risk-taking decisions.

Risk tolerance is a key factor in investment decisions. Weber et al. (2002) argued that risk perception and risk-taking is domain specific. In other words, someone who engages in extreme sports may nevertheless be very risk-averse in investing. Thus, it was hypothesized that domain specific risk measures would be linked to risk-taking decisions.

Shiller (1998) argued that social influence has a significant impact on people's behaviour. Engelberg and Parsons (2011) and Engelberg et al. (2012) found that stock trading was strongly predicted by social influences coming from media coverage. Thus, it was hypothesized that social influence would be linked to risk-taking decisions.

4.4.2.2 Research Design Implications

Having identified general and specific personality traits that are theoretically linked to risk-taking decisions, the next step was to identify the best method to test this theorized link. Various personality scales, all previously validated, were employed (see Section 4.4.6 below) and the scores for these instruments were then analyzed to see whether they were predictive of expectations of return and risk, as well as of risk-taking decisions. The domain specific measures of risk (for finance and investing) from the DOSPERT scale were used in the analysis. Short form versions of the Big 5 Inventory of personality traits (the BFI-10 and TIPI) were used. In addition, instruments measuring other personality traits, all hypothesized to be involved in the investment context – regret, tendency to maximize versus satisfice, grit, loss aversion, social comparison and decision style – were employed in this thesis to determine whether they were predictive of return expectations and risk-taking decisions.

4.4.3 Experimental Conditions to Test Behavioural Biases

4.4.3.1 Background

Experimental tests for anchoring bias, recency bias and peer group bias were included as prior studies have demonstrated their impact on decision-making.

The presence of an irrelevant anchor such as the last two digits of a social security number or the total sum showing on a pair of dice were found to significantly influence either the value attached to a bottle of wine (Ariely et al., 2003) or the prison sentence given to a hypothetical criminal (Englich et al., 2006). In both of those earlier studies, some of the subjects were presented an irrelevant low anchor and others were presented an irrelevant high anchor. Both were then asked to make decisions – in the first case, how much to pay for a bottle of wine and in the second, the length of the jail sentence. Kahneman and Riepe (1998) suggest that the purchase price of a stock could be a reference point (i.e. anchor) which then may affect future decisions to sell or not (i.e. a lower prevailing price than the purchase price would crystallize a loss which the disposition effect suggests investors are reluctant to do).

Shiller (1998) commented (p. 1315):

Values in speculative markets, like the stock market, are inherently ambiguous. Who would know what the value of the Dow Jones Industrial Average should be? Is it really “worth” 6,000 today? Or 5,000 or 7,000? or 2,000 or 10,000? There is no agreed-upon economic theory that would answer these questions. In the absence of any better information, past prices (or asking prices or prices of similar objects or other simple comparisons) are likely to be important determinants of prices today.

Thus, the anchoring bias is relevant in investing and, therefore, a bias that is tested in this thesis.

The availability or recency bias is another bias that potentially affects investors. Shiller (1998) observed that (p. 1330):

Investor attention to categories of investments (stocks versus bonds or real estate, investing abroad versus investing at home) seems to be affected by alternating waves of public attention or inattention. Investor attention to the market at all seems to vary through time, and major crashes in financial markets appear to be phenomena of attention, in which an inordinate amount of public attention is suddenly focused on the markets.

The availability heuristic identified by Tversky and Kahneman (1973) suggested that people pay more attention to more available information, including more recent occurrences (p. 1127): “Furthermore, recent occurrences are likely to be relatively more available than earlier occurrences”.

Vissing-Jorgensen (2003) and Greenwood and Shleifer (2014) both provided support for the view that investors form extrapolative expectations from recent experience. Choi et al. (2009) found that individuals who had recent positive investment gains tended to increase their retirement savings. These three studies suggest that recency bias may potentially impact investors and advisers and, therefore, is tested in this thesis.

The impact of social culture and comparison in investing decisions is an interesting phenomena. Shiller (1998) suggests that (p. 1332) “something more is at work in producing internationally-similar human behavior than just rational reactions to common information sets relevant to economic fundamentals”. He further asks (p. 1333) “why have the stock markets of the world moved somewhat together?” In doing so, Shiller (1998) suggests that social influence from peer groups and others have an impact on decision-making beyond fundamental factors.

Some people know more than others. As a result, it makes sense for investors to take into account the decisions of other market participants, especially if others are thought to be better informed. One way to overcome informational problems is to copy the behavior of other people. Imitation on a large scale amounts to mass herding. The phenomenon is linked to bubbles, sentiment and capital market inefficiency (see, e.g., Katona, 1979; Shiller, 2000; or Brunnermeier, 2001). Herding does not have to be irrational. It may be based on reason.

Brown et al. (2008) and Engelberg and Parsons (2011) found that investors relied on what peers were doing when making their own investment decisions, while Rao et al. (2001) found that professional investment analysts relied on their peers for making coverage decisions. These three studies suggested that peer group comparisons may potentially bias investors and advisers and, therefore, peer group comparison is tested in this thesis.

In this thesis, the anchoring bias was tested by having participants randomly assigned to a low anchor or high anchor condition and asked to solve a simple math problem resulting in a lower or higher answer. This was broadly similar to the approach taken by Ariely et al. (2003) and Englich et al. (2006). Participants were then asked to provide their expected return and risk estimates as well as their answer to the risk-taking measure.

The chosen methodology for testing the other two biases (recency and peer group effect) was experimental vignette methodology described in greater detail below.

4.4.3.2 Experimental Vignette Methodology

The previous section outlined some of the biases that may affect investors and advisers in their investment decision-making. However, it is very difficult to identify these biases and isolate their impact from other variables in natural settings. The best way to quantify and provide evidence of these hypothesized causal relationships is through experimental or quasi-experimental designs. However, besides the practical, logistical and ethical considerations, there are concerns of external validity associated with such experimental designs. As Aguinis and Bradley (2014, p. 352) observe:

For example, experimental designs often involve participants such as students or individuals who are not students but are removed from their natural environments. Thus, researchers seem to face a seemingly inescapable dilemma:

(a) implement experimental designs that yield high levels of confidence regarding internal validity but are challenged by difficulties regarding external validity (i.e., uncertainty regarding generalizability of results)
or

(b) implement nonexperimental designs that often maximize external validity because they are conducted in natural settings but whose conclusions are ambiguous in terms of the direction and nature of causal relationships.

Experimental vignette methodology (EVM) is a way of addressing these concerns. EVM involves participants who are presented carefully constructed, realistic scenarios (or vignettes) thus allowing researchers to control and manipulate independent variables and observe the subsequent impact on dependent variables such as choices and behaviours. One form of EVM, Paper People Studies, has been used for decades wherein participants are provided vignettes (typically in written form) and then asked to make explicit decisions or choices (Aguinis & Bradley, 2014, p. 354). This is the form of EVM methodology used in this thesis.

Aguinis and Bradley (2014) further set out ten guidelines or best practices in designing and implementing an EVM study. These guidelines and the way they are applied in this thesis are discussed below:

- (i) Is EVM suitable? The authors argue that EVM is useful when researchers want to exercise control of independent variables and where there may be ethical dilemmas in proceeding otherwise. Both situations apply in the current thesis as there is a desire to test the impact of behavioural biases on investment decision-making but other variables need to be isolated and field research is not possible.
- (ii) Type of EVM. People Paper Studies focus on explicit responses to hypothetical scenarios and is used widely in organizational and management settings. This is the case in the current thesis.
- (iii) Type of Research Design. Between-subject designs require that each participant read only vignette and comparisons are made across participants. They are typically uncommon especially where the dependent variable is the participant's judgment largely because the participants lack the basis to ground their responses contextually. The authors' recommendation is to provide participants with adequate contextual background in all cases including between-subject designs. In this thesis, the design is between-subjects and only one vignette is used. However, all participants are provided the same context. The manipulation is simply in the independent variable (the bias) which is at two levels.
- (iv) Level of Immersion. A major criticism and limitation of EVM is that it is unrealistic and not easily generalizable. One recommendation is to

improve realism by increasing the level of immersion (using video, audio, etc.). Of course, the trade-off is the time, cost and logistics of such immersion. In this thesis, the level of immersion is low as only written vignettes were used. However, in the realm of studying investment behaviour, the use of written vignettes is typical (cf. Ackert & Church, 2006; Baeckström et al., 2018) as there are practical limitations in testing real-life investors in a controlled or studio environment. Thus, there is a trade-off between realism and external validity of the findings and, in this thesis, the decision was made in favour of external validity.

- (v) Number and Level of Manipulated Factors. The authors describe the “actual derived cases” approach where variables chosen to be manipulated and their levels are selected to represent concrete values found in actual settings. In this thesis, the two biases described above (recency and peer group effect) are independent factors each with their own vignette. The vignettes each have two levels: recency – gain vs. loss; peer group – better; worse.
- (vi) Number of Vignettes. The authors suggest that the determination of the number of vignettes depends on the number of variables to be manipulated and their levels. In this thesis, there were two variables being manipulated, each with two levels. Therefore, four vignettes were used, two for each manipulated variable with the differentiation being simply to reflect the different levels.
- (vii) Sample of Participants. Key considerations are that the situation in the vignette be as realistic as possible and that the respondents represent a more generalized population to maximize external validity. In this thesis, the vignettes represent typical scenarios facing investors and advisers as confirmed by a group of industry professionals. The respondents represent the general populations of interest.
- (viii) Setting and Timing. The criticism that vignettes lack realism can be addressed, in part, by administering the vignettes in the participants’ natural setting. In this thesis, the vignettes were administered online and the respondent chose the time and setting that were most natural to them.
- (ix) Method of Analysis. MANOVA is an appropriate analysis for between-subjects design and was the chosen analysis in this thesis.
- (x) Transparency. Researchers should disclose as much information as possible about the vignettes used in the EVM study. In the following section, full details are provided about the written vignettes used in this thesis.

Thus, there are advantages (time, cost, logistics, ethical considerations, external validity) and disadvantages (realism, generalizability) of using experimental vignette methodology. However, on balance, and given that this approach has been used in other studies of individual investor behaviour (cf.

Ackert & Church, 2006; Baeckström et al., 2018), it was decided that the EVM approach was the only practical method to test for behavioural biases in this thesis.

4.4.3.3 Experimental Design in this Thesis

Three different behavioural biases were tested independently, each in a 1x2 factorial design. They were tested independently for several reasons. First, there were no theoretical grounds to test for interaction effects and this was not the focus of the thesis. Second, the size and nature of the data set did not lend itself to testing interaction effects. It is important to note that the three biases were tested virtually identically for investors and advisers (vignettes were modified to reflect whether investors were deciding on their behalf or advisers were recommending decisions to the investor) because the research question focused on the impact of the bias on the same dependent variables, irrespective of the decision-maker.

Participants: investors in Study 1A and advisers in Study 1B who were randomly allocated to each of the three independent experimental conditions (anchoring, recency, peer group) and further assigned to one of two levels for each of the conditions. Randomization was achieved through the Qualtrics software used for the online survey through which the conditions were presented and other information was collected (see Section 5.2.1 for more details).

Materials: For the anchoring condition, the stimuli presented to participants was a simple math question – one that resulted in a higher number for the high anchor condition and one that resulted in a lower number for the low anchor condition. For the recency and peer group conditions, vignettes were presented to stimulate the behavioural bias being studied. Details of these vignettes and levels can be found in Table 1. Once the experimental condition was presented to the participants, they were asked to make decisions on two dependent variables of interest: return expectations and level of risk-taking. Both variables are described in greater detail in Study 1A and Study 1B. Through

an online survey, demographic information was also collected across all participants.

Table 1: Experimental Conditions Tested

<i>Experimental Condition</i>	<i>Level</i>	<i>Stimulus / Vignette</i>
Anchoring (Investors & Advisers)	High	What is 9 + 5?
	Low	What is 5 - 9?
Recency (Investors)	Gain	You invested \$350,000 several years ago. Several of your investments have done very well and, as a result, you now have \$500,000 that is currently in cash and available to be invested.
	Loss	You invested \$650,000 several years ago. Several of your investments have done relatively poorly and, as a result, you now have \$500,000 that is currently in cash and available to be invested.
Peer Group (Investors)	Better than	You have decided that you need to revisit your investment portfolio to ensure that it meets your future needs. As part of the process, you do your homework. You have asked close friends and family, whose opinions you respect, about their investment portfolios. You note that the amount you have accumulated is significantly more than what your peers have managed to accumulate.
	Worse than	You have decided that you need to revisit your investment portfolio to ensure that it meets your future needs. As part of the process, you do your homework. You have asked close friends and family, whose opinions you respect, about their investment portfolios. You note that the amount you have accumulated is significantly less than what your peers have managed to accumulate.
Recency (Advisers)	Gain	Your client had invested \$350,000 several years ago with a different advisor. Her investments have done relatively well and, as a result, she has \$500,000 that is currently in cash and available to be invested. The client is looking to you for advice.
	Loss	Your client had invested \$650,000 several years ago with a different advisor. Several of her investments have done relatively poorly and, as a result, she now has \$500,000 that is currently in cash and available to be invested. The client is looking to you for advice.
Peer Group (Advisers)	Better than	Earlier this week, you attended your investment firm's monthly investment meeting. You and your colleagues discuss client portfolios and performance. You note that, on average, the amount your clients have gained in their investment accounts is significantly more than what your peers have managed to accumulate for their clients.
	Worse than	Earlier this week, you attended your investment firm's monthly investment meeting. You and your colleagues discuss client portfolios and performance. You note that, on average, the amount your clients have gained in their investment accounts is significantly less than what your peers have managed to accumulate for their clients.

Procedure: Testing occurred at a time and place of the participants' choosing as all materials were administered online. See section 5.2.1.4 and section 5.3.1.4 for more details.

Design and Analysis: The data was collected as three independent between-subjects 1x2 factorial design. The independent variable was the

manipulated experimental condition (i.e. the bias being stimulated) and the associated levels. The dependent variable was the participants' return expectations and level of risk-taking. Analysis was conducted using a one-way MANOVA and the rejection level was set at $p = 0.05$ for all conditions.

4.4.4 Return and Risk Expectations, Investment Experience, and Financial Literacy

The findings by Weber et al. (2013) prompted one of the core research questions of this thesis: how do expectations of future returns get formed? Greenwood and Shleifer (2014) found that expectations were extrapolative from investors' past experience. Kaustia and Knüpfer (2008) found that investors' prior experience in investing in new equity offerings was a key predictor of similar behaviour in the future. Furthermore, van Rooij et al. (2007) found that the level of financial literacy determined the level of stock market participation. Similarly, Guiso and Jappelli (2008) found that the level of financial literacy impacted the level of diversification in investor portfolios. Thus, it was reasonable to hypothesize that past experience with stock market investing and general knowledge about investing might be predictors of return and risk expectations as well as risk-taking decisions.

In this thesis, basic and advanced financial literacy questions were adapted from van Rooij et al. (2007), Lusardi (2008) and Lusardi and Mitchell (2011b). Given that the subjects for the thesis were either typically HNWI (or MA2) or experienced advisers, the basic financial literacy questions were adapted to focus on investing (rather than savings and banking) and sought to determine knowledge of the risk-return trade-off (per Cordell, 2001) and relative returns for different asset classes. The advanced financial literacy question (and the only one asked of advisers) was about the relationship between interest rates and bond prices. In the author's experience, even knowledgeable investors and advisers do not always answer this question correctly. In addition, advisers were asked about their perception of their clients' investment literacy and experience.

To test their level of relative risk aversion, participants were asked to specify the rate of return they would need to invest CAD 100,000 (or equivalent) in a risky asset versus in a risk-free guaranteed rate investment, using a simplified Holt-Laury type choice problem.

Past experience questions were in the form of 7-point Likert-type questions to determine participants' self-assessed experience with equity investing as well as in comparison to their friends and family. Other questions included: a subjective rating by participants of their past equity returns versus their initial expectations; and the number of years of experience the participant had in equity investing. For investors, the questions were related to their own personal experience. For advisers, the questions focused on the advisers' perception of their clients' experience.

4.4.5 Data Collection

The following section describes the population and sampling strategy for the quantitative and experimental phase of the current research. The specific procedures utilized in each study are discussed in the forthcoming chapters.

4.4.5.1 Population

For the quantitative phase of the research, there were two main populations studied: investors and advisers. In Study 1A and 1C, the investors were Canadian ("investors"), while in Study 2A the investors were international (drawn primarily from the US, UK, and Germany, "international investors"). The population of interest was wealthy Canadian investors who received financial advice for at least some of their investments and who would qualify as Mass Affluent 2 (MA2) (CAD 500,000 – CAD 1M, or equivalent, in investable assets) or High Net Worth Investors (HNWI) (> CAD 1M, or equivalent, in investable assets). Of course, it was not possible to determine net worth at the outset; as a result, it was expected that the sample would also include individuals that would qualify as Retail (<CAD 250,000, or equivalent, in investable assets) or Mass Affluent 1 (MA1) (CAD 250,000 – CAD 500,000, or

equivalent, in investable assets). It should be noted that it is particularly difficult to obtain population and demographic statistics of wealthy Canadians for privacy reasons as well as the fact that this information is not generally collected by official statistical surveys. Nevertheless, in line with other research (cf. Weber et al. (2013), Baeckström et al. (2018)) and available statistics in Canada (Brown & Hodges, 2014), wealthy Canadian investors tend to skew male, older and married. This is broadly supported by available data from the United States Federal Reserve (Thompson, 2013).

In Study 1B and 1D, the advisers were Canadian ("advisers"), while in Study 2B the advisers were international (drawn primarily from the US and UK, "international advisers"). The population of interest were those individuals who are licensed to provide financial advice to wealthy Canadian investors. Four types of licensing are common in Canada: MFDA, IIROC, ICPM and Insurance licensed advisers (see Glossary). Financial planners ("planners") and other individuals may be involved in providing financial planning or other advisory services involving investments, while not falling strictly within the licensing regimes outlined above. All international advisers were asked to confirm that they were licensed to provide financial advice in their jurisdiction of employment.

4.4.5.2 Sampling Strategy

The sampling frame consisted of individuals in the author's network who were part of the populations of interest. These investors and advisers were approached via email to participate in this research and asked to forward the invitation to other individuals in their network who were investors or advisers, respectively. The requested participation was to complete an online questionnaire of approximately 15 to 20 minutes in duration. This modified snowball sampling strategy was used as it would have been impractical to independently identify members of the desired population.

Biernacki and Waldorf (1981, p. 141) described snowball sampling, or chain referral sampling, as a method to generate a study sample "through

referrals made among people who share or know of others who possess some characteristics that are of research interest". They further stated that, as a method, it "is particularly applicable when the focus of study is on a sensitive issue, possibly concerning a relatively private matter, and thus requires the knowledge of insiders to locate people for study".

The issues identified by Biernacki and Waldorf (1981) are in initiating the referral chain and then verifying the eligibility of the potential respondents. In this thesis, the referral chains were initiated by emails to individuals in the population of interest in the author's network. Once responses were obtained, verification of representativeness was accomplished through a series of demographic questions.

A lottery incentive was used for Study 1A and 1B where all individuals who completed a questionnaire and provided their email address were included in a draw for two Apple iPad minis (supplied by the author) - one iPad for each study. The lottery incentive was added to increase response rates as well as to encourage participants to provide email addresses for follow-up studies. Disclosure was made in the invitation email that email information would only be used for the stated purposes.

Studies 1C and 1D were follow-up studies to Studies 1A and 1B respectively. In these follow-up studies, participants from Studies 1A and 1B who had provided their email addresses were contacted to request their participation in a further short online questionnaire.

Using the demographic data provided by participants in the online questionnaires, descriptive statistics were calculated. The descriptive statistics summarized the distribution of the sample for each study and allowed conclusions to be drawn as to whether the sample was representative of the population of interest. Details of the samples are provided in the forthcoming chapters.

4.4.6 Instruments

All investors in Study 1A were asked to complete the instruments described below. While clear instructions were provided online on how to complete them, the instruments themselves were not labelled nor was the purpose of the questions explained. Advisers in Study 1B were also asked to complete the instruments listed below. However, advisers were not asked to complete the risk tolerance questionnaire (RTQ). In Study 2A, participants were only asked to complete the RTQ and the TIPI (see below). In Study 2B, participants were only asked to complete the TIPI (see below).

All instruments (other than RTQ) were previously validated scales. The instruments and their purpose for the present thesis are described below.

4.4.6.1 Risk Tolerance Questionnaire – RTQ

As stated at the outset, risk tolerance questionnaires are a common feature in the investment industry. However, there are no standards and most firms have typically constructed their own RTQs. Indeed, a recent review undertaken on behalf of the principal Canadian securities regulator (the Ontario Securities Commission) in Canada found the following (Brayman et al. (2015), p. 1 - 2):

- Risk questionnaires are most widely used in retail channels using mutual funds and less so in wealth management and portfolio manager channels.
- Over 53% of respondents to an advisor survey indicated that between 76% and 100% of clients had completed a risk questionnaire, creating a strong dependency on the fitness of these tools.
- About 48% of firms answering a survey indicated risk questionnaires were developed in-house and another 36% said that advisors could choose their own risk profiling methodology. Only 11% of firms could confirm that their questionnaires (where they had one) were ‘validated’ in some manner.
- 16.7% of questionnaires reviewed would be considered ‘fit for purpose’:
 - 27.8% had poorly worded questions that combine multiple factors in one question, or had questions that were confusing or logically inconsistent.
 - 75% had scoring models that had arbitrary weightings of questions, that merged multiple factors without clarity, or that weighted a specific factor (like age) heavily. Fewer than 6% used known techniques like psychometrics to measure subjective sub-factors.

Further, the authors reported that “(a)lmost all regulators are principles-based and provide little guidance on how a firm or advisor should arrive at the determination of a risk profile. They all recognize and rely on professional judgment of the advisor and the ‘process’ created by the advisor or firm to determine a consumer’s risk profile (p.1).”

Table 2: Comparison of Selected Risk Tolerance Questionnaires Used in Canada

	<i>Category of Questions</i>						<i>Total Number of Questions</i>	<i>Link to Investment Recommendations</i>
	<i>Current Financial Situation</i>	<i>Investment Objectives</i>	<i>Time Horizon</i>	<i>Risk Tolerance</i>	<i>Long Term Expectations</i>	<i>Investment Knowledge</i>		
Bank 1	5	2	1	3			11	Advisor discretion
Bank 2	5	1	1	4			11	Points linked to category - no description of asset class breakdown or investments
Bank 3	5	5	4	4			18	Advisor discretion
Bank 4	3	1	1	1		1	7	Points linked to category - description of asset class breakdown & investments
Bank 5	3	3	1	6			13	Advisor discretion
Insurance Company	1	1	1	5			8	Points linked to category - no description of asset class breakdown or investments
Independent Investment Firm	3	1	1	2	1	2	10	Points linked to category - no description of asset class breakdown; limited link to investment recommendations
Independent Service Provider to Financial Advisers			2	2	3		7	Points linked to category - some description of asset class breakdown; no link to investment recommendations

RTQs were obtained and downloaded from the respective websites of these firms. The categorization was conducted by the author and confirmed by a panel of industry professionals. Details of the underlying questionnaires are available by written request to the author.

With the above conclusions in mind, the author reviewed the risk tolerance questionnaires used by the major financial institutions in Canada (the 5 large banks, one large insurance company, and one large independent investment firm) as well as a firm that does not provide financial products or services to investors but rather provides tools and support to financial advisers. This review is summarized in Table 2 and highlights the fact that most questions in the different questionnaires fall into definable categories and that the link to portfolio recommendations is ambiguous at best (and echoes the criticisms levied by Pan and Statman (2012)).

For the purposes of this thesis, the author adapted the questionnaire prepared by the Independent Service Provider (ISP) to Financial Advisers for several reasons: (i) given that there is a wide variety of questionnaires used in Canada and that there was broad overlap in the types of questions asked (as shown in Table 2), (ii) the relative independence of the ISP, and (iii) while the other questionnaires were only used by advisers of that specific firm, the ISP questionnaire was used by independent advisers across Canada and the US. The modifications to the RTQ were undertaken primarily to minimize the likelihood that the original commercial RTQ would be recognized. For example, one modification was to double the scoring for each answer (a score of 1 in the original RTQ would translate into 2 in the modified RTQ). The portfolio recommendations section (used by advisers in Study 1B) was condensed and simplified. A panel of industry professionals confirmed that the modifications were minimal and did not result in a materially different questionnaire from the original.

The chosen RTQ had 7 questions broken down into three sub-scales and is contained in Appendix 1A as questions 2.1 – 2.7 with associated scoring: Time Horizon (2 questions – question 2.1 and 2.2), Long-term Goals & Expectations (3 questions – questions 2.3, 2.4, and 2.5), Attitude to Short Term Risk (Volatility) (2 questions – questions 2.6 and 2.7). This RTQ was qualitatively compared by a panel of industry professionals, who were

consulted by the author, (in terms of # of questions, factors measured, readability, etc.) to those provided by Canadian financial institutions and was deemed to be broadly representative of the structure used in Canada. Furthermore, the critiques raised by Brayman et al. (2015) would broadly apply to the RTQ used in this thesis and, as such, is reflective of the RTQs currently used in Canadian industry.

As noted by Brayman et al. (2015), Linciano and Soccorso (2012), and Pan and Statman (2012), industry RTQs are typically self-developed and not psychometrically tested. This was also the case for the ISP RTQ used in this thesis and, therefore, no reliability or validity measures are available to be reported.

4.4.6.2 Big Five Inventory – (BFI-10) / Ten Item Personality Inventory (TIPI)

The BFI-10 was used in this thesis because: (i) it was hypothesized that personality traits would be related to how investment decisions are made; and (ii) it was short and concise. In Study 2A and Study 2B, the version of BFI-10 developed by Gosling et al. (2003), the TIPI, was used.

The BFI-10 and the TIPI are abbreviated versions (10 items) of the 44-item Big Five Inventory (BFI-44), both measuring personality across five broad subscales: extraversion, agreeableness, conscientiousness, emotional stability (or neuroticism), and openness. The version developed by Rammstedt and John (2007) (BFI-10) was for cross-cultural research, was tested in English-speaking and German-speaking populations, and consisted of ten 5-point Likert-type questions. The TIPI consisted of ten 7-point Likert-type questions. Both versions are fundamentally similar.

Because the BFI-10 and TIPI only had 2 items per subscale and the subscales themselves had low inter-item correlations, low internal consistency estimates could be expected. Indeed, the reported Cronbach's Alphas for the five subscales were: extraversion (0.68); agreeableness (0.40); conscientiousness (0.50); emotional stability (neuroticism) (0.73); and openness

(0.45) (Gosling et al., 2003, p. 516). As a result, the researchers focused on test-retest reliability as well as convergent and discriminant reliability between the TIPI and the BFI-44.

The convergent correlations between TIPI and BFI-44 were ($p < 0.01$): extraversion (0.87); agreeableness (0.70); conscientiousness (0.75); emotional stability (neuroticism) (0.81); and openness (0.65). The average of the convergent correlations (mean $r = 0.77$) was much greater than the average of the discriminant correlations (absolute mean $r = 0.20$), with all of the discriminant correlations less than 0.36. Gosling et al. (2003) also found test-retest reliability for the TIPI to be high ($r = 0.72$), although lower than the BFI-44 ($r = 0.80$).

Overall, the BFI-10 and TIPI retained much of the reliability and validity of the BFI-44. Rammstedt and John (2007) concluded that the BFI-10 has acceptable psychometric properties but that “we agree with Gosling et al. (2003) that ultra-short measures should not and cannot be used as substitutes for regular personality assessments. Only for research settings in which participant time is truly limited and when personality assessment would otherwise be impossible, such as in telephone surveys, the BFI-10 offers an adequate assessment of personality (p. 210)”.

4.4.6.3 Domain-Specific Risk-Taking Scale (DOSPERT)

DOSPERT scales were used in this thesis as it was hypothesized that risk perception (RP), risk-taking behaviour (RB) and perception of expected benefits (PB) would all be related to how investment decisions are made.

The DOSPERT scale was originally developed to measure risk-taking behaviour (RB) (defined as the reported level of risk-taking) and risk perception (RP) (defined as whether activities were perceived as risky or not) in five common domains: ethical; financial (broken down into investing and gambling); health and safety; social; and recreational (Weber, Blais, & Betz, 2002). The

questions were further replicated to generate risk-perception, risk-taking and perceived benefits scales.

The investment domain of DOSPERT consists of three 7-point Likert-type questions. The three questions were asked in modified form in each of the three scales (RP, RB, and PB). The investment domain scales had an average item total correlation of 0.68 (range 0.61 – 0.73) for RB and 0.46 (range 0.27 – 0.54) for RP. No reliability measures were found for the PB scales.

Weber et al. (2002) reported Cronbach's Alphas of 0.84 and 0.67 for RB and RP, respectively. One month test-retest reliability was somewhat low for the financial scales at 0.44 and 0.42 for RB and RP, respectively. The three items on the DOSPERT scale related to investment behaviours loaded very highly onto one factor (investment risk), accounting for 4.6% of the variance. Weber et al. (2002) also reported adequate validity when compared to various constructs (e.g. sensation seeking, dispositional risk-taking, intolerance for ambiguity and social desirability).

4.4.6.4 Nenkov Maximization Scale

The Nenkov Maximization scale was used in this thesis as it was hypothesized that those who scored higher on the maximization versus satisficing continuum would have beliefs about future returns that were more aggressive and would thus choose portfolios higher in equities to maximize their returns.

Schwartz et al. (2002) developed a 13-item maximization scale. Subsequently, Nenkov, Morrin, Schwartz, Ward, and Hurland (2008) tested and established a shorter 6-item maximization scale, using 7-point Likert-type questions. The purpose was to measure the tendency of individuals to either maximize or satisfice. Nenkov et al. (2008) reported a Cronbach's Alpha of 0.75. They also calculated and reported a validity index (average correlation) for maximization of 0.22 (0.09 – 0.33) and presented an adjusted goodness of fit index (AGFI) score of 0.95.

4.4.6.5 Schwartz Regret Scale

The Schwartz et al. (2002) regret scale was used in this thesis as it was hypothesized that investor decisions are influenced by regret aversion, a view supported by Markowitz's interview quote (see above) and several prior studies (Huang & Zeelenberg, 2012; Pan & Statman, 2012).

Along with their 13-item Maximization scale, Schwartz et al. (2002) developed a 5-item, 7-point Likert-type regret scale measuring individuals' propensity for regret. The authors reported relatively high item inter-correlations of 0.78. Cronbach's Alpha was 0.67, despite the original 9-item regret scale being reduced to 5 items due to item reliability and face validity issues. Face validity was established as most of the 11 judges (undergraduate students) rated the items as measuring regret.

The 5-item regret scale was then subjected to a principal components analysis where all 5 items loaded highly onto one factor – regret – and all loadings were above 0.56. Reasonable validity was found in comparison to various constructs (e.g. happiness, depression, satisfaction with life, etc.).

4.4.6.6 Duckworth Grit Scale

The Duckworth Grit scale was used in this thesis as it was hypothesized that those with higher grit would have beliefs consistent with longer term views of the market and would therefore have higher equity allocations (Duckworth & Quinn, 2009).

Duckworth and Quinn (2009) developed the Grit Scale to measure trait-level perseverance and passion for long-term goals. The 8-item, 5-point Likert-type scale was found to have good internal consistency with reported Cronbach's Alphas of 0.73 to 0.83 (across the four different sample groups tested). Confirmatory factor analysis also produced strong goodness of fit numbers (CFI) in the range of 0.86 to 0.95.

One year test-retest reliability was 0.68. Convergent validity correlations between self-report and peer-report for the Grit Scale ranged from

0.45 to 0.47. The authors confirmed that the scale correlated more strongly with the Big 5 Inventory conscientiousness subscale (0.77) than other factors (neuroticism 0.40; extraversion 0.20; agreeableness 0.24; openness 0.06).

4.4.6.7 Loss Aversion Scale (LAS)

The Loss Aversion scale was used in this thesis as it was hypothesized that those with a higher tendency to be loss averse would have beliefs about returns that were more conservative and would thus have a lower equity exposure in their portfolios.

Since loss aversion was proposed as a concept by Kahneman and Tversky (1979), attempts at measuring it have focused on choice experiments. De Baets and Buelens (2012) developed a questionnaire to measure individual differences in loss aversion. The scale, consisting of seven 5-point Likert-type questions, was found to have good internal consistency with a Cronbach's Alpha of 0.72.

The authors confirmed that the scale correlated strongly with the State-Trait Anxiety Inventory construct with a correlation of 0.298. An exploratory principal axis analysis found that the seven items loaded highly on one factor (loss aversion), with all factor loadings above 0.4 and less than 0.3 on the second factor (anxiety). A subsequent confirmatory factor analysis generated high goodness of fit measures (RMSEA = 0.5; CFI = 0.921).

4.4.6.8 Rational and Intuitive Decision Style (RIDS) Scale

The RIDS Scale was used in this thesis as it was hypothesized that different decision styles would have different implications for investment decisions.

Different decision styles are employed by individuals: rational – where decisions are made cognitively and systematically; and intuitive – where decisions are made affectively and unsystematically. Hamilton, Shih, and Mohammed (2016) developed a ten question, 5-point Likert-type scale to

measure decision styles. The Rational Decision Style sub-scale exhibited high internal consistency with Cronbach's Alphas ranging from 0.78 – 0.89. The comparative Intuitive Decision Style sub-scale also had high Cronbach's Alphas ranging from 0.72 – 0.89.

Test-retest reliability (over 2 – 3 weeks) was high at 0.79 for both sub-scales. A confirmatory factor analysis was conducted to confirm the two-factor structure of the scales over two independent samples (RMSEA of 0.04, 0.06; CFI of 0.98, 0.93). Discriminant and convergent validity was established with high correlations with related constructs (e.g. maximization scale, Big 5 personality traits, decision self-efficacy).

4.4.6.9 Iowa-Netherlands Comparison Orientation Measure (INCOM)

The INCOM Scale was used in this thesis as it was hypothesized that those with a higher tendency to compare themselves to others would be susceptible to peer group comparisons, which might impact their investment decisions.

Gibbons and Buunk (1999) developed the INCOM scale to measure how prone individuals were to compare themselves to others. This 11-item, 5-point Likert-type scale was subjected to an exploratory principal-components analysis and two factors were extracted – ability and opinions – that explained 38% and 10% of the variance respectively. Further analysis indicated that the two-factor solution was appropriate with the goodness of fit index (GFI) and adjusted goodness of fit index (AGFI) both greater than 0.95. A high Cronbach's Alpha of 0.83 was achieved (ranging from 0.78 to 0.85 in various samples). Test-retest reliability was high, ranging from 0.71 (3 – 4 weeks) to 0.6 (for 1 year). Construct validity was established with moderately strong correlations in various samples between INCOM and: (i) interpersonal orientation (0.45); (ii) Attention to Social Comparison Information scale (0.47, 0.66); and (iii) public self-consciousness (0.38 - 0.49). Low correlations were reported between INCOM and: (i) depression (0.13 – 0.25); and (ii) low self-

esteem (-0.18, -0.32). Moderate correlations were reported between INCOM and neuroticism (0.28 – 0.37).

4.4.7 Establishing Reliability and Validity of the Quantitative Study

The value of research relies, in large part, on its reliability and validity. According to Roberts, Priest, and Traynor (2006, p. 41), "[r]eliability describes how far a particular test, procedure or tool, such as a questionnaire, will produce similar results in different circumstances, assuming nothing else has changed." Validity, on the other hand, "is about the closeness of what we believe we are measuring to what we intended to measure" (Roberts et al., 2006, p. 41).

As described in Section 4.4.6, the instruments that were used in the quantitative studies have been previously developed and reported satisfactory reliability and validity.

The data was collected through snowball sampling, which was subsequently tested and determined to represent the population of interest (see description of samples used in each study in the forthcoming chapters). This was done to minimize the risk of selection bias. The use of an online questionnaire and cross-sectional data maximized the response rate but, as such, did not allow for measures such as inter-rater reliability or test-retest reliability to be determined.

Key measures utilized in the questionnaire, such as return expectations, risk expectations and risk-taking measure were adapted from previously validated and reported research (in particular, Weber et al., 2013).

Finally, for the experimental design portion of the studies, participants were randomly assigned to one of six experimental conditions, using methodology adapted from prior research (in particular, Englich et al., 2006; Ariely et al., 2003).

Thus, reasonable steps were taken throughout the design and data collection phases to maximize the reliability and validity of the quantitative research.

4.4.8 Quantitative Analytical Methods

The data collected in the quantitative research phase was analyzed using rigorous statistical techniques.

The experimental conditions were analyzed in Study 1A and Study 1B using a one-way MANOVA analysis where the experimental condition was the independent variable and return expectations and risk-taking decisions (%TSX) were the dependent variables. A one-way MANOVA analysis was used to ascertain if there were differences between independent groups on more than one dependent variable.

Using hierarchical multiple linear regression, the relationship between the dependent variable (risk-taking decisions) and the independent variables (demographic variables, personality traits, expected risk, expected return) was analyzed in Study 1A and Study 1B. This method is a variation of multiple linear regression and allows the researcher to control the order in which the variables are entered in the regression and thus allows one to test the effects of certain independent variables without the influence of the other variables.

In Study 1C and Study 1D, the impact of literacy, experience and a measure of risk aversion on return expectations and risk-taking decisions was investigated using path analysis, a special case of Structural Equations Modelling (SEM). SEM is an extension of multiple regression used to evaluate causal models by examining the relationships between dependent variables and two or more independent variables. SEM allows for the estimation of both magnitude and significance of causal relationships between variables.

In Study 2A and Study 2B, the relationship between independent variables (demographics, personality traits, RTQ and return expectations) and

the dependent variable (risk-taking decisions) was analyzed using hierarchical multiple regression.

Another hypothesis in Study 2A and 2B concerned the dependent variable, Beliefs_5Y (a Likert-type question asking for the respondents' view on returns in their home equity market over the next five years) which was a categorical variable. Hence, the relationship between the independent variables (literacy, experience and a measure of risk aversion) on the dependent variable was analyzed using ordinal regression. Ordinal regression is a form of regression analysis used when the dependent variable is ordinal i.e. a categorical variable where the possible values are ordered. Where the assumptions for ordinal regression were not met, a multinomial logistic regression analysis was used where the dependent ordinal variable was treated instead as a nominal variable.

Finally, Studies 1C, 2A and 2B also considered the impact of given return expectations (as opposed to self-generated) on risk-taking decisions. A paired samples *t*-test was used to determine whether this manipulation had an impact on the dependent variable (risk-taking decisions).

All statistical analyses, except the SEM, was conducted using the SPSS statistical package.²⁸ The SEM was conducted using the AMOS structural equations modelling (SEM) package.²⁹ For all of the statistical analyses conducted, the necessary underlying assumptions to justify use of the procedure were analyzed and are reported in the forthcoming chapters.

²⁸ IBM Corp. Released 2013. IBM SPSS Statistics for Macintosh, Version 22.0. Armonk, NY: IBM Corp.

²⁹ Arbuckle, J. L. (2014). Amos (Version 23.0) [Computer Program]. Chicago: IBM SPSS.

4.5 Qualitative Semi-structured Interviews Study Design

4.5.1 Rationale and Design

The objective of the qualitative phase of this thesis was to provide a deeper and richer understanding of the factors that drive return expectations and risk-taking decisions. Qualitative analysis seeks depth of understanding while quantitative analysis aims for breadth of understanding (Patton, 2002). As the pilot project described in Section 4.3 illustrated, factors other than risk tolerance are at play in risk-taking decisions. And while the quantitative analysis described earlier in this chapter was expected to shed some light on the nature of these factors, a thorough understanding of the nuances and differences between individuals would require a carefully designed qualitative analysis. The same information was broadly available to all investors and all advisers. Differences in their decisions, therefore, can be argued to be a result of individuals' different interpretations or selective use of that information.

To gain an understanding of these different interpretations, this thesis used semi-structured interviews of investors and advisers selected from a criterion-based purposive sample. The design of the interviews allowed the researcher and participants an opportunity to follow "a thematic, topic-centred, biographical or narrative approach where the researcher has topics, themes or issues they wish to cover, but with a fluid and flexible structure." (Edwards & Holland, 2013, p. 3). By encouraging investors and advisers to describe their thought processes in investment decisions using open-ended questions rather than the closed-ended questions used in the analytic surveys, the expectation was that interviews would provide insights that would not be as readily obtained from the quantitative analyses. This is a view echoed by several researchers (cf. Creswell, 2014; Gray, 2004). The initial set of interview questions was developed from the analysis of the quantitative data (see Appendix 3). Like the analytic surveys in Study 1C and Study 1D, the interview questions were not validated instruments and therefore were pre-tested by

presentation to a panel of industry professionals and the author's supervisors for critique and were modified accordingly.

The qualitative methodology chosen for this analysis was based on thematic analysis. Braun and Clarke (2006) argue that other analytic methods to describe patterns across qualitative data are theoretically bounded. According to Charmaz (2006, p. 2), "grounded theory methods consist of systematic, yet flexible guidelines for collecting and analyzing qualitative data to construct theories 'grounded' in the data themselves." This thesis sought to understand the factors involved in investment decisions by both investors and advisers. The objective was to test rather than generate theory with the results of the quantitative analysis informing the approach to the qualitative phase. As a result, thematic analysis was considered to be the appropriate methodology.

Braun and Clarke (2006, p. 81) argue that "a 'named and claimed' *thematic* analysis means researchers need not subscribe to the implicit theoretical commitments of grounded theory". Furthermore, they argue that thematic analysis can be an essentialist or realist method that simply seeks to report the "experiences, meanings and the reality of participants" (p. 81). This approach fits well with the pragmatic worldview underpinning this thesis.

4.5.2 Data Collection

4.5.2.1 Sampling

Study 3 involved qualitative interviews with investors and advisers. The subjects eligible to participate in the qualitative phase of this thesis were investors, who participated in both Study 1A and Study 1C, and advisers, who participated in both Study 1B and Study 1D, and had indicated a willingness to participate in further qualitative interviews. The selection of subjects was achieved through a criterion-based purposive sampling process. Grounded theory is typically associated with theoretical sampling, a special case of purposive sampling, where the initial sample is based on some loose criteria but

subsequent sample selection is defined by the emerging theory. In this thesis, the initial sample was necessarily limited to the subset of investors and advisers that had participated in the quantitative phase. Creswell (2014, pp. 79-80) suggests that in an explanatory sequential design, as with this thesis:

- the qualitative sample is drawn from the participants in the quantitative sample in order for the qualitative results to be able to “explain” the quantitative results;
- thus, the qualitative sample will necessarily be smaller; and
- participants in the qualitative sample “need to be individuals who are capable of answering the qualitative questions”.

According to Patton (2002 as cited in Palinkas et al., 2015), purposive sampling is a widely used technique in qualitative research to obtain access to information-rich subjects, thereby maximizing use of limited resources. Creswell and Clark (2011) suggest that this translates into selecting subjects that are particularly knowledgeable or experienced with the phenomenon of interest. Seven principles of sampling, qualitative or quantitative, were put forth by Kemper, Stringfield, and Teddie (2003 as cited in Palinkas et al., 2015, p. 542):

- the sampling strategy should stem logically from the conceptual framework as well as the research questions being addressed by the study;
- the sample should be able to generate a thorough database on the type of phenomenon under study;
- the sample should at least allow the possibility of drawing clear inferences and credible explanations from the data;
- the sampling strategy must be ethical;
- the sampling plan should be feasible;
- the sampling plan should allow the researcher to transfer/generalize the conclusions of the study to other settings or populations; and
- the sampling scheme should be as efficient as practical.

Based on the above, the purposive sampling design employed was a form of maximum variation sampling (Palinkas et al., 2015). In this thesis, the criteria for sampling for the investor and adviser samples was variability in two key quantitative variables analyzed in Chapter 5: (i) return expectations and (ii) %TSX. Accordingly, the sample was selected so that the investors and advisers exhibited maximum variability in these factors. Additional criteria for investors included adequate representation of gender, while for advisers representation of different licensing types was considered desirable.

What is a sufficient sample size? Grounded theory expounds on the notion of theoretical saturation. Glaser (2001, p. 191) defines saturation as “conceptualization of comparisons of these incidents which yield different properties of the pattern, until no new properties of the pattern emerge. This yields the conceptual density that when integrated into hypotheses make up the body of the generated grounded theory with theoretical completeness.” Dey argues that it is simply conjecture by researchers that categories are saturated and that such saturation is hard to prove. Furthermore, GTM results in categories that are suggested by the data. Hence, he prefers a “theoretical sufficiency” approach as better reflecting how GTM is conducted in practice (Dey, 1999, as cited in Charmaz, 2006). From the author’s perspective, this was the preferable approach to defining adequacy of sample size for the qualitative phase and supported the view that the obtained sample size was sufficient to suggest the resulting categories.

4.5.2.2 Conduct of Interviews

The semi-structured interviews were conducted via Skype (audio only) in order to facilitate recording and were each 45 – 60 minutes in length. The author pre-arranged the interviews to ensure that they were free from distractions or time constraints. Each interview began with the author reading a prepared introduction outlining the purpose of the interview and requesting permission to record the proceedings. Informed consent for using the data in a non-attributable format was obtained. Subjects were encouraged to provide

candid answers and to expand as fully as they desired on any topic. The fact that there was no right or wrong answer was also reinforced.

The questions were broadly focused around the following themes: (i) the participants' understanding of the risk-return trade-off; (ii) factors influencing their return expectations; and (iii) questions asked in the meetings between investors and advisers. A list of the initial questions and themes that formed the basis of the semi-structured interviews can be found in Appendix 3. Of course, the actual questions asked were guided by the participants.

The interview recordings were sent to a third-party commercial provider for transcription. The author then reviewed the transcribed documents against the original recordings to ensure the transcriptions were accurate. The objective was to capture the full statements of both interviewer and interviewee without capturing pauses, stutters, sentence restarts or insignificant utterances (e.g. "um", "er", "you know"). All efforts were taken throughout the process to ensure that direct quotes were not attributable to individuals and that confidentiality was maintained.

It should be noted that these interviews did not provide quantitative data or necessarily record issues of fact. The purpose of the interviews was to highlight the perceptions and thinking of a sample of investors and advisers and investigate the factors that appear to influence risk-taking decisions.

4.5.3 Qualitative Analytical Methods

As described in section 4.5.1, this thesis utilized a thematic analysis as the qualitative analytical method but also leveraged the systematic processes common to Charmaz's approach to grounded theory. Braun and Clarke (2006) describe the six phases of thematic analysis as follows:

- (i) **Familiarization with the data:** transcribing data, reading and re-reading data, noting initial ideas
- (ii) **Generating initial codes:** systematic coding to identify interesting features across entire data set

- (iii) **Identifying themes:** collating codes into potential themes
- (iv) **Reviewing themes:** verifying that themes work across the data
- (v) **Naming themes:** Refine specifics and the overall story the analysis tells
- (vi) **Producing report:** Selection of vivid, compelling extract examples and relating analysis back to research question

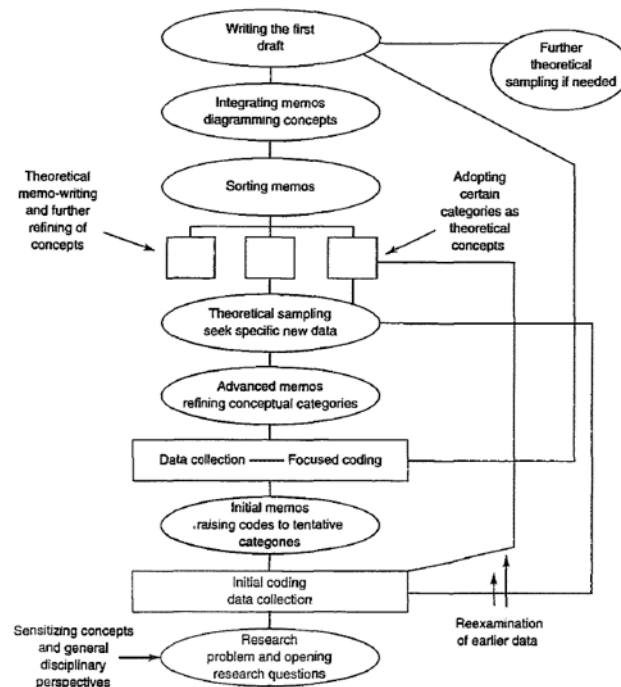
Steps ii – v require a systematic analysis and process to provide the rigour necessary to instill confidence in the reliability and validity of the findings. To that end, the thematic analysis method used in this thesis leveraged the coding philosophy and methodology used in Charmaz’s approach to grounded theory. This requires the coding of the underlying data into concepts and categories that are then subsumed into themes, eventually leading, through an iterative process, to answers to the research question. In this thesis, the author used NVivo for Mac (version 11.4.2)³⁰ to code and analyze the transcribed data.

4.5.3.1 The Coding Process and Analysis

Figure 3 summarizes the Grounded Theory process. An initial coding process was utilized wherein codes were created by scrutinizing the data and defining the inherent meanings. This was an iterative process where the researcher interacted with the “data again and again and ask[ed] many different questions of them” (Charmaz, 2006, p. 46).

³⁰ NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 11.4.2 for Mac, 2017.

Figure 3: The Grounded Theory Process



From Charmaz (2006, p. 11)

The second step in the analytic process, focused coding, re-analyzed the data to determine which of the original codes could be subsumed into broader categories. Per Charmaz (2006), this focused coding process was unlikely to be a simple, linear process, as insights developed in this phase would likely prompt the researcher to revisit the earlier codes and data.

The foundation of both initial and focused coding is the process of constant comparison, where items of data are compared to each other and to the codes that are generated. This process results in the creation of new codes or the removal or re-categorization of existing codes. Constant comparison requires an ongoing shift between deductive and inductive thinking, which allows for higher levels of analytical coding. Throughout this process, the researcher writes analytic memos about the ideas that develop during the process of coding and data analysis. This attempt to “identify patterns” often involves including verbatim material from different participants to facilitate the constant comparison (Charmaz, 2006).

The resulting memos are analyzed and sorted on an iterative basis, allowing the researcher to work on the theoretical integration of the categories. This process develops a clearer visualization of the relationships between the categories. Subsequently, the use of diagrams provides concrete images of the ideas and concepts – a process that ultimately generates “grounded theories” (Charmaz, 2006, pp. 115 - 119).

In this thesis, there were two phases of initial coding of the transcripts of investors and advisers over a period of approximately two months. A round of focused coding followed over the subsequent month, which required constant comparisons between the seven investors and six advisers who participated in the qualitative study. The comparisons included the participants’ responses in the quantitative phase as well as their views on expectation formation, the investment decision process, interactions that they expected between investor and adviser, etc. A number of analytic memos were written with three substantive memos as evolving visualizations of the underlying data. Thereafter, a number of attempts to diagrammatically depict the evolving concepts followed. Several final diagrams emerged suggesting a dynamic model of investment decisions (see Chapter 8 and 9).

It is important to reiterate that the analysis was not a grounded theory analysis as the approach and questions used in the semi-structured interviews were informed by the earlier quantitative results. For example, the purposive sample was chosen using criteria - variation in return expectations and %TSX - that was informed both by earlier literature (cf. Weber et al., 2013; Merkle & Weber, 2014) and the results of the quantitative analysis (the subjects for the qualitative analysis were chosen for the variation in their answers to these two variables in the analytic survey). Furthermore, the initial set of questions for the semi-structured interviews were also informed by this prior literature and the results of the quantitative analysis. For example, one interview question sought to determine the information source that participants relied on in forming their return expectations. Therefore, given these factors that

underpin the qualitative analysis, thematic analysis is a more appropriate methodology than grounded theory. Thus, thematic analysis was the method used for the analysis. However, in keeping with the pragmatic worldview that the author brought to this thesis, the analysis leveraged the structure and processes well described in Charmaz (2006).

4.5.4 Establishing Reliability and Validity of the Qualitative Study

Morse, Barrett, Mayan, Olson, and Spiers (2002, p. 14) argued that without “rigor, research is worthless, becomes fiction, and loses its utility.” In quantitative research, random sampling, *p*-values and other statistical methods exist to demonstrate rigour. In qualitative research, verification, or the mechanisms used during the research process to incrementally ensure reliability and validity, can provide the necessary rigour (Morse et al., 2002). Strategies for verification include methodological coherence, appropriate sampling, concurrent data collection and analysis, thinking theoretically, and theory development.

Methodological coherence looks to establish correspondence between the research method and the research questions. In order to maintain correspondence, either the questions or the method may be modified in accordance with the data.

Appropriate sampling means that the selected participants are best positioned to have knowledge of the research topic. In addition, Morse et al. (2002, p. 18) suggested that “(s)eeing negative cases is essential, ensuring validity by indicating aspects of the developing analysis that are initially less than obvious.” The key objective of the qualitative phase was to better understand the variability of risk-taking decisions that could not be explained by return expectations, demographic factors, literacy or experience as determined in the quantitative phase. The criterion-based purposive sampling thus provided appropriate sampling, including some element of “negative” cases.

The concurrent collection and analysis of data in an iterative fashion is “the essence of attaining reliability and validity” (Morse et al., 2002, p. 18). The iterative process and constant comparison described in Section 4.5.3.1 above is in keeping with this verification strategy.

Similarly, thinking theoretically implies that ideas emerging from the data are reconfirmed in new data and re-checked against existing data. This constant checking and re-checking of the data was inherent in the above described process of coding and re-coding and constant comparison not just between investors and between advisers, but across the two groups as well.

Finally, theory development requires moving deliberately between the micro perspectives embedded in the data and the conceptual framework on a macro level. This process ensures that “(v)alid theories are well developed and informed, they are comprehensive, logical, parsimonious, and consistent” (Morse et al., 2002, pp. 18 - 19). The theory that emerged from this thesis did move in a deliberate fashion from the micro perspectives of investors and advisers to a conceptual macro framework. Codes gave rise to categories that were then subsumed under higher analytical concepts.

The qualitative phase of this thesis followed a rigorous process, including constant comparison of the data and the evaluation of the emerging theory against the data itself and the literature. As such, this rigour supports the view that the resulting theory reliably represents the concepts discovered in the underlying data and provides a sound contribution to the understanding of the investment decisions of investors and advisers.

4.5.4.1 Identifying Researcher Bias

In qualitative research, it is particularly important to identify and declare potential bias of the researcher. In this case, the author has experience both as an investor in his personal capacity as well as having the qualifications of an adviser and having managed a team of advisers for many years. While this background was of benefit, both in terms of sourcing participants for the

quantitative and qualitative studies and for conversing with investors and advisers in Study 3, it could also be a source of potential bias.

The author sought to minimize this risk of potential bias in three distinct ways. First, the selection of the sample was criterion-based. The objective was to achieve maximum variation on key quantitative variables. Second, the initial questions in the semi-structured interviews were formulated by the author but validated by a group of industry practitioners and laypeople as well as by the author's supervisors. Finally, the author sought to ground the categories and themes in the words of the participants themselves to minimize the potential for "biased" interpretation.

4.6 Chapter Summary

This chapter outlined the methodological approach taken in this explanatory sequential mixed methods study. The pilot project, which precipitated this thesis was discussed in detail, together with the findings that led to the current research questions. Justification was provided for the research approach used, namely analytic survey and quasi-experimental design with rigorous statistical analyses in phase 1 and semi-structured interviews analyzed using grounded theory in phase 2. The data collection procedures, instruments and questions used were described to provide justification for the research path and findings.

Chapter 5 The Role of Risk Tolerance and Return Expectations in Risk- Taking Decisions

This chapter presents the results from two studies involving Canadian investors (Study 1A) and Canadian advisers (Study 1B). The results from the follow-up study conducted with a subset of these investors (Study 1C) and advisers (Study 1D) are presented in Chapter 6. Finally, the results from a modified approach (from the one used with Canadian participants) used with international investors (Study 2A) and international advisers (Study 2B) are presented in Chapter 7. Statistical analysis and descriptive statistics of each sample are detailed in the respective chapters.

5.1 Study 1A

The purpose of Study 1A was to determine whether return expectations and risk tolerance, as measured by a typical industry risk tolerance questionnaire, predicted Canadian investors' risk-taking behaviour. In addition, Study 1A sought to determine whether behavioural biases, personality traits and demographic variables impact return expectations as well as risk-taking behaviour.

The research questions and related hypotheses examined in Study 1A are summarized below:

Q1. Do behavioural biases affect investors' return expectations and risk-taking behaviour?

Kahneman and Riepe (1998) suggested that investors focus on the initial purchase price of a stock as a reference point or anchor. Shiller (1998) suggested that investors' sense of investment opportunities (i.e. whether markets are overvalued or undervalued) are also based on prior levels as reference points or anchors (see Section 4.4.3). Thus, it is hypothesized that

exposure to a higher (lower) anchor prior to the elicitation of return expectations and risk-taking behaviour will lead investors to indicate a higher (lower) return expectation and to exhibit higher (lower) risk-taking behaviour.

- H1A-1 Exposure to scenarios with a higher anchor will result in a) a higher return expectation and b) higher risk-taking behaviour from investors.

Tversky and Kahneman (1973) argued that more recent information is one driver of the availability heuristic, which frequently influences decisions. Vissing-Jorgensen (2003) and Greenwood and Shleifer (2014) both found that investors' past return had a strong effect on their expectations about future market returns (see Section 4.4.3). Thus, it is hypothesized that exposure to a scenario designed to simulate recent portfolio gains (losses) prior to the elicitation of return expectations and risk-taking behaviour will lead investors to indicate higher (lower) return expectations and to exhibit higher (lower) risk-taking behaviour.

- H1A-2 Exposure to scenarios with recent gains will result in a) a higher return expectation and b) higher risk-taking behaviour from investors.

Shiller (1998) argued that the role of culture and social influence could affect investor behaviour in a way that could not be explained by fundamental factors alone. Research by Engelberg and Parsons (2011) and Brown et al. (2008) provides evidence that investors were influenced by their peers when making investment decisions (see section 4.4.3). Thus, it is hypothesized that exposure to a scenario designed to simulate better (worse) performance than peers prior to the elicitation of return expectations and risk-taking behaviour will lead investors to indicate higher (lower) return expectations and to exhibit higher (lower) risk-taking behaviour.

- H1A-3 Exposure to scenarios with peer groups performing better will result in a) a higher return expectation and b) higher risk-taking behaviour from investors.

Q2. Do personality traits or demographics affect investors' risk-taking behaviour?

De Bondt et al. (2013) argued that personality, cognitive style and social influence are all factors of interest in financial decisions (p. 100). They also argued that rationality means that "given their beliefs, agents make decisions that are consistent with subjective expected utility theory. They maximize. (p. 101)." Filbeck et al. (2005) found that personality type affected risk tolerance. Pompian and Longo (2004) found that personality type and gender were associated with differences in vulnerability to investor biases. Mayfield et al. (2008) found that the Big 5 personality traits predicted risk aversion and investment intentions. Regret (both anticipated and experienced) was found to impact investment decisions (Huang & Zeelenberg, 2012; Pan & Statman, 2012). Kahneman & Tversky (1978) identified loss aversion as a key investor condition. Shiller (1998) and Benartzi & Thaler (1995) both identified investors' preparedness (or grit) to hold their equity investments for longer time frames as positively related to investment returns. Weber et al. (2002) identified that risk perception and risk-taking is domain specific.

Thus, personality traits are hypothesized to be key factors affecting investment decisions. Broader personality traits (such as the Big 5) and more specific traits associated specifically with investment decisions in the literature discussed above (regret, maximizing behaviour, cognitive style, loss aversion, social influence, domain specific risk) are all hypothesized to affect risk-taking behaviour.

- H1A-4 Differences in personality traits will result in differences in risk-taking behaviour from investors.

Gender has been found to account for systematic differences in risk-taking (in part, due to the fact that men perceive risks to be lower than women although this differs significantly by domain – e.g. driving, use of drugs, investing, etc.) (cf. Byrnes et al., 1999; Barber & Odean, 2001; Weber & Klement, 2018). Sahm (2012) found that risk tolerance declines with age.

DaSilva and Giannikos (2006) also found that risk aversion increased with age. Vissing-Jorgensen (2003) found that stock market participation increases with wealth. Guiso and Jappelli (2008) found that age, education and financial wealth were all associated with greater number of assets held by individuals. Thus, it is hypothesized that differences in key demographic variables (gender, marital status, age, education and net worth) are linked to differences in investors' risk-taking behaviour.

- H1A-5 Differences in demographic characteristics will result in differences in risk-taking behaviour from investors.

Q3. Do risk tolerance or return expectations predict investors' risk-taking behaviour?

The use of risk tolerance questionnaires by the industry is driven by the desire to ensure that investment recommendations are suitable for the level of risk tolerance of the investor (cf. Brayman et al., 2015; Linciano & Soccorso, 2012; Pan & Statman, 2012). Thus, it is hypothesized that higher (lower) investor RTQ scores will result in higher (lower) risk-taking behaviour from investors.

- H1A-6 Higher RTQ scores will result in higher risk-taking behaviour from investors.

Vissing-Jorgensen (2003) found that higher expected returns were strongly correlated with higher equity shares in an investors' portfolio. Similarly, Greenwood and Shleifer (2014) found positive correlations between mutual fund inflows and investors' return expectations. Thus, it is hypothesized that higher (lower) investor return expectations will result in higher (lower) risk-taking behaviour from investors.

- H1A-7 Higher return expectations will result in higher risk-taking behaviour from investors.

5.1.1 Study Design

5.1.1.1 Sample and Descriptive Statistics

Through the snowball sampling technique described in Chapter 4, 266 Canadian investors commenced the online questionnaire; of these, 42 did not complete the questionnaire by the time the survey period was closed. All questions were mandatory, so partially completed questionnaires were discarded. Of the 224 that completed the questionnaire, 32 respondents did not provide the proper answer for the attention filter question and were thus discarded from the study. In total, there were 192 usable responses to questionnaires from Canadian investors. The response rate (84%) and the useable response rate (72%) was considered to be relatively high. The participants were randomly assigned to one of six experimental conditions. Demographic and other characteristics of the investors are reported in Table 3 and support the view that the sample was representative of the investor population of interest (wealthy Canadian investors receiving financial advice) in that the sample is skewed male, older and married (see commentary on p. 111).

5.1.1.2 Questionnaire and Instruments

All subjects were asked to complete an online questionnaire created with and hosted by Qualtrics survey software through the University of Manchester (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017). The questionnaire consisted of demographic information, ten previously validated instruments as described in Chapter 4, an anonymized but typical industry risk tolerance questionnaire and six experimental conditions to which subjects were randomly assigned. In addition, the quantitative measure of expected return as well as the risk-taking measure described in Section 5.2.1.4 were included in the questionnaire (see Appendix 1A for the full questionnaire).

The personality scales, experimental protocols and risk-taking measure were all validated in prior research, although this was the first study to combine the different elements. Additional testing of the measures was conducted through pre-tests to a panel of industry professionals and the author's

supervisors for critique. Consensus was reached regarding the clarity and suitability of the questions. Feedback to improve the clarity of wording was incorporated in the final version of the investors' questionnaire.

Data collection for Study 1A was undertaken between October and December 2016.

Table 3: Descriptive Statistics – Canadian Investors Study 1A (N = 192)

<i>Measure</i>	<i>n</i>	<i>%</i>	<i>Measure</i>	<i>n</i>	<i>%</i>
Gender			Education		
Male	115	59.9%	High School	7	3.6%
Female	77	40.1%	Bachelors	77	40.1%
Marital Status			Masters	95	49.5%
Single	21	10.9%	Doctor	13	6.8%
Married	157	81.8%	Net Worth		
Separated	8	4.2%	Retail	45	23.4%
Divorced	6	3.1%	Mass Affluent 1	28	14.6%
Widowed	0	0.0%	Mass Affluent 2	30	15.6%
Age			High Net Worth	89	46.4%
<45	4	2.1%	Experimental Condition		
46-55	19	9.9%	High Anchor	32	16.7%
56-65	34	17.7%	Low Anchor	33	17.2%
66-75	78	40.6%	Recent Gain	33	17.2%
>75	57	29.7%	Recent Loss	31	16.1%
			Better Than Peer Group	31	16.1%
			Worse Than Peer Group	32	16.7%

The sample is 192 Canadian investors completing an online questionnaire through Qualtrics survey software (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017).

5.1.1.3 Experimental Conditions

Three experimental conditions for behavioural biases were independently tested in the study, and each condition had two levels (see Table 1). All subjects were randomly assigned to one of the six scenarios. Anchoring, where an arbitrary number at the outset can influence subsequent decisions, was the first experimental condition. Subjects were randomly assigned to complete one of two simple arithmetic problems – one generating a low result and the second generating a high result. The second experimental condition tested for recency bias, where recent outcomes can have a disproportionate influence on choices compared to outcomes further in the

past. In this condition, subjects were either assigned to a scenario (vignette) where they had experienced a recent gain in their portfolio or a scenario where they had experienced a recent loss. The third and final experimental condition tested for peer group comparison, where subjects were made explicitly aware of how well friends and family did with their investments. Accordingly, subjects were either assigned to a scenario (vignette) where they had accumulated significantly less wealth than their friends and family or a scenario where they had accumulated significantly more wealth than their friends and family.

5.1.1.4 Procedures for Study 1A

1. Each subject was asked to provide demographic information (gender, age, education, level of wealth, and marital status).
2. Each subject was asked to complete the Instruments including an anonymized standard industry risk tolerance questionnaire (RTQ).
3. Each subject was randomly assigned to one of the 6 experimental conditions.
4. Quantitative measure of expected return ("Return") (modified from Weber et al., 2013). Each subject was asked to make three estimates of future market returns of the main Canadian stock market index (i.e. TSX).
 - "Please enter your response as a percent, i.e. a rise as X%, or a fall as - X%. The return of the Canadian stock market (TSX) in 12 months: (i) Your middle estimate (expected return – "ER") should be your best guess (as likely to be above the actual value as below it) (ii) Your high estimate ("HR") should be lower than the actual value very rarely (about once in 20 estimates) and (iii) Your low estimate ("LR") should be above the actual value very rarely (about once in 20 estimates)."
5. Qualitative measure of expected risk - each subject was asked to assess how risky they think the Canadian stock market (TSX) will be over the next 12 months. (1 = Not risky at all ... 7 = Extremely risky) (modified from Weber et al., 2013).
6. Qualitative measure of expected return - each subject was asked to assess the return prospects for the Canadian stock market (TSX) will be over the next 12 months. (1 = Extremely Bad ... 7 = Extremely Good) (modified from Weber et al., 2013).
7. Measure of risk-taking behaviour - each subject was asked to allocate \$500,000 between (i) a 5-year Government of Canada Savings Bond (i.e. a risk-free investment) or (ii) the Canadian stock market index fund (TSX)

(modified from Weber et al., 2013). Greater % in (ii) indicates greater risk-taking (modified from Weber et al., 2013)³¹:

- “Now imagine you have an overall wealth of \$500,000 that you wish to invest and that you don’t need this money for at least another 15 years. You could invest this amount either in a 5-year Government of Canada Savings Bond (i.e. a risk-free investment), into the Canadian stock market (TSX) or a combination of the two. How much would you invest in the Canadian stock market (TSX)?” (0 = invest everything into the risk-free asset; 100 = invest everything into the Canadian stock market).”

5.1.2 Impact of Behavioural Biases on Return Expectations and Risk-Taking Behaviour

The first set of hypotheses, H1A-1 to H1A-3, tested the effects of six paired experimental conditions on return expectations (“Return”) and risk-taking behaviour (%TSX): H1A-1 compared the “Low Anchor” group with the “High Anchor” group; H1A-2 compared the “Recent Gain” group with the “Recent Loss” group; and H1A-3 compared the “Better than Peers” group with the “Worse than Peers” group. These three hypotheses were tested using a one-way MANOVA model (Hair, Black, Babin, & Anderson, 2013). MANOVA is the appropriate statistical test to use here because there were two dependent variables of interest – Return and %TSX. Furthermore, there were theoretical reasons to believe that there was a linkage between these two dependent variables. An alternative approach, using multiple simple t-tests, would risk inflating Type 1 error, and implicitly assume that the multiple dependent variables are independent, when in truth they are not (Hair et al., 2013).

5.1.2.1 Assumptions for MANOVA

Prior to undertaking the main analysis, the assumptions underlying the MANOVA procedure were tested. The first assumption is that the dependent

³¹ Investment in the index is a good proxy for relative risk-taking when investors are faced with a choice between investing in a risk-free investment (e.g. Government of Canada bond, which most Canadians would view as risk-free) or a stock market index. Markowitz (1952) has shown that risk and return are positively correlated and Weber et al. (2013) found that investors understand this positive correlation. Therefore, higher return expectations for the index implies that the investor understands that there is more risk associated with the index and therefore allocation to this asset indicates greater risk-taking behaviour. The fact that prior research (e.g. Weber et al. (2013) and Merkle & Weber (2014) has used this hypothetical choice between a risk-free asset and the index as a proxy for risk-taking behaviour provides additional confidence in the use of this approach in this thesis.

variables across all groups, i.e. the six paired experimental conditions, are normally distributed. The Shapiro-Wilk statistic indicated that normal distributions were only observed for the Low Anchor, Recent Loss and Worse than Peers groups for Return; all other groups had non-normal distributions on both Return and %TSX ($p < 0.05$). However, as MANOVA is extremely robust to deviations from normality and outperforms the non-parametric equivalent even when this assumption is violated (Finch, 2005), the analysis continued as planned.

The second assumption is the homogeneity of covariance matrices which was evaluated by Box's test statistic. The matrices were found to be homoscedastic across the High Anchor and Low Anchor groups ($p = 0.222$) and across the Recent Gain and Recent Loss groups ($p = 0.344$). However, the matrices were found to be heteroscedastic for the Worse than Peers and Better than Peers groups for Return ($p < 0.05$). Nevertheless, as the finding was close to non-significance and the fact that Box's test is highly sensitive to deviations from normality (Field, 2013) as previously noted, the MANOVA analysis continued as planned.

A comparison of the descriptive statistics across conditions can be seen in Table 4. The variation across key demographic variables is broadly statistically similar across experimental conditions and with the overall sample (see Table 3), suggesting the process of randomization used in the experimental manipulation was successful.

Table 4: Descriptive Statistics – Comparison of Demographics across Experimental Conditions for Study 1A

Variables		High Anchor		Low Anchor		Recent Gain		Recent Loss		Better than Peers		Worse than Peers	
		n	%	n	%	n	%	n	%	n	%	n	%
Gender	Male	21	65.60%	21	63.60%	19	57.60%	18	58.10%	19	61.30%	17	53.10%
	Female	11	34.40%	12	36.40%	14	42.40%	13	41.90%	12	38.70%	15	46.90%
Marital Status	Single	1	3.10%	7	21.20%	2	6.10%	3	9.70%	1	3.20%	7	21.90%
	Married	28	87.50%	23	69.70%	29	87.90%	26	83.90%	27	87.10%	24	75.00%
	Separated	3	9.40%	1	3.00%	1	3.00%	0	0.00%	2	6.50%	1	3.10%
	Divorced	0	0.00%	2	6.10%	1	3.00%	2	6.50%	1	3.20%	0	0.00%
	Widowed	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Education	High School	1	3.10%	1	3.00%	0	0.00%	2	6.50%	1	3.20%	2	6.30%
	Bachelors	10	31.30%	10	30.30%	14	42.40%	16	51.60%	14	45.20%	13	40.60%
	Masters	18	56.30%	20	60.60%	18	54.50%	11	35.50%	13	41.90%	15	46.90%
	Doctors	3	9.40%	2	6.10%	1	3.00%	2	6.50%	3	9.70%	2	6.30%
Net Worth	Retail	7	21.90%	11	33.30%	4	12.10%	9	29.00%	8	25.80%	6	18.80%
	Mass Affluent 1	3	9.40%	6	18.20%	4	12.10%	3	9.70%	3	9.70%	9	28.10%
	Mass Affluent 2	7	21.90%	4	12.10%	5	15.20%	3	9.70%	7	22.60%	4	12.50%
	High Net Worth	15	46.90%	12	36.40%	20	60.60%	16	51.60%	13	41.90%	13	40.60%

5.1.2.2 MANOVA Results

For H1A-1, the Low Anchor group was compared to the High Anchor group. The MANOVA model was found to be non-significant ($F(2,61) = 0.027$, $p = 0.973$, Pillai's Trace = 0.001, $\eta^2 = 0.001$); no differences were observed between the groups with respect to Return (i.e. the quantitative measure of return expectation) ($F(1,62) = 0.005$, $p = 0.944$, $\eta^2 = 0.000$) and %TSX ($F(1,62) = 0.055$, $p = 0.815$, $\eta^2 = 0.001$). The low power implied by the low η^2 statistic provided by SPSS is consistent with the non-significant results obtained. Thus, H1A-1 was rejected.

For H1A-2, the Recent Gain group was compared to the Recent Loss group. The MANOVA model was not significant ($F(2,61) = 1.027$, $p = 0.364$, Pillai's Trace = 0.033, $\eta^2 = 0.033$); no differences were observed between the groups with respect to Return ($F(1,62) = 0.034$, $p = 0.854$, $\eta^2 = 0.001$) and %TSX ($F(1,62) = 2.086$, $p = 0.154$, $\eta^2 = 0.033$). Accordingly, H1A-2 was also rejected.

Finally, for H1A-3, the Better than Peers and Worse than Peers groups were compared. The MANOVA model was also not significant ($F(2,60) = 0.015$, $p = 0.986$, Pillai's Trace = 0.000, $\eta^2 = 0.000$); no differences were observed

between the groups with respect to Return ($F(1,61) = 0.001, p = 0.977, \eta^2 = 0.000$) and %TSX ($F(1,61) = 0.030, p = 0.864, \eta^2 = 0.000$) leading to the rejection of H1A-3.

5.1.3 Impact of Personality Traits, Demographic Variables, and Return Expectations on Risk-Taking Behaviour

For hypotheses H1A-4 to H1A-7, a hierarchical multiple regression model was used as the same dependent variable, %TSX, was common to all four hypotheses. As the dependent variable is continuous in nature, the optimal model to use is Ordinary Least Squares (OLS) (Hair et al., 2013) and the four hypotheses were simultaneously tested in a single hierarchical model. The analysis first verified the reliability of the personality scales and then evaluated the assumptions underlying OLS analysis.

5.1.3.1 Reliability of Personality Scales

The reliability of the personality scales used in this analysis (and described in Chapter 4) was evaluated by means of the Cronbach's Alpha test statistic.

Table 5: Cronbach's Alpha - Personality Scales Canadian Investors Study 1A

<i>Variable</i>	<i>Cronbach's Alpha</i>
Extraversion	0.643
Agreeableness	0.385
Consciousness	0.564
Neuroticism	0.642
Openness	0.389
Dospert Risk Perception	0.686
Nenkov Maximization Scale	0.537
Schwartz Regret Scale	0.831
Dospert Risk Taking	0.562
Duckworth Grit Scale	0.655
Loss Aversion Scale	0.642
Rational & Intuitive Decision-Making Style	0.627
Dospert Perceived Benefits	0.658
Iowa-Netherlands Comparison Scale	0.591

Note: Cronbach's Alpha test statistic calculated using participants' responses to respective scales and analyzed using SPSS for Macintosh.

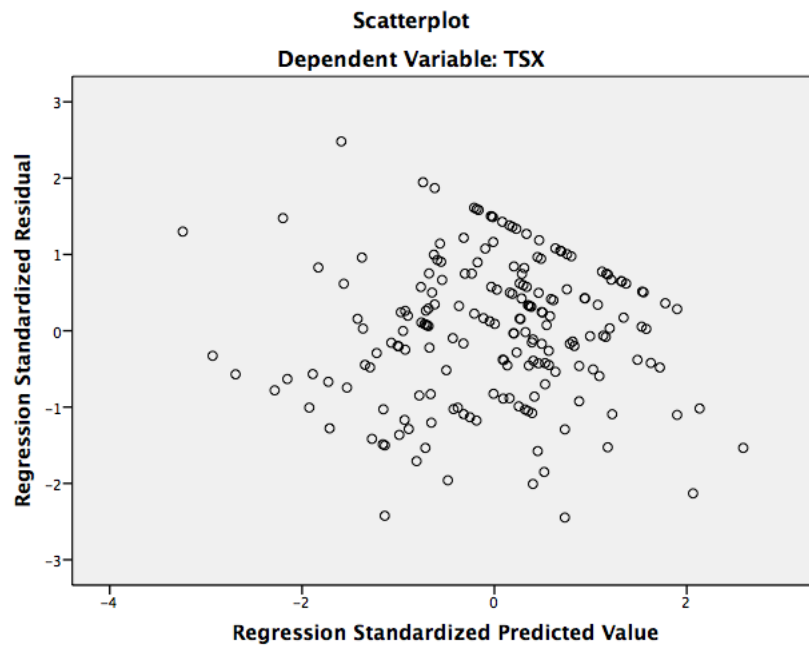
The results summarized in Table 5 suggest that the majority of scales demonstrate reliability scores somewhat lower than the normally acceptable thresholds for acceptance (Darren & Mallery, 1999). While it was decided to keep the scales in the subsequent regression model, interpretations of the results must bear in mind this reliability analysis.

5.1.3.2 Assumptions for OLS

The first assumption to be tested was whether there were any signs of multi-collinearity in the independent variables, i.e. excessive correlations with other predictor variables. For this analysis, any variable with a Variance Inflation Factor (VIF) greater than 5 was considered to be excessively multicollinear (Hair et al., 2013; Stine, 1995) and thus potentially a candidate for removal. An initial regression analysis was conducted to evaluate the VIF scores. In doing so, it was determined that all variables were within the thresholds for acceptance except for the following: RTQTH (RTQ Time Horizon subscale) had a VIF of 8.098; and SRS (Schwartz's Regret Scale) had a VIF of 8.230. Accordingly, these two variables were removed from the analysis. In addition, the dummy variables for the age ranges of 46 – 55 years and 56 – 65 years had VIFs of 7.546 and 5.263, respectively. However, as demographic variables were a core part of the hypotheses to be tested, it was opted to retain these dummy variables in the analysis.

In addition, the assumptions of linearity, normality and homoscedasticity were collectively tested using a scatterplot of the predicted values versus the residuals. For this purpose, the guidelines specified in Tabachnik et al. (2001) were used. Linearity can be assumed if the residuals do not follow a curvilinear or nonlinear pattern. Normality can be inferred when the residuals are symmetrically distributed across the centre, with a greater concentration around the centre. A random pattern of residuals scattered around the zero value is indicative of homoscedasticity. Figure 4 suggests that all of these criteria were met and that therefore the assumptions necessary for regression analysis were satisfied.

Figure 4: Scatterplot of Predicted Values versus Residuals – Study 1A



Source: SPSS for Macintosh

5.1.3.3 Regression Results

To test hypotheses H1A-4 to H1A-7, a hierarchical multiple regression was run to determine if the RTQ subscales, quantitative measure of return expectation (Return), investor demographic factors, personality scales and qualitative expectation of risk and return improved the prediction of %TSX (Petrocelli, 2003). The details of the regression model tested in a hierarchical fashion are summarized in Table 6. The regression model can be represented by the following functional form:

$$y = b_0 + b_1 \text{RTQLTE} + b_2 \text{RTQSTR} + b_3 \text{Return} + b_4 \text{Gender} + b_5 \text{Marital} + b_6 \text{Education} + b_7 \text{NetWorth} + b_8 \text{Age} + b_9 \text{Extra} + b_{10} \text{Agree} + b_{11} \text{Consc} + b_{12} \text{Neuro} + b_{13} \text{Open} + b_{14} \text{DRP} + b_{15} \text{NMS} + b_{16} \text{DRT} + b_{17} \text{DGS} + b_{18} \text{LAS} + b_{19} \text{RIDS} + b_{20} \text{DPB} + b_{21} \text{INCOM} + b_{22} \text{INCOM} + b_{23} \text{QUALRETURN} + b_{24} \text{QUALRISK} + \varepsilon$$

where (parentheses indicates related hypotheses):

RTQLTE	= Risk Tolerance Questionnaire – Long Term Expectations Subscale (H1A-6)
RTQSTR	= Risk Tolerance Questionnaire – Short Term Risks Subscale (H1A-6)
Return	= Quantitative Measure of Expected Returns (% expected over next 12 months) (H1A-7)
Gender	= Dummy variable for gender of subject (H1A-5)
Marital	= Dummy variable for marital status of subject (H1A-5)

Education	= Dummy variable for education level of subject (H1A-5)
Net Worth	= Dummy variable for net worth level of subject (H1A-5)
Age	= Dummy variable for age group of subjects (H1A-5)
Extra	= Extraversion subscale of the Big Five Inventory 10 (BFI10) scale (H1A-4)
Agree	= Agreeableness subscale of the BFI10 scale (H1A-4)
Consc	= Conscientiousness subscale of the BFI10 scale (H1A-4)
Neuro	= Neuroticism subscale of the BFI10 scale (H1A-4)
Open	= Openness subscale of the BFI 10 scale (H1A-4)
DRP	= Dospert Risk Perception Scale (H1A-4)
NMS	= Nenkov Maximization Scale (H1A-4)
DRT	= Dospert Risk Taking Scale (H1A-4)
DGS	= Duckworth Grit Scale (H1A-4)
LAS	= Loss Aversion Scale (H1A-4)
RIDS	= Rational and Intuitive Decision-Making Style (H1A-4)
DPB	= Dospert Perceived Benefits Scale (H1A-4)
INCOM	= Iowa-Netherlands Comparison Scale (H1A-4)
QUALRETURN	= Qualitative Return Expectations (H1A-7)
QUALRISK	= Qualitative Risk Expectations (H1A-7)

Model 2, the model with the best fit, was found to be significant with reasonably good fit ($R^2 = 0.278$, adjusted $R^2 = 0.207$, $F(17,174) = 3.934$ $p < 0.001$). Other iterations of the model included personality scales and qualitative measures of return and risk expectations. While there were modest increases in R^2 , adjusted R^2 decreased and none of the observed changes in R^2 were significant. This was the critical consideration used to identify Model 2 as the best model. Model 2 was found to be significant with RTQLTE ($B = 1.599$, $t(174) = 3.994$, $p < 0.001$), Return ($B = 1.463$, $t(174) = 2.475$, $p < 0.05$), Gender - Female ($B = -7.975$, $t(174) = -2.243$, $p < 0.05$), Marital Status - Single ($B = 13.878$, $t(174) = 2.497$, $p < 0.05$) and Net Worth - Retail ($B = -11.983$, $t(174) = -2.430$, $p < 0.05$) all being significant predictors. An analysis of the effect size and resulting power was conducted using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009). A post-hoc analysis of the linear multiple regression fixed model (R^2 deviation from 0) indicated an effect size of 0.39 and power of 0.9999.

Table 6: Determinant Effects on %TSX Canadian Investors Study 1A (N=192)

Variables	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
(Constant)	19.663	9.107		31.122	11.400		80.290	33.488		75.656	35.392	
RTQLTE	1.760	0.364	0.331***	1.599	0.400	0.301***	1.724	0.425	0.324***	1.719	0.428	0.324***
RTQSTR	0.554	0.462	0.082	0.312	0.480	0.046	0.013	0.510	0.002	0.009	0.514	0.001
Return	1.769	0.566	0.204**	1.463	0.591	0.169*	1.606	0.613	0.185**	1.421	0.721	0.164
Female	-9.725	3.382	-0.199**	-7.975	3.555	-0.163*	-4.824	3.968	-0.099	-5.168	4.077	-0.106
Single	8.496	5.231	0.111	13.878	5.559	0.181*	13.768	5.730	0.180*	14.025	5.769	0.183*
Separated	8.119	7.903	0.068	5.665	8.155	0.047	6.597	8.539	0.055	6.298	8.587	0.053
Divorced	-6.175	9.103	-0.045	-4.309	9.300	-0.031	-1.836	9.724	-0.013	-1.931	9.808	-0.014
High School				-5.324	8.893	-0.042	-1.068	9.458	-0.008	-1.849	9.616	-0.014
Bachelors				-3.650	3.552	-0.075	-3.703	4.026	-0.076	-3.365	4.082	-0.069
Doctor				7.625	6.527	0.080	8.152	6.883	0.086	7.681	6.953	0.081
Retail				-	4.930	-0.212*	-	5.187	-0.223*	-	5.250	-0.222*
				11.983			12.569			12.526		
Mass Affluent 1				-6.060	5.150	-0.089	-8.222	5.561	-0.121	-7.915	5.656	-0.117
Mass Affluent 2				0.364	4.748	0.006	-0.976	4.935	-0.015	-1.115	5.007	-0.017
Age<45				3.534	11.470	0.021	7.150	11.824	0.043	6.524	11.976	0.039
Age=46-55				-5.936	6.013	-0.074	-6.057	6.342	-0.076	-6.071	6.389	-0.076
Age=56-65				0.690	4.508	0.011	1.601	4.965	0.026	1.864	5.013	0.030
Age >75				1.496	4.515	0.029	3.693	4.678	0.071	3.925	4.737	0.075
DRP							-0.559	0.555	-0.081	-0.546	0.558	-0.079
NMS							0.145	0.383	0.033	0.128	0.385	0.029
DRT							-0.199	0.521	-0.034	-0.134	0.531	-0.023
DGS							-0.392	0.483	-0.064	-0.343	0.490	-0.056
LAS							0.052	0.442	0.009	0.063	0.445	0.011
RID							-0.585	0.463	-0.092	-0.570	0.466	-0.090
DPB							0.711	0.493	0.117	0.636	0.505	0.104
INC							0.091	0.404	0.017	0.092	0.406	0.018
EXTRA							-1.505	1.096	-0.108	-1.539	1.102	-0.111
AGREE							-0.146	1.308	-0.009	-0.062	1.319	-0.004
CONSC							-0.047	1.241	-0.003	-0.056	1.260	-0.004
NEURO							-2.160	1.154	-0.150	-2.085	1.163	-0.144
OPEN							-1.692	1.464	-0.111	-1.572	1.491	-0.103
QUALRETURN										1.235	2.324	0.044
QUALRISK										-0.769	1.679	-0.033
<i>F</i>	7.874***			3.934***			2.524***			2.363***		
<i>R</i> ²	0.230			0.278			0.320			0.322		
Adjusted <i>R</i> ²	0.201			0.207			0.193			0.186		
Change in Adj. <i>R</i> ²	0.201			0.006			-0.014			-0.007		

* $p < .05$, ** $p < .01$, *** $p < .001$. Note: The table presents the results of a hierarchical multiple regression with the dependent variable TSX. Dummy variables were used for Gender (Base = Male), Marital Status (Base = Married), Education (Base = Masters), Net Worth (Base = HNW), Age (Base = Age 66 - 75). Durbin-Watson statistic = 2.073.

None of the personality scales were found to be significant, a finding that was contradictory to the literature. Thus, H1A-4 was rejected and H1A-5 was supported by the data as several demographic variables were found to be significant.

RTQSTR was not a significant predictor of %TSX, a finding that was contrary to the literature. RTQTH (the time horizon subscale) was not included in the statistical analysis as it was found to be highly multicollinear. RTQSTR (the short-term risks) subscale was not a significant predictor of risk-taking behaviour while RTQLTE (long-term expectations) subscale was a significant predictor. Alternative models, not reported here for brevity, using the full RTQ scale were tested and the full scale consistently exhibited statistical non-significance as a predictor of risk-taking behaviour. Notwithstanding the significance of the RTQLTE subscale, H1A-6 was rejected. Return expectations and RTQLTE (a form of long-term return expectations) were significant predictors of risk-taking behaviour. Thus, H1A-7 was supported by the data.

5.2 Study 1B

The purpose of Study 1B was to apply the approach of Study 1A to advisers and determine whether expectations of return and risk impacted advisers' risk-taking advice to investors. Further, Study 1B sought to establish whether behavioural biases, personality traits and demographic variables also impacted advisers' return and risk expectations as well as their risk-taking advice. Study 1B also sought to extend the findings of Diacon (2004), where he found that there were differences in perception between advisers and investors in the UK, to the Canadian context. However, whereas the focus of Diacon (2004) was on advisers' perception of risk associated with financial products in the abstract, the focus of Study 1B was to determine whether differences in expectations explained differences in advisers' risk-taking advice. In this respect, this thesis contributed to the literature as it is one of the few that has focused on factors influencing risk-taking advice.

The research question and related hypotheses examined in Study 1B are summarized below:

Q4. Do behavioural biases affect advisers' return expectations and risk-taking advice?

The hypotheses tested in Study 1B are the adviser analogue of the investor hypotheses tested in Study 1A (with the exception of H1A-6 which tested for the impact of RTQ on risk-taking behaviour). In both Study 1A and Study 1B, the role of various factors on return expectations and risk-taking decisions are examined whether it is an investor deciding for themselves or an adviser making the recommendation to an investor. For the sake of brevity, the reader is referred to Study 1A for the theoretical rationale underpinning each of the hypotheses below.

- H1B-1 Exposure to scenarios with a higher anchor will result in a) a higher return expectation and b) higher risk-taking advice from advisers.
- H1B-2 Exposure to scenarios with a higher anchor will result in a) a higher return expectation and b) higher risk-taking advice from advisers.
- H1B-3 Exposure to scenarios with peer groups performing better will result in a) a higher return expectation and b) higher risk-taking advice from advisers.

Q5. Do personality trait or demographics affect advisers' risk-taking advice?

- H1B-4 Differences in personality traits will result in differences in risk-taking advice from advisers.
- H1B-5 Differences in demographic characteristics will result in differences in risk-taking advice from advisers.

Q6. Do advisers' return expectations predict their risk-taking advice?

- H1B-6 Higher return expectations will result in higher risk-taking advice from advisers.

5.2.1 Study Design

5.2.1.1 Sample and Descriptive Statistics

Through the snowball sampling technique described in Chapter 4, 286 Canadian advisers commenced the online questionnaire. Of these, 81 did not complete the questionnaire by the time the survey period was closed. All questions were mandatory, so partially completed questionnaires were discarded. Of the 205 that completed the questionnaire, 50 respondents did not provide the proper answer for the attention filter question and were thus discarded from the study. In total, there were 155 usable responses to questionnaires from Canadian advisers. The response rate (72%) and the useable response rate (54%) was considered satisfactory. The participants were randomly assigned to one of six experimental conditions. Demographic and other characteristics of the advisers are reported in Table 7. The sample was considered to be representative of the adviser population of interest.

Table 7: Descriptive Statistics – Canadian Advisers Study 1B (N = 155)

<i>Measure</i>	<i>n</i>	<i>%</i>	<i>Measure</i>	<i>N</i>	<i>%</i>
Gender			Education		
Male	111	71.6%	High School	23	14.8%
Female	44	28.4%	Bachelors	104	67.1%
Marital Status			Masters	28	18.1%
Single	17	11.0%	Doctor	0	0.0%
Married	126	81.3%	Experimental Condition		
Separated	4	2.6%	High Anchor	26	16.8%
Divorced	7	4.5%	Low Anchor	26	16.8%
Widowed	1	0.6%	Recent Gain	26	16.8%
Licensing			Recent Loss	25	16.1%
MFDA	25	16.1%	Better Than Peer Group	26	16.8%
IIROC	23	14.8%	Worse Than Peer Group	26	16.8%
ICPM	12	7.7%			
Insurance	43	27.7%			
Planner	36	23.2%			
Other	16	10.5%			

The sample is 155 Canadian advisers completing an online questionnaire through Qualtrics survey software (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017).

5.2.1.2 Questionnaire and Instruments

All subjects were asked to complete an online questionnaire created with and hosted by Qualtrics survey software through the University of Manchester (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017). The questionnaire consisted of demographic information (gender, type of licensing, level of education, marital status), nine previously validated instruments (excluding the RTQ), six experimental conditions to which subjects were randomly assigned, and a detailed case of a hypothetical client with completed risk tolerance questionnaire and investment objectives. In addition, the qualitative measures of expected risk and quantitative measure of expected return as well as the risk-taking measure (amended to reflect the adviser recommending the level of risk the investor should take) described in Section 5.2.1.4 were included in the questionnaire (see Appendix 1B for the full questionnaire provided to advisers).

The personality scales, experimental protocols and risk-taking measure were all validated in prior research, although this was the first study to combine the different elements. Additional testing of the measures was conducted through pre-tests to a panel of industry professionals and the author's supervisors for critique. Consensus was reached regarding the clarity and suitability of the questions. Feedback to improve clarity of wording was incorporated in the final version of the advisers' questionnaire. Data collection for Study 1B was undertaken between October and December 2016.

5.2.1.3 Experimental Conditions

The experimental conditions for Study 1B were the same as Study 1A and respondents were randomly assigned to one of six groups.

5.2.1.4 Procedures for Study 1B

1. Each subject was asked to provide demographic information (gender, marital status, education, type of licensing).
2. Each subject was asked to complete the Instruments. The RTQ was not provided to advisers.
3. same as Study 1A

4. same as Study 1A
5. same as Study 1A
6. same as Study 1A
7. Measure of risk-taking advice - each adviser was asked to allocate \$500,000 of the representative client's money between (i) a 5-year Government of Canada Savings Bond (i.e. a risk-free investment) or (ii) the Canadian stock market (TSX) (per Weber et al.); Greater % in (ii) indicates greater risk-taking advice. (modified from Weber et al., 2013):
 - “You have been approached by a potential client to design an investment proposal to finance her retirement in 15 years’ time. She has \$500,000 to invest and does not need the money between now and retirement. As a first step, you have asked her to complete a standard industry risk tolerance questionnaire. The questionnaire has 7 questions testing for time horizon, long term expectations and attitudes to short-term volatility. The possible scores fall into the categories below. Your potential client scored 56 on the questionnaire.”

Score	Category	Description
14 – 20	Very Conservative	This approach seeks a high degree of stability and should minimize the chances of substantial short-term volatility. For a very conservative investor, portfolio will be invested in the most risk-averse securities such as cash and fixed- income.
21 – 34	Conservative	Focus is on stability rather than maximizing return and should limit the chances of substantial short-term volatility. For a conservative investor, portfolio will be invested primarily in risk-averse areas such as cash and fixed-income securities with limited exposure to equities.
35 – 48	Balanced	The aim is to achieve a balance between stability and return and is likely to involve at least some short-term volatility. For a balanced investor, portfolio will include investment in equities, balanced by exposure to more risk-averse areas of the market such as cash and fixed-income securities.
49 – 62	Growth	This approach concentrates on achieving a good overall return on the investment portfolio while avoiding the most speculative areas of the market. Significant short-term fluctuations in value are possible. For a growth investor, portfolio will be invested primarily in equities.
63 – 70	Very Aggressive	The aim is to maximize return while accepting the possibility of large short-term fluctuations in value and even the possibility of longer-term losses. For a very aggressive investor, portfolio will be invested in equities and will include exposure to more speculative areas of the market.

- “Your client could invest the \$500,000 either in a 5-year Government of

Canada Savings Bond (i.e. a risk-free investment), in the Canadian stock market (S&P/TSX Composite) or a combination of the two.

- How much would you advise your client to invest in the Canadian stock market (TSX)?” (0 = invest everything into the risk-free asset; 100 = invest everything into the Canadian stock market).”

5.2.2 Impact of Behavioural Biases on Return Expectations and Risk-Taking Advice

The first set of hypotheses, H1B-1 to H1B-3, tested the effects of six paired experimental conditions on return expectations (“Return”) and risk-taking advice (%TSX): H1B-1 compared the “Low Anchor” group with the “High Anchor” group; H1B-2 compared the “Recent Gain” group with the “Recent Loss” group; and H1B-3 compared the “Better than Peers” group with the “Worse than Peers” group. These three hypotheses were tested using one-way MANOVA models (Hair et al., 2013). MANOVA is the appropriate statistical test to use here because there were two dependent variables of interest – Return and %TSX. Furthermore, there was reason to believe that there was a linkage between these two dependent variables. An alternative approach, using multiple simple t-tests, would risk inflating Type 1 error, and implicitly assume that the multiple dependent variables are independent, when in truth they are not (Hair et al., 2013).

5.2.2.1 Assumptions for MANOVA

Prior to undertaking the main analysis, the assumptions underlying the MANOVA procedure were tested. The first assumption is that the dependent variables across all groups, i.e. the six paired experimental conditions, are normally distributed. The Shapiro-Wilk statistic indicated that for the dependent variable Return normality was not observed for the Recent Gain, Better than Peers, and Worse than Peers groups ($p < 0.05$), with all other groups exhibiting normal distribution. For the dependent variable %TSX, only the Low Anchor and the Recent Loss groups exhibited normal distribution, with the remaining groups violating this assumption ($p < 0.05$). However, as MANOVA is extremely robust to deviations from normality, and outperforms the non-

parametric equivalent even when this assumption is violated (Finch, 2005), the analysis continued as planned.

The second assumption is the homogeneity of covariance matrices which was evaluated by Box's test statistic. It was determined that the matrices were heteroscedastic across all combinations of groups ($p < 0.05$). Subsequent Levene tests suggested that the issue is limited to a single predictor for each MANOVA. Thus, it was decided to proceed with the analysis. This decision was further substantiated by the fact that Box's test is highly sensitive to deviations from normality (Field, 2013) as previously noted.

A comparison of the descriptives across conditions can be seen in Table 8. The variation across key demographic variables is broadly statistically similar across experimental conditions (curiously, there were more female advisers in the Worse than Peer condition than in other conditions). Overall, the results of randomization process used in the experimental manipulation appears broadly consistent with the overall adviser sample.

Table 8: Descriptive Statistics – Comparison of Demographics across Experimental Conditions for Study 1B

<i>Variables</i>		<i>High Anchor</i>		<i>Low Anchor</i>		<i>Recent Gain</i>		<i>Recent Loss</i>		<i>Better than Peers</i>		<i>Worse than Peers</i>	
		<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Gender	Male	19	73.10%	17	68.00%	23	88.50%	19	76.00%	20	76.90%	13	48.10%
	Female	7	26.90%	8	32.00%	3	11.50%	6	24.00%	6	23.10%	14	51.90%
Marital Status	Single	4	15.40%	2	8.00%	2	7.70%	1	4.00%	4	15.40%	4	14.80%
	Married	17	65.40%	22	88.00%	22	84.60%	23	92.00%	21	80.80%	21	77.80%
	Separated	1	3.80%	0	0.00%	2	7.70%	0	0.00%	0	0.00%	1	3.70%
	Divorced	3	11.50%	1	4.00%	0	0.00%	1	4.00%	1	3.80%	1	3.70%
	Widowed	1	3.80%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Education	High School	2	7.70%	3	12.00%	3	11.50%	3	12.00%	5	19.20%	7	25.90%
	Bachelors	23	88.50%	16	64.00%	17	65.40%	16	64.00%	14	53.80%	18	66.70%
	Masters	1	3.80%	6	24.00%	6	23.10%	6	24.00%	7	26.90%	2	7.40%
	Doctor	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Licensing	MFDA	6	23.10%	3	12.00%	3	11.50%	5	20.00%	4	15.40%	5	18.50%
	IIROC	2	7.70%	4	16.00%	6	23.10%	1	4.00%	5	19.20%	5	18.50%
	ICPM	0	0.00%	4	16.00%	4	15.40%	3	12.00%	1	3.80%	0	0.00%
	Insurance	3	11.50%	9	36.00%	9	34.60%	8	32.00%	6	23.10%	7	25.90%
	Planner	12	46.20%	5	20.00%	4	15.40%	2	8.00%	8	30.80%	5	18.50%
	Other	3	11.50%	0	0.00%	0	0.00%	6	24.00%	2	7.70%	5	18.50%

5.2.2.2 MANOVA Results

For H1B-1, the Low Anchor group was compared to the High Anchor group. The MANOVA model was found to be non-significant ($F(2, 48) = 0.328$, $p = 0.722$; Pillai's Trace = 0.013, $\eta^2 = 0.013$); no differences were observed between the groups with respect to Return ($F(1, 49) = 0.566$, $p = 0.455$, $\eta^2 = 0.011$) and %TSX ($F(1, 49) = 0.140$, $p = 0.710$, $\eta^2 = 0.003$). The low power implied by the low η^2 statistic provided by SPSS is consistent with the non-significant results obtained. Thus, H1B-1 was rejected.

For H1B-2, the Recent Gain group was compared to the Recent Loss group; significant differences were observed ($F(2, 48) = 3.891$, $p < 0.05$; Pillai's Trace = 0.140, $\eta^2 = 0.140$). Differences were observed between the groups with respect to %TSX ($F(1,49) = 7.149$, $p < 0.05$, $\eta^2 = 0.127$) but not Return ($F(1,49) = 0.175$, $p = 0.678$, $\eta^2 = 0.004$). Accordingly, H1B-2 was partially supported by the data.

Finally, for H1B-3, the Better than Peers and Worse than Peers groups were compared. The MANOVA model was found to be significant ($F(2, 50) = 3.222$, $p < 0.05$; Pillai's Trace = 0.114, $\eta^2 = 0.114$). No differences were observed in %TSX ($F(1, 51) = 0.633$, $p = 0.430$, $\eta^2 = 0.012$) but significant differences were found in Return ($F(1, 51) = 6.493$, $p < 0.05$, $\eta^2 = 0.113$). The Better than Peers group exhibited higher return expectations ($M = 62.85$, $SD = 17.937$) than the Worse than Peers group ($M = 58.48$, $SD = 21.751$). Thus, H1B-3 was partially supported by the data.

5.2.3 Impact of Personality Traits, Demographic Variables, and Return Expectations on Risk-Taking Advice

For hypotheses H1B-4 to H1B-6, a single hierarchical multiple regression model was used as the same dependent variable, %TSX, was common to all three hypotheses. As the dependent variable is continuous in nature, the optimal model to use is Ordinary Least Squares (OLS) (Hair et al., 2013) and the three hypotheses were simultaneously tested in a single model. The analysis

first verified the reliability of the personality scales and then evaluated the assumptions underlying OLS analysis.

5.2.3.1 Reliability of Personality Scales

The reliability of the personality scales used in this analysis (and described in Chapter 3) was evaluated by means of the Cronbach's Alpha test statistic. The results are summarized in Table 9.

Table 9: Cronbach's Alpha - Personality Scales Canadian Advisers Study 1B

<i>Variable</i>	<i>Cronbach's Alpha</i>
Extraversion	0.057
Agreeableness	0.224
Consciousness	0.012
Neuroticism	-0.006
Openness	0.174
Dospert Risk Perception	0.624
Nenkov Maximization Scale	0.566
Schwartz Regret Scale	0.777
Dospert Risk Taking	0.431
Duckworth Grit Scale	0.382
Loss Aversion Scale	0.593
Rational & Intuitive Decision-Making Style	0.635
Dospert Perceived Benefits	0.612
Iowa-Netherlands Comparison Scale	0.707

Note: Cronbach's Alpha test statistic calculated using participants' responses to respective scales and analyzed using SPSS for Macintosh.

The results summarized in the table suggested that the majority of scales demonstrated reliability scores somewhat lower than the normally acceptable thresholds for acceptance (Darren & Mallery, 1999). The BFI-10 sub-scales exhibited especially low reliability, including a negative value on the neuroticism sub-scale, despite verification that items were properly coded. While it was decided to keep the scales in the subsequent analysis, interpretations of the results must bear in mind this reliability analysis.

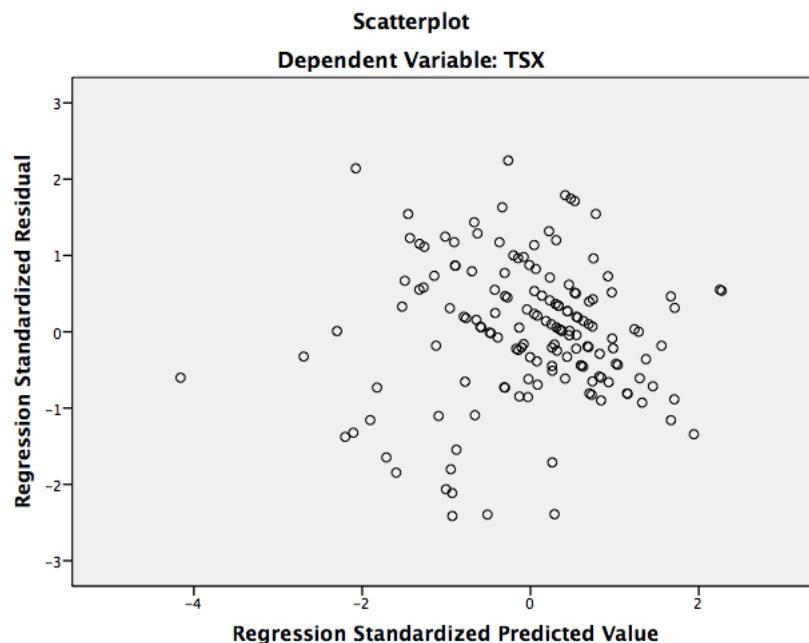
5.2.3.2 Assumptions for OLS

The first assumption to be tested was whether there were any signs of multi-collinearity in the independent variables, i.e. excessive correlations with other predictor variables. For this analysis, any variable with a Variance

Inflation Factor (VIF) greater than 5 was considered to be excessively multicollinear (Hair et al., 2013) and thus potentially a candidate for removal. An initial regression analysis was conducted to evaluate the VIF scores. In doing so, it was determined that all variables were below the threshold for acceptance. As such, all variables were retained and the other assumptions were tested.

The assumptions of linearity, normality and homoscedasticity were collectively tested using a scatterplot of predicted values versus the residuals, as previously discussed. Figure 5 suggests that all of these criteria were met and that therefore the assumptions necessary for regression analysis were satisfied.

Figure 5: Scatterplot of Predicted Values versus Residuals – Study 1B



Source: SPSS for Macintosh

5.2.3.3 Regression Results

To test hypotheses H1B-4 to H1B-6, a hierarchical multiple regression was run to determine if qualitative risk expectation, quantitative return expectation, adviser demographic factors and personality scales improved the prediction of %TSX (Petrocelli, 2003). The full details of the regression model

are summarized in Table 10. The regression model can be represented by the following functional form:

$$y = b_0 + b_1 \text{QUALRISK} + b_2 \text{QUALRETURN} + b_3 \text{Return} + b_4 \text{Gender} + b_5 \text{Marital} + b_6 \text{Education} + b_7 \text{Licensing} + b_8 \text{Extra} + b_9 \text{Agree} + b_{10} \text{Consc} + b_{11} \text{Neuro} + b_{12} \text{Open} + b_{13} \text{DRP} + b_{14} \text{NMS} + b_{15} \text{DRT} + b_{16} \text{DGS} + b_{17} \text{LAS} + b_{18} \text{RIDS} + b_{19} \text{DPB} + b_{20} \text{INCOM} + \varepsilon$$

where (parentheses indicate related hypotheses):

QUALRISK	= Qualitative Measure of Risk (Likert scale) (H1B-6)
QUALRETURN	= Qualitative Measure of Risk (Likert scale) (H1B-6)
Return	= Quantitative Measure of Expected Returns (% expected over next 12 months) (H1B-6)
Gender	= Dummy variable for gender of subject (H1B-5)
Marital	= Dummy variable for marital status of subject (H1B-5)
Education	= Dummy variable for education level of subject (H1B-5)
Licensing	= Dummy variable for type of licensing of subject (H1B-5)
Age	= Dummy variable for age group of subjects (H1B-5)
Extra	= Extraversion subscale of the Big Five Inventory 10 (BFI10) scale (H1B-4)
Agree	= Agreeableness subscale of the BFI10 scale (H1B-4)
Consc	= Conscientiousness subscale of the BFI10 scale (H1B-4)
Neuro	= Neuroticism subscale of the BFI10 scale (H1B-4)
Open	= Openness subscale of the BFI 10 scale (H1B-4)
DRP	= Dospert Risk Perception Scale (H1B-4)
NMS	= Nenkov Maximization Scale (H1B-4)
DRT	= Dospert Risk Taking Scale (H1B-4)
DGS	= Duckworth Grit Scale (H1B-4)
LAS	= Loss Aversion Scale (H1B-4)
RIDS	= Rational and Intuitive Decision-Making Style (H1B-4)
DPB	= Dospert Perceived Benefits Scale (H1B-4)
INCOM	= Iowa-Netherlands Comparison Scale (H1B-4)

Table 10: Determinant Effects on %TSX Canadian Advisers Study 1B (N=155)

<i>Variables</i>	<i>Model 1</i>			<i>Model 2</i>			<i>Model 3</i>		
	B	SE	β	B	SE	β	B	SE	β
(Constant)	51.172	10.443		59.807	10.463		92.350	36.467	
Return	1.809	0.502	0.330***	1.796	0.483	0.327***	1.519	0.541	0.277**
QUALRISK	0.176	1.509	0.009	-1.009	1.505	-0.051	-0.286	2.566	-0.015
QUALRETURN	1.022	1.955	0.048	0.585	1.873	0.027	1.186	1.983	0.055
Male				-2.820	3.189	-0.068	-5.027	3.486	-0.121
Single				-4.070	4.555	-0.068	-5.009	4.729	-0.084
Separated				8.969	8.704	0.076	9.168	9.437	0.078
Divorced				-8.617	6.662	-0.096	-12.261	7.152	-0.136
Widowed				5.610	17.085	0.024	6.320	17.371	0.027
High School				-9.188	3.938	-0.175*	-9.846	4.297	-0.188*
Masters				-4.214	3.892	-0.087	-3.634	4.080	-0.075
MFDA				0.321	4.295	0.006	2.686	4.482	0.054
IIROC				10.152	4.558	0.193*	11.707	4.808	0.223*
ICPM				11.786	5.845	0.169*	12.235	6.161	0.175*
Planner				4.918	3.853	0.111	4.803	4.033	0.109
Other				-9.525	4.982	-0.155	-8.963	5.397	-0.146
EXTRA							-2.013	1.828	-0.139
AGREE							1.201	1.890	0.082
CONSC							-1.353	1.441	-0.081
NEURO							-5.024	2.322	-0.276*
OPEN							1.228	1.111	0.093
DRP							-0.006	0.522	-0.001
NMS							0.180	0.278	0.054
SRS							-0.407	0.346	-0.117
DRT							0.140	0.512	0.029
DGS							-0.281	0.500	-0.055
LAS							0.055	0.406	0.012
RID							-0.471	0.397	-0.102
DPB							0.288	0.445	0.061
INC							0.287	0.330	0.083
<i>F</i>	7.359***			3.767***			2.404***		
<i>R</i> ²	0.128			0.289			0.358		
Adjusted <i>R</i> ²	0.110			0.212			0.209		
Change in Adj. <i>R</i> ²	0.110			0.102			-0.003		

* $p < .05$, ** $p < .01$, *** $p < .001$. Note: The table presents the results of a hierarchical multiple regression with the dependent variable TSX. Dummy variables were used for Gender (Base = Female), Marital Status (Base = Married), Education (Base = Bachelors), Licensing (Base = Insurance). Durbin-Watson statistic = 2.048

All model specifications were found to be significant; however, Model 2 was found to have the best fit as measured by adjusted R^2 ($R^2 = 0.289$, adjusted $R^2 = 0.212$, $F(15,139) = 3.767$, $p < 0.001$). Interestingly, Model 3 found that neuroticism was a significant predictor of risk-taking advice even though the Cronbach's Alpha for the neuroticism scale was negative (see Table 9). Model

2 found that Return ($B = 1.796$, $t(139) = 3.718$, $p < 0.001$), High School education (compared to a Bachelors' degree) ($B = -9.188$, $t(139) = -2.333$, $p < 0.05$), IIROC and ICPM licensing (as compared to Insurance licensing) ($B = 10.152$, $t(139) = 2.227$, $p < 0.05$ and $B = 11.786$, $t(139) = 2.016$, $p < 0.05$, respectively) were significant predictors of advisers' risk-taking advice. An analysis of the effect size and resulting power was conducted using G*Power (Faul et al., 2009). A post-hoc analysis of the linear multiple regression fixed model (R^2 deviation from 0) indicated an effect size of 0.41 and power of 0.9999. Model 3 included personality scales. While there was a significant increase in R^2 , adjusted R^2 decreased and none of the coefficients (except Neuro) were significant. Given this result and the Cronbach's Alpha tests, hypothesis H1B-4 was rejected. However, both hypotheses H1B-5 and H1B-6 were supported by the data.

5.3 Chapter Summary

This chapter summarized the results from Study 1A and Study 1B. A hypothetical investment task was provided that asked participants to allocate retirement money between a risk-free asset and an investment tracking the TSX. Following Weber et al. (2013), the resulting percentage was considered to be the measure of risk-taking.

For investors and advisers, there was a random assignment to one of six experimental conditions to test the impact of behavioural biases on Return and %TSX. No effect was found for investors but some evidence of an impact for advisers through the recency effect and peer group comparison biases was found.

Study 1A found that neither personality traits nor answers to the RTQ (and specifically the subscale measuring attitudes to short-term risks) predicted risk-taking behaviour but return expectations and certain demographic variables did. Similarly, Study 1B found that personality traits did not predict risk-taking advice but return expectations and certain demographic variables did.

Discussion of these results, in conjunction with the findings of Chapter 6, 7 and the qualitative results from Chapter 8, can be found in Chapter 9.

Chapter 6 The Role of Literacy, Experience and Risk Aversion in the Formation of Expectations

This chapter presents the results from two follow up studies (Study 1C and Study 1D, respectively) involving a subset of the Canadian investors and Canadian advisers described in Chapter 5. The results from the previous chapter suggested that return expectations were a significant predictor of risk-taking decisions. In a world of perfect information, all participants have access to the same information. Thus, a natural consequence of the findings of Chapter 5 is the question: what factors determine the formation and updating of return expectations in individuals? This is the topic of exploration in the current chapter.

6.1 Study 1C

The results of Study 1A identified return expectations as a more important predictor of investors' risk-taking behaviour than risk tolerance questionnaire scores or personality traits. The results raised the follow-on question of how investors form and update these return expectations. Study 1C was designed to explore and provide insight into this question.

The research questions and related hypotheses examined in Study 1C are summarized below:

Q7. Do investment literacy, experience or risk aversion affect investors' return expectations and risk-taking behaviour?

Van Rooij et al. (2007) found that higher stock market participation was linked to greater financial literacy. Similarly, Guiso and Jappelli (2008) linked financial literacy to portfolio diversification. Thus, it was hypothesized that higher (lower) investment literacy (i.e. measuring specifically literacy with

respect to investments) would be linked to higher (lower) return expectations and higher (lower) risk-taking behaviour.

- H1C-1 Higher investment literacy will result in (a) higher return expectations and (b) higher risk-taking behaviour.

Choi et al. (2009) provided evidence that investors who had better return experiences tended to have higher retirement savings rates while Malmendier and Nagel (2011) found that past history of lower equity returns resulted in lower equity exposure in future years. Kaustia and Knüpfer (2008) found that positive return experiences in past stock offerings were a key factor in driving demand for future stock offerings. Thus, it was hypothesized that higher (lower) investment experience would be linked to higher (lower) return expectations and higher (lower) risk-taking behaviour.

- H1C-2 Higher levels of investment experience will result in (a) higher return expectations and (b) higher risk-taking behaviour.

Markowitz's MVO framework, and the prevailing investment paradigm, argues that higher levels of risk aversion would lead to lower equity (i.e. risky) market participation. Thus, it was hypothesized that higher (lower) levels of risk aversion would lead to higher (lower) return expectations and lower (higher) risk-taking behaviour.

- H1C-3 Higher levels of risk aversion will result in (a) higher return expectations and (b) lower risk-taking behaviour.

Similar to Hypothesis 1A-7 (see p. 138), higher return expectations are hypothesized to lead to higher risk-taking behaviour.

- H1C-4 Higher return expectations will result in higher risk-taking behaviour.

Q8. Do investors update their risk-taking behaviour when new information is provided?

Vissing-Jorgensen (2003) and Greenwood and Shleifer (2014) argued that return expectations were linked to equity market participation. De Bondt et al. (2013) suggest that not all available information is processed by investors due to time pressures, complexity or processing limitations. Furthermore, Sharot (2011) and Sharot and Garret (2016) argue that individuals process information in a way that results in their beliefs being updated selectively. Thus, it is hypothesized that providing investors updated information on return expectations will result in differences in risk-taking behaviour.

- H1C-5 Differences between given and self-determined return expectations will result in differences in risk-taking behaviour.

6.1.1 Study Design

6.1.1.1 Sample and Descriptive Statistics

The sampling frame consisted of investors who participated in Study 1A and who provided their email addresses. A subset of the original sample from Study 1A was used, as the objective of Study 1C was to explore questions in relation to the participants' risk-taking decisions which emerged from Study 1A. Most of the data collected in Study 1C reflected additional factors that might have impacted the participants' original risk-taking decision from Study 1A. Only the question asking individuals to process new return expectations prior to repeating the hypothetical investment task might have involved a learning effect. Any exploration of the impact of updating of beliefs on decisions (as this question seeks to explore) implies some degree of learning effect and is therefore unavoidable. Thus, given the nature of the questions explored in Study 1C, this approach to sample selection was deemed to be the most appropriate.

A follow-up questionnaire was sent to this group. Of the 192 useable responses from Study 1A, approximately 110 investors had provided their email addresses. These 110 respondents were contacted to ask whether they would answer additional questions through a supplementary questionnaire. Of the

110, 63 responded to the request and 61 provided completed questionnaires. Thus, 61 useable responses for Study 1C were obtained. This represents an attrition rate of 44.5%, which falls within the common range of attrition rates reported in the literature for longitudinal studies (Gustavson, von Soest, Karevold & Røysamb, 2012) and the demographic and other characteristics of these investors are reported in Table 11. The sample characteristics of these 61 participants are broadly comparable to the demographic characteristics of the original investor sample from Study 1A.

Table 11: Comparison of Canadian Advisers Study 1A (N = 192) and Study1C (N = 61)

<i>Variables</i>		<i>Study 1A</i>		<i>Study 1C</i>	
		<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Gender	Male	115	59.90%	33	54.10%
	Female	77	40.10%	28	45.9%
Marital Status	Single	21	10.90%	9	14.80%
	Married	157	81.80%	42	68.9%
	Separated	8	4.20%	6	9.80%
	Divorced	6	3.10%	4	6.60%
	Widowed	0	0.00%	0	0.00%
Education	High School	7	3.60%	1	1.60%
	Bachelors	77	40.10%	29	47.50%
	Masters	95	49.50%	27	43.30%
	Doctors	13	6.80%	4	6.60%
Net Worth	Retail	45	23.40%	13	21.30%
	Mass	28	14.60%	6	9.80%
	Affluent 1				
	Mass	30	15.60%	8	13.10%
	Affluent 2				
Age	High Net Worth	89	46.40%	34	55.70%
	< 45	4	2.10%	13	21.30%
	46 - 55	19	9.90%	30	49.20%
	56 - 65	34	17.70%	11	18.00%
	66 - 75	78	40.60%	6	9.80%
	>75	57	29.70%	1	1.60%

The sample is 61 Canadian investors completing a follow-up online questionnaire through Qualtrics survey software (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017).

6.1.1.2 Questionnaire and Instruments

All subjects were asked to complete an online questionnaire created with and hosted by Qualtrics survey software through the University of

Manchester (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017). The questionnaire consisted of several investment literacy questions which were coded as 1 for the right answer and 0 for the wrong answer, several 7-point Likert-type questions gauging investment experience, and a certainty equivalent question to derive a quantitative measure of risk aversion (described below). In addition, the subjects were again asked to complete the hypothetical investment task from Study 1A, but this time were told to assume that the return on the TSX over the next 15 years was expected to average 7% p.a. (see Step 8 in the procedures section of Study 1A - see Appendix 1C for the full questionnaire).

Although the questions regarding investment literacy, experience and the quantitative measure of risk aversion ("Risk_CE") were based on prior research, the specific questions in this study were not previously validated. Accordingly, the questions in Study 1C were pre-tested by a panel of industry professionals and the author's supervisors for critique. Feedback to improve clarity of wording was incorporated in the final version of the investors' questionnaire. Data collection for Study 1C was undertaken between February and March 2017.

6.1.1.3 Procedures for Study 1C

1. Each subject was provided a unique link to a questionnaire that associated their answers to their email address (to be able to connect their answers in Study 1C to their answers in Study 1A).
2. Each subject was asked to answer questions on basic financial literacy (adapted from Lusardi and Mitchell, 2011b). Correct answers were coded 1, incorrect answers were coded 0.
3. Each subject was also asked one question on advanced literacy (i.e. how bond prices react to a fall in interest rates). Correct answers were coded 1, incorrect answers were coded 0.
4. Each subject was asked to answer questions on their previous investment experience. Answers were coded on a 7-point Likert-type scale.
5. Risk Aversion Certainty Equivalent - each subject was asked the following certainty equivalent question to determine an index of risk aversion:

- Please consider the following scenario: You have \$100,000 (or local equivalent) of extra cash to invest that you do not need for the next 10 years.
 - “You could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
 - You could invest in Investment B, which has a 25% chance of losing 15% and a 75% chance of winning [X]
 - I will choose Investment B if x is at least ...[X]”

6.1.2 Impact of Investment Literacy, Experience, and Risk Aversion on Return Expectations and Risk-Taking Behaviour

The variables used for this analysis are as follows:

- Return - Quantitative Measure of Expected Returns (% expected over next 12 months)
- %TSX - Amount allocated to an investment in the Canadian stock market.
- Experience - calculated as the sum of questions 12 – 14 on the Study 1C questionnaire (i.e. 7-point Likert-type questions on respondents’ amount of experience with stocks, compared to friends and family, and the quality of that experience); total possible scores on Experience ranged from 3 to 21.
- Literacy - calculated as the sum of five basic literacy questions (questions 1 – 5 on the Study 1C questionnaire) and one advanced literacy question (question 6). Total possible scores on Literacy ranged from 0 to 6.
- Risk_CE - a continuous variable measuring relative risk aversion; the certainty equivalent rate of return is 9% and thus, investors’ required rate of return above 9% reflected risk aversion while returns below reflected risk seeking. The required rate of return was expressed as a ratio relative to the certainty equivalent rate of 9%.

Given the interlinkages of hypotheses H1C-1 to H1C-4 and the potential existence of a mediation effect, it was opted to test these four hypotheses concurrently through a single model using Structural Equations Modelling (SEM). This technique offers significant advantages over simple regression analysis. In this particular case, it allows all pathways between the variables to be estimated simultaneously, providing a more comprehensive view of the relationships between the variables (Gefen, Straub, & Boudreau, 2000) while

also allowing superior estimation of indirect effects (Iacobucci, Saldanha, & Deng, 2007). There is little guidance in prior literature on what might be reasonably expected effect sizes for this type of analysis (e.g. Weber et al., 2013 does not provide effect size data). Therefore, due to the relatively small sample size, it was opted to use only manifest variables during model specification, as the sample size requirements for models of this kind are comparatively lower (Budaev, 2010). First, the data was analyzed to ensure that it fit the assumptions underlying SEM.

6.1.2.1 Assumptions for SEM

The first assumption to be evaluated was multivariate normality. The simplest way of evaluating this was through an analysis of the kurtosis and skewness statistics for each variable. Multivariate normality can be assumed if the absolute value for skewness is under 3 and the absolute value for kurtosis is under 10 (Kline, 2015). Table 12 indicates that this assumption was fully met.

Table 12: Testing for Multivariate Normality – Canadian Investors Study 1C

<i>Variables</i>	<i>Min</i>	<i>Max</i>	<i>Skewness</i>	<i>Kurtosis</i>
Risk CE	0.444	2.222	0.899	0.806
Experience	7.000	21.000	-0.064	-0.459
Literacy	1.000	6.000	-1.518	2.645
Return	-2.000	9.000	-0.340	0.148
%TSX	20.000	100.000	-0.576	-0.590

Source: Amos

Lack of multicollinearity is also required for SEM analysis. For the pathways with multiple predictors, separate OLS regressions were conducted to estimate the VIF values. It was considered that VIF scores above 5 were indicative of multicollinearity issues (Hair, et al., 2013; Stine, 1995). Based on this criteria, no variable met the criteria for removal and thus this assumption was met. The presence of outliers was evaluated by means of Mahalanobis' distance. Although two cases could be classified as multivariate outliers (Arbuckle, 1995), it was nevertheless decided to retain these observations as they were not serious outliers. Having verified the assumptions, the analysis proceeded with an initial specification of the model and fit evaluation.

6.1.2.2 SEM Model Specification and Fit Evaluation

The first step was to specify the saturated model where all possible pathways between the variables were specified. Maximum Likelihood (ML) estimation was employed for this exercise as it is the most common and robust estimation method (Kline, 2015). As most fit indices were not available in the saturated model, liberating degrees of freedom was desirable for optimal estimation. Literacy was found to have non-significant paths towards Return ($p = 0.847$) and %TSX ($p = 0.449$). Thus, the coefficients of these paths were constrained to zero and the model re-estimated. The fit for the new model was evaluated and is summarized in Table 13.

Table 13: Fit Indices for SEM Model – Canadian Investors Study 1C

	χ^2/df	GFI	PGFI	RMSEA	AIC
Value	0.304	0.996	0.133	~0.000	26.608
Quality	Very Good	Very Good	Bad	Very Good	-

Source: Amos

Based on the thresholds determined by the literature (Barrett, 2007; Hair et al., 2013; Hooper, Coughlan, & Mullen, 2008), the model fit was considered to be very good except for the parsimony-adjusted goodness-of-fit (PGFI) index. The comparative fit is slightly better than the one from the saturated model (AIC = 30.000). As such, no further changes were made to the model specification.

The complete direct effects are summarized in Table 14. Beginning with H1C-1, as observed during model specification, Literacy did not have the expected effect on Return or %TSX; thus, this hypothesis was rejected. For H1C-2, Experience was found to be a significant predictor of both Return ($B = 0.285$; $p < 0.001$) and %TSX ($B = 3.241$; $p < 0.001$). Thus, H1C-2 was supported by the data. For H1C-3, Risk_CE was a good and negative predictor of %TSX ($B = -13.173$; $p < 0.05$) (i.e. as risk aversion increases, risk-taking behavior decreases) and, simultaneously, a significant and positive predictor of Return ($B = 1.448$, $p < 0.05$). Thus, H1C-3 was also supported by the data. Finally, for H1C-4, Return was found to be a good predictor of %TSX ($B = 2.473$; $p < 0.05$),

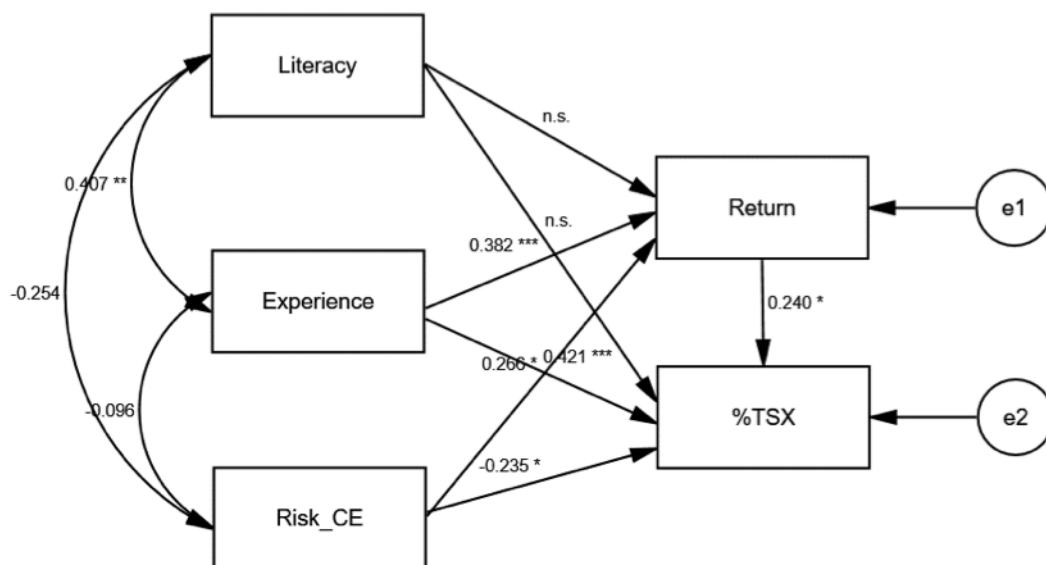
supporting this hypothesis and re-confirming H1A-7. Figure 6 summarizes the relationships between these variables and the final specified model.

Table 14: Regression Coefficients for SEM Model – Canadian Investors Study 1C

<i>Independent Variable</i>	<i>Dependent Variable</i>	<i>B</i>	<i>Beta</i>
EXP	Return	0.285 *** (0.087)	0.382
EXP	TSX	3.241 *** (0.870)	0.421
Return	TSX	2.473 * (1.193)	0.240
Risk_CE	TSX	-13.173 * (6.093)	-0.235
Risk_CE	Return	1.448 * (0.632)	0.266

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Notes: standard errors are in parenthesis.

Figure 6: Final Path Diagram for SEM Model – Canadian Investors Study 1C



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Note: values indicate standardized regression coefficients. Latent variables “e” indicate error terms. Source: Amos

6.1.2.3 Mediation Analysis

Based on the previous results, two potential mediation effects were identified between Experience, Risk_CE, Return, and %TSX. As all the paths in this part of the model were significant, it raised the question of whether Return

operated as a mediator between Experience and Risk_CE, on the one hand, and %TSX, on the other; i.e. was there an indirect effect from Experience or Risk_CE on %TSX? This analysis was conducted using the bootstrapping method (Shrout & Bolger, 2002). The direct effect of Experience on %TSX was found to be significant ($B = 0.421, p < 0.001$). However, an indirect effect ($B = 0.092, p < 0.05$) was also identified, leading to a total effect of Experience on %TSX of $B = 0.513$. Thus, Return mediated the relationship between Experience and %TSX. In other words, part of the effect of Return on %TSX was due to the inflation of Return because of the effect of increased Experience. Beyond the direct effect ($B = -0.235, p < 0.05$), there was a significant indirect effect of Risk_CE on %TSX ($B = 0.064, p < 0.05$), leading to a total effect of -0.171 . That is to say, although Risk_CE directly decreased %TSX, it also inflated Return, which in turn led to a slight increase in %TSX, even though the total effect was still negative. It is important to note that these effects are correlational, as it is not possible to infer causality on the basis of SEM alone.

6.1.2.4 Impact of Given versus Self-Determined Return Expectations on Risk-Taking Behaviour

For H1C-5, a paired-samples t -test was conducted to determine whether there were significant differences in %TSX when investors were told to assume Return of 7% per annum versus self-determined Return. Based on the t -test results, it was determined that the differences were not significant ($t(60) = 0.414, p = 0.681$). An analysis of the effect size and resulting power was conducted using G*Power (Faul et al., 2009). A post-hoc analysis of the difference of means matched pairs t -test indicated an effect size of 0.053 and power of 0.069. Thus, H1C-5 was rejected. Interestingly, however, self-determined Return was significantly different from the given Return of 7% ($t(60) = -8.920, p < 0.001$). A post-hoc analysis of the difference from a constant one sample case t -test indicated an effect size of 1.14 and power of 1.000.

6.2 Study 1D

The results of Study 1B identified advisers' return expectations as a more important predictor of advisers' risk-taking advice than their personality traits or the investor's risk tolerance questionnaire scores. The results raised the follow-on question of how advisers formed and updated these return expectations. Study 1D was designed to provide insight into this question.

The research question and related hypotheses examined in Study 1D are summarized below:

Q9. Does advisers' perception of their clients' investment literacy or experience affect their return expectations and risk-taking advice?

The hypotheses tested in Study 1D are the adviser analogue of the investor hypotheses tested in Study 1C (with the exception of H1C-4 which tested for the impact of updated return expectations on risk-taking behaviour). In both Study 1C and Study 1D, the role of investment literacy, investment experience and risk aversion on return expectations and risk-taking decisions are examined whether it is an investor deciding for themselves or an adviser making the recommendation to an investor. For the sake of brevity, the reader is referred to Study 1C for the theoretical rationale underpinning each of the hypotheses below.

- H1D-1 Higher perception of clients' knowledge about the stock market will result in (a) higher return expectations and (b) higher risk-taking advice.
- H1D-2 Higher perception of clients' experience with the stock market will result in (a) higher return expectations and (b) higher risk-taking advice.

Q10. Does advisers' risk aversion affect their return expectations and risk-taking advice?

- H1D-3 Higher levels of risk aversion will result in (a) higher return expectations and (b) lower risk-taking advice.

6.2.1 Study Design

6.2.1.1 *Sample and Descriptive Statistics*

The sampling frame consisted of advisers who participated in Study 1B and who provided their email addresses. A subset of the original sample from Study 1B was used, as the objective of Study 1D was to explore questions in relation to the participants' risk-taking decisions which emerged from Study 1B (see Section 6.1.1.1 for a more detailed explanation). Of the 155 useable responses from Study 1B, approximately 136 advisers had provided their email addresses. These 136 respondents were contacted to ask whether they would answer additional questions through a supplementary questionnaire. Of the 136, 52 responded to the request and 49 provided completed questionnaires. Thus, 49 useable responses were obtained for Study 1D, representing an attrition rate of 64%, which, as before, falls within the usual dropout rate reported by the literature (Gustavson et al., 2012). The demographic and other characteristics of these advisers are reported in Table 15. The sample characteristics of these 49 participants are roughly comparable to the demographic characteristics of the original adviser sample from Study 1B (although there were less Insurance advisers than in the original sample).

Table 15: Descriptive Statistics – Comparison of Canadian Advisers Study 1B (N = 155) and Study 1D (N = 49)

<i>Variables</i>		<i>Study 1B</i>		<i>Study 1D</i>	
		<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Gender	Male	111	71.6%	36	73.5%
	Female	44	28.4%	13	26.5%
Marital_Status	Single	17	11.0%	3	6.1%
	Married	126	81.3%	44	89.8%
	Separated	4	2.6%	0	0.00%
	Divorced	7	4.5%	2	4.1%
	Widowed	1	0.6%	0	0.0%
Education	High School	23	14.8%	9	18.4%
	Bachelors	104	67.1%	34	69.4%
	Masters	28	18.1%	6	12.2%
	Doctor	0	0.0%	0	0.0%
Licensing	MFDA	26	16.8%	7	14.3%
	IIROC	23	14.8%	10	20.4%
	ICPM	12	7.7%	2	4.1%
	Insurance	42	27.1%	4	8.2%
	Planner	36	23.2%	12	24.5%
	Other	16	10.3%	14	28.6%

The sample is 50 Canadian advisers completing a follow-up online questionnaire through Qualtrics survey software (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017).

6.2.1.2 Questionnaire and Instruments

All subjects were asked to complete an online questionnaire created with and hosted by Qualtrics survey software through the University of Manchester (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017). The questionnaire consisted of several questions ascertaining advisers' perceptions of their clients' literacy (CI_Beliefs), which were coded as 1 for "true" and 0 for "false" or "I don't know", several 7-point Likert-type questions gauging client investment experience (CI_Exp) and a certainty equivalent question to derive a quantitative measure of risk aversion (Risk_CE) (described below). The full questionnaire to advisers is contained in Appendix 1D.

Although the questions measuring CI_Beliefs, CI_Exp, and Risk_CE were based on prior research, the specific form of questions in this study were not previously validated. Accordingly, the questions in Study 1D were pre-tested by a panel of industry professionals and critiqued by the author's supervisors.

Feedback to improve clarity of wording was incorporated in the final version of the advisers' questionnaire. Data collection for Study 1D was undertaken in February and March 2017.

6.2.1.3 Procedures for Study 1D

1. Each subject was provided a unique link to a questionnaire that associated their answers to their email address (to be able to connect their answers in Study 1D to their answers in Study 1B).
2. Each subject was also asked one question on advanced literacy (i.e. how bond prices react to a fall in interest rates). Correct answers were coded 1, incorrect answers were coded 0.
3. Each subject was asked to rate their perceptions of their clients' past level of experience in equity investing on a series of 7-point Likert-type questions.
4. Each subject was asked to rate their perceptions of their clients' financial literacy on a series of 7-point Likert-type questions.
5. Risk Aversion Certainty Equivalent - each subject was asked the following certainty equivalent question to determine an index of risk aversion:
 - Please consider the following scenario: you have \$100,000 of extra cash to invest that you do not need for the next 10 years.
 - "You could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
 - You could invest in Investment B, which has a 25% chance of losing 15% and a 75% chance of winning [X]
 - I will choose Investment B if x is at least ...[X]"

6.2.2 Impact of Adviser Perception of Client Literacy and Investment Experience and Adviser Risk Aversion on Return Expectations and Risk-Taking Advice

The key variables used for this analysis are summarized below:

- Return - Quantitative Measure of Expected Returns (% expected over next 12 months).
- %TSX - Amount allocated to an investment in the Canadian stock market.
- Cl_Exp - the sum of questions 9 – 12 on the Study 1D questionnaire (i.e. three 7-point Likert scale questions on advisers' perception of their clients' experience with stocks, compared to friends and family, and the quality of that experience as well as a true / false question on whether clients were more concerned recently about portfolio performance

where “true” was coded as 1 and false coded as 0); total possible scores on CI_Exp ranged from 3 to 22.

- CI_Beliefs - calculated as the sum of three questions as to advisers’ perception of their clients’ knowledge of the risk/return trade-off, benefits of diversification, and importance of equities to retirement savings (questions 1 – 3 on the Study 1D questionnaire); the questions were awarded a score of 1 for “true” and a score of 0 for “false” or “I don't know”. Total possible scores on CI_Beliefs ranged from 0 to 3.
- Risk_CE - a continuous variable measuring relative risk aversion; the certainty equivalent rate of return is 9% and thus, advisers’ required rate of return above 9% reflected risk aversion while returns below reflected risk seeking. The required rate of return was expressed as a ratio relative to the certainty equivalent rate of 9%.

Given the interlinkages between hypotheses H1D-1 to H1D-3 and the potential existence of a mediation effect, it was opted to test these three hypotheses concurrently through a single model using Structural Equations Modelling (SEM). This technique offers significant advantages over simple regression analysis. In this particular case, it allows all pathways between the variables to be estimated simultaneously, providing a more comprehensive view of the relations between the variables (Gefen et al., 2000) while also allowing superior estimation of indirect effects (Iacobucci et al., 2007). First, the data was analyzed to ensure that it fit the assumptions underlying SEM.

6.2.2.1 Assumptions for SEM

The first assumption to be evaluated was multivariate normality. The simplest way of evaluating this was through analysis of kurtosis and skewness statistics for each variable. Multivariate normality can be assumed if the absolute value for skewness is under 3 and the absolute value for kurtosis is under 10 (Kline, 2015). Table 16 indicates that this assumption was fully met.

Table 16: Testing for Multivariate Normality – Canadian Advisers Study 1D

<i>Variables</i>	<i>Min</i>	<i>Max</i>	<i>Skewness</i>	<i>Kurtosis</i>
Risk_CE	0.444	0.1556	-0.974	-0.197
CI_Exp	9.000	20.000	0.078	-0.148
CI_Beliefs	1.000	3.000	-0.974	-0.197
Return	-4.000	8.000	-1.088	1.996
%TSX	15.000	100.000	-1.053	2.822

Source: Amos

Lack of multicollinearity is also required for SEM analysis. For the pathways with multiple predictors, separate OLS regressions were conducted to estimate the VIF values. It was considered that VIF scores above 5 were indicative of multicollinearity issues (Hair, et al., 2013; Stine, 1995). Based on this criteria, no variable met the criteria for removal and thus this assumption was met. The presence of outliers was evaluated by means of Mahalanobis' distance. Although five cases could be classified as multivariate outliers (Arbuckle, 1995), it was nevertheless decided to retain these observations as they were not serious outliers. Having verified the assumptions, the analysis proceeded with an initial specification of the model and fit evaluation.

6.2.2.2 SEM Model Specification and Fit Evaluation

The saturated model was first specified with all possible pathways between the variables estimated. Maximum Likelihood (ML) estimation was employed for this exercise as it is the most common and robust estimation method (Kline, 2015). As most fit indices were not available in the saturated model, liberating degrees of freedom was desirable for optimal estimation. This was done by constraining the coefficients of non-significant paths to zero. The left side of the model, i.e. the first level independent variables, was found to be non-significant. CI_Beliefs neither predicted Return ($p = 0.225$) nor %TSX ($p = 0.605$). Risk_CE had non-significant paths for both Return ($p = 0.434$) and %TSX ($p = 0.997$). Finally, CI_Exp was non-significant for both Return ($p = 0.100$) and %TSX ($p = 0.373$). All of these paths were constrained to zero in order to allow fit estimation, which is described in Table 17.

Table 17: Fit Indices for SEM Model – Canadian Advisers Study 1D

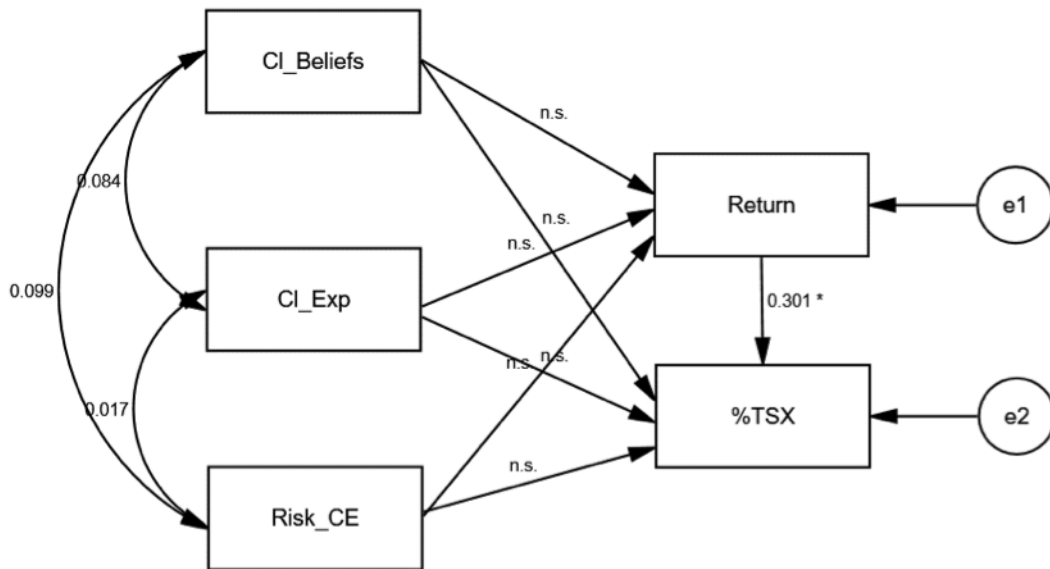
	χ^2/df	GFI	PGFI	RMSEA	AIC
Value	1.024	0.953	0.381	~0.000	24.143
Quality	Good	Very Good	Bad	Very Good	-

Source: Amos

Based on the thresholds determined by the literature (Barrett, 2007; Hair et al., 2013; Hooper et al., 2008), the model fit was considered to be very good except for the parsimony-adjusted goodness-of-fit (PGFI) index. The comparative fit was slightly better than the one from the saturated model (AIC = 30.000). As such, no further changes were made to the model specification.

As previously noted, most of the paths were constrained to zero during model specification as they were not significant. Beginning with H1D-1, as observed during model specification, the advisers' perception of their client's investment literacy, i.e. Cl_Beliefs, did not have the expected effect on Return and %TSX; thus, this hypothesis was rejected. For H1D-2, the advisers' perception of their client's investment experience, i.e. Cl_Exp, was also found to be not significant for both Return and %TSX. Thus, this hypothesis was also rejected. Regarding H1D-3, Risk_CE was not a significant predictor of Return or %TSX and therefore this hypothesis was rejected. However, Return was a good predictor of %TSX ($B = 2.020$; $p < 0.05$), lending further support to H1B-6. No mediation analysis was possible, as only one of the paths was significant in the model. Figure 7 summarizes the relationships between these variables and the final specified model.

Figure 7: Final Path Diagram for SEM Model – Canadian Advisers Study 1D



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Note: values indicate standardized regression coefficients. Latent variables "e" indicate error terms. Source: Amos

6.3 Chapter Summary

This chapter was a follow up to the findings from Chapter 5 and attempted to determine what factors drove the formation and updating of return expectations of investors and advisers.

A measure of literacy and experience was introduced for investors; similarly, a measure of advisers' perception of their clients' literacy and experience was introduced for advisers. As well, a Holt-Laury type choice problem to identify the level of risk aversion (Holt & Laury, 2002) was provided to investors and advisers.

Study 1C found that Experience, but not Literacy, was a significant predictor of Return and %TSX. The measure of risk aversion, Risk_CE, was found to be a significant negative predictor of %TSX and a significant positive predictor of Return. Return was also found to be a significant positive predictor of %TSX. Finally, a mediation analysis was performed and revealed that Return mediated the relationship between Experience and Risk_CE on the one hand and %TSX on the other. Study 1C found that when investors were

provided return expectations that were significantly different than self-determined return expectations, there was not a significant difference in risk-taking behaviour.

Study 1D found that none of the hypothesized predictors (advisers' perception of their clients' experience, advisers' perception of their clients' literacy, or the measure of adviser risk aversion) were significant predictors of Return or %TSX. Return, however, was found to be a significant positive predictor of %TSX.

Discussion of these results, in conjunction with the findings of Chapter 5, 7 and the qualitative results from Chapter 8, can be found in Chapter 9.

Chapter 7 Evidence from International Participants

Chapter 5 investigated the role of return expectations, risk tolerance, personality traits, and demographic factors in the risk-taking behaviour of investors and risk-taking advice of advisers. Chapter 6 followed up the findings from Chapter 5 and explored the factors that impacted return expectations. Were these results unique to Canada or similar in other jurisdictions? Chapter 7 describes two studies aimed at international investors (Study 2A) and international advisers (Study 2B) that sought to extend the findings in Canada to the international stage.

7.1 Study 2A

The results of Study 1A identified return expectations as a more important predictor of investors' risk-taking behaviour than risk tolerance questionnaire scores or personality traits (at least, as measured in this thesis). The results of Study 1C identified investment experience of investors as having significant influence on the formation of return expectations and risk-taking behaviour. Are these findings unique to the Canadian marketplace? Study 2A was designed to explore this question and determine if the Canadian findings could be replicated outside of Canada.

The hypotheses examined in Study 2A are summarized below. The hypotheses tested in Study 2A are the international investor analogue of the investor hypotheses tested in Study 1A and Study 1C. For the sake of brevity, the reader is referred to Study 1A and Study 1C for the theoretical rationale underpinning each of the hypotheses below. As this is an exploratory study, it was not possible to specify anticipated direction of relationships beforehand (e.g. H2A-5, H2A-6, and H2A-9):

- H2A-1 Higher RTQ scores will result in higher risk-taking behaviour.

- H2A-2 Higher return expectations will result in higher risk-taking behaviour.
- H2A-3 Higher investment experience will result in higher risk-taking behaviour.
- H2A-4 Higher investment literacy will result in higher risk-taking behaviour.
- H2A-5 Differences in personality traits will result in differences in risk-taking behaviour.
- H2A-6 Differences in demographic characteristics will result in differences in risk-taking behaviour.
- H2A-7 Higher levels of investment experience will result in higher return expectations.
- H2A-8 Higher levels of investment literacy will result in higher return expectations.
- H2A-9 Differences between given and self-determined return expectations will result in differences in risk-taking behaviour.

7.1.1 Sample and Descriptive Statistics

The sampling frame consisted of individuals in the author's network who were approached via email to participate in this research and asked to forward the invitation to people in their network (snowball sampling). Through this approach, 56 international investors commenced the online questionnaire; of these, 9 did not complete the questionnaire by the time the survey period was closed. All questions were mandatory so partially completed questionnaires were discarded. In total, there were 47 usable questionnaires from international investors. The demographic and other characteristics of the international investors are reported in Table 18.

Table 18: Descriptive Statistics – International Investors Study 2A (N = 47)

<i>Measure</i>	<i>n</i>	<i>%</i>	<i>Measure</i>	<i>n</i>	<i>%</i>
Gender			Education		
Male	35	74.5%	High School	0	0%
Female	12	25.5%	Bachelors	6	12.8%
			Masters	34	72.3%
Marital Status			Doctor	7	14.9%
Single	11	23.4%			
Married	36	76.6%	Net Worth		
Separated	0	0%	Retail	12	25.5%
Divorced	0	0%	Mass Affluent 1	4	8.5%
			Mass Affluent 2	12	25.5%
Age			High Net Worth	19	40.4%
<45	21	44.7%			
46-55	19	40.4%	Basic Literacy (# of questions correct; max =5)		
56-65	6	12.8%	<3	1	2.1%
66-75	1	2.1%	4	19	40.4%
>75	0	0%	5	27	57.4%
Country			Experience # of Years		
US	18	38.3%	<3 (< 10 years)	17	36.2%
UK	4	8.5%	4 (10 – 20 years)	18	38.3%
Germany	5	10.6%	5 (>20 years)	12	25.5%
Other	20	42.6%			

The sample is 47 international investors completing an online questionnaire through Qualtrics survey software (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017).

7.1.2 Questionnaire and Instruments

All subjects were asked to complete an online questionnaire created with and hosted by Qualtrics survey software through the University of Manchester (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017). The questionnaire consisted of demographic information, one previously validated instrument (TIPI), an anonymized but typical industry risk tolerance questionnaire and questions pertaining to subjects' expectations of market performance, past experience with equity investing and investment literacy (see Appendix 2A for the full questionnaire).

The personality scale, quantitative measure of return expectations, and risk-taking measure were all validated in prior research, although this is the first

study to combine the different elements. The questions regarding investment literacy and experience as well the quantitative measure of risk aversion were the same as those used in Study 1C. Data collection for Study 2A was undertaken between February and April 2017.

7.1.3 Procedures for Study 2A

1. Each subject was asked to provide demographic information.
2. Each subject was asked to complete the TIPI, a 10-item, 7-point Likert-type version of the Big 5 Inventory personality instrument.
3. Each subject was asked for their expectations with respect to future market returns over the next five years using a Likert-type scale. Note that this was different from Study 1A where investors were asked to provide numerical return expectations.³²
4. Risk Aversion Certainty Equivalent - each subject was asked the following certainty equivalent question to determine an index of risk aversion:
 - Please consider the following scenario: you have \$100,000 (or local equivalent) of extra cash to invest that you do not need for the next 10 years.
 - “You could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
 - You could invest in Investment B, which has a 25% chance of losing 15% and a 75% chance of winning [X]
 - I will choose Investment B if x is at least ...[X]”
5. Each subject was asked to answer questions on basic financial literacy (adapted from Lusardi & Mitchell, 2011b). Correct answers were coded 1, incorrect answers were coded 0.
6. Each subject was also asked one question on advanced literacy (i.e. how bond prices react to a fall in interest rates). Correct answers were coded 1, incorrect answers were coded 0.
7. Each subject was asked to answer questions on their previous investment experience. Answers were coded on a 7-point Likert-type scale.
8. Each subject was asked to allocate \$500,000 (or local equivalent) as follows:
 - “Imagine you have an overall wealth of \$500,000 (or equivalent in local currency) that you wish to invest now and that you don’t need this

³² Asking for a qualitative answer where categories were provided was expected to aid easier comprehension with international subjects and the longer time period reflected the findings in Study 1A that the long-term expectations subscale of RTQ was a significant predictor of risk-taking behaviour.

money for at least another 15 years. You could invest this amount either in a 5-year bond issued by your country's Government (i.e. a risk-free investment), in an investment fund tracking the main stock market of your home country (e.g. US - S&P500, UK - FTSE100, Germany - DAX) or a combination of the two."

9. Each subject was asked to repeat the exercise in #8 but this time expected return is given, as follows:
 - "Imagine the same scenario as in the previous question. However, now you expect the returns from your home country stock market to average about 7% a year over the next 15 years. Please use the slider below to indicate the percentage you would invest in the investment fund ranging from 0 = invest nothing in this fund to 100 = invest everything in this fund."

7.1.4 Impact of Risk Tolerance, Return Expectations, and other Factors on Risk-Taking Behaviour

The most appropriate procedure to test hypotheses H2A-1 to H2A-6 is a hierarchical regression, where iterative models are specified with each adding further predictors. The goal was to determine whether any individual variable has predictive strength above and beyond the others (Petrocelli, 2003).

This model used %Equity, a continuous variable indicating the percentage of funds allocated to equity investment, as the dependent variable. The independent variables were RTQ (risk tolerance questionnaire), Beliefs_5Y (5-year return expectations for the home equity market), Extraversion and Neuroticism (two dimensions of the TIPI scale), and a series of demographic variables coded as dummy variables. The continuous nature of the dependent variable suggests that OLS (Ordinary Least Squares) is the optimal model to use in this analysis (Hair et al., 2013). Before initiating the analysis itself, the assumptions of the model were tested as follows.

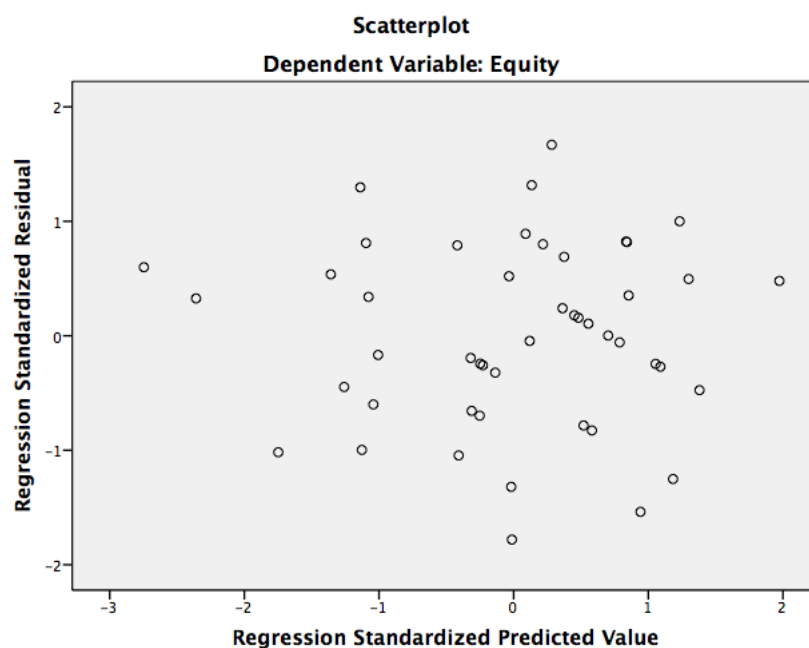
7.1.4.1 Assumptions for OLS

The first assumption to be tested was whether there were any signs of multi-collinearity in the independent variables, i.e. excessive correlations with other predictor variables. For this analysis, any variable with a Variance Inflation Factor (VIF) greater than 5 was considered to be excessively multicollinear (Hair et al., 2013; Stine, 1995) and thus potentially a candidate for

removal. An initial regression was conducted for the sole purpose of evaluating the VIF scores. It was determined that all variables met the threshold for acceptance.

The assumptions of linearity, normality and homoscedasticity were collectively tested using a scatterplot of the predicted values versus the residuals, as previously discussed. Figure 8 suggests that all of these criteria were met and that therefore the assumptions necessary for regression analysis were satisfied.

Figure 8: Scatterplot of Predicted Values versus Residuals – Study 2A#1



7.1.4.2 Regression Results

This regression resulted in four models which are summarized in Table 19. The first model contains only the variables Beliefs_5Y and RTQLTE and RTQSTR; the second model adds Literacy, Experience and Risk_CE³³; the third model adds dummy variables for gender, education, net worth and country; and finally, the fourth model adds extraversion and neuroticism.

³³ Literacy is included as is since it is ordinal and not nominal. In most cases ordinal variables behave close enough to continuous data to the point where there are few practical differences. In this case, skewness and kurtosis are low so it can be argued that it's even sufficiently normal.

Only Model 2 was found to be significant ($F(6, 40) = 3.1.03, p < 0.05$), as Literacy, but not Experience or Risk_CE, was found to be a significant predictor of %Equity ($B = 7.079, p < 0.05$). While Models 3 and 4 showed modest increases in R^2 , adjusted R^2 decreased and none of the observed changes in R^2 were significant. As a result, H2A-1, H2A-2, H2A-3, H2A-5 and H2A-6 were rejected; only H2A-4 could be supported by the data. An analysis of the effect size and resulting power was conducted using G*Power (Faul et al., 2009). A post-hoc analysis of the linear multiple regression fixed model (R^2 deviation from 0) indicated an effect size of 0.25 and a power of 0.851.

Table 19: Determinant Effects on %Equity International Investors Study 2A (N=47)

Variables	Model 1			Model 2			Model 3			Model 4		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
(Constant)	13.184	26.711		33.205	30.360		47.608	36.869		36.714	40.348	
RTQLTE	1.583	0.843	0.273	1.054	0.805	0.182	1.015	0.881	0.175	0.968	0.904	0.167
RTQSTR	1.517	0.882	0.252	0.295	0.917	0.049	-0.235	1.079	-0.039	-0.236	1.108	-0.039
Beliefs_5Y	-2.058	4.070	-0.076	-6.795	4.143	-0.250	-6.423	4.681	-0.237	-5.775	5.054	-0.213
Literacy				7.079	2.802	0.414*	5.978	3.326	0.349	5.836	3.417	0.341
Experience				0.273	0.860	0.044	0.089	1.125	0.014	-0.063	1.170	-0.010
RISK_CE				-7.057	6.355	-0.152	-2.553	7.770	-0.055	-4.308	8.273	-0.093
Male							0.252	8.430	0.005	0.383	8.839	0.007
Bachelors							-8.560	12.182	-0.124	-7.679	12.556	-0.112
Doctor							2.241	10.356	0.035	1.351	10.745	0.021
Retail							-7.352	10.354	-0.140	-6.041	10.776	-0.115
Mass Affluent 1							13.699	15.476	0.167	13.988	16.046	0.170
Mass Affluent 2							1.246	8.776	0.024	0.700	9.174	0.013
UK							7.864	13.596	0.096	9.146	14.617	0.111
Germany							-6.160	14.573	-0.083	-6.801	14.948	-0.091
Other							-10.244	8.457	-0.221	-9.615	8.752	-0.207
EXTRA										0.512	1.206	0.067
NEURO										0.907	1.546	0.093
<i>F</i>	2.622			3.103*			1.547			1.338		
R^2	0.155			0.318			0.428			0.440		
Adjusted R^2	0.096			0.215			0.151			0.111		
Change in Adj. R^2	0.096			0.119			-0.064			-0.04		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Note: The table presents the results of a hierarchical multiple regression with the dependent variable %Equity. Dummy variables were used for Gender (Base = Female), Education (Base = Masters), Net Worth (Base = HNWI), and Country (Base = US). Durbin-Watson statistic = 1.965.

7.1.5 Impact of Prior Investment Experience on Return Expectations of International Investors

For H2A-7, the dependent variable was Beliefs_5Y (the same variable which was used as a predictor in the previous analysis) and the independent variable was Experience, calculated as the sum of three 7-point Likert-type variables measuring the degree of experience in investing. The most appropriate model for this relationship is an ordinal regression, as the dependent variable is ordinal in nature (Harrell Jr, 2015). The major assumptions for conducting an ordinal regression are the ordinality of the dependent variable, and proportional odds. This assumption can be tested by means of the test of Parallel Lines, which tests the null hypothesis that the slopes are identical across the response categories. This test confirmed that the assumption was met ($\chi^2(3, N = 43) = 7.451; p = 0.059$). The model was not significant ($\chi^2(1, N = 43) = 0.168; p = 0.682$), as the sole predictor, Experience, was itself not significant (Wald $\chi^2(1, N = 43) = 0.185; p = 0.667$). Thus H2A-7 was rejected.

7.1.6 Impact of Investment Literacy on Return Expectations of International Investors

For H2A-8, the dependent variable was Beliefs_5Y (as before), and the independent variable was Literacy, calculated as the sum of five basic and one advanced literacy questions. Similar to the previous hypothesis, the most adequate model is an ordinal regression. Assumption testing by means of the test of Parallel Lines revealed that the proportional odds assumption was not met ($\chi^2(3, N = 43) = 22.197, p < 0.001$). Accordingly, it was opted not to proceed with the ordinal regression.

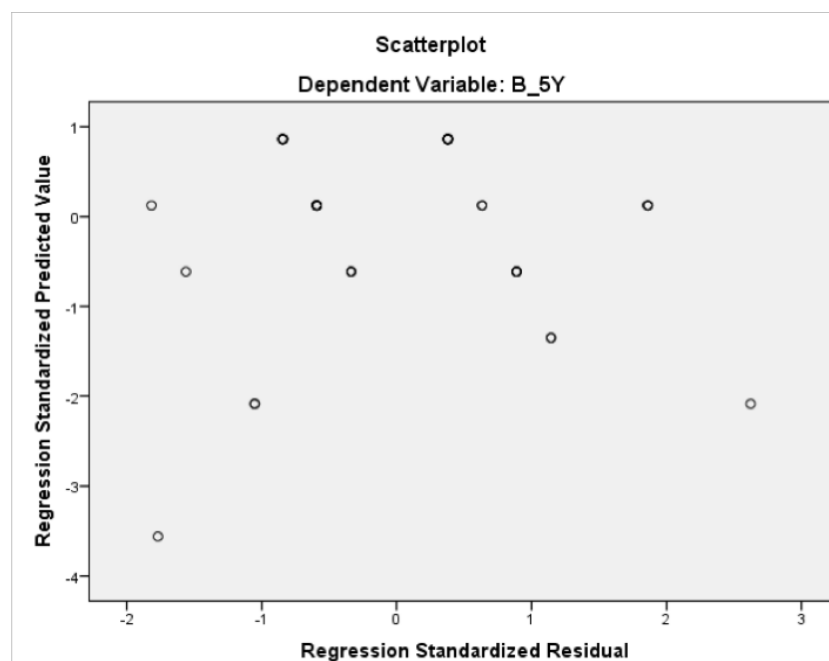
As an alternative analytical strategy, a simple OLS regression was used instead. This choice was based on two arguments. First, the literature indicates that Likert-style items can be treated as continuous variables (Norman, 2010), which makes them suitable for an OLS regression – in other words, there is evidence of OLS' robustness to violation of assumptions, which

is not the case for ordinal regression. Second, differences in estimations between linear and non-linear models have been reported as minimal, despite the additional complexity of non-linear modelling (Angrist & Pischke, 2008). Thus, using ordinal regression in spite of the assumptions not being met would likely skew the analysis with no clear benefit over simply using OLS. As such, the analysis continued with the evaluation of OLS assumptions.

7.1.6.1 Assumptions for OLS

The assumptions of linearity, normality and homoscedasticity were concurrently tested using a scatterplot of predicted values versus the residuals, as previously described. Due to the fact that an ordinal variable is used, the scattering of the data points in the graph is much more even than what would be expected from a continuous variable. Nevertheless, Figure 9 suggests that the assumptions are still met, as no flagrant patterns suggesting violation of assumptions can be observed.

Figure 9: Scatterplot of Predicted Values versus Residuals - Study 2A#2



Source: SPSS

The analysis proceeded after validation of these assumptions. The estimated model was found to be significant ($R^2 = 0.109$, $F(1, 45) = 5.480$, $p < 0.05$). Literacy significantly predicted Beliefs_5Y ($B = 0.208$, $t(45) = 2.341$, $p <$

0.05) with a positive coefficient. As a practical interpretation, this result can be read as “for every point that the literacy score increased, 5-year expectations increased by 0.208 points”. As such, H2A-8 was supported by the data.

7.1.7 Differences in Return Expectations on Risk-Taking Behaviour

In Study 2A, international investors were asked the measure of risk-taking behaviour question (i.e. %Equity) twice, once without market return information and once with the expectation of 7% return per annum over the next 15 years. H2A-9 sought to determine whether this difference in return expectations would result in differences in %Equity chosen by the international investors.

A paired samples *t*-test was conducted to compare the %Equity in the self-determined and given return expectations conditions. There was a statistically significant difference in %Equity for self-generated return expectations ($M=59.15$, $SD=23.203$) and given return expectations ($M=65.96$, $SD=23.651$) conditions; $t(46)=-2.655$, $p < 0.05$. Thus, H2A-9 was supported by the data.

7.2 Study 2B

The results of Study 1B identified return expectations as a more important predictor of advisers’ risk-taking advice than the clients’ risk tolerance questionnaire scores or the advisers’ personality traits (at least as measured in this thesis). The results of Study 1D identified the advisers’ perception of their clients’ investment experience or literacy as not having significant influence on the formation of their return expectations. Were these findings unique to the Canadian marketplace? Study 2B was designed to explore this question and determine if the Canadian findings could be replicated outside of Canada.

The hypotheses examined in Study 2B are summarized below. The hypotheses tested in Study 2B are the international adviser analogue of the adviser hypotheses tested in Study 1B and Study 1D. For the sake of brevity, the reader is referred to Study 1B and Study 1D for the theoretical rationale underpinning each of the hypotheses below:

- H2B-1 Higher return expectations will result in higher risk-taking advice.
- H2B-2 Perception of higher clients' experience with the stock market will result in higher risk-taking advice.
- H2B-3 Perception of higher clients' knowledge about the stock market will result in higher risk-taking advice.
- H2B-4 Differences in personality traits will result in differences in risk-taking advice.
- H2B-5 Differences in demographic characteristics will result in differences in risk-taking advice.
- H2B-6 Perception of higher clients' experience with the stock market will result in higher return expectations.
- H2B-7 Perception of higher clients' knowledge about the stock market will result in higher return.
- H2B-8 Differences between given and self-determined return expectations will result in differences in risk-taking advice.

7.2.1 Sample and Descriptive Statistics

The sampling frame consisted of international advisers in the author's network and who were approached via email to participate in this research and asked to forward the questionnaire to other advisers in their network (snowball sampling). Through this approach, 85 international advisers commenced the online questionnaire. Of these, two did not complete the questionnaire by the time the survey period was closed. All questions were mandatory so partially

completed questionnaires were discarded. In total, there were 83 usable questionnaires from the pool of international advisers. The demographic and other characteristics of the international advisers are reported in Table 20.

Table 20: Descriptive Statistics – International Advisers Study 2B (N = 83)

<i>Measure</i>	<i>n</i>	<i>%</i>	<i>Measure</i>	<i>n</i>	<i>%</i>
Gender			Education		
Male	68	81.9%	High School	12	14.5%
Female	15	18.9%	Bachelors	44	53.0%
			Masters	26	31.3%
			Doctor	1	1.2%
Country			Client Beliefs		
US	74	89.2%	1	7	8.4%
UK	1	1.2%	2	27	32.5%
Germany	0	0%	3	49	59.0%
Other	8	9.6%			
			Adviser Literacy		
			0	10	12.0%
			1	73	88.0%

The sample is 83 international advisers who completed an online questionnaire through Qualtrics survey software (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017).

7.2.2 Questionnaire and Instruments

All subjects were asked to complete an online questionnaire created with and hosted by Qualtrics survey software through the University of Manchester (www.survey.mbs.ac.uk) (Qualtrics, Provo, UT, copyright 2017). The questionnaire consisted of demographic information, one previously validated personality scale (TIPI), several questions ascertaining advisers' perceptions of their clients' literacy (Client Beliefs), several 7-point Likert-type questions gauging client investment experience (Client Experience), a certainty equivalent question to derive a quantitative measure of risk aversion (described below), and a detailed case of a hypothetical client with completed risk tolerance questionnaire and investment objectives (see Appendix 2B for the full questionnaire provided to advisers).

The personality scale, quantitative measure of return expectations, and risk-taking measure were all validated in prior research although this is the first

study to combine the different elements. The questions regarding client beliefs and experience as well as the quantitative measure of risk aversion were the same as those used in Study 1D. Data collection for Study 2B was undertaken between February and April 2017.

7.2.3 Procedures for Study 2B

1. Each subject was asked to provide demographic information.
2. Each subject was asked the advanced financial literacy question.
3. Each subject was asked to complete the Instruments.
4. Each subject was asked for their expectations with respect to future returns in their home equity market over the next five years using a Likert-type scale. Note that this was different from Study 1B where advisers were asked to provide numerical return expectations.³⁴
5. Risk Aversion Certainty Equivalent - each subject was asked the following certainty equivalent question to determine an index of risk aversion:
 - Please consider the following scenario: you have \$100,000 (or local equivalent) of extra cash to invest that you do not need for the next 10 years.
 - “You could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
 - You could invest in Investment B, which has a 25% chance of losing 15% and a 75% chance of winning [X]
 - I will choose Investment B if x is at least ...[X]”
6. Each subject was asked to rate their perceptions of their clients’ past level of experience in equity investing on a series of 7-point Likert-type questions.
7. Each subject was asked to rate their perceptions of their clients’ financial literacy on a series of 7-point Likert-type questions.
8. Each subject was asked to allocate \$500,000 (or local equivalent) of the representative client’s money as follows:
 - “You have been approached by a potential client to design an investment proposal to finance her retirement in 15 years’ time. She has \$500,000 (or equivalent in local currency) to invest and does not need the money between now and retirement. As a first step, you have asked her to complete a standard industry risk tolerance questionnaire. The questionnaire has 7 questions testing for time

³⁴ Asking for a qualitative answer where categories were provided was expected to aid easier comprehension with international subjects and the longer time period reflected the findings in Study 1A that the long-term expectations subscale of RTQ, measured over a longer period of 5 - 10 years, was a significant predictor of risk-taking behaviour.

horizon, long term expectations and attitudes to short-term volatility. The possible scores fall into the categories below.”

- Your potential client scored 56 on the questionnaire.

Score	Category	Description
14 – 20	Very Conservative	This approach seeks a high degree of stability and should minimize the chances of substantial short-term volatility. For a very conservative investor, portfolio will be invested in the most risk-averse securities such as cash and fixed- income.
21 - 34	Conservative	Focus is on stability rather than maximizing return and should limit the chances of substantial short-term volatility. For a conservative investor, portfolio will be invested primarily in risk-averse areas such as cash and fixed-income securities with limited exposure to equities.
35 - 48	Balanced	The aim is to achieve a balance between stability and return and is likely to involve at least some short-term volatility. For a balanced investor, portfolio will include investment in equities, balanced by exposure to more risk-averse areas of the market such as cash and fixed-income securities.
49 – 62	Growth	This approach concentrates on achieving a good overall return on the investment portfolio while avoiding the most speculative areas of the market. Significant short-term fluctuations in value are possible. For a growth investor, portfolio will be invested primarily in equities.

- “You could invest the \$500,000 (or equivalent in local currency) either in a 5-year bond issued by your country's Government (i.e. a risk-free investment), in an investment fund tracking the main stock market of your home country (e.g. US - S&P500, UK - FTSE100, Germany - DAX) or a combination of the two.”
 - “How much would you advise your client to invest in their home stock market?” (0 = invest everything into the risk-free asset; 100 = invest everything into their home stock market).”
9. Each subject was asked to repeat the exercise in #8 but this time expected return was given, as follows:
- “Imagine the same scenario as in the previous question. However, now you expect the returns from your home country stock market to average about 7% a year over the next 15 years. How much would you advise your client to invest in their home stock market?” (0 = invest everything into the risk-free asset; 100 = invest everything into their home stock market).”

7.2.4 Impact of Return Expectations and Other Factors on Risk-Taking Advice

The most appropriate procedure to test hypotheses H2B-1 to H2B-5 is a hierarchical regression, where iterative models are specified with each one

adding further predictors. The goal was to determine whether any individual variable has predictive strength above and beyond the others (Petrocelli, 2003).

This model used %Equity, a continuous variable indicating the percentage of funds allocated to equity investment, as the dependent variable. The independent variables were Beliefs_5Y (5-year return expectations), Extraversion and Neuroticism (two dimensions of the TIPI scale), variables measuring the advisers' perception of their clients' investment literacy and experience, the advisers' measure of risk aversion and a series of demographic variables coded as dummy variables. The continuous nature of the dependent variable suggests that OLS (Ordinary Least Squares) is the optimal model to use in this analysis (Hair et al., 2013). This choice was further supported by the fact that the goal of this analysis was to determine whether any individual variable has predictive strength above and beyond the others. A hierarchical regression approach allows variables to be entered in batches and enables the computation of the R^2 delta. This allows the researcher to evaluate the significance of these changes as well as determining which variables create a meaningful improvement in the predictive power of the model, which was the proposed goal of this study. Before initiating the analysis itself, the assumptions of the model were tested as follows.

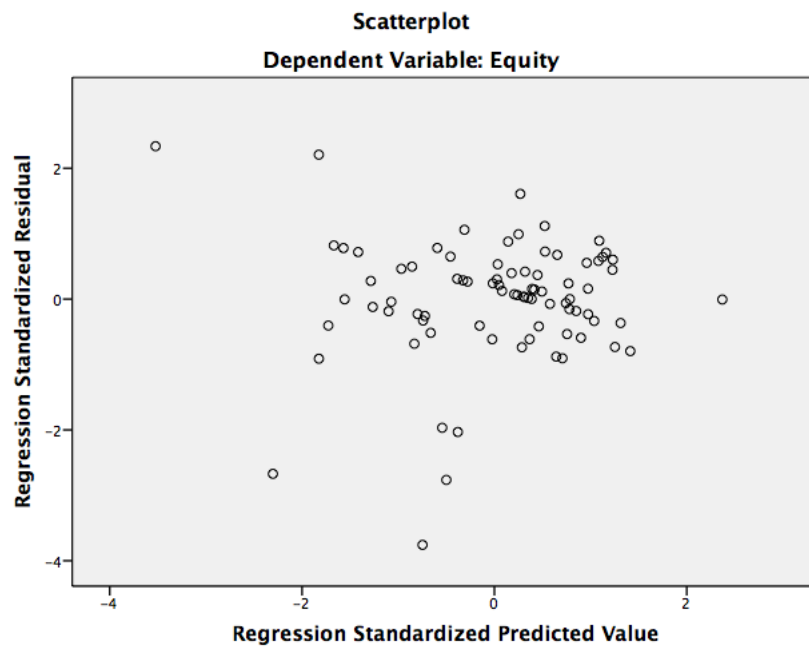
7.2.4.1 Assumptions for OLS

The first assumption to be tested was whether there was any signs of multi-collinearity in the independent variables, i.e. excessive correlations with other predictor variables. For this analysis, any variable with a Variance Inflation Factor (VIF) greater than 5 was considered to be excessively multicollinear (Hair et al., 2013; Stine, 1995) and thus potentially a candidate for removal. An initial regression was conducted for the sole purpose of evaluating the VIF scores. No variable met this threshold, and thus it was decided to retain all of the variables in the analysis.

The assumptions of linearity, normality and homoscedasticity were collectively tested using a scatterplot of the predicted values versus the

residuals, as previously discussed. Figure 10 suggests that all of these criteria were met and that therefore the assumptions necessary for regression analysis were satisfied.

Figure 10: Scatterplot of Predicted Values versus Residuals – Study 2B#1



The single participant that reported holding the degree of Doctor was removed as being an outlier. The fact that this participant was the only one in this category, coupled with his high score on %Equity, resulted in a serious inflation of the model's estimates.

7.2.4.2 Regression Results

This regression resulted in four models which are summarized in Table 21. The first model contains Beliefs_5Y; the second model adds Cl_Beliefs, Cl_Exp and Risk_CE; the third model adds gender (reference category is Male), education (reference category is Masters), and country (reference category is US); and the fourth model adds Extraversion and Neuroticism.

None of the models tested in Table 21 were found to be significant and all of the resulting adjusted R^2 statistics were significantly low. Thus, hypotheses H2B-1 to H2B-5 were rejected.

Table 21: Determinant Effects on %Equity International Advisers Study 2B (N=83)

<i>Variables</i>	<i>Model 1</i>			<i>Model 2</i>			<i>Model 3</i>			<i>Model 4</i>		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
(Constant)	79.906	11.591		63.302	14.620		66.298	15.770		63.349	18.847	
Beliefs_5Y	-2.465	2.382	-0.115	-3.316	2.420	-0.155	-4.125	2.540	-0.192	-4.213	2.625	-0.196
CI_Beliefs				1.709	2.341	0.083	-0.219	2.456	-0.011	-0.102	2.511	-0.005
CI_Exp				1.018	0.716	0.164	1.090	0.748	0.175	1.202	0.823	0.193
RISK_CE				2.130	3.172	0.075	2.466	3.162	0.087	2.376	3.218	0.084
Female							-3.116	3.923	-0.091	-3.167	4.005	-0.092
High School							8.718	4.793	0.239	8.591	5.050	0.236
Bachelors							7.614	3.540	0.295*	7.556	3.598	0.292
UK							-5.244	13.833	-0.045	-5.729	14.124	-0.049
Other							-3.425	5.655	-0.079	-2.941	5.849	-0.068
EXTRA										0.246	0.603	0.050
NEURO										0.020	0.635	0.004
<i>F</i>		1.071			1.130			1.441			1.165	
<i>R</i> ²		0.013			0.055			0.153			0.155	
Adjusted <i>R</i> ²		0.001			0.006			0.047			0.022	
Change in Adj. <i>R</i> ²		0.001			0.005			0.041			-0.025	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Note: The table presents the results of a hierarchical multiple regression with the dependent variable Equity. Dummy variables were used for Gender (Base = Male), Education (Base = Masters), and Country (Base = US). Durbin-Watson statistic = 1.550.

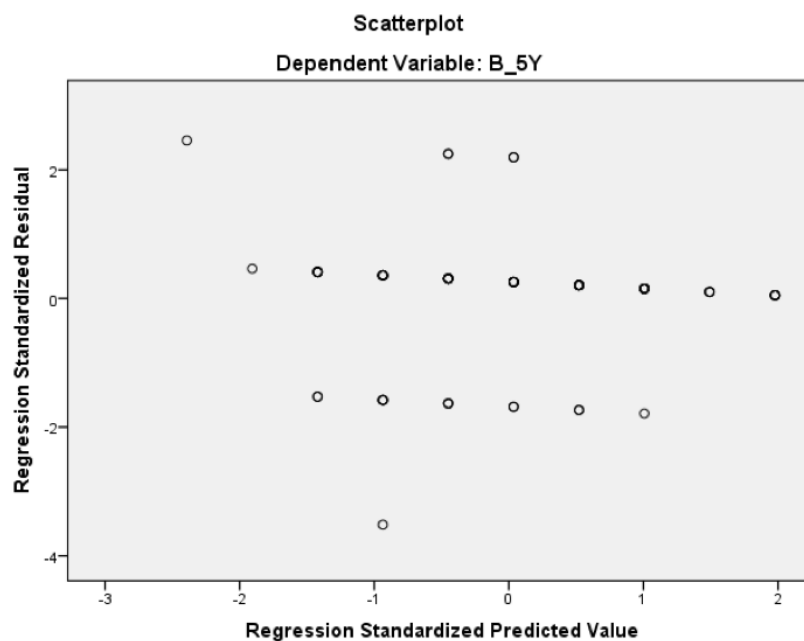
7.2.5 Impact of Advisers' Perception of their Clients' Investment Experience on Return Expectations

For H2B-6, the dependent variable was Beliefs_5Y (the same variable which was used as a predictor in the previous analysis, also referred to as B_5Y) and the independent variable was CI_Exp, calculated as the sum of three 7-point Likert-type variables measuring advisers' perception of their clients' experience in investing. The most appropriate model for this relationship is an ordinal regression, as the dependent variable is ordinal in nature (Harrell Jr, 2015). The major assumptions for this are the ordinality of the dependent variable and proportional odds. These assumptions can be tested by means of the test of Parallel Lines, which tests the null hypothesis that the slopes are identical across the response categories. This test indicated that the assumptions were not met ($\chi^2 (2, N = 82) = 6.603; p < 0.05$).

As an alternative strategy, a simple OLS was used instead, similar to the analysis for Hypothesis H2A-7 and for the same reasons. The first step in this analysis was to evaluate the OLS assumptions.

The three assumptions of linearity, normality and homoscedasticity were concurrently tested using a scatterplot of the predicted values versus the residuals, as previously described. Due to the fact that an ordinal variable was used, the scattering of the data points in the graph was more regular than would be expected from a continuous variable. Nevertheless, Figure 11 suggests that the assumptions are still met, as no flagrant patterns can be observed.

Figure 11: Scatterplot of Predicted Values versus Residuals – Study 2B#2



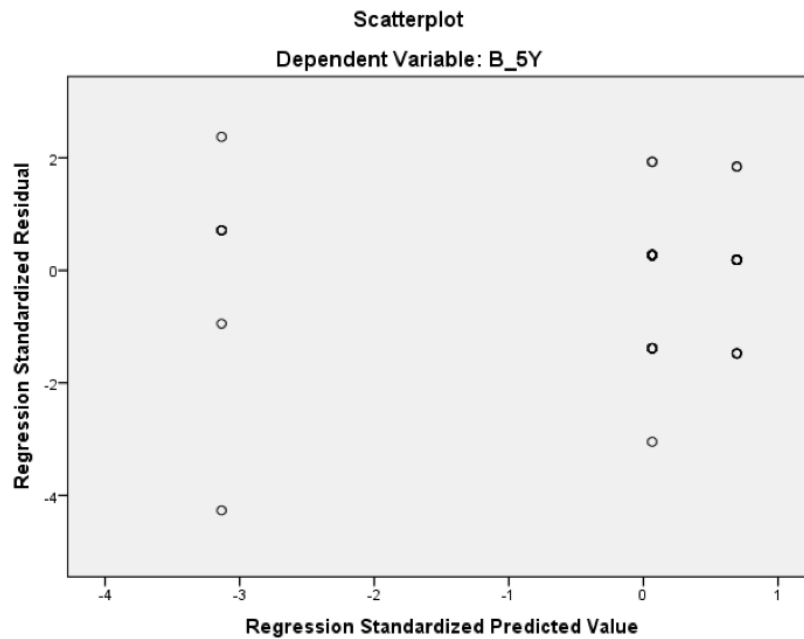
The estimated model was found to be non-significant ($R^2 = 0.107$, $F(1, 80) = 0.925$, $p = 0.339$). This was due to the fact that the sole predictor – Client Experience – was also found to be non-significant ($B = 0.027$, $t(80) = 0.962$, $p = 0.339$). Thus, H2B-6 was rejected.

7.2.6 Impact of Advisers' Perception of their Clients' Investment Literacy on Return Expectations

For H2B-7, the dependent variable was Beliefs_5Y (as before), and the independent variable was Cl_Beliefs, calculated as the sum of three questions measuring investment literacy. Similar to H2B-6, the most adequate model is an ordinal regression. Assumption testing by means of the test of Parallel Lines revealed that the proportional odds assumption was not met ($\chi^2(6, N = 82) = 26.835, p < 0.001$). As a result, it was opted not to proceed with the ordinal regression. As an alternative analytical strategy, a simple OLS was used instead, following the same arguments as before.

The three assumptions of linearity, normality and homoscedasticity were concurrently tested using a scatterplot of the predicted values versus the residuals, as previously described. Figure 12 reveals a significant gap in the centre of the plot, which indicates both non-normality of the data and non-linearity. Because of this, OLS was also discarded as an analytical option. The tertiary analytical option that was considered was Multinomial Logistic Regression, by treating the Beliefs_5Y variable's levels as nominal rather than ordinal data. Although interpretation of this regression is slightly harder than OLS or Ordinal regressions, it has the distinct advantage of being more lenient in terms of assumptions (Chan, 2005; Starkweather & Moske, 2011).

Figure 12: Scatterplot of Predicted Values versus Residuals – Study 2B#3



An initial attempt at Multinomial Logistic Regression resulted in a Hessian matrix singularity error. This was likely caused by the presence of categories with few cases, requiring recoding of the variables. Beliefs_5Y was recoded by merging categories “2” and “3”, each with a single case. The error persisted after this change; Cl_Beliefs was recoded by merging the category with the lowest number of cases (“1”) into the closest semantic category (“2”). This resolved the error and allowed the analysis to continue.

Nevertheless, the model was found to be non-significant ($\chi^2 (6, N = 82) = 4.673, p = 0.586$), matching the non-significance of the sole predictor, Client Beliefs, ($\chi^2 (6, N = 82) = 4.673, p = 0.586$). Thus, H2B-7 was rejected.

7.2.7 Differences in Return Expectations on Risk-Taking Advice

In Study 2B, international advisers were asked the measure of risk-taking advice question (i.e. %Equity) twice, once without market return information and once with the expectation of 7% return per annum over the next 15 years.

Hypothesis 2B-8 sought to determine whether this difference in return expectations would result in differences in %Equity chosen by the advisers.

A paired samples *t*-test was conducted to compare the %Equity in the self-determined and given return expectations conditions. There was no statistically significant difference in the %Equity for self-generated return expectations ($M=67.30$, $SD=14.374$) and given return expectations ($M=66.43$, $SD=17.380$) conditions; $t(82)= 0.655$, $p = 0.515$. Thus, Hypothesis 2B-8 was rejected.

7.3 Chapter Summary

This chapter extended the findings from Chapter 5 and Chapter 6 to the international context to determine whether the factors impacting investor risk-taking behaviour and adviser risk-taking advice was common across jurisdictions.

Some differences in methodology were employed in Chapter 7. For example, the variable measuring return expectations, *Beliefs_5Y*, was a categorical variable measuring the respondent's expectations of returns in their home equity markets over the next 5 years; in contrast, the return expectations variable in Chapter 5 was a continuous variable measuring the respondent's expectations of returns in the Canadian equity markets over the next 12 months. There were two reasons for the modification: (i) the instructions in Chapter 5, modeled after Weber et al. (2013), may not have been easily comprehended by international audiences where English was not the first language and (ii) a longer time period may be more in line with the investing culture of other jurisdictions.

In addition, the BFI-10 was replaced with the TIPI. Both are 10 item versions of the Big 5 Inventory but low Cronbach's Alphas scores for the BFI-10 in Study 1A and 1B prompted a change. The fact that TIPI was evaluated on a 7-point Likert-type scale versus the 5-point Likert-type scale for BFI-10 was a motivating factor for its use.

Study 2A and 2B found that return expectations (Beliefs_5Y) was not a significant predictor of risk-taking behaviour or advice (%Equity). Study 2A found that RTQ, Extraversion and Neuroticism and demographic variables (education, country, age, and net worth) were not significant predictors of risk-taking behaviour. Study 2A also found that literacy, but not experience, predicted return expectations of international investors. As well, Study 2A found that there were significant differences in risk-taking behaviour when return expectations were provided compared to when return expectations were self-determined.

Study 2B found that Extraversion, Neuroticism, demographic variables (gender, education, and country) and advisers' perception of their clients' literacy and experience were not significant predictors of risk-taking advice. Study 2B also found that there was no significant difference in risk-taking advice when return expectations were provided compared to when return expectations were self-determined.

Discussion of these results, in conjunction with the findings of Chapter 5 and 6 and the qualitative results from Chapter 8, can be found in Chapter 9.

Chapter 8 Investment Decisions – A Qualitative Analysis (Study 3)

This chapter presents the results from a qualitative study involving Canadian investors and Canadian advisers (Study 3), using semi-structured interviews as described in Chapter 4. A pragmatic adaptation of grounded theory methodology was used to conduct the analyses.

The core research question – i.e. finding the factors that influence investor and adviser investment decisions– which was explored in the empirical studies, was investigated in Study 3 through a qualitative lens. Section 8.1 provides a portrait of the participants in Study 3. Evidence for the role of expectations and how they are formed is provided in Section 8.2. Section 8.3 provides evidence of the role a process-oriented approach plays in investment decisions. Section 8.4 describes the role of mindset and Section 8.5 describes the importance of the discovery process. An evolving framework to connect all these themes is described in Section 8.6. Finally, Section 8.7 provides a brief summary of the chapter.

8.1 Portrait of the Participants in Study 3

Using the sampling process described in Chapter 4, seven investors and six advisers participated in Study 3. Table 22 provides a summary portrait of these investors and advisers, including their answers to the risk tolerance questionnaire, personality scales, return expectations, %TSX and key demographic variables, all of which were collected in Studies 1A – 1D. For a detailed description of the variables and scales summarized in Table 22, the reader is directed to Chapter 4.

Table 22 highlights Return and %TSX of the participants. The significant variation in these variables amongst the participants was the key criteria in the purposive sampling that led to the inclusion of these individuals in this study.

For instance, RTQ scores ranged from 38 to 60 while %TSX ranged from 0% to 100%. Furthermore, three investors indicated return expectations of 0%. However, two of them had corresponding %TSX responses of 0% while the third had %TSX of 100%. What accounted for this discrepancy? The heat map in Table 122 further illustrates the significant variation in the variables and scales measured across the participants. This is additional evidence that the quantitative analysis is not telling the full story. The set of initial questions for the semi-structured interviews can be found in Appendix 3.

Table 22: Portrait of Investors and Advisers in Study 3

	INV-1	INV-2	INV-3	INV-4	INV-5	INV-6	INV-7	ADV-1	ADV-2	ADV-3	ADV-4	ADV-5	ADV-6
RTQ	38	46	60	38	38	52	50						
RTQTH	10	14	18	16	4	20	18						
RTQLTE	16	14	24	14	22	18	20						
RTQSTR	12	18	18	8	12	14	12						
RETURN	0	0	0	2	4	4	7	0	0	4	5	5	7
TSX	25	30	100	100	30	40	63	60	60	70	60	60	80
DRP	15	15	5	11	18	7	12	13	12	12	15	8	13
DRT	14	7	9	12	7	10	10	16	11	14	5	15	10
DEB	15	13	12	12	17	15	16	15	11	15	15	9	11
NMS	22	21	22	26	26	30	24	31	34	29	33	26	20
SRS	16	10	5	18	14	15	13	15	14	27	17	11	18
DGS	33	38	38	31	29	36	31	25	20	23	22	25	26
LAS	25	23	28	26	26	24	28	25	26	19	25	25	24
RID	33	29	31	30	35	38	36	32	34	44	50	31	32
INC	36	29	25	35	30	33	38	35	32	46	36	31	34
EXTRA	5	8	4	8	7	10	6	8	6	7	8	9	6
AGREE	6	6	6	5	3	7	6	6	5	5	7	5	6
CONSC	5	2	1	5	5	5	3	6	6	6	6	6	5
NEURO	5	4	4	5	4	3	4	2	3	5	4	3	3
OPEN	2	2	1	3	2	2	3	5	5	6	6	5	5
Qual. RISK	3	3	4	3	3	4	3	4	5	6	3	4	4
RISK_CE	1.333	1.111	0.444	1.333	1.111	1.111	0.889	0.667	0.889	0.889	0.889	0.444	0.667
LIT	4	6	6	6	6	5	5						
EXP	11	12	18	12	11	14	14						
CL_Beliefs								1	3	2	3	3	3
CL_EXP								13	12	11	18	13	17
GENDER	Female	Female	Male	Male	Male	Female	Female	Female	Male	Male	Male	Female	Male
EDUCATION	Bachelors	Masters	Masters	Masters	Bachelors	Bachelors	Masters	Bachelors	Masters	Bachelors	Bachelors	Bachelors	Bachelors
NETWORTH	HNW	Retail	HNW	Retail	MA1	Retail	HNW						
LICENSE								MFDA	MFDA	IIROC	MFDA	IIROC	MFDA

Note: RTQ = Risk Tolerance Questionnaire, RTQTH = RTQ Time Horizon subscale, RTQLTE = RTQ Long Term Expectations subscale, RTQSTR = RTQ Short Term Risks subscale, Return = expected return on TSX in next 12 months in %, TSX = % invested in Canadian stock market in risk-taking decisions question in Study 1A and 1B, DRP = Dospert Risk Perception scale, DRT = Dospert Risk Taking scale, DPB = Dospert Perceived Benefits scale, NMS = Nenkov Maximization scale, SRS = Schwartz Regret scale, DGS = Duckworth Grit scale, LAS = Loss Aversion scale, RID = Rational and Intuitive Decision Making Style scale, INC = Iowa-Netherlands Comparison scale, Extra = Extraversion subscale of the BFI-10, Agree = Agreeableness subscale of the BFI-10, Consc = Conscientiousness subscale of the BFI-10, Neuro = Neuroticism subscale of the BFI-10, Open = Openness subscale of the BFI-10, Qual. Risk = Likert-type question measuring perception of risk over the next 12 months in the TSX, Risk_CE = measure of risk-aversion using Holt-Laury type choice question, LIT = measure of investor literacy, EXP = measure of investor experience, CL_Beliefs = measure of adviser perception of client literacy, CL_EXP = measure of adviser perception of client experience. Heat map depicts comparison across row of observations with red connoting lower scores for that variable, yellow connoting median scores for that variable and green connoting higher scores for that variable. Return and TSX are in bold and blue for emphasis as key criteria for selection of these participants.

8.2 Expectations

The results from the earlier quantitative studies (Studies 1A, 1B, 1C, and 1D) suggested that return expectations of investors and advisers significantly influenced their risk-taking behaviour. This was broadly supported by the participants in Study 3 as evidenced by their comments (emphases added):

My knowledge and my experience of the market has an impact in terms of the return and volatility I **expect** in the market. **Investor 3**

Does the overall return **fit with my plan**, or what I'm trying to achieve? **Investor 4**

Going way back because when I was still a very young man most of our decisions were made when we had a little bit of money, not much. Decisions were often made by **hunches**... But it rarely resulted in very much in terms of making any money. **Investor 5**

Clients' **expectations** going forward are the sum of their **experiences** in the past. There are very few people that come in with some keen interest and the critical thinking ability to argue with their embedded set notions. **Adviser 1**

I mean our past **experiences** really lead us to our **expectations** or beliefs in my mind. **Adviser 5**

So, we understand what the client's **expectations** are because that is when you get a problem. **Adviser 4**

Expectations (return and risk) were a common theme for investors and advisers. For both investors and advisers, return expectations for the TSX ranged from 0% to 7%. One factor to explain this wide dispersion may be the source of the expectations. Investor 2, who had a return expectation of 0%, said "I'm getting my [return expectation] from my adviser". In contrast, Investors 3 and 4 noted that their return expectations were obtained primarily from a review of historical performance. Investor 7 attributed her return expectations to third party sources, "(a)s an example, I read the Economist every week."

While expectations are an important factor, the sources of information relied on to form these expectations appear to play a significant role in determining the magnitude of the expectations. For example, Investor 3 and 4

both relied on historical performance but have expectations of 0% and 2% respectively. And while Investor 3 considered current market trends, Investor 7, who also looks at market trends, had expectations of 7%. Similarly, all of the advisers, who had access to the same historical performance data and current market trends, had return expectations that were widely dispersed. Perhaps individuals differed on their interpretation of the same data, depending on their level of literacy and their prior experience?

8.2.1 Investment Literacy

Study 1C and Study 2A suggested that literacy and experience played a role in both return expectations and risk-taking behaviour. Study 2A (international investors) found that literacy was related to risk-taking behaviour, a finding supported by prior research. In contrast, Study 1C did not find a significant effect of literacy on risk-taking behaviour. Nevertheless, the interviews in Study 3 highlighted literacy-related themes that appeared to impact risk-taking behaviour. For instance, did investors understand (i) the trade-off between risk and return, (ii) the difference between volatility and shortfall, (iii) the importance of asset allocation and time horizon, (iv) that risk may be better thought of as loss of capital and (v) the range of possible returns available in investing in equities?

Investors really need to understand what some basic **fundamental financial education** is about. Just even some basics, about how rudimentary things work. **Investor 4**

I think there are huge issues with **financial literacy** among adults. **Investor 7**

Specifically, investors' understanding of risk and the role of time horizon was explored in the interviews.

Risk means **preservation of capital** or the probability of losing your capital... I think there is also **risk in erosion of capital** due to not making enough to even cover inflation, taxes, etc. **Investor 2**

I wouldn't think of risk as symmetric. I think you are more likely to gain. The chance of you losing would be much smaller than 50%.

Investor 3

I have to tell you I don't like short-term paper losses, but I don't panic. I think it is because I say to myself well this is a **longer-term thing** ... I stop myself from getting upset [but] this is a learned behaviour.

Investor 2

We don't think we're going to be in a position to need to use that money in the **next 10 years** even **Investor 3**

So, a long time. Thirty years **Investor 6**

If I am going to get anxious, I am much more anxious about having a **potential short fall** than I am about a blip or a loss over a **one-year period**. **Investor 7**

My time frame for most of my investments is for when I retire [**15 years**] **Investor 7**

Investors were further probed to determine the time period over which they evaluated the performance of their long-term investments.

I guess our evaluation mechanism would be more in terms of relatively how the investments we selected perform compared to the overall market, or how things are going worldwide. So, we would be a lot more patient losing 10% or 20% or 30% in a scenario like 2008 where the market was doing very poorly; but if it was say this year, and we were down 30%, we may question the adviser and say well how come everybody else is up 30%, and we're down 30% especially if people have invested in the last 12 months or so in the US market. **Investor 3**

Semi-annual, not quarterly. More likely yearly **Investor 4**

Well usually in about a year at the most **Investor 5**

Well I keep an eye on when my statements arrive every six months to one year, but if I needed to make any changes I couldn't do it in a period less than a year, or less than two years, but that's only for retirement. **Investor 6**

If everything was down, you have to look at it from that perspective. If it was one that's down, and everything else is doing well then, I probably think a little bit about why is this happening, and if I can't find a reason to back up. I would probably sell, but I wouldn't react right away. **Investor 7**

Thus, most investors chose their investments with a long (typically 10+ years) time frame in mind. However, they chose to evaluate the performance

of these same investments over much shorter periods of time (typically 1 - 2 years). This was an interesting mismatch and one that could have significant implications for investor and adviser. Indeed, the author's industry experience suggests that such short-term evaluation of a long-term investment decision often results in a reversal of the original long-term decision.

The comment by Investor 2 regarding her view of risk was interesting and suggested that her view of risk was somewhat different than the Markowitz framework view – i.e. she viewed risk as permanent loss of capital rather than day-to-day volatility in security prices. This was a view that was echoed by both investors and advisers.

Losing capital. That's probably what risk means to me. **Investor 7**

When I ask my clients so what does risk mean to you because I ask that question quite a lot especially to less, sophisticated client, they always say loss. ...Risk of loss, **loss of capital**, yeah it going down. I give you 100 bucks and it's only 75 later. **Adviser 1**

Well, I think it depends on the investor. So, let's say someone is 60 years old. They're five years away from retirement. **The risk is when they start withdrawing money their investment could be worth less than what's put in.** **Adviser 2**

Yeah, I think honestly that our industry has done a disservice to the consumer in ascribing risk to investing the way that it does. At the end of the day the investor has one concept of risk which is **I don't want to lose my money.** **Adviser 6**

From an adviser perspective, Study 3 suggested a key theme was how well the adviser understood their clients' literacy.

So, the client completely **understands** statistics, Sharpe ratios, and standard deviations. He gets all of it and then some; he could probably teach me. And in the 2008 correction, he completely freaked out when his investments went down 30%. And **I could not talk him out of selling** after two months and repeated hour-long conversations with him. **Adviser 1**

The big thing [I look for] I would think is the **time**, like when do you need this money. That is the biggest thing because we all know that the longer you stretch something out the less volatile the curve looks. **Adviser 4**

This quote from Adviser 1 with respect to one of her knowledgeable clients emphasized the distinction between knowledge (i.e. the theoretical understanding of investment concepts) and literacy (i.e. the practical ability to apply that knowledge to their own portfolio). By way of analogy, experience would suggest that many students manage to earn top marks in exams without truly understanding the concepts or being able to apply them. And, as discussed in Chapter 3, an individual's ability to recall pertinent information at decision time is dependent on a number of factors including the conditions under which the information is encoded and the conditions under which the information is retrieved (Ryack & Kida, 2006). For instance, Investor 3 had a graduate degree in statistics while the client of Adviser 1 also has advanced statistics knowledge. Both investors have detailed knowledge of statistics and probability. Nevertheless, the two individuals reacted dramatically differently in the aftermath of the Great Recession of 2008 - Investor 3 stayed the course and invested in more equity while Adviser 1's client sold out of his investments. Their knowledge was similar but their literacy was different. It may well be that the same information was not encoded or retrieved in the same way.

8.2.2 Investment Experience

Study 1C found that investment experience was related to risk-taking behaviour amongst Canadian investors while Study 2A did not find any such connection among international investors. In Study 3, the interviews identified some themes related to experience that suggested an impact on risk-taking behaviour: (i) the investor's prior experience with the particular asset class; (ii) the outcome of that prior experience; (iii) the process they followed to make the decision to invest in that asset class; and (iv) the investor's handling of subsequent volatility in that asset class.

My knowledge and my **experience** of the market has an impact in terms of the return and volatility I expect in the market. **Investor 3**

Because I've been very lucky that's the **experience** I've had, but I've also seen and heard from lots of people that haven't had that experience. **Investor 7**

That, to me, was the **worst possible investment experience** [choosing a successor plan to a closing defined benefit pension scheme], and for a very significant asset that can make or break people's lives.

Investor 2

I would say **experience** is a factor, and every year perhaps it becomes a little bit more important because every year you have a little bit more experience under your belt. You've seen what's happening. At the beginning, I probably was totally open to recommendations, and thoughts, and what you recommend, and now there can be a bit more debate, a bit more discussion when recommendations are put in front of me **because I'm more informed.** **Investor 7**

Although neither Study 1D nor Study 2B found that advisers' perception of their clients' experience had an impact on their risk-taking advice, the interviews in Study 3 suggested that this was an emerging theme.

Experience is one of the biggest single factors. Someone who is brand new to investment doesn't really know what to expect and they hear stories from friends who made 20% last year... **They don't understand if they haven't experienced losses or negative returns...** and then they panic. **Adviser 2**

It goes back to their **experience** and if they are **skittish.** **Adviser 2**

So, taking into account their **understanding** of the asset class, **how long** they have been invested in the asset class, and **during which periods** they invested in that asset class are all important factors. **Adviser 3**

Experience can be a teacher. As the results of Malmendier and Nagel (2011) suggest, individuals who have experienced lower stock market returns in the past are less likely to take investment risk in the future. Investor 5 is a good example. He is less risk-taking today because of past experience.

We had enough experience by then to know you could really lose a lot of money if you weren't too careful. **Investor 5**

Thus, Adviser 3 would appear to be correct that one has to take account of the periods in which an investor invested in a particular asset class. However, that in itself is likely to be insufficient. The level of experience is important, but so are factors such as: the quality of that experience; the experiences that preceded as well as followed that particular experience; and what elements of those experiences have been internalized or encoded into

memory. To paraphrase Denrell and March (2001), a cat that has only stepped on a hot stove will react differently to future stoves than a cat that had stepped on many cold stoves before stepping on a hot stove.

Furthermore, as discussed in Section 3.5, there is substantial evidence that past experiences are more likely to be “reconstructed” rather than “relived” (Fredrickson, 2000; Kahneman et al., 1993). That means two individuals that lived through the Great Recession may have very different recollections of that period and thus two very different affective reactions to a similar circumstance in the future. Therefore, probing questions to understand the exact nature of the experience, the length of that experience, the interaction of the experience with all other experiences and the affective evaluation of that experience are necessary. As Weber and Klement (2018) observed, “(r)ecent market events and investors' lifetime experiences do influence investment decisions because they change the perception of risk” (p. 12). A self-assessment questionnaire alone will not be sufficient.

8.3 Self-Awareness

Prior research suggested that personality traits (such as the Big 5) have an influence on risk-taking decisions. However, the results of the quantitative studies did not find personality traits to have a statistically significant impact on risk-taking decisions. However, research by Mishra, Lalumiere and Williams (2010, p. 872) suggests that “Variance Preference and Risky Personality were significantly correlated, suggesting that there is an association between personality traits associated with risk and a behavioral preference for risky outcomes”.

Interestingly, in their interview comments, investors demonstrated awareness of personal factors such as: (i) their own limits of knowledge and experience; (ii) their need or desire for control; (iii) their willingness to trust others; (iv) whether they were maximizers or satisficers; and (v) their recognition that changing circumstances may require different behaviours.

Certain life circumstances make you take on or consider risks that you always thought you couldn't take. Suddenly, you are presented a different set of factors that well, I could either take some risks and maybe retire when I feel like I want to retire; or I don't take them, and I know I am going to have to work a lot longer. **Investor 2**

But I might not be putting as big a percentage of my portfolio in something like that than someone of an equivalent age with a different kind of make-up, psychological make up. **Investor 2**

Investor 2's comments above suggested that situational circumstances can override the underlying dispositional factors affecting risk-taking, as posited by Lopes (1987). Investor 2 recognized that her personality means that she was taking less risk than others similarly situated, but she accepted that. Such situational circumstances and dispositional characteristics were not adequately captured in the risk tolerance questionnaire but appeared to manifest themselves in different risk-taking behaviour.

I have industry knowledge and the intellect to do my own investing, but I just don't have the interest or the time to build up my own expertise. ... Being **self-aware enough** to go you know what, **this isn't something I want to do on my own**, and making the decision to work with somebody. **Investor 7**

I didn't feel that I had the time to do the homework necessary to agree or disagree with a broker's recommendations for example. And then the other thing is **that I don't trust people**. **Investor 1**

Investor 1 and Investor 7 were both self-aware of their limitations (lack of time and lack of trust for Investor 1 and lack of interest for Investor 7) but the similarity ended there. The former used two different advisers (see Section 8.4.2.) to offset her lack of time and her lack of trust whereas the latter chose to invest in and develop a trust-based relationship with one adviser to whom she delegated her investment decisions.

From an adviser perspective, the interviews suggested that successful advisers tried to understand their clients' personality traits and self-awareness as part of their process.

And **we talk about many ways risk shows up in their lives**; for example, well we don't want our daughter to go to university unless she is very certain she wants to be X at the end of it. As opposed to,

we will spend the money to send her to university and she will explore things and maybe she will find the thing she is passionate about. That is a risk assessment at some level. **Adviser 1**

And it really comes down to that **person's personality** and how they **react** to things in general. **Adviser 4**

The same people are the ones that are always reacting to short term volatility and the same people that never react, never react. I think it is a **fundamental characteristic of the client** that although we use the exact same process in explaining risk and volatility and although we can get the exact same positive response towards [accepting that risk], we sometimes get a different outcome [when there is a market downturn] but it is always from the same people. **Adviser 4**

Despite the commonality of self-awareness as a theme, there appeared to be differences in the implications. Investors 1, 2 and 7 were all self-aware but this awareness led to different behaviours. These differences suggested that self-awareness acts to bring background personality traits to the forefront but did not in itself provide direction. While beyond the scope of this research, there appeared to be both qualitative differences and differences of intensity in self-awareness, all of which likely play a role in how this trait manifests itself in behaviour.

8.4 Mindset

Much debate abounds in the investment industry between process and outcome. A good process may, on occasion, result in a bad outcome; while a bad process may also, on occasion, result in a good outcome. In repeated probabilistic decisions, such as investing, a good process is crucial to maximizing the likelihood of a good long-term outcome. A common theme that emerged from the interviews was that investors believed in the importance of process and that this was something they considered in choosing advisers.

And I think what gives me the most confidence is the fact that there is a **really good process**. They [the advisers] are ridiculously anal.
Investor 2

Changes to the investment strategy were made when things got closer to when we needed to withdraw money [from RESP (education savings plan in Canada)], and so the right kinds of actions were taken.

The readjustments were taken, and I feel like it really did do its job, right? **Investor 2**

Over the long term it's really more about investing regularly, staying invested, and not trying to worry too much about things like market timing, picking the right sector, picking the right industry, being in a country that's hot, and that's the way I would think about things for the long term. **Investor 3**

Nevertheless, all of the investors indicated that they had previously lost confidence in a process, an investment or even an adviser. Prior research also supports the view that investors often move away from a good process when they experience a bad outcome (Ratner & Herbst, 2005). So, clearly, the belief in a process only goes so far and, after too many bad outcomes, the process might be abandoned. What an individual considers as too many bad outcomes likely depends on some of the factors outlined earlier: expectations; literacy; experience; and self-awareness.

8.4.1 Defining Clear Goals

Specifically, many investors favoured a disciplined, financial planning based approach that clearly understood the investor's goals and defined a plan to achieve those goals.

I like the idea of goals-based investing. Just recognizing that there isn't just one retirement goal but seeing different allocations and different recommendations for each goal that I have and managing that. The only way an adviser could know that is if they went through the discovery process with me, and provided recommendations based on that. **Investor 6**

Once you have a definitive plan on what you want to do with the money, the return may be less important to you. And so, chasing a higher return doesn't really become the goal. **Investor 3**

The above quote from Investor 3 suggested that a definitive goal and a plan to reach that goal may influence risk-taking behaviour – greater risk-taking was not required if a higher return was not needed.

The interviews also suggested that advisers attributed much of their success to following a disciplined process, appropriately determining the goals

of their clients, setting forth a clear plan to achieve that goal and getting agreement on that plan with their clients.

So, if you do the plan, then you know the client really well in a way that KYC will never deliver because you have been able to tease out the **things that don't add up**; well, I am going to buy a house, I am going to educate my children, and do this and do that and save \$50 a month... **Adviser 1**

The **plan certainly gives you the context** for the way they answer the risk tolerance questions. ... But a **lot of people can't articulate as specific a goal** as we advisers might want. So, you really have to get your head around, or get their head around more accurately, what they are saving for. ... But I am fundamentally first a financial planner and **so the actual return number may or may not be important as whether or not they are on plan.** **Adviser 1**

But the **financial plan will be able to indicate to us how much they need at any given point** and then we will use a kind of cascading bucket strategy where we know we have enough for the next three years; and then we have some moderate conservative money that starts cascading into the money that is being depleted. **Adviser 4**

Going forward, the **decision of investors has to be driven by the financial plan.** And that has to be in line with the risk profile of course. ... **Are you okay with this plan [and the projected retirement income]?** And if the answer is no, well either you retire with less, you retire later, you put more money away now or you take on a little bit of risk or a combination of these. But it won't work based on what we are doing now. **Adviser 4**

Here is the rate of return that is necessary to achieve the income that you want, and **so based upon that we then look at the asset mix to achieve that rate of return, which basically determines the risk profile.** And then you go from there into the product world. **Adviser 6**

Once we start down the road, I emphasize that the **importance of the plan is to create our objectives**, and to create the strategies in place, but the most important thing of the financial planning relationship is exactly the relationship where **we will monitor, and meet, and change things as they need to be changed** because the bottom line is **whatever we set out to accomplish we will achieve something other than that simply because life keeps going on.** **Adviser 6**

The investor needs to really understand what they are trying to achieve, what is their goal, how much time do they have before they need to reach that goal. And I think a lot of the time that's missed totally in discussion, it is more of 'let us quickly get you invested into something, here is the XYZ fund, it is going to make you X%, that is good, off you go'. **Whereas they are not really talking about the goal**

that the client has and what their expectations are and making them understand the risk if there is a down market and how that will affect the portfolio. Adviser 5

Well, **you got to go through their goals**, and it has got to be done account by account in many ways. **Adviser 2**

Then on the return side of things, **working backwards you can develop an asset mix, or asset allocation**, that is going to maximize the chances of remaining within the client's threshold. **Adviser 3**

Fundamentally, all of the interviews with advisers indicated that a process was central to their investing approach. In all cases, the advisers stuck to their process and spent a lot of time in moving their clients away from discussing product or strategy before having fully identified the clients' goals. Only then did they devise a plan to achieve that goal. The product or investment selection was the last step in this process.

Nevertheless, not all clients can articulate their goal. Equally, many do not remain committed to that particular goal over time, as Adviser 1 indicated. Nor do all advisers clearly uncover and understand their clients' goals. This is related to the "skills" in discovery (see Section 8.5). Furthermore, the author's prior industry experience suggests that there are clear differences in both investors and advisers' ability to evaluate future portfolio performance in the context of previously set goals.

8.4.2 Consistency

Another theme that clearly emerged from the interviews was the need for consistency. Do the investor and adviser value consistency of returns and process over peaks and troughs in portfolio performance? Do the investor and adviser focus on controlling what can be controlled (i.e. a plan that can be followed) while ignoring the uncontrollable (i.e. short term market movements)?

Some investors appeared to follow a more ad-hoc approach to investing where the focus seemed to be on identifying a great investment opportunity and relying on instincts or a “nose” for a good investment.

So, I think it is actually dangerous, but I have to say **I think I also have good instincts.** I mean I bought real estate in Montreal just before the second referendum. So, I got an amazing deal on a beautiful house and it has since, I don't know, quadrupled in value. **Investor 1**

So really my investment decisions to date have been sitting down with the investment adviser whenever I feel I have the time, and listening to what they have to say, and **deciding whether or not I like their advice,** or where they think things are moving in the future, and I change my funds accordingly. **Investor 1**

Going way back because when I was still a very young man, most of our decisions were made when we had a little bit of money, not much. Decisions were often made by hunches, or sometimes inside information as we were able to get. **But it rarely resulted in very much in terms of making any money.** **Investor 5**

Other investors, and all of the interviewed advisers, seemed to follow a systematic rules-based approach to investing. Consistently investing and following the plan seemed to be more critical to their investing strategy than “looking for the win”.

I would say that my investment knowledge, and maybe partly my demeanor, is just to recognize that **over the long term it is really more about investing regularly and staying invested** rather than trying to worry too much about things like market timing, picking the right sector, etc., and that is the way I think about things for the long term. **Investor 3**

I always talk to my clients about their sleep at night comfort; **what can they be invested in that will help them to achieve their goals but yet allow them to sleep comfortably at night** not worrying about how the performance of their accounts is doing. **Adviser 5**

Well, my clients [continue saving and contributing] because I don't let them stop. But absolutely right, savings is somehow optional when it is for your retirement and mandatory to live in your home. **Adviser 1**

I am very clear [to my clients] that the market goes down and that you better be sure if it goes down that much **you can stay where you are** because that is the only way you will recover whatever you might have lost. **Adviser 1**

I have had arguments with clients who have wanted to do something far more aggressive and I have always believed that my best answer to that is – **I am not going to do that for you**; if you want to blow yourself up go do it yourself. ... I know other Advisers that would die before they would do that. **Adviser 1**

And we basically say that [with our portfolios] you may only get 80% of the full market upside, but the flipside of that is that **you are only going to get 20% of the downside**, and people are happy with that. **Adviser 4**

The success ultimately for achieving a client's plan requires achieving the rate of return that you set out to achieve, but **that does not mean that you go after the managers who are necessarily at the top of their category** for specific periods of time, or whatever. **Adviser 6**

I am really looking at **consistency** because I call that the **keel of the portfolio**, something that is going to weather the storm. **Adviser 5**

People who love real estate don't get the stock market, and they hate it, and they can't get their head around it. I said if you valued your property every day, it would go up and down too. **And I compared it to real estate, and I said look, with real estate, how long do you hold those houses? Ten or twenty years?** I said, well, it is the same thing with the stock market, just that you can see the price every day. **Adviser 2**

So much of our industry focuses on the returns, and the excess returns produced especially during bull markets. The preservation of wealth is not only how much you make on the upside, **it is how much you can protect on the downside**. **Adviser 2**

Just explaining how the portfolio is doing, that we are still staying on course, **relating it back to the investment policy statement, which we view as the road map and blueprint for what we have set out to do**, and reminding them of what the goals are, and what the aspirations are, and how we intend to get there. **Adviser 3**

One of the most telling comments was from Investor 3 who verbalized that the real value of an adviser for him was to help the investor stay on plan no matter what was happening in the market.

Everybody wants low fees, and everybody wants high returns, and everybody wants a great relationship and baseball tickets; but that is not where [advisers] add the most value. **You add the most value to me and my family by giving us the right advice through thick and thin when the market is going down. That is when you push me to continue making regular investments.** This kind of good advice over the long term really pays off. **It is really like when you have a personal trainer at the gym; you are just more likely to show up and**

that is what I think advisers can really do for people. They can help you set up a plan and keep you on that plan; and that is tremendous value. The research papers that I have read show that clients whose advisers do that retire with a lot more money than clients whose advisers don't do that. **Investor 3**

However, not all investors had a similar view of advisers. Investor 1, for example, used two advisers to compare and contrast advice.

Well, I did see both advisers within a very short period of time [to compare their views and recommendations before choosing to act].
Investor 1

In contrast, Investors 2 and 4 built a long term trusted relationship with one adviser.

He's been basically my only adviser. **Investor 2**

I probably should start by saying I work with an adviser, and so probably I don't often make my own completely independent investment decisions. I have worked with her for 13, 14 years. Totally trust her, she's done very well by me, and so she probably is the biggest influencer. **Investor 7**

8.4.3 Responsibility

One theme that emerged from the interviews was the concept of responsibility – whether self-responsibility from the perspective of investors or professional responsibility to investors from the perspective of advisers. Part of the themes uncovered included questions such as: Are investors coachable? Are they willing to learn from the adviser? Does the adviser take responsibility for educating the investor? Does the adviser take pride in her craft?

I do feel that **there is a convenience in abdicating accountability for your own financial wellbeing** and then easily blaming elsewhere. ... It is almost like you have to force the experience of wanting, or not having, in a relatively affluent society to actually **create the responsibility for your own wellbeing**. ... I think that's partly a problem because our society is affluent and we don't demand as much of our own children; even if we have learned through the school of hard knocks, we are not doing that for our kids. **Investor 2**

Investors have to **take responsibility for their own finances** to some degree. We are all adults; if we have got money to invest, we should be responsible for that and own that. ... **I think it ultimately has to rest**

with the investor. It is your future, it is your money, and it is in your name. **You have to own that responsibility.** ... I think expectation management is a big part of that. **[Advisers] being able to have honest conversations** about 'Well, if you are telling me you are expecting 20 – 25 % return year over year, we need to talk about that".
Investor 7

At some level, everybody understands that if you take more risk you got a chance for a higher return, and if you take less risk you are more likely to have a lower return. I think people understand that in an intellectual way. **I still think that there is a role for advisers in clarifying that.** **Adviser 2**

I have had clients who are no longer my clients, and I was trying to go through my process, which was let us determine your needs. **Let us figure out what your rate of return needs to be to be successful, and then we can create an investment strategy that has that potential,** and they came back to me and said we just want to make lot of money. ... The **clients just refused to articulate needs, goals, objectives;** all they said was take our money and make more. I told them they were perfect candidates to be really abused by someone who wants to make a lot of money in the business. **Adviser 6**

From the get-go when I have a new client, I want to make sure that they are the right client for me as much as I am the right adviser for them. I think the first thing to make sure is that our expectations are in line and that they have the same thought process. It is really about trust. **Adviser 5**

The person has to be motivated in some sense to think about taking responsibility. I don't like to take on clients who say why don't you just take care of it. I prefer to say well no, you need to understand what you are getting into, and what the behaviour of what you are buying is going to look like or what it could potentially look like.
Adviser 2

The interviewed advisers felt that a large part of their role was in educating their clients about investment matters.

The level of financial literacy or lack thereof is the biggest barrier to the client's success ... Clients need to understand the **cost of their choice** ... You can be too conservative at the age of 40 and you will still end up a penniless old lady. **Adviser 1**

I try to make clients understand the difference between having a rate of 5 to 6% a year over ten years versus having a rate of 12% one year and negative 15 or 20% the next year. How the little engine that could. **Let's try and find consistency and move it forward.** ... I think it is really very, very important to try and educate the client and it is a **continuous process.** Every time you meet with the client that you are trying to understand their situation and **trying to make sure that their**

situation fits the way that they are invested. But also, trying to dig deeper and continue to give them information to help them make a wise decision. **Adviser 5**

I mean a **big part of my job is education** ... clients also look to me to explain what we are doing... **Adviser 6**

That is where it comes back to educating the client, and thinking about the blueprint, and the investment policy statement, what we are trying to achieve, how it is that we can achieve that, and trying to move away from emotion decision. **Adviser 3**

From the interviews, one theme that emerged was that the advisers in Study 3 took their jobs seriously and were proud of their work. There was almost a sense of craftsmanship and pride in their craft. The concept of craftsmanship is interesting as it embodies a focus on quality but also on continuous improvement and on an aspiration beyond the monetary.

The thing that will **keep me up at night** is if a client thinks they are going to make it and I can see that they are not. **Adviser 1**

I have known guys for years in this business, the ones that the only thing they know about a product is how much they are going to make from it and how they can sell it. **Adviser 6**

I think if you are an adviser you have to understand and believe in your own story. You have to really believe in the way that you manage money and when you believe in a process that you continue to follow that. **Adviser 5**

For me personally, [during the financial crisis] **to watch portfolios every single day going down was very gut-wrenching** when you know that these are people's livelihoods, this is their retirement, this is their kids' education or their first house. **Adviser 5**

I think we have got a lot of unqualified so-called advisers out there who are really just mutual fund salesmen. If you want to become a lawyer, you go to law school for another 3 years in addition to your undergraduate degree and then another two years of articling before you are allowed to practice. **So, you got eight years of education, and why should it be any different with people's money?** There should be a master's degree in financing that you have to take if you want to advise people. **Adviser 2**

A particularly poetic and insightful comment was made by Investor 2 to describe the importance of craftsmanship.

I will give you an example using coffee. I love coffee and I am Italian, and I think coffee is very important. When you are in Italy, you cannot get a bad cup of coffee because there is pride. There is pride in serving an excellent cup of coffee; and so, to me, it is almost like it is a professionalism thing and it has to be that way in the investment industry. **Investor 2**

8.5 Discovery

The prior themes discussed investor traits and the degree to which investors understood these traits about themselves. Equally, however, advisers indicated that it was important for them to understand these traits in their clients. One interesting theme that emerged from the interviews was whether the investors felt that these traits were well understood by the advisers they worked with. In other words, did the advisers ask the necessary questions to “discover” and truly understand their clients?

I wouldn't say **my literacy and experience was explored in a systematic way** in the sense of getting it all out at once; but over time for sure ... there was an attempt at **really trying to understand the whole context**; I think it takes time because it is not easy to expect people to be that open, at least initially, about financial stuff ... **Investor 2**

I think it is hit and miss. I think **some advisers are really good at knowing their clients**, and some advisers might just do those KYC forms. That might be the only way they ask these kinds of questions and **they are all done in a very robotic, check the box, type of way**. ... I think not everyone is equal in the advice world. **Investor 2**

The good ones [advisers] follow their **discovery process**, if you want to call it that. The onboarding of a new client, and is there a fit? That is one of the things that should definitely be **explored, and discussed, and understood**. **Investor 7**

I think the **discovery process is key**. Actually sitting down and outlining the goals, but also recognizing that there is a level of knowledge on my end versus hey, I [the adviser] know best. **Investor 6**

No, and **I don't think there is enough** [understanding by advisers of their prospective clients' literacy and experience]. At least based on my experience there is not. It is only limited to asking what is your investment knowledge, filling out the KYC form, but no actual discussion. **Investor 6**

From the interviews with advisers, it became apparent that successful advisers focused their practice on a thorough and structured discovery process.

I want to **get a sense of what lifestyle they enjoy now** because clients can't articulate what they want to have to spend in retirement.

Adviser 1

I also ask about their confidence in making decisions about investment.

Adviser 1

We spend too much time in the industry looking at returns and risk without spending enough time on the individual person. If investment advisers could better profile their clients and better understand the qualitative aspects of each unique case, I think the industry would be better off as a whole if we pinpointed the right investment portfolio for each different client. **Adviser 3**

I think it is imperative that you approach any client from a financial planning perspective. **You have to first understand the client, their needs, goals and objectives.** **Adviser 6**

I think it is really important for an adviser to understand expectations of the client, their goals, their objectives, if there are several different goals or objectives, it is important to know. ... it is important to understand if they have unrealistic expectations so a few years later they don't suddenly realize that they are behind the eight ball with not enough to retire and so they suddenly want to start taking high risk. It is important, I think as an adviser to manage that expectation as quickly as possible and try to make them to understand a more prudent process to try and help them to meet their goals. **Adviser 5**

Discovery is critical, but the approach and the efficacy in which it is carried out seems to vary. The questions the advisers ask, the responses they receive, and the follow-up questions they ask depend on a variety of factors – the skill of the adviser, the openness of the investor, the mood of each, the environment, the rapport established, etc. Different views were clearly demonstrated. For example, Investor 4 believed that advisers should approach all clients in fundamentally the same way.

No, I wouldn't think so [response to question as to whether advisers' approach needs to be tailored to each individual]. **Investor 4.**

In contrast, Investor 6 wanted her adviser to tailor his approach to each client.

Well I think the discovery process is key. Actually, sitting down and outlining the goals, but also recognizing that there is a vast amount of information, and even though I come to seek advice, and I assume the investment professional is someone who's experienced. **There is a level of knowledge on my end** versus hey, I know best ... **Investor 6**

Fundamentally, a good discovery process requires two willing and committed parties but also a recognition that it is a process – information is gathered, processed and utilized over time. Advisers can, and should, invest in developing this skill. Psychiatrists and police interrogators, for example, receive significant training in asking the right questions, at the right time, and in the right way. Similar training for advisers can make a substantial difference in the discovery process.

8.6 Putting it All Together - the Investment Journey

In this chapter, a number of themes emerged about the investment decision process - from both the perspective of the investor and of the adviser. While earlier chapters treated risk-taking as a one-off decision (for empirical testing purposes), the current chapter reminds us that participants consider investment decisions as repeat decisions - a journey of sorts.

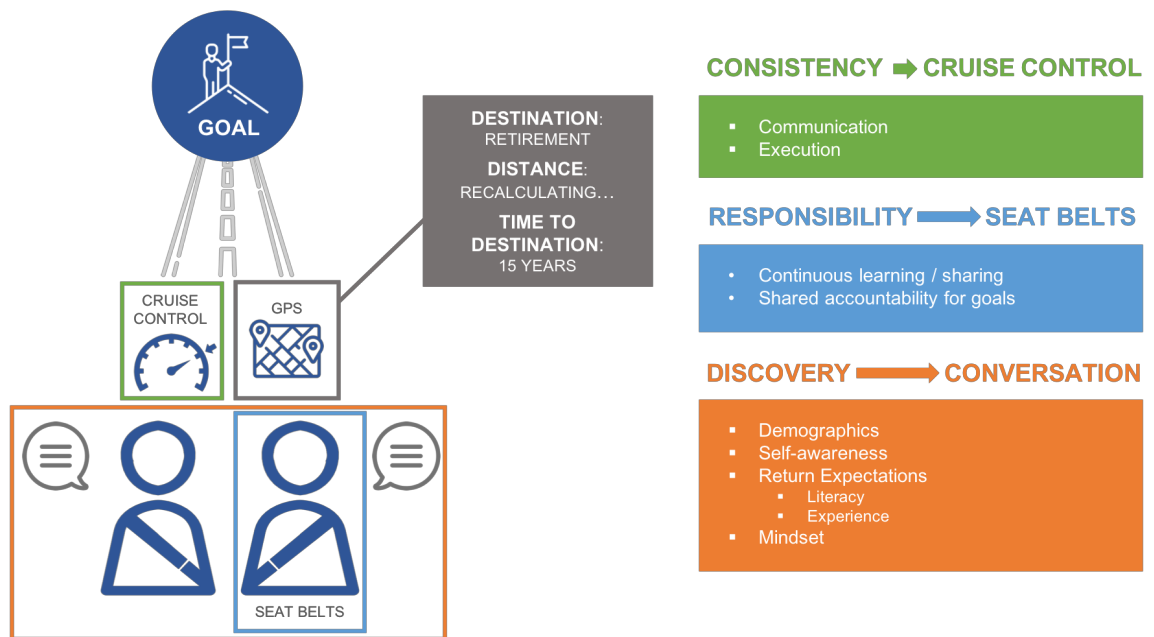
Following through with that analogy, the role of an adviser is more that of a tour guide than a travel agent. A travel agent is transactional and has limited interest in the outcome of that trip. A tour guide is with the customer for the entire journey and is responsible for ensuring that the client reaches the destination on time, on budget, and enjoys the experience. The tour guide is on the trip the whole time and is there to solve the inevitable problems that arise. That is also the role of an adviser: to fully understand what the client wants; design a strategy that gets the client there on time and on budget; and help solve problems along the way.

Figure 13 captures the dynamics at work that emerged through the qualitative analysis, using the analogy of a guided tour road trip with both the adviser and the investor: the discovery process (demographics, literacy, etc.) is the ongoing dialogue between the two; the responsibility of both (continuous

learning, shared accountability) corresponds to the use of seatbelts; and consistency in communication and execution can be thought of as the cruise control. There is a specified destination in mind and the GPS provides the route. In the investment context, the investment goal is the destination and the investment strategy is the route. Car journeys face obstacles on the road and investment journeys face changing market conditions. Both necessitate slowing down or speeding up, or even taking slight detours. In the context of the car journey, the GPS constantly recalculates and recalibrates. This recalculation process, encapsulated in a goals-based approach to investing, found favour with the interviewed investors and advisers. Recall from Section 8.4 when Investor 2 said "Changes to the investment strategy were made when things got closer to when we needed to withdraw money" - that is recalibration in action.

Risk-taking decisions are better contemplated as a journey - one with ups and downs, periods of faster and slower travel, and inevitable detours. This is consistent with the view that simply considering risk tolerance at the outset of an investment strategy is akin to setting the destination in the GPS, setting the speed on the cruise control, and ignoring all other factors as they arise.

Figure 13: The Investment Journey



8.7 Chapter Summary

The interviews with investors and advisers were revealing. Common themes emerged that complemented and extended the findings of the quantitative analysis. For instance, both investors and advisers felt that the literacy and experience of investors were factors in how expectations were formed. Personality traits played a role, although perhaps more subtly than contemplated in the quantitative analysis. As an example, whether to make investment decisions on your own or use the services of an adviser was seen as a reflection of an investor's self-awareness of his or her own personality and state of knowledge.

Detailed discussions between investor and adviser was considered by both parties to be critical to the decision process. The information gathered went far beyond what was captured in a risk tolerance questionnaire. The qualitative differences between investors revealed in this discovery process help explain, for example, the variation found in the results of the pilot project described in Chapter 4.

The use of a process-oriented approach by investors and advisers also emerged as a theme. Those that believed in and followed a process-oriented approach were generally more satisfied with their results. All of the interviewed advisers attributed their success to the use of a rigorous process. Clearly defined goals, a well-articulated plan to achieve those goals, and consistency of execution and communication were factors that both investors and advisers valued. Greater understanding that investors may have a multitude of goals, and that a different approach for each goal may be required, was apparent by the stated desire of many investors and advisers to use a goals-based approach to investing.

Finally, both groups believed that investors needed to take responsibility for their financial affairs, and that there was an ongoing education process that should be part of the adviser's role. Investors valued advisers who acted as coaches and who took pride in their craft. The interviewed advisers exhibited their willingness to act as coaches and have the tough conversation with their clients. They demonstrated considerable pride in their craft and in their role in helping clients achieve their financial goals.

Despite all of the common themes that emerged, there were differences in expectations and risk-taking behaviour that could not be explained. As was apparent throughout this chapter, commonality of themes did not mean uniformity of views. There were nuances of quality and intensity (e.g. of experience), of level of internalization or ability to recall (e.g. of literacy), of implications for behaviour (e.g. of self-awareness), or of the skill and ability to execute (e.g. of discovery). Furthermore, it is not only a matter of exploring the differences within each theme but also understanding the interaction between the themes. Exploring these nuances is beyond the scope of the current research. Nevertheless, it is safe to conclude that a simple inventory of these themes is not sufficient – a deeper probing and understanding of these themes and their interaction is critical.

Chapter 9 Discussion

This thesis set out to explore and determine the factors that impact the risk-taking behaviour of investors and the risk-taking advice of advisers, together defined as risk-taking decisions. At the outset, industry practice and the traditional approach to portfolio theory suggested that an investor's risk tolerance, as measured by a questionnaire, would be the primary driver of risk-taking behaviour. This chapter will argue that this may not be the case.

This chapter summarizes the findings of this thesis and argues that they are valid, reliable, and relevant. Section 9.1 restates the objectives of the thesis, the research questions considered, and the methodologies underpinning the analyses. In doing so, this section argues that the employed protocols can support the validity and reliability of the findings. Section 9.2 discusses the quantitative findings, supplemented with the findings from the qualitative analysis where appropriate. This section argues for the relevance of those findings to regulators, investors, advisers or future academic research. Section 9.3 summarizes the additional themes not connected to the quantitative findings that emerged from the qualitative analysis. Reflections and potential critiques of the current research are discussed in Section 9.4. A summary of this chapter is provided in Section 9.5.

9.1 Thesis Objectives, Research Questions, and Methodology

The objective of this thesis was to investigate what factors need to be considered in determining the appropriate investment portfolio for an individual investor. The questions that motivated the research were as follows:

What determines risk-taking decisions in the practice of financial advice?

This primary research question developments prompted a number of sub-questions that are investigated in this thesis:

1. Do behavioural biases affect investors' return expectations and risk-taking behaviour?
2. Do personality traits or demographics affect investors' risk-taking behaviour?
3. Do risk tolerance or return expectations predict investors' risk-taking behaviour?
4. Do behavioural biases affect advisers' return expectations and risk-taking advice?
5. Do personality trait or demographics affect advisers' risk-taking advice?
6. Do advisers' return expectations predict their risk-taking advice?
7. Do investment literacy, experience or risk aversion affect investors' return expectations and risk-taking behaviour?
8. Do investors update their risk-taking behaviour when new information is provided?
9. Does advisers' perception of their clients' investment literacy or experience affect their return expectations and risk-taking advice?
10. Does advisers' risk aversion affect their return expectations and risk-taking advice?

To answer the research questions, an explanatory sequential mixed methods design was employed. In the first phase, quantitative data was collected from representative samples of investors and advisers using a quasi-experimental and analytic survey design. In the second phase, the findings from the first phase informed the design and collection of qualitative data using semi-structured interviews.

A number of safeguards were taken to maximize the reliability and validity of the findings of both phases. While discussed in greater detail in Chapter 4, a summary is provided here. For the quantitative analysis, the sampling strategy, the research design and the statistical analysis protocols

were all designed to provide confidence in the reliability and validity of the findings.

- A snowball sampling strategy was employed, which is not the typical probability sampling approach that ensures that each member of the population of interest has an equal chance of being sampled. However, the resulting samples in this thesis were compared with the demographic characteristics of the populations of interest and were found to be broadly representative. This comparison process to confirm that a convenience or snowball sample is representative is often used in investment research given the unique factors being studied and the sensitive nature of the data (Merkle & Weber, 2014; Weber et al., 2013).
- The design of the experimental analysis (i.e. three independent experimental conditions testing the impact of behavioural biases) randomly assigned all subjects to one of six conditions. The design of the experimental tasks was broadly patterned after the methodology in Ariely et al. (2003) and Englich et al. (2006). The vignettes used in the experimental conditions were reviewed and vetted in advance by a group of industry professionals and the author's supervisors to ensure clarity and, in so doing, improve the likelihood of construct validity.
- The personality scales used in the empirical analysis were all previously validated instruments (see Section 4.4.6). The one exception was the Risk Tolerance Questionnaire (RTQ) utilized in this thesis. Traditionally, most firms use their own risk tolerance questionnaires which are typically not psychometrically validated. The RTQ analyzed in this thesis is popularly used in the industry but has been anonymized for the purposes of this research.
- While the scales used in the thesis were chosen because they were established instruments with published reliability and validity measures, the analytic survey questions (e.g. demographic questions, literacy, experience, return and risk expectations, risk measure, etc.) were not previously validated. However, the return and risk expectations as well as the risk-taking measure were adapted from Weber et al. (2013). The whole analytic survey was pilot tested with a number of industry professionals as well as the author's supervisors to ensure clarity and suitability.
- The data in the empirical chapters was subjected to rigorous statistical analysis including one-way MANOVA, SEM, multiple regression (and variants thereof) and *t*-tests. In all cases, the assumptions necessary for those tests were investigated, addressed and reported (see the respective empirical Chapters 5, 6, and 7). Statistical significance was assessed at the $p < 0.05$ level and, where appropriate, effect sizes and power were reported.

Similarly, in the qualitative phase, steps were taken in the sampling, data collection and data analysis to ensure confidence in the validity and reliability of the findings.

- Subjects were chosen through a purposive sampling strategy. Investors who participated in Studies 1A and 1C and advisers who participated in Studies 1B and 1D and who expressed a willingness to further participate were eligible. Maximum variation sampling was used to select subjects that demonstrated variability in two key quantitative variables: (i) Return, and (ii) %TSX. The sampling process in this case ensured that the chosen participants were the best positioned to answer the research questions.
- Data was collected in semi-structured interviews. While prior knowledge from the quantitative results informed the initial questions in the interviews, the follow-up questions and subsequent analyses flowed directly from the responses of the subjects. The initial interview questions were vetted in advance by a panel of industry professionals and the author's supervisors.
- The data analysis was based on grounded theory methodology and involved concurrent collection and analysis of data in an iterative manner. Morse et al. (2002) suggest that this approach is "the essence of attaining reliability and validity" (p. 18). The deliberate progression from the micro perspectives contained in the data to the macro perspectives of a conceptual framework, through a constant comparison process of checking new data against existing data, ensures that the resulting theory is "comprehensive, logical, parsimonious, and consistent" (Morse et al., 2002, pp. 18-19).

As the above discussion illustrates, the sampling strategies, data collection methods and data analysis procedures were designed to proactively address issues of reliability and validity. The rigorous execution of this design (as described in detail in Chapters 5 to 8) should reassure the reader as to the reliability and validity of the findings in this thesis.

9.2 Review and Discussion of the Main Findings

For the research questions listed above, a number of hypotheses were formulated and tested in the empirical chapters. The findings from the qualitative analysis, which guided the discovery of important themes related to risk-taking decisions, are discussed in the context of their impact, illustration or qualification of the quantitative findings, and are summarized in Table 23.

Table 23: Summary of Hypotheses and Results

<i>Objective</i>	<i>Hypothesis</i>	<i>Description</i>	<i>Results</i>
Anchoring	H1A-1	Exposure to scenarios with a higher anchor will result in a) a higher return expectation and b) higher risk-taking behaviour from investors.	Rejected
	H1B-1	Exposure to scenarios with a higher anchor will result in a) a higher return expectation and b) higher risk-taking advice from advisers.	Rejected
Recency Effect	H1A-2	Exposure to scenarios with recent gains will result in a) a higher return expectation and b) higher risk-taking behaviour from investors.	Rejected
	H1B-2	Exposure to scenarios with recent gains will result in a) a higher return expectation and b) higher risk-taking advice from advisers.	Supported – (b)
Peer Group Effect	H1A-3	Exposure to scenarios with peer groups performing better will result in a) a higher return expectation and b) higher risk-taking behaviour from investors.	Rejected
	H1B-3	Exposure to scenarios with peer groups performing better will result in a) a higher return expectation and b) higher risk-taking advice from advisers.	Supported – (a)
Personality Traits	H1A-4	Differences in personality traits will result in differences in risk-taking behaviour from investors.	Rejected
	H1B-4	Differences in personality traits will result in differences in risk-taking advice from advisers.	Rejected
	H2A-5	Differences in personality traits will result in differences in risk-taking behaviour from international investors.	Rejected
	H2B-4	Differences in personality traits will result in differences in risk-taking advice from international advisers.	Rejected
Demographic Traits	H1A-5	Differences in demographic characteristics will result in differences in risk-taking behaviour from investors.	Supported
	H1B-5	Differences in demographic characteristics will result in differences in risk-taking advice from advisers.	Supported
	H2A-6	Differences in demographic characteristics will result in differences in risk-taking behaviour from international investors.	Rejected
	H2B-5	Differences in demographic characteristics will result in differences in risk-taking advice from international advisers.	Rejected
Risk Tolerance	H1A-6	Higher RTQ scores will result in higher risk-taking behaviour from investors.	Rejected
	H2A-1	Higher RTQ scores will result in higher risk-taking behaviour from international investors.	Rejected
Return Expectations	H1A-7	Higher return expectations will result in higher risk-taking behaviour from investors.	Supported
	H1B-6	Higher return expectations will result in higher risk-taking advice from advisers.	Supported
	H1C-4	Higher return expectations will result in higher risk-taking behaviour from investors [1].	Supported
	H2A-2	Higher return expectations will result in higher risk-taking behaviour from international investors.	Rejected
Investment Literacy	H2B-1	Higher return expectations will result in higher risk-taking advice from international advisers.	Rejected
	H1C-1	Higher investment literacy will result in (a) higher return expectations and (b) higher risk-taking behaviour from investors.	Rejected
	H1D-1	Higher perception of clients' knowledge about the stock market will result in (a) higher return expectations and (b) higher risk-taking advice from advisers.	Rejected
	H2A-4	Higher investment literacy will result in higher risk-taking behaviour from international investors.	Supported
Investment Experience	H2B-3	Perception of higher clients' knowledge about the stock market will result in higher risk-taking advice from international advisers.	Rejected
	H1C-2	Higher levels of investment experience will result in (a) higher return expectations and (b) higher risk-taking behaviour from investors.	Supported
	H1D-2	Higher perception of clients' experience with the stock market will result in (a) higher return expectations and (b) higher risk-taking advice from advisers.	Rejected
	H2A-3	Higher investment experience will result in higher risk-taking behaviour from international investors.	Rejected
Risk Aversion	H2B-2	Perception of higher clients' experience with the stock market will result in higher risk-taking advice from international advisers.	Rejected
	H1C-3	Higher levels of risk aversion will result in (a) higher return expectations and (b) lower risk-taking behaviour from investors.	Supported
Belief Updating	H1D-3	Higher levels of risk aversion will result in (a) higher return expectations and (b) lower risk-taking advice from advisers.	Rejected
	H1C-5	Differences between given and self-determined return expectations will result in differences in risk-taking behaviour from investors.	Rejected
	H2A-9	Differences between given and self-determined return expectations will result in differences in risk-taking behaviour from international investors.	Supported
	H2B-8	Differences between given and self-determined return expectations will result in differences in risk-taking advice from international advisers.	Rejected

The research in this thesis was designed to be an exploratory study – to investigate the factors that affect risk-taking decisions. By definition, such a study first identifies variables that have a theoretical connection to risk-taking decisions in the practice of financial advice and then empirically tests this relationship. The design of Study 1A and Study 1B was a hierarchical regression where variables are entered sequentially to determine whether the addition of later variables helped explain more of the variation in risk-taking decisions (as measured by an increase in adjusted R^2).

In Study 1A, for example, RTQLTE explained about 13.3% of the total variation in risk-taking behaviour. RETURN, the elicitation of quantitative return expectations, explained an additional 3.2%. All other significant variables (Gender, Marital Status, Net Worth) together explained an additional 2.8% of the total variation in risk-taking behaviour. Similarly, in Study 1B, RETURN explained 12% of the total variation in risk-taking advice. All other significant variables (Education and Licensing) together explained an additional 9.2% of the total variation in risk-taking advice.

These results are consistent with prior literature in investor behaviour. For example, Weber et al. (2013) tested 20 variables as potential predictors of risk-taking in a regression model. Although they do not report R^2 for these models, they only find 10 of 20 variables to be significant predictors. Similarly, Foerster et al. (2017) investigated the factors that affect investors' risky share (i.e. a measure of risk-taking) in their mutual fund portfolios. They found adviser fixed effects (i.e. advisers' own expectations and asset allocation) explained an additional 18% of the variation in risky share compared to just investor characteristics. Of note, they state (p. 1455):

The most striking finding in this analysis of risky share is that all of the regressors in the model — there are 47 variables excluding the year fixed effects — jointly explain only one-eighth of the cross-sectional variation in risky shares. That is, although differences in risk tolerance translate to significant differences in average risky shares, the model's

R^2 is just 12.2%. A remarkable amount of variation thus remains unexplained. Our model's explanatory power is comparable to or even higher than other estimates in the literature. Calvet and Sodini (2014), for example, regress risky shares on investor attributes and year fixed effects using Swedish data and find an adjusted- R^2 of 11.5%. This comparability suggests, first, that the low explanatory power of investor attributes is not sample-specific and, second, that measurement errors on investor attributes — Calvet and Sodini (2014) use administrative data — do not depress the R^2 measure.

Foerster et al. (2017) does not identify significance levels of the 47 tested variables but many were found to not be significant. Thus, the prevalence of null findings for many of the tested variables in Study 1A and Study 1B is not unusual in an exploratory study, in general, and in an exploratory study of risk-taking in investment decisions, in particular. In this section of the chapter, the main findings are reviewed for each hypothesis followed by a discussion of these findings and their relevance for investors, advisers, researchers, and policy-makers.

9.2.1 Return Expectations and Risk-Taking Decisions

9.2.1.1 Behavioural Biases

Three hypotheses (H1A-1 to H1A-3) tested the impact of three behavioural biases (anchoring, recency effect, and peer group effects) on investors' return expectations and risk-taking behaviour. All three hypotheses were rejected. There was no statistically significant impact of these behavioural biases on investors' return expectations or their risk-taking behaviour. This was a surprising finding as prior research would suggest that these biases should have an impact (cf. anchoring - Ariely et al., 2006; Englich et al., 2006; Kaustia et al., 2008; recency - Gilovich et al., 1985; Huber et al., 2010; Nofsinger and Varma 2005; peer group - Brown et al., 2008; Engelberg et al., 2012; Engelberg & Parsons, 2011; Rao et al., 2001).

Three hypotheses (H1B-1 to H1B-3) tested the impact of three behavioural biases (anchoring, recency effect, and peer group effects) on advisers' return expectations and risk-taking advice. H1B-1 was rejected while H1B-2 and H1B-3 were partially supported by the data. While there was no

evidence of an anchoring effect on the return expectations or risk-taking advice of advisers, there was a recency effect on risk-taking advice and a peer group effect on return expectations. The finding that behavioural biases were present was consistent with prior research but the mixed results were surprising and, as noted, not consistent with the findings for investors. The discussion below addresses the approach utilized in this thesis, the findings and implications in light of prior research (described in section 3.3).

There could be several explanations for these contrary and inconsistent results: (i) the sample size was too small to capture the difference; (ii) the intervention was not adequate to accurately simulate the bias in question; or (iii) the participants were too sophisticated to be “caught” by these biases. However, these explanations are unsatisfactory for several reasons: (i) the sample size was not smaller than those used in studies by Englich et al. (2006); however, the effect sizes (0 – 0.034 for investors and 0.13 – 0.16 for advisers) and power (0.05 – 0.23 for investors and 0.1 – 0.7 for advisers) were much smaller than that found in Englich et al. (2006) (effect = 0.788, power = 0.95);³⁵ (ii) the same form of intervention was used by these referent studies; and (iii) the group of experienced trial lawyers studied by Englich (2006), arguably at least as sophisticated a group as those in the present study, were found to be susceptible to the anchoring bias. One reason for the greater noise and variability in the results in this thesis may be due to the broader range of instruments used and hypotheses tested versus the referent studies. As another explanation, perhaps the use of online data collection, instead of in controlled settings, had differential impacts on the experimental conditions. In other words, there is a greater ability to stimulate a potential behavioural bias through reading a scenario in a controlled lab environment than through an online survey.

³⁵ Note that Englich et al. (2006) do not report effect sizes and power for their results. These statistics have been calculated by the author based on their reported results.

One of the strongest counter-arguments to the contrary findings with respect to investors were the findings that behavioural biases did have an impact on advisers. Broadly similar sample sizes, similar interventions and similar levels of sophistication are reflected in both the investor and adviser study. The findings with respect to advisers, confirming prior research, provides strong support for the view that the impact of behavioural biases need to be considered in the context of investment decisions. The contradictory results of the two studies in this thesis (Study 1A and Study 1B) suggest that more research is needed to understand if, and under what conditions, behavioural biases play a role. For instance, advisers were not susceptible to the anchoring effect but were susceptible to the recency and peer group effects. One reason for the difference between advisers and investors may be that advisers are regularly exposed to these types of scenarios while investors are not – at least not in the investing context.

Whether behavioural biases have an impact on the way return expectations are formed or risk-taking decisions are made is clearly relevant to investors, advisers, researchers, and regulators. If behavioural biases do play a role, the way questions are asked, information is provided, or interviews are conducted, will have to be reconsidered. In light of the prior findings by English et al. (2006), the finding in this thesis, that advisers are susceptible to behavioural biases, is not surprising. If recency effects (such as recent client meetings where unhappy clients talk about their poor performance) or peer group effects (such as firm meetings about investment outlook and strategy) impact adviser decisions, then greater dialogue and probing by investors of adviser recommendations is required. That, in turn, requires greater investor and adviser education which, in turn, may require a more active role for policy-makers, a point that is addressed in Chapter 10.

9.2.1.2 Personal Characteristics

Hypotheses H1A-4 and H1A-5 tested the impact of personal characteristics of the investors (personality traits and demographic variables,

respectively) on risk-taking behaviour. Hypothesis H1A-4 was rejected as there was no statistically significant relationship between the various personality traits investigated and risk-taking behaviour. This is a surprising result as the findings are contrary to prior findings in the literature (cf. Huang & Zeelenberg, 2012; MacCrimmon & Wehrung, 1986; Nicholson et al., 2005; Olver & Mooradian, 2003; Weber et al., 2002). Hypothesis H1A-5 was supported by the data. Certain investor demographic variables were found to be statistically significant predictors of risk-taking behaviour.

Hypotheses H1B-4 and H1B-5 tested the impact of the personal characteristics of the advisers (personality traits and demographic variables, respectively) on risk-taking advice. Hypothesis H1B-4 was rejected as there were no statistically significant relationships between the various personality traits investigated and risk-taking advice. As before, this was a surprising result as the findings were contrary to prior findings in the literature. Hypothesis H1B-5 was supported by the data. Certain adviser demographic variables were found to be statistically significant predictors of risk-taking advice.

Prior research suggested that personality traits would be predictive of risk-taking behaviour (see references to prior literature above). In the current thesis, the core analysis was conducted with Canadian participants and used a variety of previously validated scales to measure risk-perception and risk-taking behaviour, tendency to maximize, regret aversion, grit, decision styles, and tendency to compare with others. In addition, a short-form version of the Big Five Inventory personality scale (the BFI-10) was provided to participants. In the international samples, a different version of the Big Five Inventory personality scale (the TIPI) was used. Despite prior research that demonstrated a connection between personality, risk aversion and investment intentions (Buccioli & Zarri, 2017; Mayfield et al., 2008; Oehler, Wendt, Wedlich, & Horn, 2017), the current research found no statistically significant relationship between personality scales and return expectations or risk-taking decisions in any of the Canadian or international data samples. While these

results were surprising, the analysis also revealed that the reliability measures of these scales in the samples in this thesis were typically below the generally accepted thresholds, even though they were all previously validated instruments. For example, neuroticism was found to be a significant predictor of risk-taking advice for advisers in Study 1B. However, this finding was questionable as the Cronbach's Alpha for neuroticism in this study was found to be negative; as well, a model without personality traits (Model 2) provided a better fit (as measured by R^2). This is a potential explanation for the lack of significant results, and also the reason why the significant effect found for neuroticism might not be stable, despite prior research suggesting that it is a significant factor in job performance and career success (cf. Hiller and Hambrick, 2005). Clearly, the lack of findings with respect to the role of personality traits in this thesis is unexpected and suggests further research may be required.

The findings in this thesis confirmed prior research that demographic variables were predictive of risk-taking behaviour in investors. In particular, gender was found to be statistically significant, as female investors engaged in less risk-taking behaviour than male investors. This was consistent with prior research (Barber & Odean, 2001; Charness & Gneezy, 2012). Similarly, net worth was found to be statistically significant, as retail investors engaged in less risk-taking behaviour than high net-worth investors (cf. Hallahan et al., 2004; McInish et al., 1993). Vissing-Jorgensen (2003) cited data from the 1998 and 2001 Survey of Consumer Finances to show that those with higher net-worth held a greater percentage of their financial assets in stocks. Finally, marital status was found to be statistically significant as single investors engaged in more risk-taking behaviour than married investors (cf. Hallahan et al., 2004; Sung & Hanna, 1996; and Yao & Hanna, 2005). Van Rooij et al. (2007) reported that males, married individuals and higher net worth quartiles reported greater stock market participation. Weber et al. (2013) found that those with more dependents took marginally significantly more risk. This was contrary to the findings in this thesis.

Similar to the investor study, previously validated instruments were provided to advisers although they did not complete the risk tolerance questionnaire. Like the findings for investors, there was no statistically significant relationship between the various personality scales and advisers' return expectations or their risk-taking advice. Equally, the reliability measures of these scales for the adviser study were typically below the generally accepted thresholds, even though they were all previously validated instruments.

This thesis found that the level of education and the type of adviser license were statistically significant predictors of advisers' risk-taking advice.³⁶ Specifically, advisers with high school education engaged in lower risk-taking advice than those with a bachelor's degree. Similarly, advisers with either an IIROC or ICPM license engaged in greater risk-taking advice than those with a MFDA license.

The findings in this thesis are relatively unique in that it is one of the few to consider Canadian advisers and the factors impacting the advice that they provide to their clients. Foerster et al. (2017) analyzed data from trading records of MFDA advisers and found that adviser effects, i.e. advisers' personal preferences and beliefs, accounted for 22% of the variation in risky share while investor-specific effects only accounted for 12% of that variation.³⁷

Their findings can be distinguished from this thesis in that: (i) they only considered MFDA advisers and no other license types; (ii) education level was not observed; and (iii) risky share was measured as the actual proportion of equities in the portfolio. This last distinction is noteworthy as it may obscure underlying differences. For example, two individuals holding portfolios with the same proportion of equities may differ substantially in both perceived and actual experienced risk. For example, individual A may hold blue-chip equities

³⁶ The reader is reminded that in Canada there are four primary adviser licensing types: MFDA, IIROC, ICPM and Insurance; the reader is referred to Chapter 4 for more details.

³⁷ The reader is reminded that risky share is defined as the amount of equity risk taken by investors in their portfolios. As an aside, one interesting factor that Foerster et al. (2017, p. 1444) correctly pointed out was that "(i)n light of potential agency conflicts, it is reassuring that advisers are willing to hold the portfolio that they recommend."

in their portfolio and individual B may hold small-cap (and thus riskier) equities in their portfolio.

Nevertheless, the results from Foerster et al. (2017) support the views of this thesis. If, as they found, adviser recommendations reflect the adviser's personal preferences and beliefs and, as van Rooij et al. (2007) found, stock market participation increases with education level (supported by previous findings, cf. Grable & Lytton, 1999a; Hallahan et al., 2004; Sung & Hanna, 1996), then the findings in this thesis, namely that those advisers with high school education recommend less risk (as measured by %TSX), is consistent. The findings with respect to license type can be explained similarly. IIROC and ICPM licensing typically has different (more investment focused) coursework and continuing education requirements than the MFDA regime, specifically as it relates to equity investments.

With respect to the findings with personality scales, the first question to consider is if there were mistakes in the way the data was tabulated. The data was re-visited and the scale results re-tabulated and re-confirmed by the author and a third party. Furthermore, even the use of a different measure of the Big Five Inventory for the international participants (TIPI vs. BFI-10) did not affect the results. There are a number of possible explanations for these anomalous results: (i) the sample size was too small to identify the differences; (ii) the scales were validated with students but used here with sophisticated investors; and (iii) the scales were validated in controlled lab conditions but here were completed online at the participants' own pace (see, e.g., Levitt & List, 2007):

- (i) The sample size in this thesis for investors was 192 and for advisers was 155. In comparison, the INCOM scale was tested and replicated across 12 samples in the Netherlands that ranged from 73 to 161 participants and 10 samples in the United States that ranged from 172 to 847 participants. The Nenkov Maximization scale was validated using samples that ranged from 87 to 1725 participants across the general population in Canada, China, Italy and the US. The fact that the basic factor structure was again found in subsequent samples, no matter how large or small, validated the instruments used in this thesis. Thus, a sample size of 192 and 155 participants, respectively (or the smaller sizes in the international samples) in the current thesis does not appear to be a

plausible explanation for the low Cronbach's Alpha scores observed for these previously validated instruments.

- (ii) Most of the instruments were tested and their factor structures successfully replicated with adult populations. For example, the INCOM scale was tested with adult populations in the US and the Netherlands and the Nenkov Maximization scale was successfully tested with the general population in Canada and the US. This would suggest that the scales should have provided reliable and valid results with the sample of sophisticated investors and advisers in this thesis.
- (iii) Third, most of the instruments were previously validated in controlled lab conditions where the subjects had to complete them under observation, without distractions and within defined time limits. In this thesis, the subjects could complete the instruments online and at their own pace, which did not preclude the impact of distractions and other interruptions. However, as a counter to this explanation, Bucciol et al. (2017) used the data from the US Health and Retirement study, which was collected online, to demonstrate a connection between individual portfolio decisions and several stable personality traits (including variants of the Big 5). Of course, the number of observations in the HRS study was over 10,000. Thus, it is possible that the combination of the two factors - smaller samples and non-controlled format - had an impact on the realized reliability measures.
- (iv) Finally, it should be noted that there is no universal minimally acceptable reliability value for Cronbach's alpha nor is it, in and of itself, the only measure to be considered in utilizing a scale. Bonett and Wright (2015, p. 4) observe that:

(s)ome researchers worry that the sample value of Cronbach's alpha for a response variable or a predictor variable in a statistical analysis might be unacceptably small (we have both heard of numerous reports where manuscripts were rejected simply because the sample value of Cronbach's alpha was below .7). However, there is no universal minimally acceptable reliability value. An acceptable reliability value depends on the type of application, and furthermore, the focus should be on the population reliability value and not on the sample reliability value ... However, in more typical research applications ... In these situations, much smaller reliabilities can be tolerated as long as the effect size results are interpreted accordingly.

In this research, the previously validated scales did display Cronbach's Alpha lower than 0.7 in most cases, but not alarmingly lower. In addition, as discussed in Chapter 4, the BFI-10 and TIPI were expected to have low internal consistency estimates given that there are only two items per sub-scale.

Additional non-reported regression models were investigated for Study 1A and Study 1B with just the Extraversion (Extra) and Neuroticism (Neuro) subscales of BFI-10 used as predictor variables (i.e. eliminating from analysis all of the other personality traits and thereby replicating the analysis in Study 2A and Study 2B). While there was a modest increase in adjusted R^2 in Study 1A, the coefficients for Extra and Neuro remained statistically insignificant. It might be the case that the measured personality scales do not predict risk-taking decisions in the time frame contemplated in the hypothetical investment task. Ajzen (1991) did suggest that general personality traits have limited ability to predict particular behaviour in specific situations.

Whether personality traits impact the way return expectations are formed or risk-taking decisions are made is of relevance to investors, advisers, researchers and regulators. Personality traits are generally considered to be stable and there are a variety of validated instruments to measure personality. If, as prior research suggests, traits such as extraversion, openness, or neuroticism are broadly predictive of risk-taking decisions and investor behaviour, there is value in better understanding investors' personality. Knowing that someone high in extraversion is more likely to engage in short-term investing, while someone who is high in openness to experience is likely to invest for the long-term (cf. Mayfield et al., 2008), is significantly valuable to both the investor and the adviser in advance of investment decisions. As a result, regulators can also take comfort that this additional data-point may help ensure that the recommended investment portfolio is, in fact, the right one.

Some support for this viewpoint can be drawn from the findings of the qualitative research in this thesis. In the semi-structured interviews in Study 3, the qualitative evidence suggests that personal factors, loosely defined as personality traits (specifically self-awareness, the ability to trust, the need for control), did have an impact on investment decisions. Furthermore, advisers who discovered clues about their clients' personality were able to more

successfully manage the relationship on an ongoing basis. What can explain this difference in qualitative and quantitative findings?

The quantitative findings focused on establishing statistical significance in the relationship between the personality traits and the dependent variables, i.e. Return and %TSX. The qualitative study, on the other hand, sought to establish the importance of personality traits, or more generically personal characteristics, in the context of investment decisions. In this sense, the findings are not contradictory, but result from different measurements. In the author's opinion, the right question is whether personality traits impact decisions, not whether we have a complete enough understanding to translate them into a quantitative model. Indeed, Bookstaber (2017, p. 44) argues:

We are not computers and our preferences are not simple functions. A mathematician entering the world of economics begins with a set of axioms. That is just the way mathematics works. And one of those axioms—or one of the assumptions that is necessary to take an axiomatic approach—is that people think like mathematicians. In starting this way, neo-classical economists fail to consider how people actually think, much less how that thinking is intertwined with their environment and the context of their decisions.

That means environment and context matter in decision-making. Therefore, personal characteristics should play a role as they help define context. The author argues that prior research and common sense would suggest the existence of a relationship between personality traits and return expectations or risk-taking decisions, even if such relationships do not meet the thresholds of statistical significance or cannot be quantified in a predictive model. For instance, whether someone is a maximizer, or satisficer, or is prone to regret (see Schwartz et al., 2002) intuitively appeals as a factor impacting risk-taking decisions. Of course, such intuitive appeals still require rigorous testing. Further research should investigate if, and under what conditions, such personality traits might manifest themselves.

Gender differences in risk-taking decisions have been repeatedly established in prior research (as discussed in section 3.5). Limited evidence

exists to decide whether such differences are due to nature (i.e. genetic factors) or nurture (i.e. environmental factors) and, as such, lend themselves to further research.³⁸ Net worth differences are another factor. Those with lower levels of wealth likely do not have as much disposable income available to invest in risky investments as those with higher levels of wealth. As a result, they likely have less experience in investing in risky assets. The two factors combine to tie lower levels of wealth to lower risk-taking behaviour. Of course, diminishing marginal utility and loss aversion suggest that there are limits to risk-taking behaviour even for the wealthiest of individuals. Billionaires do not automatically invest the majority of their assets in the riskiest of assets.

The finding that single investors take more risk than married investors was interesting and contradicted the findings from Weber et al. (2013). Weber et al. (2013) themselves acknowledge that their finding was marginally significant and they did not seem to place a lot of weight on this. The finding in this thesis was significant at the $p < 0.05$ level. Nevertheless, in this thesis there were only 21 individuals who classified themselves as single compared to 157 individuals that classified themselves as married. Further investigation indicated that 57% of single investors were classified as retail and 14% were HNWI. In contrast, 19% of married investors were classified as retail while 52% were HNWI. It may very well be the case that the findings with respect to marital status were actually masking the findings of net worth, as discussed above. As a result, the author places limited weight on this result and suggests that this is worthy of future research.

The finding in van Rooij et al. (2007) can be contrasted with the current finding in the sense that the former measured stock market participation (i.e. the effect of cumulative decisions and accumulated wealth) as opposed to a single risk-taking decision. Furthermore, their research compared non-married

³⁸ Research by Sapienza, Zingales and Maestriperi suggest that gender differences in risk-aversion or propensity might be biological in nature, i.e., due to testosterone levels. See Sapienza, P., Zingales, L., & Maestriperi, D. (2009). Gender differences in financial risk aversion and career choices are affected by testosterone. *Proceedings of the National Academy of Sciences*, 106(36), 15268-15273.

to married. Presumably the former category included separated, divorced and widowed which were separate categories in this thesis. The different findings in this regard suggest avenues for future research. Such research should consider the role of marital status in risk-taking decisions, controlling for number of dependents, disposable income, and net worth. It may well be the case that one or more of those other variables is the actual determinant (as the discussion above suggests).

The role of demographic variables of investors, however, is of undeniable relevance and should be considered in the discovery process and portfolio recommendations. These are factors that are easily determined and, while not readily lending themselves to algorithmic application, provide directional guidance to all stakeholders and are the foundations for deeper dialogue. For example, an adviser who is aware that female investors typically take less risk may be more likely to avoid the observation by Foerster et al. (2017, p. 1444) that "(t)he picture that emerges here is that, no matter what a client looks like, the adviser views the client as sharing his preferences and beliefs." Similarly, regulators and firms that are aware that adviser preferences and beliefs, including their demographic variables, play a significant role in their portfolio recommendations, are able to take a more proactive approach in training their advisers and monitoring the client portfolios.

9.2.1.3 Risk Tolerance

Hypotheses H1A-6 tested the impact of investors' RTQ score and was rejected as there was not a statistically significant relationship between either the full RTQ or the short-term risks subscale (RTQSTR) and risk-taking behaviour. Risk tolerance was not found to be a significant predictor of risk-taking behaviour in investors. In fact, of the three subscales of risk tolerance within the questionnaire (Time Horizon, Short Term Risks and Long Term

Expectations), only Long Term Expectations was found to be a significant predictor of risk-taking behaviour.³⁹

As discussed earlier, a psychometrically validated domain specific measure of risk tolerance (DOSPERT) for the investing domain was also used in this thesis. DOSPERT was found to be not significant as a predictor of risk-taking behaviour; in addition, DOSPERT's Cronbach's Alpha scores were lower than in previously validated studies. Risk tolerance in general, and the short-term risks subscale in particular, were not significant predictors of risk-taking behaviour. This finding is a mixed result as it is contrary to prevailing industry wisdom and practice, but broadly consistent with recent academic research.

There was no corresponding hypothesis for advisers regarding risk tolerance questionnaires, as they were not required to complete one. Instead, advisers were provided a hypothetical client situation together with this client's completed RTQ. The wide variation in risk-taking advice documented in these findings suggests that investor risk tolerance plays a lesser role in adviser recommendations than industry practice or regulations would expect. This finding is consistent with that of Foerster et al. (2017), who found that investor-specific effects (e.g. their risk tolerance) accounted for less than 12% of the variation in risky share, while adviser-specific effects accounted for 22%, leaving the majority of variation unexplained.

Weber et al. (2013) used three 7-point Likert-type questions to measure risk attitude. Their questions did not specify the timeframe to be considered. They found risk attitudes to be fairly stable (if measured correctly and without confounding effects) and changes in risk-taking to be triggered by changes in "subjective feelings about market risk and return and not the result of changes in risk attitude" (Weber et al., 2013, p. 31). Merkle and Weber (2014) used one 7-point Likert-type question to measure risk attitude without specifying

³⁹ Although not reported in this thesis for reasons of parsimony, the full RTQ scale was tested with the various models and found to be not statistically significant as a predictor of risk-taking behaviour. In addition, as discussed in Chapter 5, RTQTH (the time horizon subscale) was not included in subsequent analysis as it was found to be highly multicollinear.

timeframe. They found that risk tolerance remained broadly stable over the survey period and that "(r)isk tolerance and qualitative expectations mostly have no predictive power for portfolio risk." (Merkle & Weber, 2014, p. 379).

Contrary to Weber et al. (2013), Hoffmann et al. (2013b) found that risk tolerance and risk perception significantly fluctuated and temporarily became depressed during periods of crisis even though over the longer term they remained broadly stable. However, this slight difference in findings may be attributable to the different questions employed and the fact that Hoffmann et al. (2013b) measured risk tolerance on a monthly basis while Weber et al. (2013) measured it every three months. Industry experience suggests that subjective feelings are likely to be accentuated and fluctuating during crisis periods. Hoffmann et al. (2013b) used four 7-point Likert-type questions to determine participants' risk tolerance for the subsequent month. They found that risk tolerance was significantly related to risk-taking behaviour but that individual portfolio risk appeared to move in parallel with market risk "as if changes in risk tolerance had no impact" (p. 72).

This finding by Hoffmann et al. (2013b) is interesting and seems to contradict the findings in this thesis. This seeming contradiction may well be a result of differences in the definition of portfolio risk used in the respective studies. Hoffmann et al. (2013b) argued that the increased buy-sell ratio (calculated as the volume of trades in a month) at the height of the crisis indicated that individuals were not reducing risk-taking behaviour. It is difficult to reconcile that conclusion with the fact that many individual investors moved to cash during this period. A number of explanations may exist for these findings in Hoffmann et al. (2013b): (i) the sample of online investors in their study were more risk-taking during this period than the broader market; (ii) the investors' buying behaviour masked a move from high-risk to low-risk equities (including perhaps market tracking ETFs that could explain the concordance between portfolio and market risk); or (iii) the investors employed a dollar-cost averaging strategy (i.e. splitting one trade into many trades), a particularly

popular strategy in a volatile market. If the behaviour described in (iii) occurred, using buy-sell ratios as a proxy could be mistaken for risk-taking behaviour when in fact it is actually risk-reducing behaviour.

Notwithstanding the results of Hoffmann et al. (2013b), the findings in this thesis, that risk tolerance is not predictive of risk-taking behaviour, are broadly consistent with prior research. Risk tolerance is largely stable over time, even in periods of crisis, and is not predictive of risk-taking behaviour. Weber et al. (2013, p. 31) suggest:

Thus, practitioners urged, e.g., by the MiFID of the European Union (2006), to elicit their customers' risk profiles and risk preferences can argue that risk attitudes need not [be] elicited on a quarterly basis.

The qualitative interviews in Study 3 also support the view that short-term volatility is not the primary concern for investors or advisers. Both groups remarked that they considered investment risk as primarily shortfall (i.e. permanent loss of capital or not having the target amount at the required future date) and not short-term volatility. This is an important result and one that is in contrast to prevailing industry views.

How does one reconcile the view that short-term volatility is not a primary concern with the substantial investor angst that can be observed during periods such as the Great Recession? The author argues, consistent with prior research, that the experienced returns of this period significantly influenced the return expectations going forward (Greenwood & Shleifer, 2014; Vissing-Jorgensen, 2003). Consistent with the findings in this thesis, these expected returns then drive investor risk-taking behaviour. Experienced volatility of returns influences experienced returns (realized and unrealized), which in turn influences expected returns, which in turn drive future risk-taking behaviour. Therefore, the impact of volatility is indirect, and in conjunction with prior research which suggests that investors do not understand volatility (Ehm, Kaufmann, & Weber, 2014), helps explain the finding in this thesis that investors do not perceive volatility as risk.

This thesis found that the risk tolerance questionnaire used was not predictive of risk-taking behaviour. How generalizable is that finding? Would a different conclusion be reached if a different risk tolerance questionnaire was used. The findings by the OSC-commissioned report (the main Canadian regulator – see Brayman et al., 2015 findings summarized in section 4.4.6.1) suggest that Canadian firms do not typically use psychometrically validated questionnaires nor is there much guidance on what should be measured and how. Table 2 (Comparison of Selected Risk Tolerance Questionnaires Used in Canada) suggests that the risk tolerance questionnaires used in Canada by the largest financial firms are largely similar to the one used in this thesis in terms of structure, focus of questions, and the way scores are linked to portfolio recommendations. Foerster et al. (2017) found that investor-specific factors (such as risk tolerance preferences) accounted for very little of the variation in portfolio recommendations. Similarly, Weber et al. (2013) and Merkle and Weber (2014) found that risk tolerance (as measured by qualitative questions with UK subjects) was not predictive of risk-taking behaviour. Taken together, this suggests strong support that the findings in this thesis are broadly generalizable to other risk tolerance questionnaires that exhibit a similar structure and framework.

This is of substantial relevance to investors, advisers and regulators. The prevailing industry framework has almost exclusively focused on eliciting investors' risk tolerance as a precursor to investment decisions. As Chapter 2 indicated, the regulatory criticism validly points to gaps in the questionnaire methodology, including lack of psychometric validity. However, as prior research shows, even qualitative measures of risk tolerance lack predictive power of actual risk-taking behaviour. Furthermore, such measures are broadly stable over time. The findings in this thesis, that a typical industry risk tolerance questionnaire is not predictive of risk-taking behaviour and that, furthermore, concern about short-term volatility (i.e. over 3 months) does not seem to impact long-term investment strategy (i.e. over 15 years), lend further credence to this perspective. The key implication is that an over-reliance on

risk tolerance or on convictions that investors are primarily concerned about short-term volatility may lead to mis-aligned investor portfolios.

9.2.1.4 Return Expectations

Hypothesis H1A-7 tested the impact of investors' return expectations on risk-taking decisions. This hypothesis was supported by the data as there was a statistically significant relationship between investors' return expectations and risk-taking behaviour. This result was expected and confirmed prior research. Interestingly, the qualitative measure of return expectations (similar measure to Weber et al., 2013) was not a significant predictor of risk-taking behaviour, contrary to the findings of Weber et al. (2013). However, RTQLTE, which was a construct measuring long-term return expectations (over the next 3 years), was a highly significant predictor.

The findings in this thesis confirmed prior research that return expectations were predictive of risk-taking behaviour in investors. For example, Greenwood and Shleifer (2014) found that there was a positive correlation between investors' expected returns and subsequent mutual fund inflows. Dominitz and Manski (2011, p. 352) argued that “(e)xpectations of equity returns are widely thought to be central determinants of investment in equities and other assets”. Weber et al. (2013) used similar measures of return expectations and risk-taking measure as utilized in this thesis, measured every three months during 2008 - 2009. They reached broadly similar conclusions, although their research found that subjective (i.e. qualitative) measures of return expectations were more significant than numerical (i.e. quantitative) measures.

Merkle and Weber (2014) used subjective and numerical measures of return expectations (using similar methodology to Weber et al. (2013)), measured every three months during 2008 – 2009, and compared them to actual risk-taking behaviour as measured by brokerage records. They found that numerical expectations are more relevant for actual financial risk-taking decisions than subjective expectations were for the hypothetical risk-taking task

in Weber et al. (2013). Merkle and Weber (2014) suggested that subjective measures are affective evaluations of the market while numerical expectations demand a greater cognitive load. Their conjecture was that actual investment decisions require more deliberate thought processes than the hypothetical task, thus explaining the greater predictive power of the numerical measures in their research than in Weber et al. (2013). Merkle and Weber (2014) suggest, and the author agrees, that this nuanced difference between subjective and numeric measures is worthy of further research.

Hoffmann et al. (2013b) used brokerage data from the Netherlands to explore how monthly changes in return and risk perceptions and risk tolerance impacted actual risk-taking behaviour during 2008 - 2009. Risk-taking, as in Merkle and Weber (2014), was calculated from brokerage records and was based on trading direction and buy-sell ratio (i.e. the volume and number of buy trades versus sell trades) and portfolio volatility. As mentioned before, there are a number of potential issues in this approach to defining risk-taking.

First, buying more equities in real trading accounts does not necessarily imply greater risk-taking. It depends on what the holdings were to begin with and whether the trading activity resulted in the individual holding more risky or less risky equities. Not every equity is equally risky: blue-chip bank stocks, for example, are far less risky than biotech start-up stocks. Second, a greater number or volume of buys may simply imply a dollar-cost averaging strategy (i.e. splitting one trade into many to take advantage of falling prices), which is not risk-taking behaviour but actually risk-reducing behaviour. Third, using measured portfolio volatility as an indicator of risk-taking is potentially misleading. Actual realized volatility says nothing about the volatility (or risk) the investor expected when he or she made the trading decision. And, as the qualitative analysis indicated, if individuals do not consider volatility as their measure of risk, then such a measure is even less reliable as an ex post indicator of ex ante risk-taking.

The portfolio volatility approach in Hoffmann et al. (2013b) tries, implicitly, to distinguish between more and less risky equities. This approach has its limitations, especially when examining post-trade data instead of pre-trade perceptions and expectations. In contrast, this thesis, using a hypothetical task focusing on one risky asset versus one risk-free asset, avoids this trading "noise" and provides a clearer picture of how investor expectations impact risk-taking behaviour.

Hypothesis H1B-6 was supported by the data as advisers' return expectations were a statistically significant predictor of their risk-taking advice. This supports the findings in the few prior studies that have explored advisers' recommendations to their clients. Foerster et al. (2017) found, from a Canadian dataset, that an adviser's own risk-taking behaviour influences how much risk they recommend to their clients. Further, they found that "advisers may project their own preferences and beliefs onto their clients" (Foerster et al., 2017, p. 1444). Equally, other research in Canada found that advisers' beliefs dictated not only their own investment choices but the advice that they provided to clients (Linnainmaa et al., 2015). In addition, Linnainmaa et al. (2015) suggest that conflict of interest or agency problems (i.e. advisers recommending riskier portfolios than investors would for themselves simply because it is not their money at risk) are less of an issue than misguided beliefs, a position echoed by Foerster et al. (2017). Note that in these prior studies, advisers' return expectations were not specifically elicited. Nevertheless, the findings in this thesis are consistent with this prior research.

In this thesis, numerical and subjective measures (specifically RTQLTE) of return expectations were found to be significant predictors of risk-taking. However, Weber et al. (2013)'s qualitative measure, QUALRETURN, which was also tested in this research, was not significant.⁴⁰ RTQLTE, a subjective

⁴⁰ It should be noted here that the qualitative measure of return (i.e. Likert-type question) as used by Weber et al. (2013) was not a significant predictor while RTQLTE was a significant predictor. The difference may be due to (i) that the former was a 12 month measure while the latter was a 3 - 5 year measure, (ii) that the latter was measured as a "construct" as opposed to a single question, and (iii) the measure predicted a hypothetical long-term investing task not a short-term one.

construct, was actually more statistically significant than the numerical measure. The hypothetical example used in this thesis contemplated investing for retirement, 15 years in the future, and involved a thought process that was arguably more deliberate than the hypothetical short-term investing task posed in Weber et al. (2013). In this thesis, the investor was also asked to complete a risk tolerance questionnaire and provide demographic information as well as answer personality scale questions. This all requires more cognitive resources and is more akin to the process involved in actual investment decisions, which is consistent with the argument in Merkle and Weber (2014). As to why RTQLTE was so significant when QUALRETURN was not, there are a couple of possible explanations. First, RTQLTE is a construct of subjective return expectations whereas QUALRETURN was simply a one 7-point Likert-type question. Second, RTQLTE measured return expectations over the next 3 years as opposed to QUALRETURN, which measured subjective expectations over the next 12 months. In both cases (RTQLTE and QUALRETURN), such expectations were tied to a 15-year long hypothetical investment task. Perhaps the time frames of expectations and the hypothetical risk-taking task need to correspond.

As an aside, Weber et al. (2013) found that subjective risk expectations were significant predictors of risk-taking behaviour. Although this relationship was not a prime focus of this thesis, this subjective measure, QUALRISK, was not found to be a significant predictor and neither was QUALRETURN. While contrary to the findings in Weber et al. (2013), the explanation in Merkle and Weber (2014), that subjective measures have less predictive power for tasks requiring more cognitive resources, is a persuasive argument in support of the current findings.

The quantitative findings are supported by the qualitative analysis. Both investors and advisers indicated (see Chapter 8) that their expectations impacted their risk-taking decisions. The findings that return expectations are predictors of risk-taking decisions has significant relevance for investors, advisers and regulators. Measuring risk tolerance is problematic at best (Pan &

Statman, 2012) and neglects situational factors in most cases (Lopes, 1987), while eliciting return expectations, subjective or numeric, is quite straightforward. Moreover, once the expectations are elicited, they can be further explored to determine if there is a recency effect, lack of literacy or specific experience, among other factors, at work. As Weber et al. suggest (2013, p. 31):

Instead our results show that investors hold risk and return expectations that change significantly over time and seem to guide their investment behavior. Our data also show that these changing risk and return expectations are influenced by recent events, in a number of ways not consistent with rational theory, **providing ample opportunity for investor education.** [emphasis added]

This view is echoed by Linnainmaa et al. (2015) with respect to correcting misguided beliefs in advisers through greater education. They observe that "(o)ur estimates suggest that correcting advisers' misguided beliefs, through screening or education, may reduce the cost of advice more than policies aimed at eliminating conflicts of interest" (Linnainmaa et al., 2015, p. 1). Thus, the findings in this thesis are relevant as the significant role of return expectations of investors and advisers in investment decisions suggest that those expectations should be: (i) identified and cross-referenced by both parties; and (ii) subject to scrutiny and contextualization in light of historical performance and current market conditions.

9.2.2 The Role of Investment Literacy and Experience

9.2.2.1 Investment Literacy

Hypothesis H1C-1 tested the impact of investors' investment literacy levels on their return expectations and risk-taking behaviour. Hypothesis H1D-1 tested the impact of advisers' perception of their clients' investment literacy on the advisers' return expectations and risk-taking advice. H1C-1 and H1D-1 were both rejected. These were both unexpected results and contradict comparable earlier research, as described below.

Bateman et al. (2012, p. 5) found that financial literacy has implications for expectations formation, "more literate respondents assigned probabilities to a future shock rather than expressing a lack of knowledge of probabilities". Furthermore, they state that "(o)ur finding that poor financial literacy is linked to both unwarranted optimism and uncertainty matches recent research into retirement preparation and pension expectations in the Netherlands (p. 19)".

While higher financial literacy may lead to return expectations that converge over the longer term (to "mean" returns), there is not necessarily a connection between financial literacy and return expectations in the short-term. In other words, those with high financial literacy may nonetheless view that the market is headed for a short term correction while those with lower financial literacy may have "unwarranted optimism" that past returns will continue into the future.

However, the finding that financial literacy does not impact risk-taking behaviour is contrary to prior research: "(s)tock ownership increases sharply with literacy" (van Rooij et al., 2007, p. 14). Similarly, Klapper et al. (2013) found that financial literacy is positively related to participation in financial markets in Russia. One possible explanation for the discrepancy between the current findings and prior research is that level of financial literacy in Canada is quite high. Canada ranks amongst the highest (fourth out of 30) OECD countries in financial literacy. The study reported a literacy rate of 68% for Canada compared to 57% for the US, 67% for the UK, and 66% for Germany (the major groups studied in Study 2A) (OECD, 2017). Perhaps the sample considered in this thesis was not large enough to find a statistically significant result or the sample was more homogenous in literacy than the broader population. Interestingly, Weber et al. (2013) also found that literacy levels did not predict risk-taking behaviour, although they did not elaborate on this finding.

Adviser perceptions of their clients' literacy was hypothesized to be related to the formation of their return expectations and risk-taking advice.

Advisers were asked a series of questions about their perception of their clients' knowledge (in general across all of their clients as opposed to each of their individual client's knowledge) about the risk-return trade-off, benefits of diversification, and the importance of equities to retirement savings. In a profession where being more aggressive or conservative than your clients can be costly to long-term success, this seemed to be a reasonable stance. Nevertheless, hypothesis H1D-1 was rejected. As an aside, the findings of Foerster et al. (2017) and of this thesis suggest that adviser recommendations are driven by adviser beliefs rather than by advisers adjusting their views to concord with their clients. This is a reassuring finding in the sense that mistaken adviser beliefs can be corrected with education and training, while a practice of advisers moderating their beliefs to match their clients is harder to identify or correct.

Several possible explanations exist for the finding that H1D-1 was rejected:

- (i) that advisers were asked to generalize their perception across all their clients. It may be more realistic to determine the advisers' view of each individual client's literacy and experience, and relate that to both the advisers' return expectations and the risk-taking advice provided for each client;
- (ii) as with investors (discussed above), financial literacy at the investor level or adviser level may lead to converging return expectations in the long run but widely diverging expectations in the short run, thus explaining the lack of correlation with return expectations;
- (iii) as Foerster et al. (2017) found, adviser preferences and beliefs are a bigger factor in adviser recommendations than investor beliefs, leading one to the view that testing for adviser - as opposed to investor - literacy may be more appropriate particularly with respect to their risk-taking advice (as opposed to their return expectations).

The fact that these empirical findings were different than expected prompted further investigation through the qualitative study. In the qualitative study, both investors and advisers did identify investors' investment literacy as a key factor in investment decisions. Investors indicated that their level of understanding of the role of time horizon, the return and risk trade-off

and the range of possible returns impacted their investment decisions. Advisers indicated that they sought to determine their clients' understanding of the same concepts as part of their discovery process and prior to providing their investment recommendations. Thus, the qualitative results support the prior research that financial literacy does impact risk-taking decisions. The discrepancy between the qualitative and empirical findings may be due to several facts: (i) high level of financial literacy in Canada (as outlined earlier); (ii) issues with measuring adviser perception of clients' investment literacy (as outlined earlier); and (iii) the measure of investment literacy used in the empirical analysis.

This third explanation deserves further discussion. Investment literacy of investors was measured by five basic literacy questions and one advanced literacy question, based on prior research (Lusardi & Mitchell, 2011b; van Rooij et al., 2007) and vetted and reviewed by a panel of industry professionals and the author's supervisors. Measuring financial literacy is an evolving endeavour and no standard has yet emerged and this is particularly true for investment literacy: "unlike health literacy, which is typically measured using one of the three standardized tests, there is currently no standardized instrument to measure financial literacy" (Huston, 2010, p. 296). Thus, the literacy measurement tool used in this thesis may not have been calibrated sufficiently for the purpose for which it was used.

Nevertheless, the findings of this thesis have relevance and implications for investors, advisers and regulators. Financial literacy and, specifically, investment literacy, has been tied to stock market participation by prior research and by the qualitative findings in this thesis. The shift from defined benefit pension plans to defined contribution plans puts the onus of retirement planning on the individual. Low stock market participation does not bode well for individuals' futures. Industry experience has demonstrated that stock market returns have outperformed fixed income returns over the long run. Improving literacy, therefore, is tied to higher stock market participation and

better retirement outcomes. Future research should be directed at a more stable and accurate measure of investment literacy as well as ways to improve that level of literacy. Poor numeric ability (Paccagnella, 2016) and the persistence of behavioural biases (such as the confirmation bias) and environmental factors (such as growing up in a household with low financial literacy) are further avenues for research to ensure that improved literacy efforts are effective.

9.2.2.2 Investment Experience

Hypothesis H1C-2 tested the impact of investors' investment experience on their return expectations and risk-taking behaviour. Hypothesis H1D-2 tested the impact of advisers' perception of their clients' investment experience on the advisers' return expectations and risk-taking advice. H1C-2 was supported by the data while H1D-2 was rejected. The latter was an unexpected result.

Prior research suggests that positive (negative) investment experiences in the past results in higher (lower) stock market participation in the future (Choi et al., 2009; Kaustia & Knüpfer, 2008; Malmendier & Nagel, 2011). There is also support for the view that investor return expectations are positively correlated with past stock market returns (i.e. experience) (Greenwood & Shleifer, 2014). Research by Nicolosi, Peng, and Zhu (2009, p. 335) found that "individual investors do learn from their investment history, adjust their future stock trading accordingly, and achieve higher investment performance as they gain experience". Seru, Shumway, and Stoffman (2009, p. 733) also found that "performance improves and the disposition effect declines as investors become more experienced, suggesting that investors learn by trading".

Thus, the finding in this thesis that investors' investment experience is a significant predictor of both return expectations and risk-taking behaviour is consistent with prior research as described above. The finding that advisers' perception of their clients' investment experience is not a significant predictor

of either the advisers' return expectations or their risk-taking advice is not surprising, given the discussion in the previous section.

These empirical findings prompted deeper probing in the qualitative analysis. Investors and advisers in the qualitative study identified investment experience as a significant factor in investment decisions. Both groups suggested that investors' prior investment experience, including the specific time period and the types of asset classes invested in, were significant factors in investment decisions. This result supports the findings in prior research (Kaustia & Knüpfer, 2008; Malmendier & Nagel, 2011). The discrepancy between the qualitative and empirical findings for advisers may be due to the issues with measuring adviser perception of clients' investment experience as outlined earlier. In addition, the qualitative findings identified general factors considered by advisers in their investment decisions, while the empirical analysis sought to establish a predictive relationship between advisers' perception of their clients' investment experience, on the one hand, and risk-taking advice, on the other. It is likely the case that such considerations are an implicit part of advisers' investment decision process without lending themselves to quantification.

The finding that investment experience is predictive of investors' return expectations and risk-taking behaviour is of profound relevance to investors, advisers and regulators. Understanding the specific experience (realized results, time periods, and asset classes invested in) provides both investor and adviser with a better base from which to develop investment recommendations. Detailed discussions in this area can help ensure that the investor is prepared for how their portfolio might behave in the future. Regulators have a vested interest in ensuring that investment experience is more systematically explored and captured as part of the investor discovery process.

Future research should focus on the type of experience (e.g. the peak and end rule discussed in Chapter 3 (Fredrickson, 2000; Kahneman et al., 1993))

that is recalled and whether order effects matter. Measurement of experience in this thesis was self-assessed. As Dunning et al. (2004) demonstrated, individuals are flawed at self-assessment. Future research should consider different measures of experience, both self-assessed and independent objective measures, and explore the relationship with risk-taking decisions. Industry experience suggests that objective measures of experience should be related to investment decisions. Research on simulated trading experience suggests that this may be an efficient way for investors to learn without incurring financial losses (Bradbury, Hens, & Zeisberger, 2014). The impact of such tailored investor education programs may be a promising avenue for future research.

9.2.2.3 Risk Aversion

In Chapter 2, an alternative to risk tolerance questionnaires was discussed - a Holt-Laury type choice problem that asked subjects to select from a menu of lotteries with a choice between higher and lower payoff alternatives. Given the lack of significance of risk tolerance as a predictor of risk-taking decisions in Study 1A and Study 1B, subsequent studies in this thesis incorporated a measure of risk aversion akin to the Holt-Laury type of problem. As a reminder, this question determined what level of return an individual would require in order to choose a risky asset versus a risk-free asset with a given level of return. Readers are directed to Chapter 6 for more details.

Hypothesis H1C-3 tested the impact of risk aversion on investors' return expectations and risk-taking behaviour. H1C-3 was supported by the data. Hypothesis H1D-3 tested the impact of risk aversion on advisers' return expectations and risk-taking advice. H1D-3 was rejected.

Filbeck et al. (2005) used a risk aversion task to find a relationship between risk aversion (as inherent in EUT) and personality types (as measured by the Myers-Briggs Type Indicator (MBTI)). Holt and Laury (2002) established the lottery-choice experiment and demonstrated that it can measure risk aversion over a range of payoffs up to several hundred dollars. However, they cautioned that "subjects facing hypothetical tasks cannot imagine how they

would actually behave under high-incentive conditions" (Holt & Laury, 2002, p. 1654). This raises the question of how effective such a tool would be in predicting risk aversion for investors where typically high incentives are at stake. Furthermore, as discussed in Chapter 2, subsequent research found that the Holt-Laury task did not have test-retest stability, nor was it correlated with personality traits and actual risk-taking behaviour (Lönnqvist et al., 2015). Therefore, the research findings on the viability of risk aversion measured by the choice problem used in this thesis are mixed. Future research should re-examine the findings from Lönnqvist et al. (2015) to see if those findings are robust to different types of choice problems on the one hand and robust to different types of risk tolerance questionnaires on the other.

The findings in this thesis with respect to investors' risk aversion have some logical appeal. Higher risk aversion was associated with lower %TSX and higher return expectations. A higher degree of risk aversion means that one would likely require a higher rate of return as compensation for taking greater risk. However, similar to the discussion regarding investment literacy, there is not necessarily a reason to assume that risk aversion should have any impact on short-term return expectations, as opposed to the impact on the level of return required to engage in risk-taking behaviour. In other words, higher required returns do not necessarily translate into higher return expectations.

The finding that higher risk aversion is negatively related to risk-taking behaviour is more interesting and has much greater implications. Thus, the greater the level of risk aversion, the less likely an investor is to engage in risk-taking behaviour. However, and this may be the mechanism that links return expectations and risk-taking behaviour to risk aversion, it is likely that someone who is more risk-averse will require a higher return in order to engage in risk-taking behaviour than someone who is less risk-averse.

The finding that advisers' risk aversion has no impact on their return expectations is consistent with the argument for investors: risk aversion is not necessarily related to return expectations. The finding that advisers' risk

aversion has no impact on their risk-taking advice is more surprising. Advisers incur business risk in recommending portfolios to their clients: if those portfolios take too little or too much risk, the adviser is likely to lose the client or even have the client complain or sue. There are a number of possible explanations. First, it may be the case (particularly in a low return environment), that some advisers see more danger of losing a client by not taking enough equity risk than by taking too much equity risk. Second, the measure of risk aversion reflects the advisers' attitude to investment risk and should not be confused with the advisers' attitude to their business risk.

The qualitative analysis did not directly explore the concept of risk aversion. However, the interviews did support the view that investors who described themselves as risk averse also reported investing less in equity investments. The findings in this thesis have relevance for investors, advisers and regulators. The lack of stability of the Holt-Laury measure of risk aversion (as found by Lönnqvist et al. (2015)) is of particular concern. As such, substituting this type of choice problem likely does not solve the problems inherent in risk tolerance questionnaires. Nevertheless, this type of choice problem posed to investors might provide advisers with one additional data point.

9.2.2.4 Updating of Return Expectations

The findings in Study 1A indicated that investors' return expectations were significant predictors of their risk-taking behaviour. This prompted the question as to whether investors' risk-taking behaviour would be impacted if they were given return expectations instead of being asked to provide their own. Hypothesis H1C-5 tested the impact of given return expectations on investors' risk-taking behaviour. H1C-5 was rejected, which was an interesting result in light of what traditional finance theory suggests – according to Bayes' Theorem available information is used by people to update their beliefs in a correct manner. However, De Bondt et al. (2013) suggested that not all available information is processed by investors due to time pressures,

complexity or processing limitations. In addition, Sharot (2011) and Sharot and Garret (2016) argued that individuals update their beliefs selectively.

In Study 1C, the given return expectations were significantly different from the self-determined returns expectations from Study 1A. Nevertheless, investors did not significantly revise their risk-taking behaviour. If return expectations are a significant predictor of risk-taking behaviour, as this thesis found, then new return expectations should change the amount of risk taken. This was not supported by the data.

There are a number of possible explanations for these observations. It might be the case that no change was observed in Study 1C due to the time lag between the original risk-taking decision and the subsequent decision (after return expectations were given) - approximately 2 months passed between the two studies. In other words, in the intervening time, the participants had forgotten their original return expectations but roughly remembered their choice of %TSX. Thus, their choice of %TSX might have been more easily recollected and did not change significantly despite there being a significant difference in the two return expectations. However, it might also be the case that the return expectations that were given were not actually incorporated into the participants' expectations, i.e. that this new information was not used to update the original expectations. This is consistent with earlier research that found individuals update their beliefs selectively (see Section 2.8). Additional research is required to determine the circumstances under which information is updated, how it is updated, and what is updated. For example, does concordance with current views matter? Does the source of the new information matter? Does the vividness of the new information matter?

Some colour to the results in the empirical studies were found in the qualitative interviews. Investors differed on the source that they relied on in developing their expectations. Some indicated that they got their return expectations from their adviser, others from reviewing historical performance, still others from third party sources such as business and economic publications.

Thus, the source of the information may matter. Just providing updated information does not automatically translate into this information getting incorporated into the decision. Confirmation bias and selective updating of beliefs occurs, as prior research has established.

This finding is of profound relevance to investors, advisers and regulators. Simply providing information - whether from regulator to adviser, regulator to investor, or adviser to investor - does not necessarily guarantee that this information will be used or relied upon. Analogies can be drawn to current affairs. Whether one watches CNN or Fox News has implications for the political beliefs that an individual forms. The same applies in the world of investing. The implication for advisers is that more time and effort has to be spent on understanding what sources of information their clients are relying on and what conclusions they are drawing from those sources. Advisers may not be able to counter those sources but, at the very least, a better understanding of their clients' beliefs may help them. The same applies to investors.

9.2.3 International Participants

Study 2A and Study 2B sought to determine whether the findings from Canada extended to international investors and international advisers, respectively. The investigated hypotheses and related findings are summarized below. The discussion in this section is limited to comparing and contrasting the international findings with the Canadian findings.

Of hypotheses H2A-1 to H2A-6, all of them except H2A-4 were rejected. In fact, the only significant predictor of risk-taking behaviour was investor literacy. H2A-7 was rejected as no significant relationship between investment experience and return expectations was found. A significant relationship between investment literacy and return expectations was found, so H2A-8 was supported by the data. Finally, there was a statistically significant difference between risk-taking in the self-determined and given return expectations conditions. Thus, H2A-9 was also supported by the data.

A number of explanations are possible as to why return expectations were not found to be significant predictors within the international samples but significant within the Canadian samples: (i) the obtained sample was smaller than anticipated; and (ii) the dependent variable in the international samples was changed to a categorical variable (this change was deemed necessary to standardize across different countries). However, prior research that supported the findings in the Canadian context was based on non-Canadian samples (Merkle & Weber, 2014; Weber et al., 2013). Thus, there is little reason to conclude that the international findings in Chapter 7 contradict the Canadian findings in Chapter 5. The implications for future research may simply be to re-examine the relationship between return expectations and risk-taking decisions while addressing some of the revealed limitations of Study 2A and Study 2B discussed above.

The findings that experience is not a significant predictor of risk-taking behaviour is contrary to the Canadian results. On reflection, because of the small sample size obtained, the use of a categorical variable measure of return expectations may have limited the type and extent of statistical analyses possible. Prior research that supported the findings in the Canadian context was based on non-Canadian samples (Kaustia & Knüpfer, 2008; Nicolosi et al., 2009). Thus, there is little reason to conclude that the international findings in Chapter 7 contradict the Canadian findings from Chapter 5.

Literacy was not found to be a predictor of return expectations in the Canadian context. The discussion in Section 9.2.2 highlights why literacy may not necessarily relate to short-term return expectations. Surprisingly, there was a connection between literacy and return expectations in the international context. However, any interpretation of this result needs to consider the same limitations discussed above.

Finally, the finding that different risk-taking behaviour resulted when return expectations were self-determined rather than given is different from the Canadian finding. A partial explanation for the different findings may be

that in the international case there was no time lag between the two conditions.

With respect to international advisers, all of the hypotheses were rejected. The rejection of H2B-1 to H2B-5, while surprising, can be explained in a similar fashion to the results obtained for the corresponding hypotheses in Study 2A. The rejection of H2B-6 and H2B-7 are likely for similar reasons, as discussed in relation to the results obtained in Study 1D. The finding in H2B-8, that there was no statistically significant difference in self-determined and given return expectations for international advisers, is not surprising. It is quite reasonable to assume that advisers have formed their expectations based on their preferred information sources and are unlikely to change those expectations based on new information from a non-preferred source.

The results from the international participants were contrary to expectations for a number of potential reasons as discussed above. The findings from Study 2A and Study 2B have two implications – one from a methodology perspective and one from a relevance perspective. From a methodological perspective, the design could be improved and the studies should be replicated in future research with the revised design. From a relevance perspective, the lack of findings or contradictory findings in the international context does not reduce the significance of the Canadian findings. The discussions earlier in this chapter situated and validated the Canadian findings in the context of prior research. Those conclusions have not been diluted by the results from the international participants. Furthermore, in most cases, the empirical findings from the Canadian context found support and colour from the qualitative interviews with investors and advisers.

9.3 Other Factors Impacting Investment Decisions

The preceding discussion was focused on the results of hypotheses testing from the quantitative phase of the research, buttressed by some of the findings from the qualitative phase. The richness of the qualitative analysis

provided flavour to the quantitative results and also provided insight into other factors that may play a role in investment decisions. The use of semi-structured interviews to understand investor and adviser behaviour was a novel contribution to the literature, as were the themes that emerged from that analysis. As a result, limited prior literature exists that is contextually on point with the findings in this thesis.

The role of return expectations in risk-taking behaviour, and of literacy, experience and self-awareness in forming these expectations, has already been discussed. In addition, the interviews highlighted the importance of discovery and a process-oriented mindset in investment decisions, both of which are discussed below.

9.3.1 Discovery Process

The qualitative interviews in Study 3 suggested that there was a process of "discovery", where investors and advisers learned about investors' expectations, their attitudes to risk, and their level of self-awareness. Self-awareness included learning about one's own limitations as to literacy and experience, but also learning about one's (in)ability to trust others and one's (un)willingness to delegate to others (i.e. the need for control).

The interviewed advisers indicated that they spent a significant amount of time learning about their clients and discovering their personality traits, their investment literacy, their investment experience, their investment goals, etc. In all cases, these advisers went beyond the basic industry requirements of "know-your-client" forms or fill-in-the-box risk tolerance questions. As shown in Chapter 2, prior research supports this view. Manski (2003), for example, recommended that "understanding expectations formation will also require intensive probing of persons to learn how they perceive their environments and how they process such new information as they may receive (p. 1369)". Furthermore, investors indicated that they valued advisers that had robust

discovery processes. Investors want their advisers to know them almost better than investors know themselves.

Figure 14, the Investor Iceberg, describes the depth of understanding that is needed by any investor and her adviser. This model illustrates the detailed discovery process that was highlighted for its importance by investors and advisers in Study 3. There are many layers to be uncovered and the risk tolerance questionnaires and know-your-client rules that are in use in most jurisdictions are simply the tip of the proverbial iceberg. Beneath the surface, and requiring a fair degree of time, effort and skill to uncover, are other factors such as the investor's return expectations, mindset and level of self-awareness.

Figure 14: The Investor Iceberg



Note: This figure represents a conceptual framework describing the investor discovery process based on the empirical and qualitative analysis in this thesis.

9.3.2 Mindset

Most investors also demonstrated that they understand that investing is a process and that sometimes undesirable outcomes may nevertheless result even from robust processes. A theme that emerged strongly from the interviews was that most investors expressed a preference for a mindset that was process-oriented rather than outcome-oriented. In other words, they

wanted their investment process to be "good" rather than "lucky". Investors looked for advisers who had a clearly defined process that they believed in and stood behind. Successful advisers were also characterized by the strength and transparency of their process and, in many cases, advisers provided examples of turning away clients who were not willing to embrace their process.

A key element of this process-orientation was the notion of self-control by both investors and advisers, especially in the face of adverse market movements. A mindset that was process-oriented meant that investors and advisers did not deviate from their process in the face of temporary setbacks. It remains an unanswered question as to how many consecutive temporary setbacks it would take before investors or advisers decided to abandon their process.

9.3.3 Goals-based Approach

An interesting theme that emerged from the interviews was the desire of many investors to have a more goals-based approach to investing. This is an approach that is heavily process-oriented and focused on a financial planning model, where each of the investors' goals is treated separately as a result of the associated time horizon, priority of goal, etc. Implicit in this view is that while an investor may only have one risk tolerance score, they may well have different goals with different time horizons and different levels of risk-taking behaviour in each goal portfolio. This approach is consistent with the findings of this thesis, that return expectations are a better predictor of risk-taking behaviour than risk tolerance. It is also consistent with the finding in the qualitative interviews that investors want a transparent and easily understood process.

Many of the advisers also espoused a goals-based approach. Certainly, all of them emphasized the value of financial planning as a means to better understand the real investment needs of their clients. A significant number of the advisers interviewed went further and advocated a goals-based approach to

investing. The process whereby different investment strategies with different levels of risk are implemented addresses many of the key themes identified in the current research: (i) that there is a need for a transparent and easily understood process; (ii) that return expectations are a better predictor of risk-taking behaviour than risk tolerance; (iii) that literacy and experience levels vary; and (iv) failure to meet the goal is the key investment risk that concerns investors and advisers.

9.3.4 Consistency

One additional theme that emerged, and that underpins the process-oriented mindset, is the value of consistency. Both investors and advisers embraced the notion that consistency was preferred, both in terms of process but also outcome. A consistent outcome is more conducive to the financial planning and the goals-based approach discussed earlier. Furthermore, the benefits of consistent outcomes are that this avoids the "barbell" strategy unsuccessfully employed by many investors (see description in Chapter 2 of the investor "behaviour gap"), where chasing high returns in one "good" period often leads to holding cash in subsequent "bad" periods. Therefore, a consistent process that leads to more consistent outcomes was preferred by both investors and advisers.

Table 24 summarizes the main findings of this thesis.

Table 24: Summary of Research Questions and Findings

<i>Research Question #</i>	<i>Research Question</i>	<i>Quantitative Findings</i>	<i>Qualitative Findings</i>
1	Do behavioural biases affect investors' return expectations and risk-taking behaviour?	No findings of behavioural biases affecting either return expectations or risk-taking decisions of investors	Not investigated
4	Do behavioural biases affect advisers' return expectations and risk-taking advice?	Recency effect found to affect advisers' risk-taking advice. Peer group effect found to affect advisers' return expectations	Not investigated
2	Do personality traits or demographics affect investors' risk-taking behaviour?	No findings of personality traits affecting either return expectations or risk-taking decisions of investors. Gender (female – less), net worth (retail – less), and marital status (single – less) found to affect risk-taking decisions of investors.	Investors and advisers consider personality traits of investors an important consideration in the discovery phase preceding an investor and adviser deciding to work together and in choosing the recommended investment strategy. Other factors such as self-awareness, trust, and self-control were also identified as factors important in investment decisions. Both investors and advisers identified awareness of demographic factors of investors as important in the discovery phase and the investment recommendation phase. Age, net worth, dependents, etc. were all factors identified.
5	Do personality trait or demographics affect advisers' risk-taking advice?	No findings of personality traits affecting either return expectations or risk-taking decisions of advisers. Education (High School – less) and Licensing (Insurance – less) found to affect risk-taking decisions of investors.	Investors and advisers acknowledged that there had to be a personality fit between them to make the relationship work. Advisers talked about not taking on investors who wouldn't trust their advice or were not self-aware of their limitations. Investors' and advisers' view on the importance of adviser demographics was not directly investigated. Skill, experience and competence as well as fit were mentioned as important considerations by both groups.
3	Do risk tolerance or return expectations predict investors' risk-taking behaviour?	The scores from the risk tolerance questionnaire was not a significant predictor of investors' risk-taking decisions. Investors' return expectations were a significant predictor of their risk-taking decisions.	Investors and advisers both thought that risk was not equal to volatility – a key assumption in risk tolerance questionnaires. Both agreed that a good discovery process was far more detailed than a perfunctory, tick-the-box risk tolerance questionnaire. Both investors and advisers agreed that return expectations had a significant impact on their investment decisions.
6	Do advisers' return expectations predict their risk-taking advice?	Advisers' return expectations were a significant predictor of their risk-taking decisions.	Advisers indicated that long-term return expectations influenced their investment recommendations.
7	Do investment literacy, experience or risk aversion affect investors' return expectations and risk-taking behaviour?	Investment literacy was not predictive of investors' return expectations or risk-taking behaviour. Investment experience was predictive of investors' return	Investors and advisers agreed that investment literacy and experience were critical factors in investment decisions. They agreed that this

		expectations or risk-taking behaviour. Risk aversion was predictive of investors' return expectations or risk-taking behaviour.	should be a key focus in a robust discovery process. Risk aversion was not directly investigated. However, investors and advisers agreed that a good understanding of investors' attitude to risk – beyond a risk tolerance questionnaire – was essential.
9	Does advisers' perception of their clients' investment literacy or experience affect their return expectations and risk-taking advice?	Adviser perception of their clients' Investment literacy was not predictive of their return expectations or risk-taking advice. Adviser perception of their clients' Investment experience was not predictive of their return expectations or risk-taking advice.	Advisers indicated that they very much take into consideration the literacy and experience of their client. In fact, advisers noted that they also typically try and determine the experience that investors had with specific asset classes, over what time periods, etc.
8	Do investors update their risk-taking behaviour when new information is provided?	Investors did not update their risk-taking behaviour – at least not to an extent that was statistically significant – when new return expectations were provided. Updated return expectations were significantly different than their self-determined return expectations.	Investors and advisers indicated that they form (and update) their expectations based on sources that they individually rely on and trust.
10	Does advisers' risk aversion affect their return expectations and risk-taking advice?	Advisers' investment risk aversion has no impact on their return expectations or risk-taking advice.	Advisers' risk aversion (particularly to business, as opposed to investment, risk) was not investigated.

9.4 Reflections on Approach and Methodology

No research effort is without its limitations and that is true of this thesis as well. The risk-taking measure that was the cornerstone of the empirical analysis was hypothetical and critics may argue that planned behaviour is not necessarily equivalent to actual behaviour, and, as a result, the findings in this thesis may have limited relevance in practice. While there is some merit to this argument, the reality is that observing actual behaviour does not allow a researcher to isolate the variable of interest from all of the other factors involved, nor does it allow a comparison of respondents on an equal footing. Analyzing actual trading behaviour to determine risk-taking behaviour requires making a number of assumptions. When analyzing actual trading data, the fact that an investor has bought more equities does not automatically imply greater

risk-taking. What matters is whether the equities that were bought were more risky than the ones sold.⁴¹

In addition, in many cases what matters is whether the trading activity was perceived to be risk-taking by the individual at the time the decision was made and not whether it turned out to be more risky. After all, the purpose is to understand what led to the decision. It is impossible in analyzing actual trading data to tie behaviour to the actual factors involved at the moment of decision as such trading does not occur in a controlled environment. In this sense, analyzing actual trading data has its limitations. As Weber et al. (2013, p. 14) observe:

A disadvantage of using real transaction data to make inferences about risk taking in portfolio allocations is that it is hardly possible to obtain complete information on total asset holdings of individuals at all banks at which they have an account. We also know that real transactions are subject to investor inertia and temporary practical constraints that may not be constant from period to period.

The measure of risk-taking used in this thesis, while admittedly a hypothetical task, does not have the issues associated with measuring risk-taking in actual trading behaviour, as the participants only choose between two assets: a risk-free Canadian Government bond and the higher risk investment in the Canadian stock market. In this context, the definition of risk (from a participant perspective) is not given; however, irrespective of the individual's definition, greater allocation to the stock market can be readily interpreted as evidencing greater risk-taking behaviour. Weber et al. (2013, p. 2) pointed out, "(f)ar from being a negative, the hypothetical nature of such investment decisions allows people to show what they would do, based on their beliefs and expectations at a specific point in time, without constraints by inertia or other factors". In this context, as Ajzen's Theory of Planned Behaviour argues, if a particular behaviour is planned, if it is in the individual's control, and if there is

⁴¹ Note the distinction between buying more equities in real life where there is differential risk between different equities and increasing %TSX in the hypothetical task in this thesis. In the latter case, there is no subjective issues of risk perception as the individual is choosing between one risk-free asset, on the one hand, and one risky asset, on the other hand.

an opportunity to execute that behaviour, then the planned behaviour will likely result (Ajzen, 1991; Ajzen, 2002). Finally, Merkle and Weber (2014) found that numerical expectations (over the next 3 months) predicted actual trading behaviour, while Hoffmann et al. (2013b) found that subjective expectations (over the next month) did so as well, lending further credence that the findings of this thesis have relevance to actual practice.

Another critique of this thesis might point to the fact that the hypothetical task took place when the individual was in a "cold" emotional state and may not reflect how they would behave in a "hot" state. That is a valid point and, as Chapter 3 outlined, individual behaviour differs between hot and cold states. However, in industry practice, the initial investment decision is typically made in a cold state - that is, the individual comes to meet the adviser and over a period of several meetings arrives at the initial investment strategy, much like in the fictional account in the Introduction. It is in the subsequent re-investment decisions, or repeat decisions in the academic parlance, that individuals often find themselves in a hot state, similar to the fictional account in the Introduction. Thus, as the focus of this thesis was on the initial investment decision, this limitation has minimal impact on the findings.

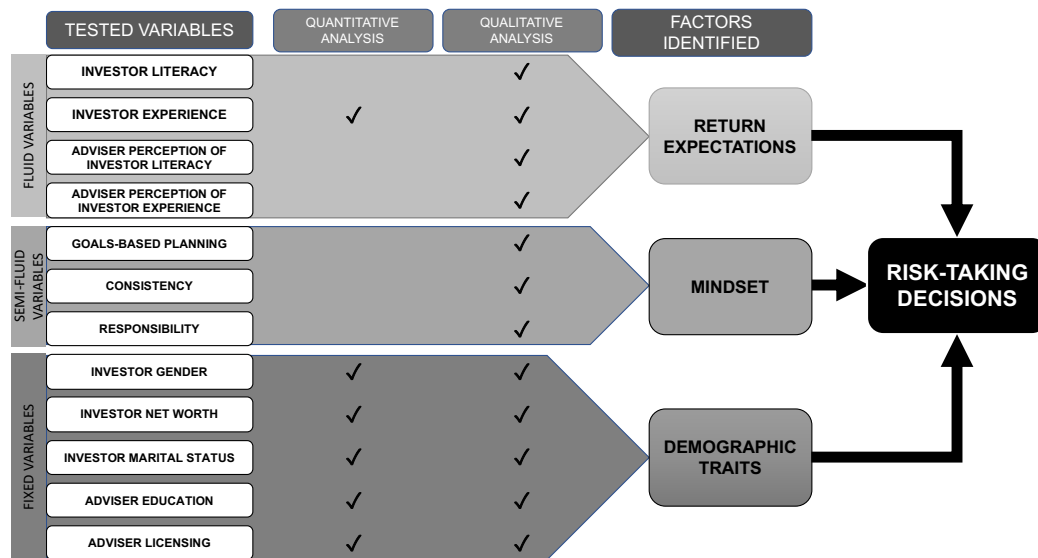
The sample size of international investors and advisers turned out lower than anticipated at the outset of Study 2A and 2B. The use of a categorical dependent variable, 5-year return expectations, made theoretical sense at the outset but rendered rigorous statistical analysis difficult, especially with the smaller samples. In any case, the findings from the international participants do not dilute the findings in the Canadian context. For international investors and advisers, the lack of sufficient respondents in each country meant that national differences could not be analyzed - a subject worthy of future research in and of itself. The samples in Canada were sufficiently large and representative of the population of interest. While the Canadian results are fairly significant, it would be dangerous to extend the conclusions too broadly to other markets without further research.

9.5 Chapter Summary

This chapter discussed the results from this thesis that were found to impact risk-taking decisions. Figure 15 summarizes the findings in diagrammatic form. It is illustrative to think of the factors as fixed, semi-fluid and fluid, corresponding to their relative ease of change. For example, demographic factors can be treated as relatively fixed (but can be changed with significant effort). The semi-fluid factors are relatively slow to change (such as a desire for consistency or the willingness to take responsibility), but can be changed with time and effort. The fluid factors are the ones that are the easiest to change.

Figure 15 shows return expectations and demographics as predictors of risk-taking decisions. It is important to note that while correlation has been found, causation has neither been established nor implied by this diagram. Mindset was identified through the qualitative analysis as having a role in investors' and advisers' risk-taking decisions. Self-awareness plays a role in that the recognition of the limits of one's own literacy or experience has an indirect effect on risk-taking decisions. Mindset and its sub-themes, together with self-awareness of those themes, emerged as factors impacting risk-taking decisions and are thus part of this thesis' contribution to the body of knowledge.

Figure 15: Factors Affecting Risk-Taking Decisions



Note: This figure represents a conceptual framework of factors affecting risk-taking decisions of investors and advisers based on the empirical and qualitative analysis and findings in this thesis. Arrows do not represent causation as causation was neither established nor implied.

Chapter 10 Conclusions

Investing decisions have come to the forefront with the spotlight shining on them during increasingly frequent market volatility. Bogle (2008) noted that market swings of 2% or more only occurred 3 or 4 times a year in the 1950s and 1960s; in contrast, in the second half of 2007 there were 15 such swings. Washer, Jorgensen, and Johnson (2016) found that total daily volatility and downside volatility for common stocks had significantly increased (although total monthly volatility was relatively stable over the longer term). In addition, as individuals live longer after retirement and more nations are returning responsibility for retirement income back to the individual, a better understanding of how investment decisions are made can benefit all stakeholders.

This thesis set out with the objective of identifying the factors impacting risk-taking decisions, from both the perspective of the investor and the adviser. The research consisted of a mixed methods investigation focused primarily on Canadian participants but also supplemented with international participants. The empirical analysis provided a broad perspective on some of the factors that may be involved in a point-in-time risk-taking decision by investors and advisers. The qualitative analysis provided a deeper dive into the thinking behind risk-taking decisions made repeatedly over time by investors and advisers. As a result, a richer and deeper framework developed describing not just investment decisions but the overall investment journey.

This conclusion chapter summarizes the findings of this thesis and demonstrates how the framework that was developed answers the fundamental research questions posed in Chapter 1. As a first step, Section 10.1 provides an explanation of how this framework answers the original research questions. Section 10.2 describes the contributions to the body of knowledge made by this thesis. Section 10.3 provides some suggestions for

future research. Finally, Section 10.4 discusses the implications of the findings in this thesis to the various stakeholders.

10.1 Research Questions

This section revisits the research questions introduced in Chapter 1 and answers each question in light of the framework developed over the course of this thesis.

This thesis highlights the fact that risk tolerance questionnaires are, in fact, not good predictors of risk-taking decisions of either investors or advisers. As the empirical findings in Chapter 5 demonstrated, return expectations, of both investors and advisers, are the single best predictor of their respective risk-taking decisions. In addition, demographic variables played a significant role. For investors, these variables include gender, net worth and marital status. For advisers, these variables include education and licensing type.

A follow-up question that was investigated was what factors impact the formation and updating of return expectations. Some evidence was found that investment literacy and experience impact both the formation of return expectations and risk-taking decisions of investors. There was no evidence that advisers' perceptions of their clients' financial literacy or return expectations play a role in their return expectations or risk-taking decisions.

Prior literature predicted that behavioural biases would impact return expectations and risk-taking decisions of investors and advisers. The findings from this thesis suggest that there was no discernible impact of behavioural biases on the return expectations or risk-taking decisions of investors. However, there was some impact found on the return expectations and risk-taking decisions of advisers. This was a curious, and mixed, result and one that requires further investigation.

Again, prior literature also suggested that personality traits should play a role in determining return expectations and risk-taking decisions of both

investors and advisers. The empirical phase of this thesis tested a variety of previously validated scales. Curiously, the findings suggest that there is no statistically significant relationship between any of the personality scales and return expectations or risk-taking decisions.

However, in the qualitative semi-structured interviews, the themes that emerged through the coding and applied grounded theory methodology included personality traits such as self-awareness, the need for control, and the ability to trust.

Finally, there were mixed findings as to whether there was a difference in risk-taking decisions between scenarios where participants were given return expectations and when such expectations were self-determined. In the two main samples, given return expectations did not lead to any statistically significant change in risk-taking decisions.

10.2 The Contributions of this Research

10.2.1 The Three Models of Investment Decisions

The framework developed over the course of this thesis is encapsulated in three core models developed through the empirical and qualitative chapters and summarized in Chapters 8 and 9. These models are: (i) Factors Affecting Risk-Taking Decisions; (ii) the Investment Journey; and (iii) the Investor Iceberg. In essence, the first model helps describe some of the factors, identified in the empirical and qualitative analyses, that impact risk-taking decisions at a point in time. The second model helps illustrate some of the considerations that emerged in the qualitative analysis as to how risk-taking decisions are made, and remade, over a period of time. The repeated decision nature is a key feature that needs to be borne in mind. The third model describes in greater detail the depth of the discovery process needed in order for the investment journey to be successful and satisfactory.

As Figure 15 in Chapter 9 illustrates, return expectations are a key determinant of risk-taking decisions and are, in turn, impacted by the investor's investment literacy and experience. These are factors that are considered to be fluid - in other words, capable of being changed over time depending on factors within the control of the investor or adviser. The second set of factors, mindset, is considered to be semi-fluid and encapsulate factors that are best described as an individual's interpretation of, and response to, a situation. Someone with a process-oriented mindset wants to understand the way the decision is arrived at rather than simply the outcome. Such a person is more likely to evaluate a bad outcome in a longer-term context than one who is purely outcome-oriented. These factors are considered to be less fluid than the first set but are open to change with sufficient time and effort. Finally, there are the demographic factors, typically considered to be fixed - such as gender, net worth, marital status, education or licensing. For all intents and purposes, these factors are not changeable without significant time and effort.

The second model, the Investment Journey, provides a framework of the factors that impact risk-taking decisions over time. Figure 13 in Chapter 8 shows the adviser, as tour guide, and the investor, as tourist, on a guided tour towards their ultimate destination. To make the journey successful and enjoyable, there needs to be an element of discovery and alignment of styles, personalities and approaches. This leads to a clear definition of the goal or objective, budget, timeframe, and other factors. Then an itinerary or plan needs to be put in place. The key elements are responsibility (e.g. seat belts and itinerary preparation), consistency (e.g. cruise control), and recalibration (e.g. GPS). In any investment journey, failure to recalibrate the plan to take account of changing conditions is a sure path to failure. At the same time, markets go up and down daily, news comes in by the minute - consistency dictates that not every change in the surrounding environment requires a response.

Finally, the last model, the Investor Iceberg, describes the depth of understanding that is needed by any investor and her adviser. Risk tolerance questionnaires and know-your-client rules are simply the tip of the proverbial iceberg. Beneath the surface, and requiring a fair degree of time, effort and skill to uncover, are other factors such as the investor's return expectations, mindset and level of self-awareness. Figure 14 in Chapter 9 describes the Investor Iceberg. The information uncovered during the discovery process needs to be interpreted in light of the prevailing investment environment. This is an ongoing exercise and one will result in new, and sometimes, contradicting information as time passes and conditions change.

Together, these three models can help investors and advisers better understand the investment decision process and, as such, are a key contribution of this thesis.

10.2.2 The Role of Return Expectations

Prior research has established that return expectations play a role in risk-taking decisions. The contribution of this thesis to the literature in this area is as follows: (i) the finding was validated for Canadian investors (including HNWI); (ii) a subjective construct for return expectations (RTQLTE) was found to be a highly significant predictor; (iii) the finding was replicated in an experimental setting where the task was investing for the long-term (where shorter-term return expectations might have been expected to play a lesser role); and (iv) the finding was extended to Canadian advisers as the primary predictor of their risk-taking advice. For both investors and advisers, their respective return expectations were a significant, and in the latter case the most significant, predictors of risk-taking decisions.

10.2.3 The Role of Risk Tolerance Questionnaires

Prior research has established the limitations of risk tolerance questionnaires and also that risk tolerance and risk attitudes are relatively

stable. Other research has shown that risk expectations play a role in determining risk-taking behaviour. This thesis contributed to the literature by specifically testing a common industry risk tolerance questionnaire to see whether it predicts risk-taking behaviour of investors. The results demonstrated that risk tolerance scores are not a predictor of investor risk-taking decisions and cannot explain the variability in the risk-taking advice provided by advisers. This is a new contribution as it adds field evidence to some of the existing criticism from regulators and academics regarding the efficacy of risk tolerance questionnaires.

Furthermore, the semi-structured interviews provide evidence that the concept of risk encapsulated in these questionnaires is not the notion of risk shared by investors and advisers. While the definition of risk inherent in the traditional investment paradigm has been questioned in academic literature and by practitioners, this thesis contributes to the literature by showcasing that investors and advisers do not view volatility as the key investment risk. This is a fairly significant finding with broad implications for the industry as its current focus is on identifying investor attitudes to short-term volatility.

10.2.4 The Role of Investment Literacy and Experience

The role of investment literacy and experience in investor decisions has been the focus of prior research. While investment literacy may not have a role in the formation of return expectations, it does seem to have a role in risk-taking behaviour. Investment experience appears to have a role in both formation of return expectations and risk-taking behaviour. This thesis contributes to the body of knowledge in this area in a number of ways. First, it tests the role of literacy and experience in investment decisions in an experimental field test. Second, the use of Structural Equations Modelling techniques to analyze the relationship provides greater insight into the role of each. Finally, the use of semi-structured interviews with investors and advisers to complement the empirical analysis provides additional depth.

10.2.5 Usefulness of Qualitative Analysis

Typically, research in the field of investment decisions is confined to quantitative methods. In this thesis, an explanatory sequential mixed methods approach was used and, in particular, a series of semi-structured interviews were conducted with investors and advisers in the qualitative phase. These interviews allowed a deeper and richer probing of key stakeholders in the investment decision process. Furthermore, these interviews resulted in insights that would not have emerged otherwise. Thus, one contribution of this research to the body of knowledge is to showcase the role of qualitative analysis in this field.

10.3 Suggestions for Future Research

The results in this thesis suggest avenues for future research. For instance, the mixed results from the analysis of behavioural biases seem worthy of further analysis. Why were professional advisers susceptible to behavioural biases but not individual investors? For how long after the introduction of the bias does it affect decisions?

Furthermore, the low reliability scores for previously validated personality instruments suggest that additional research is required to validate these scales in a Canadian context. The qualitative study identified a theme that self-awareness of personal limits to literacy and experience, the need for control and the ability to trust are all factors in the investment context. Certainly, these personality traits lend themselves to future empirical and qualitative research to both confirm and extend the findings of this thesis.

Literacy and experience appear to be significant factors in risk-taking decisions. Future research should consider both self-assessed (subjective) and independently assessed (objective) measures of literacy and experience to identify: (i) how and where discrepancies arise; and (ii) what their role is in predicting these variables. In addition, future research should consider whether gains in literacy and experience (through, for example, online training

and investment simulations – see Section 10.4.2 below) translate into changes in risk-taking decisions. Furthermore, it would be very interesting to see how literacy and experience are related to repeated decisions, i.e. are individuals with greater literacy and experience more or less likely to stay invested in the original portfolio?

Of particular interest for future research are the factors that drive advisers' return expectations. Does their experience with clients have a role to play? For example, if the adviser has lost lots of clients because of a perception that he or she underperformed the market, does that impact the advisers' future return expectations or risk-taking decisions? The author's industry experience suggests that this may play a role but empirical evidence is required to test this view.

10.4 General Discussion and Implications

What are the implications for the various stakeholders (investors, advisers, regulators and policy-makers)?

10.4.1 Ongoing Discovery Process

The industry currently requires that advisers satisfy know-your-client and investment suitability requirements. In most cases, this involves account opening information (name, date of birth, address, income, etc.) as well as a risk tolerance questionnaire. However, as stated by most of the investors interviewed in Study 3, many advisers perform this function in a perfunctory fashion. The findings in this paper establish that: (i) the discovery process is important to investors and advisers; and (ii) information that is obtained in a deeper discovery process helps zoom in on the most appropriate level of risk-taking. In addition, some of the information gained in a discovery process - like level of self-awareness, need for control or ability to trust - does not easily lend itself to being captured in a form or questionnaire. Thus, a robust discovery process is critical.

Currently, the discovery process is largely left to the individual adviser. This may be a missed opportunity and one that may have negative consequences for the industry. The underlying assumption is that professionals should not be told how to do their jobs. One can draw a clear corollary to another profession - medicine. Ignaz Semmelweis, a Hungarian doctor in Vienna, is credited with discovering that hand-washing by doctors saved patient lives. This is a fact that seems patently obvious today - but it wasn't in the mid-1850s. Indeed, Semmelweis' colleagues were upset by the implication they were killing their patients. But, even today, health care workers are washing their hands less than half of the times they should, according to the Centers for Disease Control and Prevention (CDC). As a result, on any given day, about one in 25 hospital patients in the United States has at least one healthcare-associated infection.⁴² This has led the CDC, hospitals, and regulators to proactively campaign for awareness of the issue and instill best practices (e.g. hand washing, etc.).

In the author's opinion, the investment industry is at a similar crossroads. The findings from Chapter 8 suggest that a better discovery process leads to better outcomes. Yet greater awareness is necessary in the industry and, while regulated discovery might not be the answer, promotion of best practices should benefit all stakeholders. Furthermore, investors also need to be made aware that full discovery, often including sensitive personal information, is in their best interests. A doctor, lawyer or tax accountant cannot be expected to make a proper diagnosis or help achieve the desired outcome without full discovery - and no patient or client would expect otherwise. A similar shift needs to occur in the investment industry.

While there are many excellent advisers, some of whom were the subjects of Study 3, not all advisers are equal - a point made abundantly clear by the investors in Study 3. One way to resolve this "discrepancy" is to identify best practices, some of which were identified in this thesis, and encourage the

⁴² <https://www.cdc.gov/features/handhygiene/index.html> accessed on January 5, 2018

adoption of these practices. If and when risk tolerance questionnaires are used, the deficiencies identified in Chapter 2 should be addressed. However, as the current research demonstrated, additional probing is highly recommended. For instance, the adviser should investigate what the investor's return expectations are, their level of investment literacy and their prior investment experience. As discussed in Chapter 8, literacy and experience are punctuated by nuances such as level of intensity, order of experiences, and the extent of internalization. Therefore, perfunctory questions will not add much insight for the adviser. Furthermore, perceptions change according to market and personal conditions. Advisers need to keep this in mind and regularly communicate with their clients to conduct a "pulse" check. In addition, exploration of the investors' level of self-awareness, their ability or willingness to trust others, and to delegate control, is critical. Finally, the adviser is well advised to understand whether the mindset of the investor is process-oriented or outcome-oriented and whether that mindset complements that of the adviser.

Much of the recent regulatory efforts has been aimed at greater transparency and removing actual or apparent conflicts of interest - a recognition that there is an agency relationship at work between adviser and client. Those efforts are to be lauded and continued. However, as recent research has shown (discussed in Chapter 9), advisers invest their own money in the same way that they recommend to their clients. This result was supported by the findings in this thesis. Thus, it is safe to say that while agency costs must always be a matter of concern, a greater concern is ensuring that advisers are aware of their beliefs, are methodical in forming those beliefs, and are more careful in not letting their own beliefs overwhelm investor-specific effects in their risk-taking advice.

Figure 14 summarizes the Investor Iceberg which illustrates the ultimate objective of the discovery process. Much like an iceberg where there is far more below the surface than above, the factors affecting investor risk-taking

behaviour are not at the surface. The know-your-client and risk tolerance part of the discovery were demonstrated in this thesis as not being sufficient to adequately predict risk-taking behaviour. Other factors, some readily determined (such as demographics) and some requiring more probing skill, are significant factors to be incorporated. As Figure 15 illustrated, not all of the factors are fixed therefore an ongoing discovery process is necessary. Furthermore, these factors have to be evaluated in the context of the prevailing investment environment (the situational versus dispositional distinction).

10.4.2 Continuing Education of Advisers

How are these best practices implemented? The industry requires its advisers to undertake continuing education courses as part of their licensing and certification. The best practices identified above should be part of the continuing education curriculum. Specifically, interviewing clients is a skill that should be learned. For instance, psychiatrists and police interrogators undergo detailed training to improve their ability to ask the right question, at the right time, in the right way, as well as the ability to unpack an answer and ask ever deeper questions. Similar training methodologies should be employed in the training and registration of advisers.

A planning approach, and specifically a goals-based approach, was highlighted as beneficial by both investors and advisers in Study 3. Continuing education courses, or even licensing requirements, should require a thorough grounding in the principles of financial planning and goals-based investing. An ability to clearly articulate and define the investors' goals, develop an investment strategy that is consistent with those goals, and address subsequent portfolio performance in the context of those goals should lead to better outcomes for both investor and adviser.

Advisers also have to accept that part of their role is that of educator or coach to their clients. Much like a doctor or a lawyer, advisers have a level of professional knowledge and experience that their clients do not have, which is

precisely the reason that the clients have sought out advice. However, in the age of the Internet where there are sites for health advice and countless sites for investors, there is a plethora of facts and what purports to be advice online. Much of this online information is either conjecture, outdated or needs to be interpreted in context, but these nuances are often missed. For example, chest discomfort can simply be indigestion; it can also be signs of a heart attack. Diagnosing the difference requires experience and understanding of the context. In a similar vein, advisers need to understand what knowledge their clients have (or think they have) and gently address any gaps or misconceptions. That requires skill and training. It also requires that advisers continue to stay current with market and product developments and that they are proactive in their communications. A clear theme in Study 3 was that the successful advisers communicate often and proactively and that investors very much appreciate this approach.

10.4.3 Investor Responsibility

While the preceding section focused on best practices for the adviser, the investor has a role to play as well. Indeed, the investors in Study 3 were adamant that investors need to take greater responsibility for their own investment portfolios and the decisions made. That, in turn, requires that investors develop their own investment literacy and not simply offload the decision to advisers and then blame them for the consequences. This, in no way, excuses advisers from their fiduciary duty. However, a more informed consumer is a more satisfied consumer. Despite, or perhaps because of, an inundation of financial pundits on television and in print, there are many investors who still do not understand the fundamentals of risk and return, of time horizon, and of how stock markets work. That is a dangerous foundation upon which to provide financial advice.

10.4.4 Public Policy

Public policy has a role to play as well. Basic financial literacy (e.g. savings, inflation, mortgages, etc.) should be part of the school curriculum, but so should investment literacy (e.g. risk, return, shortfall, stock markets, etc.). As more and more countries move from defined benefit pension plans to defined contribution plans, the onus to properly prepare for retirement falls squarely on the investor, with or without an adviser. In most Western countries, the social welfare net means that the state bears the ultimate financial burden of caring for those who have not adequately prepared for retirement. If, instead, some of that "cost" is redirected to adding financial literacy to the school curriculum, there is an undoubted benefit to individual investors and society as a whole.

Some of the rationale for not including financial literacy in the core curriculum is that it is boring, a view expressed by investors and advisers in Study 3. If subjects needed to be exciting to be taught in school, students may well find their day composed solely of recess and lunch. Just as computer skills and language skills are now being taught in schools to better prepare our children for the workplace of the future, financial and investment literacy needs to be taught so that our children are better prepared as consumers and members of society. These concepts should be taught as early as possible. There is no reason, for example, that simple and compound interest cannot be taught as a practical application of percentages when that material is covered in school. Nevertheless, it is the author's recommendation that a specific course on financial and investment literacy be included in the school curriculum. Some jurisdictions are starting (e.g. Germany, Canada) but a sustained effort, including refinement of curriculum and delivery, is required.

10.4.5 Experience is the Best Teacher

There is an old saying that experience is the best teacher, a view that finds some support from the findings in Chapter 8 in this thesis. The problem

is that experiencing losing money as a precursor to investing is neither practical nor pragmatic. After all, medicine is not supposed to kill the patient. However, looking to other fields might provide the answer. For example, pilots are required to spend hours in a flight simulator before getting behind the cockpit. The very sensible rationale being that you don't want to learn to fly a plane by flying a plane. The basics that are learned in the simulator then prepare the pilot for the real world.

In a similar vein, the investment industry should use simulation to prepare the investor for the realities of the market. For example, after the discovery process and investment proposal is made but before it is implemented, the investor could be provided with an online simulation tool. This tool mimics the proposed portfolio. Over five days, for instance, with each day representing one year in the market, the portfolio is subject to random shocks (as per historical time periods). At the end of each day, the investor is provided with her annual statement and typical "newspaper headlines". She is asked to record in the online tool her feelings, concerns, etc. as if this really was her retirement money. At the end of the simulation period, the investor is asked: (i) to summarize her thoughts, fears, feelings throughout the simulated investment period; and (ii) whether she wants to actually implement that portfolio or if the proposed portfolio is too risky or too conservative. This simulation may be the closest way an adviser can help the investor to experience the emotional roller coaster of investing before putting her money to work.

10.4.6 The Craft of Financial Advice

One of the most interesting comments in Study 3 was that one cannot get a bad coffee in Italy because of the pride baristas take in their work. It is an interesting premise and one that can be described as craftsmanship. In the traditional sense of the word, a craftsman (or craftswoman) spends years learning the craft (often through an apprenticeship) and plies the craft not just

for monetary rewards but for genuine pride in the handiwork. In that sense, a craftsman is always learning and always perfecting his craft.

Financial advice is a craft and one that does not lend itself to simply ticking boxes but requires a deep understanding of financial markets and also of human behaviour. There is an ethos that perhaps needs to be rediscovered in the investment industry, one of craftsmanship. Financial institutions, industry organizations and licensing bodies can play a key role in this area. By continually reassessing the minimum standards (of qualifications, experience, and training) and punishing those who fail to meet these standards, by investing in the financial education of the consumer, and by clearly defining the role of the adviser, these stakeholders can help position advisers as craftspeople. For example, too many consumers believe (with the misguided help of some advisers) that the job of an adviser is to beat the market. The job of a good adviser is not to beat the market but to help her clients beat themselves and achieve their realistic financial goals. The role of a doctor is not to help a patient avoid disease but to minimize the risk of such occurrences and to provide treatment when they do occur.

Professions like medicine and law do require, as a condition of continued licensing, that members do not do anything that brings the profession into disrepute. The investment industry should consider this practice as well. Thus, sanctions for bad or egregious behaviour should not simply be at the firm level but involve industry level sanctions. By requiring the profession to hold itself to the standards of a craftsman, it is likely that advisers will be perceived that way by their clients and by one another.

Helping investors achieve their financial objectives is a noble calling. Therefore, improving the process through which this is achieved is a worthwhile endeavour.

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Appendix 1A - Investor Questionnaire (Study 1A)

Q1.1 What is your gender?

- Male (1)
- Female (2)

Q1.2 What is your marital status?

- Single (1)
- Married / Common Law (2)
- Separated (3)
- Divorced (4)
- Widowed (5)

Q1.3 What is the highest degree or level of education you have completed?

- High School (1)
- Bachelor's degree or equivalent (2)
- Master's degree or equivalent (3)
- Ph.D. or equivalent (4)

Q1.4 What is your household net worth range (investable assets)?

- Up to \$250,000 (1)
- \$250,001 - \$500,000 (2)
- \$500,001 - \$1,000,000 (3)
- Over \$1,000,000 (4)

Q2.1 What is your current age?

- Under 45 years (10)
- 45 - 55 years (8)
- 56 - 65 years (6)
- 66 - 75 years (4)
- Over 75 years (2)

Q2.2 In how many years do you expect to start withdrawing money from your investment portfolio?

- in more than 20 years (10)
- in 10 to 20 years (8)
- in 5 to 10 years (6)
- in the next 5 years (4)
- Immediately (2)

Q2.3 What is your primary objective for your investment portfolio?

- To grow aggressively (10)
- To grow significantly (8)
- To grow moderately (6)
- To grow with caution (4)
- To avoid losing money (2)

Q2.4 Assuming typical market conditions, what performance would you expect from your investment portfolio over time?

- To outperform the stock market (10)
- To generally track the stock market (8)
- To be below the stock market, but generate a moderate return (6)
- To have some stability, but generate a modest return (4)
- To focus on capital preservation, but still generate a small return (2)

Q2.5 Suppose the stock market performs unusually poorly over the next decade, what returns would you expect from your investment portfolio?

- To lose money (10)
- To make very little or nothing (8)
- To make a small gain (6)
- To make a modest gain (4)
- To be little affected by what happens in the stock market (2)

Q2.6 Which of the following statements would most accurately describe your attitude about the next 3 years' performance of your investment portfolio?

- I don't mind if I lose money. (10)
- I can tolerate a loss. (8)
- I can tolerate a small loss. (6)
- I would have a hard time tolerating any losses. (4)
- I need to see at least a little return. (2)

Q2.7 Which of the following statements would most accurately describe your attitude about the next 3 months' performance of your investment portfolio?

- It wouldn't concern me. It is only one quarter. (10)
- Losses in that short time frame wouldn't worry me. (8)
- Losses greater than 10% would concern me. (6)
- I can only tolerate small short-term losses. (4)
- Any losses would really bother me. (2)

Q3.1 For each of the following statements, please indicate how risky you **perceive** each situation. Provide a rating from Not At All Risky (1) to Extremely Risky (7).

- Investing 10% of your annual income in a moderate growth mutual fund. (Q3.1_2)
- Investing 5% of your annual income in a very speculative stock. (Q3.1_4)
- Investing 10% of your annual income in a new business venture. (Q3.1_6)

Q4.1 For each of the following statements, please indicate your level of agreement ranging from Completely Disagree (1) to Completely Agree (7).

- When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I am listening to. (Q4.1_1)
- No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities. (Q4.1_2)
- I often find it difficult to shop for a gift for a friend. (Q4.1_3)
- Choosing a movie to watch is really difficult. I am always struggling to pick the best one. (Q4.1_4)
- No matter what I do, I have the highest standards for myself. (Q4.1_5)
- I never settle for second best. (Q4.1_6)

Q5.1 For each of the following statements, please indicate your level of agreement ranging from Completely Disagree (1) to Completely Agree (7).

- Whenever I make a choice, I'm curious about what would have happened if I had chosen differently. (Q5.1_1)
- Whenever I make a choice, I try to get information about how the other alternatives turned out. (Q5.1_2)
- If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better. (Q5.1_3)
- When I think about how I'm doing in life, I often assess opportunities I have passed up. (Q5.1_4)
- Once I make a decision, I don't look back. (Q5.1_5) [R]

Q6.1 Most modern theories of decision-making recognize the fact that decisions do not take place in a vacuum. Individual preferences and knowledge, along with situational variables, can greatly impact the decision process. In order to facilitate our research on decision-making, we are interested in knowing certain factors about you, the decision maker. So, in order to demonstrate that you have read the instructions, please choose only "Space Travel". Thank you.

Which of the following activities do you engage in regularly? (check off all that apply)

- Basketball (1)
- Soccer (2)
- Running (3)
- Hockey (4)
- Space Travel (5)
- Swimming (6)
- Tennis (7)

Q7.1 PLEASE NOTE THAT THIS QUESTION MAY APPEAR TO BE A REPETITION OF AN EARLIER QUESTION, IT IS NOT. For each of the following statements, please indicate the **likelihood** that you would engage in the

described activity or behaviour if you were to find yourself in that situation. Provide a rating from Extremely Unlikely (1) to Extremely Likely (3):

- Investing 10% of your annual income in a moderate growth mutual fund. (Q7.1_2)
- Investing 5% of your annual income in a very speculative stock. (Q7.1_4)
- Investing 10% of your annual income in a new business venture. (Q7.1_6)

Q8.1 Please respond to the following items. Be honest - there are no right or wrong answers! Very Much Like Me (1) to Not Like Me At All (5):

- New ideas and projects sometimes distract me from previous ones. (Q8.1_1)
- Setbacks don't discourage me. (Q8.1_2) [R]
- I have been obsessed with a certain idea or project for a short time but later lost interest. (Q8.1_3)
- I am a hard worker. (Q8.1_4) [R]
- I often set a goal but later choose to pursue a different one. (Q8.1_5)
- I have difficulty maintaining my focus on projects that take more than a few months to complete. (Q8.1_6)
- I finish whatever I begin. (Q8.1_7) [R]
- I am diligent. (Q8.1_8) [R]

Q9.1 For each of the following statements, please indicate your level of agreement ranging from Strongly Disagree (1) to Strongly Agree (5).

- I get easily attached to material things (my car, my furniture, ...). (Q9.1_1)
- I think eventually I could cope with losing the ability to walk. (Q9.1_2)
- I think I could cope with losing all my belongings in a fire. (Q9.1_3)
- Once I've acquired a position in the company, I wouldn't want to take a step back. (Q9.1_4)
- Losing your house to a fire is bad, but I would manage. (Q9.1_5)
- I would have no problem accepting a job that has less pay than my previous/current one. (Q9.1_6)
- I would be okay with trading my current car (bike) for a cheaper model. (Q9.1_7)

Q10.1 For each of the following statements, please indicate your level of agreement ranging from Strongly Disagree (1) to Strongly Agree (5). Describe how you are now, not as you wish to be in the future.

- I prefer to gather all the necessary information before committing to a decision. (Q10.1_1)
- I thoroughly evaluate decision alternatives before making a final choice. (Q10.1_2)
- In decision making, I take time to contemplate the pros/cons or risks/benefits of a situation. (Q10.1_3)
- Investigating the facts is an important part of my decision-making process. (Q10.1_4)
- I weigh a number of different factors when making decisions. (Q10.1_5)
- When making decisions, I rely mainly on my gut feelings. (Q10.1_6)
- My initial hunch about decisions is generally what I follow. (Q10.1_7)
- I make decisions based on intuition. (Q10.1_8)
- I rely on my first impressions when making decisions. (Q10.1_9)
- I weigh feelings more than analysis in making decisions. (Q10.1_10)

Q11.1 PLEASE NOTE THAT THIS QUESTION MAY APPEAR TO BE A REPETITION OF AN EARLIER QUESTION, IT IS NOT. For each of the following statements, please indicate the benefits you would expect to obtain

from each situation. Provide a rating from using the following scale No Benefits At All (1) to Great Benefits (7):

- Investing 10% of your annual income in a moderate growth mutual fund. (Q11.1_2)
- Investing 5% of your annual income in a very speculative stock. (Q11.1_4)
- Investing 10% of your annual income in a new business venture. (Q11.1_6)

Q12.1 Please indicate the extent to which you agree or disagree with the following statements ranging from Strongly Disagree (1) to Strongly Agree (5).

- I often compare myself with others with respect to what I have accomplished in life. (Q12.1_6)
- If I want to learn more about something, I try to find out what others think about it. (Q12.1_10)
- I always pay a lot of attention to how I do things compared with how others do things. (Q12.1_2)
- I often compare how my loved ones (boy / girlfriend, family members, etc.) are doing with how others are doing. (Q12.1_1)
- I always like to know what others in a similar situation would do. (Q12.1_9)
- I am not the type of person who compares themselves often with others. (Q12.1_5)
- If I want to find out how well I have done something, I compare what I have done with how others have done. (Q12.1_3)
- I often try to find out what others think who face similar problems as I face. (Q12.1_8)
- I often like to talk with others about mutual opinions and experiences. (Q12.1_7)
- I never consider my situation in life relative to that of other people. (Q12.1_11)
- I often compare how I am doing socially (e.g. social skills, popularity) with other people. (Q12.1_4)

Q13.1 How well do the following statements describe your personality? I see myself as someone who[Strongly Disagree (1) to Strongly Agree (5)]

- ... is reserved (Q13.1_1) [R]
- ... is generally trusting (Q13.1_2)
- ... tends to be lazy (Q13.1_3) [R]
- ... is relaxed, handles stress well (Q13.1_4) [R]
- ... has few artistic interests (Q13.1_5) [R]
- ... is outgoing, sociable (Q13.1_6)
- ... tends to find fault with others (Q13.1_7) [R]
- ... does a thorough job (Q13.1_8)
- ... gets nervous easily (Q13.1_9)
- ... has an active imagination (Q13.1_10)

Q15.1 What is $9 + 5$?

Q15.2 What is $5 - 9$?

Q15.3 You invested \$350,000 several years ago. Several of your investments have done very well and, as a result, you now have \$500,000 that is currently in cash and available to be invested.

Q15.4 You invested \$650,000 several years ago. Several of your investments have done relatively poorly and, as a result, you now have \$500,000 that is currently in cash and available to be invested.

Q15.5 You have decided that you need to revisit your investment portfolio to ensure that it meets your future needs. As part of the process, you do your homework. You have asked close friends and family, whose opinions you respect, about their investment portfolios. You note that the amount you have accumulated is significantly more than what your peers have managed to accumulate.

Q15.6 You have decided that you need to revisit your investment portfolio to ensure that it meets your future needs. As part of the process, you do your homework. You have asked close friends and family, whose opinions you respect, about their investment portfolios. You note that the amount you have accumulated is significantly less than what your peers have managed to accumulate.

Q16.1 Which of the following actors would you want to see in a movie? Please choose all that apply.

- Choice 1 (1)
- Choice 2 (2)
- Choice 3 (3)
- Choice 4 (4)

Q17.1 Please provide **three** estimates of the returns you expect from the Canadian stock market (i.e. the S&P/TSX Composite) over the next 12 months. Please use the slider to represent your expected percentage return (negative for an expected fall in the S&P/TSX Composite and positive for an expected rise in the S&P/TSX Composite).

- - - - - 0 2 4 6 8 10 12 14 16 18 20
20 18 16 14 12 10 8 6 4 2

Your middle estimate in percentage terms. This should be your best guess (as likely to be above the actual return after 12 months as below it). (1)
Your high estimate in percentage terms. Choose this high estimate so that the actual return over the next 12 months is very unlikely to be above your high estimate (less than 5% chance). (2)
Your low estimate in percentage terms. Choose this low estimate so that the actual return over the next 12 months is very unlikely to be below your low estimate (less than 5% chance). (3)



Q17.2 Please rate the returns you expect from the Canadian stock market (i.e. the S&P/TSX Composite) over the next 12 months ranging from Extremely Bad (1) to Extremely Good (7).

- Returns Expected from S&P/TSX Composite over the next 12 months (1)

Q17.3 Please rate how risky you expect the Canadian stock market (i.e. the S&P/TSX Composite) to be over the next 12 months ranging from Not At All Risky (1) to Extremely Risky (7)

- Risk Expected from S&P/TSX Composite over the next 12 months (1)

Q17.4 Imagine you have an overall wealth of \$500,000 that you wish to invest now and that you don't need this money for at least another 15 years. You could invest this amount either in a 5-year Government of Canada Savings Bond (i.e. a risk-free investment), in the Canadian stock market (S&P/TSX Composite) or a combination of the two. Please use the slider below to indicate the percentage you would invest in the Canadian stock market (S&P/TSX Composite) ranging from 0 = invest nothing in the Canadian stock market to 100 = invest everything in the Canadian stock market

0 10 20 30 40 50 60 70 80 90 100

% allocated to S&P/TSX Composite (1)



Q18.1 Thank you for your participation! If you would like to be entered into a draw for an iPad Mini (all those who complete the questionnaire are eligible to take part in the draw), please provide your email address below. Rest assured that your email address will only be used to communicate with you if you are the winner of the draw and not for any other purpose.

NOTES:

[R] denotes item that is reverse scored
Italics denotes item that is not used in data analysis

Appendix 1B - Adviser Questionnaire (Study 1B)

Q1.1 What is your gender?

- Male (1)
- Female (2)

Q1.2 What is your marital status?

- Single (1)
- Married / Common Law (2)
- Separated (3)
- Divorced (4)
- Widowed (5)

Q1.3 What is the highest degree or level of education you have completed?

- High School (1)
- Bachelor's degree or equivalent (2)
- Master's degree or equivalent (3)
- Ph.D. or equivalent (4)

Q1.4 Which of the following best describes you?

- MFDA Licensed Adviser (1)
- IIROC Licensed Adviser (2)
- ICPM Licensed Adviser (3)
- Insurance Licensed Adviser (4)
- Financial Planner (5)
- Other (6)

Q1.5 What professional designations do you have? Check all that apply.

- Financial Planning (CFP, RFP, PFP, etc.) (1)
- Insurance (CLU, etc.) (2)
- Investments (CIM, CFA, CAIA, etc.) (3)

Q2.1 For each of the following statements, please indicate how risky you **perceive** each situation. Provide a rating from Not At All Risky (1) to Extremely Risky (7).

- Investing 10% of your annual income in a moderate growth mutual fund. (Q2.1_2)
- Investing 5% of your annual income in a very speculative stock. (Q2.1_4)
- Investing 10% of your annual income in a new business venture. (Q2.1_6)

Q3.1 For each of the following statements, please indicate your level of agreement ranging from Completely Disagree (1) to Completely Agree (7).

- When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I am relatively satisfied with what I am listening to. (Q3.1_1)
- No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities. (Q3.1_2)
- I often find it difficult to shop for a gift for a friend. (Q3.1_3)
- Choosing a movie to watch is really difficult. I am always struggling to pick the best one. (Q3.1_4)
- No matter what I do, I have the highest standards for myself. (Q3.1_5)
- I never settle for second best. (Q3.1_6)

Q4.1 For each of the following statements, please indicate your level of agreement ranging from Completely Disagree (1) to Completely Agree (7).

- Whenever I make a choice, I'm curious about what would have happened if I had chosen differently. (Q4.1_1)
- Whenever I make a choice, I try to get information about how the other alternatives turned out. (Q4.1_2)
- If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better. (Q4.1_3)
- When I think about how I'm doing in life, I often assess opportunities I have passed up. (Q4.1_4)
- Once I make a decision, I don't look back. (Q4.1_5) [R]

Q5.1 Most modern theories of decision-making recognize the fact that decisions do not take place in a vacuum. Individual preferences and knowledge, along with situational variables, can greatly impact the decision process. In order to facilitate our research on decision-making, we are interested in knowing certain factors about you, the decision maker. So, in order to demonstrate that you have read the instructions, please choose only "Space Travel". Thank you.

Which of the following activities do you engage in regularly? (check off all that apply)

- Basketball (1)
- Soccer (2)
- Running (3)
- Hockey (4)
- Space Travel (5)
- Swimming (6)
- Tennis (7)

Q6.1 PLEASE NOTE THAT THIS QUESTION MAY APPEAR TO BE A REPETITION OF AN EARLIER QUESTION, IT IS NOT. For each of the following statements, please indicate the **likelihood** that you would engage in the described activity or behaviour if you were to find yourself in that situation. Provide a rating from Extremely Unlikely (1) to Extremely Likely (3):

- Investing 10% of your annual income in a moderate growth mutual fund. (Q6.1_2)
- Investing 5% of your annual income in a very speculative stock. (Q6.1_4)
- Investing 10% of your annual income in a new business venture. (Q6.1_6)

Q7.1 Please respond to the following items. Be honest - there are no right or wrong answers! Very Much Like Me (1) to Not Like Me At All (5):

- New ideas and projects sometimes distract me from previous ones. (Q7.1_1)
- Setbacks don't discourage me. (Q7.1_2) [R]
- I have been obsessed with a certain idea or project for a short time but later lost interest. (Q7.1_3)
- I am a hard worker. (Q7.1_4) [R]
- I often set a goal but later choose to pursue a different one. (Q7.1_5)
- I have difficulty maintaining my focus on projects that take more than a few months to complete. (Q7.1_6)
- I finish whatever I begin. (Q7.1_7) [R]
- I am diligent. (Q7.1_8) [R]

Q8.1 For each of the following statements, please indicate your level of agreement ranging from Strongly Disagree (1) to Strongly Agree (5).

- I get easily attached to material things (my car, my furniture, ...). (Q8.1_1)
- I think eventually I could cope with losing the ability to walk. (Q8.1_2)
- I think I could cope with losing all my belongings in a fire. (Q8.1_3)
- Once I've acquired a position in the company, I wouldn't want to take a step back. (Q8.1_4)
- Losing your house to a fire is bad, but I would manage. (Q8.1_5)
- I would have no problem accepting a job that has less pay than my previous/current one. (Q8.1_6)
- I would be okay with trading my current car (bike) for a cheaper model. (Q8.1_7)

Q9.1 For each of the following statements, please indicate your level of agreement ranging from Strongly Disagree (1) to Strongly Agree (5). Describe how you are now, not as you wish to be in the future.

- I prefer to gather all the necessary information before committing to a decision. (Q9.1_1)
- I thoroughly evaluate decision alternatives before making a final choice. (Q9.1_2)
- In decision making, I take time to contemplate the pros/cons or risks/benefits of a situation. (Q9.1_3)
- Investigating the facts is an important part of my decision-making process. (Q9.1_4)
- I weigh a number of different factors when making decisions. (Q9.1_5)
- When making decisions, I rely mainly on my gut feelings. (Q9.1_6)
- My initial hunch about decisions is generally what I follow. (Q9.1_7)
- I make decisions based on intuition. (Q9.1_8)
- I rely on my first impressions when making decisions. (Q9.1_9)
- I weigh feelings more than analysis in making decisions. (Q9.1_10)

Q10.1 PLEASE NOTE THAT THIS QUESTION MAY APPEAR TO BE A REPETITION OF AN EARLIER QUESTION, IT IS NOT. For each of the following statements, please indicate the benefits you would expect to obtain from each situation. Provide a rating from using the following scale No Benefits At All (1) to Great Benefits (7):

- Investing 10% of your annual income in a moderate growth mutual fund. (Q10.1_2)
- Investing 5% of your annual income in a very speculative stock. (Q10.1_4)
- Investing 10% of your annual income in a new business venture. (Q10.1_6)

Q11.1 Please indicate the extent to which you agree or disagree with the following statements ranging from Strongly Disagree (1) to Strongly Agree (5).

- I often compare myself with others with respect to what I have accomplished in life. (Q11.1_6)
- If I want to learn more about something, I try to find out what others think about it. (Q11.1_10)
- I always pay a lot of attention to how I do things compared with how others do things. (Q11.1_2)
- I often compare how my loved ones (boy / girlfriend, family members, etc.) are doing with how others are doing. (Q11.1_1)
- I always like to know what others in a similar situation would do. (Q11.1_9)
- I am not the type of person who compares themselves often with others. (Q11.1_5)
- If I want to find out how well I have done something, I compare what I have done with how others have done. (Q11.1_3)
- I often try to find out what others think who face similar problems as I face. (Q11.1_8)
- I often like to talk with others about mutual opinions and experiences. (Q11.1_7)
- I never consider my situation in life relative to that of other people. (Q11.1_11)
- I often compare how I am doing socially (e.g. social skills, popularity) with other people. (Q11.1_4)

Q12.1 How well do the following statements describe your personality? I see myself as someone who[Strongly Disagree (1) to Strongly Agree (5)]

- ... is reserved (Q12.1_1) **[R]**
- ... is generally trusting (Q12.1_2)
- ... tends to be lazy (Q12.1_3) **[R]**
- ... is relaxed, handles stress well (Q12.1_4) **[R]**
- ... has few artistic interests (Q12.1_5) **[R]**
- ... is outgoing, sociable (Q12.1_6)
- ... tends to find fault with others (Q12.1_7) **[R]**
- ... does a thorough job (Q12.1_8)
- ... gets nervous easily (Q12.1_9)
- ... has an active imagination (Q12.1_10)

Q13.1 What is $9 + 5$?

Q13.2 What is $5 - 9$?

Q13.3 Your client had invested \$350,000 several years ago with a different advisor. Her investments have done relatively well and, as a result, she has \$500,000 that is currently in cash and available to be invested. The client is looking to you for advice. Please click NEXT to continue.

Q13.4 Your client had invested \$650,000 several years ago with a different advisor. Several of her investments have done relatively poorly and, as a result, she now has \$500,000 that is currently in cash and available to be invested. The client is looking to you for advice. Please click NEXT to continue.

Q13.5 Earlier this week, you attended your investment firm's monthly investment meeting. You and your colleagues discuss client portfolios and performance. You note that, on average, the amount your clients have gained in their investment accounts is significantly more than what your peers have managed to accumulate for their clients. Please click NEXT to continue.

Q13.6 Earlier this week, you attended your investment firm's monthly investment meeting. You and your colleagues discuss client portfolios and performance. You note that, on average, the amount your clients

have gained in their investment accounts is significantly less than what your peers have managed to accumulate for their clients. Please click NEXT to continue.

Q14.1 Which of the following actors would you want to see in a movie? Please choose all that apply.

- Choice 1 (1)
- Choice 2 (2)
- Choice 3 (3)
- Choice 4 (4)

Q15.1 Please provide **three** estimates of the returns you expect from the Canadian stock market (i.e. the S&P/TSX Composite) over the next 12 months. Please use the slider to represent your expected percentage return (negative for an expected fall in the S&P/TSX Composite and positive for an expected rise in the S&P/TSX Composite).

- - - - - 0 2 4 6 8 10 12 14 16 18 20
20 18 16 14 12 10 8 6 4 2

Your middle estimate in percentage terms. This should be your best guess (as likely to be above the actual return after 12 months as below it). (1)
Your high estimate in percentage terms. Choose this high estimate so that the actual return over the next 12 months is very unlikely to be above your high estimate (less than 5% chance). (2)
Your low estimate in percentage terms. Choose this low estimate so that the actual return over the next 12 months is very unlikely to be below your low estimate (less than 5% chance). (3)



Q15.2 Please rate the returns you expect from the Canadian stock market (i.e. the S&P/TSX Composite) over the next 12 months ranging from Extremely Bad (1) to Extremely Good (7).

- Returns Expected from S&P/ TSX Composite over the next 12 months (1)

Q15.3 Please rate how risky you expect the Canadian stock market (i.e. the S&P/TSX Composite) to be over the next 12 months ranging from Not At All Risky (1) to Extremely Risky (7)

- Risk Expected from S&P/ TSX Composite over the next 12 months (1)

Q15.4 You have been approached by a potential client to design an investment proposal to finance her retirement in 15 years' time. She has \$500,000 to invest and does not need the money between now and retirement. As a first step, you have asked her to complete a standard industry risk tolerance questionnaire. The questionnaire has 7 questions testing for time horizon, long term expectations and attitudes to short-term volatility. The possible scores fall into the categories below. Your potential client scored 56 on the questionnaire.

Score	Category	Description
14 – 20	Very Conservative	This approach seeks a high degree of stability and should minimize the chances of substantial short-term volatility. For a very conservative investor, portfolio will be invested in the most risk-averse securities such as cash and fixed- income.
21 - 34	Conservative	Focus is on stability rather than maximizing return and should limit the chances of substantial short-term volatility. For a conservative investor, portfolio will be invested primarily in risk-averse areas such as cash and fixed-income securities with limited exposure to equities.
35 - 48	Balanced	The aim is to achieve a balance between stability and return and is likely to involve at least some short-term volatility. For a balanced investor, portfolio will include investment in equities, balanced by exposure to more risk-averse areas of the market such as cash and fixed-income securities.
49 – 62	Growth	This approach concentrates on achieving a good overall return on the investment portfolio while avoiding the most speculative areas of the market. Significant short-term fluctuations in value are possible. For a growth investor, portfolio will be invested primarily in equities.
63 – 70	Very Aggressive	The aim is to maximize return while accepting the possibility of large short-term fluctuations in value and even the possibility of longer-term losses. For a very aggressive investor, portfolio will be invested in equities and will include exposure to more speculative areas of the market.

- You could invest the \$500,000 either in a 5-year Government of Canada Savings Bond (i.e. a risk-free investment), in the Canadian stock market (S&P/TSX Composite) or a combination of the two.
- Please use the slider below to indicate the percentage you would recommend your client should invest in the Canadian stock market (S&P/TSX Composite) ranging from 0 = invest nothing in the Canadian stock market to 100 = invest everything in the Canadian stock market.

■ 0 10 20 30 40 50 60 70 80 90 100

% allocated to S&P/TSX Composite (1)



Q16.1 Thank you for your participation!

If you would like to be entered into a draw for an iPad Mini (all those who complete the questionnaire are eligible to take part in the draw), please provide your email address below. **Rest assured that the email address will only be used to communicate with you if you are the winner of the draw and not for any other purpose.**

Appendix 1C – Follow-Up Investor Questionnaire (Study 1C)

Q1 Considering a long-time period (for example 10 or 20 years), in your opinion which asset usually gives the highest cumulative return?

- A bank savings account (0)
- Bonds (0)
- Stocks (1)
- I do not know (0)

Q2 From your past experience, which asset can display the highest fluctuations in value over time?

- A bank savings account (0)
- Bonds (0)
- Stocks (1)
- I do not know (0)

Q3 In your opinion, does buying shares in a single company usually provide a safer, less volatile, return than buying units in a stock mutual fund? True or False?

- True (0)
- False (1)
- I do not know (0)

Q4 Since the beginning of 2009, which of the following investments would have generated the highest return:

- A Canadian bank savings account (0)
- A diversified Canadian Bond Fund (0)
- A diversified Canadian Equity Fund (1)
- I do not know (0)

Q5 Do you think it is generally possible to time the market? In other words, invest in the stock market at the right time in order to avoid losses and still achieve the expected returns. Yes or No?

- Yes (0)
- No (1)
- I do not know (0)

Q6 If the interest rate falls, what should happen to bond prices?

- They should rise (1)
- They should fall (0)
- They should stay the same (0)
- I do not know (0)

Q7 Over the last 3 months, has your outlook for Canadian stock market returns for the next 12 months:

- Worsened. You now expect the Canadian stock market to do worse than you expected 3 months ago. (0)
- Improved. You now expect the Canadian stock market to do better than you expected 3 months ago. (2)
- Not changed. You expect the Canadian stock market to do as you expected 3 months ago. (1)

Q8 Over the next 5 years, do you expect the Canadian stock market returns to average:

- More than 10% a year (6)
- Between 5 and 10% a year (5)
- Between 0 and 5% a year (4)
- Between -5 and 0% a year (3)
- Between -10 and -5% a year (2)
- Worse than -10% a year (1)

Q9 Over the long run (i.e. next 10 to 20 years), do you believe that the highest rate of return will be generated by

- Savings accounts (0)
- A mutual fund investing in a diversified pool of Canadian Bonds (0)
- A mutual fund investing in a diversified pool of Canadian Stocks (1)

Q10 Please rank all of the following sources of income in the order of importance you expect each source to be in your retirement (1 = most important, 5 = least important):

- _____ Company pension plan (1)
- _____ Government pension plan (2)
- _____ Wages earned in employment during retirement (3)
- _____ RRSPs and other savings (4)
- _____ Proceeds from the sale of your home (5)

Q11 Please consider the following scenario: you have \$100,000 of extra cash to invest that you do not need for the next 10 years

- you could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
- you could invest in Investment B, which has a 25% chance of losing 15% in any given year or a 75% chance of gaining x% in any given year.
- I will choose Investment B if x is at least ...

0 2 4 6 8 10 12 14 16 18 20

Required "x" rate of return to invest in Investment B (1)



Q12 On a scale of 1 to 7 (with 1 being very little experience and 7 being lots of experience), how would you rate your experience with investing in the stock market (i.e. stocks, mutual funds, ETFs)?

- 1 = very little experience (1)
- 2 (2)
- 3 (3)
- 4 = some experience (4)
- 5 (5)
- 6 (6)
- 7 = lots of experience (7)

Q13 On a scale of 1 to 7 (with 1 being much less and 7 being much more), how would you rate the extent of your experience with investing in the stock market (i.e. stocks, mutual funds, ETFs) compared to your friends and family?

- 1 = much less (1)
- 2 (2)
- 3 (3)
- 4 = about the same (4)
- 5 (5)
- 6 (6)
- 7 = much more (7)

Q14 On a scale of 1 to 7 (with 1 being significantly worse and 7 being significantly better), how would you rate your recent returns from investing in the stock market compared to what you expected when you started your current investment strategy?

- 1 = significantly worse (1)
- 2 (2)
- 3 (3)
- 4 = about what I expected (4)
- 5 (5)
- 6 (6)
- 7 = significantly better (7)

Q15 Approximately how many years of experience of investing in the stock market do you have:

- No experience (1)
- Less than 5 years (2)
- Between 5 and 10 years (3)
- Between 10 and 20 years (4)
- More than 20 years (5)

Q16 Approximately what % of your current investment portfolio (including retirement plans, pension plans, investment accounts, etc.) is invested in the stock market (stocks, mutual funds, ETFs)?

- 0% (1)
- Between 1% and 40% (2)
- Between 41% and 70% (3)
- Between 71% and 99% (4)
- 100% (5)

Q17 Are you currently working with an investment adviser for all or part of your portfolio?

- Yes (1)
- No (0)

Q18 Please consider the following scenario: imagine you have an overall wealth of \$500,000 that you wish to invest now and that you don't need this money for at least another 15 years.

- You could invest this amount either in a 5-year Government of Canada Savings Bond (i.e. a risk-free investment), in the Canadian stock market (S&P/TSX Composite) or a combination of the two. Based on forecasts from experts whose opinion you respect, you expect the returns from the Canadian stock market to average about 7% a year over the next 15 years.
- Please use the slider below to indicate the percentage you would invest in the Canadian stock market (S&P/TSX Composite) ranging from 0 (= invest nothing in the Canadian stock market to 100 (= invest everything in the Canadian stock market).

0 10 20 30 40 50 60 70 80 90 100

% allocated to S&P/TSX Composite (1)



NOTES:

[R] denotes item that is reverse scored
Italics denotes item that is not used in data analysis

Appendix 1D – Follow-Up Adviser Questionnaire (Study 1D)

Q1 Most of my clients would understand the basic investment premise that in order to earn higher returns they need to take more risk. True or False?

- True (1)
- False (0)
- I do not know (0)

Q2 Most of my clients know that over a long-time period (for example 10 or 20 years), a diversified portfolio of only stocks would have higher returns than a diversified portfolio containing only bonds. True or False?

- True (1)
- False (0)
- I do not know (0)

Q3 Most of my clients are expecting their investment portfolio to finance a significant amount (more than 50%) of their retirement lifestyle expenses. True or False?

- True (1)
- False (0)
- I do not know (0)

Q4 Over the last 3 months, my outlook for Canadian stock market returns for the next 12 months has:

- Worsened. I now expect the Canadian stock market to do worse than I expected 3 months ago. (0)
- Improved. I now expect the Canadian stock market to do better than I expected 3 months ago. (2)
- Not changed. I expect the Canadian stock market to do as I expected 3 months ago. (1)

Q5 Over the next 5 years, I expect Canadian stock market returns to average:

- More than 10% a year (6)
- Between 5 and 10% a year (5)
- Between 0 and 5% a year (4)
- Between -5 and 0% a year (3)
- Between -10 and -5% a year (2)
- Worse than -10% a year (1)

Q6 Over the long run (i.e. next 10 to 20 years), I believe that the highest rate of return will be generated by

- A bank savings account (0)
- A fund investing in a diversified pool of Canadian bonds (0)
- A fund investing in a diversified pool of Canadian Stocks (1)

Q7 With respect to your own investments, please consider the following scenario: you have \$100,000 of extra cash to invest that you do not need for the next 10 years.

- you could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
- you could invest in Investment B, which has a 25% chance of losing 15% in any given year or a 75% chance of gaining x% in any given year.
- I will choose Investment B if x is at least ...

0 2 4 6 8 10 12 14 16 18 20

Required "x" rate of return to invest in Investment B (1)



Q8 If the interest rate falls, what should happen to bond prices?

- They should rise (1)
- They should fall (0)
- They should stay the same (0)
- I do not know (0)

Q9 On a scale of 1 to 7 (with 1 being very little experience and 7 being lots of experience), how would you rate your typical clients' experience with investing in the stock market (i.e. stocks, mutual funds, ETFs)?

- 1 = very little experience (1)
- 2 (2)
- 3 (3)
- 4 = some experience (4)
- 5 (5)
- 6 (6)
- 7 = lots of experience (7)

Q10 On a scale of 1 to 7 (with 1 being much worse and 7 being much better), how would you rate your typical clients' recent returns from investing in the stock market compared to what they expected when they started their current investment strategy?

- 1 = much worse (1)
- 2 (2)
- 3 (3)
- 4 = about the same (4)
- 5 (5)
- 6 (6)
- 7 = much better (7)

Q11 On a scale of 1 to 7 (with 1 being very concerned and 7 being very relaxed), how would you rate your typical clients' concerns about short term fluctuations in the value of their investments?

- 1 = very concerned (1)
- 2 (2)
- 3 (3)
- 4 = neither concerned nor relaxed (4)
- 5 (5)
- 6 (6)
- 7 = very relaxed (7)

Q12 Over the last few years, your typical clients have become more concerned with portfolio performance and market conditions and have discussed these concerns with you. True or False?

- True (1)
- False (0)
- Not applicable to my practice (0)

Appendix 2A - International Investor Questionnaire (Study 2A)

Q1 What is your gender?

- Male (1)
- Female (2)

Q2 What is your marital status?

- Single (1)
- Married / Common Law (2)
- Separated (3)
- Divorced (4)

Q3 What is the highest degree or level of education you have completed?

- High School (1)
- Bachelor's degree or equivalent (2)
- Master's degree or equivalent (3)
- Ph.D. or equivalent (4)

Q4 In which country do you live and work?

- US (1)
- UK (2)
- Germany (3)
- Other (4) _____

Q5 Your annual family income (before taxes) falls into which of the following categories?

- Less than (the local currency equivalent of) \$100,000 (1)
- Between (the local currency equivalent of) \$100,001 - \$250,000 (2)
- More than (the local currency equivalent of) \$250,001 (3)

Q6 What is your household net worth range (investable assets)?

- Up to \$250,000 (or local currency equivalent) (1)
- \$250,001 - \$500,000 (or local currency equivalent) (2)
- \$500,001 - \$1,000,000 (or local currency equivalent) (3)
- Over \$1,000,000 (or local currency equivalent) (4)

Q7 What is your current age?

- Under 45 years (10)
- 45 - 55 years (8)
- 56 - 65 years (6)
- 66 - 75 years (4)
- Over 75 years (2)

Q8 In how many years do you expect to start withdrawing money from your investment portfolio?

- in more than 20 years (10)
- in 10 to 20 years (8)
- in 5 to 10 years (6)
- in the next 5 years (4)
- Immediately (2)

Q9 What is your primary objective for your investment portfolio?

- To grow aggressively (10)
- To grow significantly (8)
- To grow moderately (6)
- To grow with caution (4)
- To avoid losing money (2)

Q10 Assuming typical market conditions, what performance would you expect from your investment portfolio over time?

- To outperform the stock market (10)
- To generally track the stock market (8)
- To be below the stock market, but generate a moderate return (6)
- To have some stability, but generate a modest return (4)
- To focus on capital preservation, but still generate a small return (2)

Q11 Suppose the stock market performs unusually poorly over the next decade, what returns would you expect from your investment portfolio?

- To lose money (10)
- To make very little or nothing (8)
- To make a small gain (6)
- To make a modest gain (4)
- To be little affected by what happens in the stock market (2)

Q12 Which of the following statements would most accurately describe your attitude about the next 3 years' performance of your investment portfolio?

- I don't mind if I lose money. (10)
- I can tolerate a loss. (8)
- I can tolerate a small loss. (6)
- I would have a hard time tolerating any losses. (4)
- I need to see at least a little return. (2)

Q13 Which of the following statements would most accurately describe your attitude about the next 3 months' performance of your investment portfolio?

- It wouldn't concern me. It is only one quarter. (10)
- Losses in that short time frame wouldn't worry me. (8)
- Losses greater than 10% would concern me. (6)
- I can only tolerate small short-term losses. (4)
- Any losses would really bother me. (2)

Q14 Considering a long-time period (for example 10 or 20 years), in your opinion which asset usually gives the highest cumulative return?

- A bank savings account (0)
- Bonds (0)
- Stocks (1)
- I do not know (0)

Q15 From your past experience, which asset can display the highest fluctuations in value over time?

- A bank savings account (0)
- Bonds (0)
- Stocks (1)
- I do not know (0)

Q16 In your opinion, does buying shares in a single company usually provide a safer, less volatile, return than buying units in a stock investment fund? True or False?

- True (0)
- False (1)
- I do not know (0)

Q17 Since the beginning of 2009, which of the following investments would have generated the highest return:

- A bank savings account (0)
- A diversified Bond Fund investing in bonds in your home country (0)
- A diversified Stock Fund investing in shares of companies in your home country (1)
- I do not know (0)

Q18 Do you think it is generally possible to time the market? In other words, invest in the stock market at the right time in order to avoid losses and still achieve the expected returns. Yes or No?

- Yes (0)
- No (1)
- I do not know (0)

Q19 If the interest rate falls, what should happen to bond prices?

- They should rise (1)
- They should fall (0)
- They should stay the same (0)
- I do not know (0)

Q20 How well do the following statements describe your personality? I see myself as ... [Disagree Strongly (1) to Agree Strongly (7)]

- ... extraverted, enthusiastic. (1)
- ... critical, quarrelsome. (2) [R]
- ... dependable, self-disciplined. (3)
- ... anxious, easily upset. (4) [R]
- ... open to new experiences, complex. (5)
- ... reserved, quiet. (6) [R]
- ... sympathetic, warm. (7)
- ... disorganized, careless. (8) [R]
- ... calm, emotionally stable. (9)
- ... conventional, uncreative. (10) [R]

Q21 Over the next 5 years, do you expect your home country's stock market returns (e.g. US - S&P500, UK - FTSE100, Germany - DAX) to average:

- More than 10% a year (6)
- Between 5 and 10% a year (5)
- Between 0 and 5% a year (4)
- Between -5% and 0% a year (3)
- Between -10 and - 5% a year (2)
- Worse than -10% a year (1)

Q22 Over the long run (i.e. next 10 to 20 years), do you believe that the highest rate of return will be generated by

- A bank savings account in your home country (0)
- An investment fund investing in a diversified pool of your home country's bonds (0)
- An investment fund investing in a diversified pool of shares listed in your home country's stock exchange (1)

Q23 Please rank all of the following sources of income in the order of importance you expect each source to be in your retirement (1 = most important, 5 = least important):

- _____ Company pension plan (1)
- _____ Government pension plan (2)
- _____ Wages earned in employment during retirement (3)
- _____ Retirement accounts and other investments (4)
- _____ Proceeds from the sale of your home (5)

Q24 Please consider the following scenario: you have \$100,000 (or equivalent in local currency) of extra cash to invest that you do not need for the next 10 years.

- you could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
- you could invest in Investment B, which has a 25% chance of losing 15% in any given year or a 75% chance of gaining x% in any given year.
- I will choose Investment B if x is at least ...

0 2 4 6 8 10 12 14 16 18 20

Required "x" rate of return to invest in Investment B (1)



Q25 On a scale of 1 to 7 (with 1 being very little experience and 7 being lots of experience), how would you rate your experience with investing in the stock market (i.e. stocks, investment funds, ETFs)?

- 1 = very little experience (1)
- 2 (2)
- 3 (3)
- 4 = some experience (4)
- 5 (5)
- 6 (6)
- 7 = lots of experience (7)

Q26 On a scale of 1 to 7 (with 1 being much less and 7 being much more), how would you rate the extent of your experience with investing in the stock market (i.e. stocks, investment funds, ETFs) compared to your friends and family?

- 1 = much less (1)
- 2 (2)
- 3 (3)
- 4 = about the same (4)
- 5 (5)
- 6 (6)
- 7 = much more (7)

Q27 On a scale of 1 to 7 (with 1 being significantly worse and 7 being significantly better), how would you rate your recent returns from investing in the stock market compared to what you expected when you started your current investment strategy?

- 1 = significantly worse (1)
- 2 (2)
- 3 (3)
- 4 = about what I expected (4)
- 5 (5)
- 6 (6)
- 7 = significantly better (7)

Q28 Approximately how many years of experience of investing in the stock market do you have:

- No experience (1)
- Less than 5 years (2)
- Between 5 and 10 years (3)
- Between 10 and 20 years (4)
- More than 20 years (5)

Q29 Approximately what % of your current investment portfolio (including retirement plans, pension plans, investment accounts, etc.) is invested in the stock market (stocks, investment funds, ETFs)?

- 0% (1)
- Between 1% and 40% (2)
- Between 41 and 70% (3)
- Between 71 and 99% (4)
- 100% (5)

Q30 Are you currently working with an investment adviser for all or part of your portfolio?

- Yes (1)
- No (0)

Q31 Please consider the following scenario: imagine you have an overall wealth of \$500,000 that you wish to invest now and that you don't need this money for at least another 15 years.

- You could invest this amount either in a 5-year bond issued by your country's Government (i.e. a risk-free investment), in an investment fund tracking the main stock market of your home country (e.g. US - S&P500, UK - FTSE100, Germany - DAX) or a combination of the two.
- Please use the slider below to indicate the percentage you would invest in the investment fund ranging from 0 (= invest nothing in this fund) to 100 (= invest everything in this fund).

0 10 20 30 40 50 60 70 80 90 100

% allocated to investment fund tracking the main stock market of my home country (1)



Q32 Imagine the same scenario as in the previous question. However, now, based on forecasts from experts whose opinion you respect, you expect the returns from your home country stock market to average about 7% a year over the next 15 years. Please use the slider below to indicate the percentage you would invest in the investment fund ranging from 0 (= invest nothing in this fund) to 100 (= invest everything in this fund).

0 10 20 30 40 50 60 70 80 90 100

% allocated to investment fund tracking the main stock market of my home country (1)



NOTES:

[R] denotes item that is reverse scored
Italics denotes item that is not used in data analysis

Appendix 2B - International Adviser

Questionnaire (Study 2B)

Q1 Are you in the business of providing investment advice to clients in your jurisdiction?

- Yes (1)
- No (0)

Q2 What is your gender?

- Male (1)
- Female (2)

Q3 What is the highest degree or level of education you have completed?

- High School (1)
- Bachelor's degree or equivalent (2)
- Master's degree or equivalent (3)
- Ph.D. or equivalent (4)

Q4 In which country do you live and work?

- US (1)
- UK (2)
- Germany (3)
- Other (4) _____

Q5 Most of my clients would understand the basic investment premise that in order to earn higher returns they need to take more risk. True or False?

- True (1)
- False (0)
- I do not know (0)

Q6 Most of my clients know that over a long-time period (for example 10 or 20 years), a diversified portfolio of only stocks would have higher returns than a diversified portfolio containing only bonds. True or False?

- True (1)
- False (0)
- I do not know (0)

Q7 Most of my clients are expecting their investment portfolio to finance a significant amount (more than 50%) of their retirement lifestyle expenses. True or False?

- True (1)
- False (0)
- I do not know (0)

Q8 Over the next 5 years, I expect my home country's stock market returns (e.g. US - S&P500, UK - FTSE100, Germany - DAX) to average:

- More than 10% a year (6)
- Between 5 and 10% a year (5)
- Between 0 and 5% a year (4)
- Between -5 and 0% a year (3)
- Between -10 and -5% a year (2)
- Worse than -10% a year (1)

Q9 Over the long run (i.e. next 10 to 20 years), I believe that the highest rate of return will be generated by

- A bank savings account in my home country (0)
- A fund investing in a diversified pool of my home country's bonds (0)
- A fund investing in a diversified pool of shares listed on my home country's stock exchange (1)

Q10 How well do the following statements describe your personality? I see myself as ... [Disagree Strongly (1) to Agree Strongly (7)]

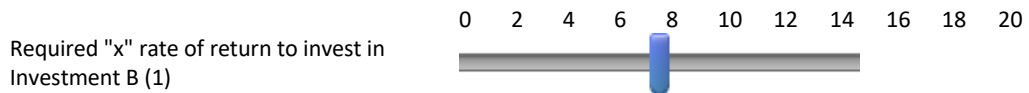
- ... extraverted, enthusiastic. (1)
- ... critical, quarrelsome. (2) [R]
- ... dependable, self-disciplined. (3)
- ... anxious, easily upset. (4) [R]
- ... open to new experiences, complex. (5)
- ... reserved, quiet. (6) [R]
- ... sympathetic, warm. (7)
- ... disorganized, careless. (8) [R]
- ... calm, emotionally stable. (9)
- ... conventional, uncreative. (10) [R]

Q11 If the interest rate falls, what should happen to bond prices?

- They should rise (1)
- They should fall (0)
- They should stay the same (0)
- I do not know (0)

Q12 With respect to your own investments, please consider the following scenario: you have \$100,000 (or equivalent in local currency) of extra cash to invest that you do not need for the next 10 years.

- you could either invest in Investment A, which provides a guaranteed annual rate of return of 3% for the next 10 years; or
- you could invest in Investment B, which has a 25% chance of losing 15% in any given year or a 75% chance of gaining x% in any given year.
- I will choose Investment B if x is at least ...



Q13 On a scale of 1 to 7 (with 1 being very little experience and 7 being lots of experience), how would you rate your **typical clients'** experience with investing in the stock market (i.e. stocks, investment funds, ETFs)?

- 1 = very little experience (1)
- 2 (2)
- 3 (3)
- 4 = some experience (4)
- 5 (5)
- 6 (6)
- 7 = lots of experience (7)

Q14 On a scale of 1 to 7 (with 1 being much worse and 7 being much better), how would you rate your **typical clients'** recent returns from investing in the stock market compared to what they expected when they started their current investment strategy?

- 1 = much worse (1)
- 2 (2)
- 3 (3)
- 4 = about the same (4)
- 5 (5)
- 6 (6)
- 7 = much better (7)

Q15 On a scale of 1 to 7 (with 1 being very concerned and 7 being very relaxed), how would you rate your **typical clients'** concerns about short term fluctuations in the value of their investments?

- 1 = very concerned (1)
- 2 (2)
- 3 (3)
- 4 = neither concerned nor relaxed (4)
- 5 (5)
- 6 (6)
- 7 = very relaxed (7)

Q16 Over the last few years, your **typical clients** have become more concerned with portfolio performance and market conditions and have discussed these concerns with you. True or False?

- True (1)
- False (0)
- Not applicable to my practice (0)

Q17 Please consider the following scenario: you have been approached by a potential client to design an investment proposal to finance her retirement in 15 years' time. She has overall wealth of \$500,000 (or equivalent in local currency) to invest and does not need the money between now and retirement. As a first step, you have asked her to complete a standard industry risk tolerance questionnaire. The questionnaire has 7 questions testing for time horizon, long term expectations and attitudes to short-term

volatility. The possible scores fall into the categories below.
the questionnaire.

Your potential client scored 56 on

Score	Category	Description
14 – 20	Very Conservative	This approach seeks a high degree of stability and should minimize the chances of substantial short-term volatility. For a very conservative investor, portfolio will be invested in the most risk-averse securities such as cash and fixed- income.
21 - 34	Conservative	Focus is on stability rather than maximizing return and should limit the chances of substantial short-term volatility. For a conservative investor, portfolio will be invested primarily in risk-averse areas such as cash and fixed-income securities with limited exposure to equities.
35 - 48	Balanced	The aim is to achieve a balance between stability and return and is likely to involve at least some short-term volatility. For a balanced investor, portfolio will include investment in equities, balanced by exposure to more risk-averse areas of the market such as cash and fixed-income securities.
49 – 62	Growth	This approach concentrates on achieving a good overall return on the investment portfolio while avoiding the most speculative areas of the market. Significant short-term fluctuations in value are possible. For a growth investor, portfolio will be invested primarily in equities.
63 – 70	Very Aggressive	The aim is to maximize return while accepting the possibility of large short-term fluctuations in value and even the possibility of longer-term losses. For a very aggressive investor, portfolio will be invested in equities and will include exposure to more speculative areas of the market.

- You could invest the \$500,000 (or equivalent in local currency) either in a 5-year bond issued by your country's Government (i.e. a risk-free investment), in an investment fund tracking the main stock market of your home country (e.g. US - S&P500, UK - FTSE100, Germany - DAX) or a combination of the two.
- Please use the slider below to indicate the percentage you would recommend your client invest in the fund ranging from 0 (= invest nothing in this fund) to 100 (= invest everything in this fund).

0 10 20 30 40 50 60 70 80 90 100

% allocated to investment fund tracking the main stock market of my home country (1)



Q18 Imagine the same scenario as in the previous question.

However, now, based on forecasts from experts whose opinion you respect, you expect the returns from your home country stock market to average about 7% a year over the next 15 years.

Please use the slider below to indicate the percentage you would recommend your client invest in the investment fund ranging from 0 (= invest nothing in this fund) to 100 (= invest everything in this fund).

0 10 20 30 40 50 60 70 80 90 100

% allocated to investment fund tracking the main stock market of my home country (1)



Appendix 3 – Qualitative Interviews Initial Questions (Study 3)

INVESTORS

- Hello, thank you for agreeing to participate in this interview for my doctoral research
- As I mentioned, I am looking at how people make investment decisions. This is a very personal process and so this interview is not a test and there are no right or wrong answers.
- With your permission, I will record this interview for further analysis. But I can assure you that you and your information will not be personally identifiable. Is that ok?

GENERAL

- So let's start with investment decisions you have made in the past, how have you chosen one investment over another, whether you sourced the idea yourself or it was presented by an advisor?
- What factors did you consider in choosing investment A over investment B?

RETURN EXPECTATIONS

- Does how much you will make on the investment influence your decision on whether you invest in it or not?
- How do you arrive at that number on how much you think the investment can make? What sources of information do you rely on? Why do you believe that source over another? Can you give specific examples?
- Over what time frame are you typically expecting to make that investment for and over which you expect to make that profit?
- How does your investment literacy and investment experience influence how much you think an investment will make for you?
- Are there other factors you think play a role in influencing what you expect an investment to make?
- You have made an investment believing that it would give you say 5%. What would it take to change your mind about whether the investment can make that amount? Can you give specific examples?

RISK – RETURN TRADE-OFF

- What does risk mean to you?

- What factors do you consider in making the trade-off between risk and return?
- What concerns you more: (i) a lot of up and down in your portfolio over the next 6 months or (ii) not having enough to meet your retirement needs in 10 years' time?
- If you had to accept more up and down to maximize the likelihood that you meet your retirement goals in the future, would you do so?

QUESTIONS ASKED OF YOU IN THE INVESTMENT PROCESS?

- What questions do you believe an adviser should ask you before recommending a portfolio?
- What is the best investment experience you have had so far? Why?
- What is the worst investment experience you have had so far? Why?
- How would you design the ideal investment process so that you or your adviser can arrive at the best investment portfolio for you to meet your goals?

ADVISERS

- Hello, thank you for agreeing to participate in this interview for my doctoral research
- As I mentioned, I am looking at how people make investment decisions. This is a very personal process and so this interview is not a test and there are no right or wrong answers.
- With your permission, I will record this interview for further analysis. But I can assure you that you and your information will not be personally identifiable. Is that ok?

GENERAL

- So let's start with investment recommendations you have made in the past, how have you chosen one investment over another to recommend?
- What factors did you consider in choosing investment A over investment B?

RETURN EXPECTATIONS

- Does how much your client will make on the investment influence your decision on whether you recommend in it or not?

- How do you arrive at that number on how much you think the investment can make? What sources of information do you rely on? Why do you believe that source over another? Can you give specific examples?
- Over what time frame are you typically expecting to make that investment for and over which you expect to make that profit?
- How does your clients' investment literacy and investment experience influence whether you choose a particular investment?
- Are there other factors you think play a role in influencing what you recommend?
- You have made an investment recommendation believing that it would give you say 5%. What would it take to change your mind about whether the investment can make that amount? Can you give specific examples?

RISK – RETURN TRADE-OFF

- What does risk mean to you?
- What does risk mean to your typical client?
- What factors do your clients consider in making the trade-off between risk and return?
- What concerns your clients more: (i) a lot of up and down in your portfolio over the next 6 months or (ii) not having enough to meet your retirement needs in 10 years' time?
- If your clients had to accept more up and down to maximize the likelihood that they meet their retirement goals in the future, would they do so?

QUESTIONS ASKED IN THE INVESTMENT PROCESS?

- What questions do you believe an adviser should ask a potential client before recommending a portfolio?
- What is the best investment experience with a client you have had so far? Why?
- What is the worst investment experience with a client you have had so far? Why?
- How would you design the ideal investment process so that you can arrive at the best investment portfolio to meet your clients' goals?